Systems

**IBM 7426
Terminal Interface Unit
Description,
Site Planning, and
Programming Guide**

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The FCC statement is required for those machines which are used in the United States.

Third Edition (May 1984)

This edition, which obsoletes the previous edition (GA23-0077-1), includes the following major changes, along with other technical and editorial changes throughout the book:

> This manual refers to all the host systems with which the 7426 can be used (S/370, 30XX, 43XX, and 8100), rather than to the 8100 system only. Chapter 2 and Appendixes B and C explain how to install 7426 microcode on each of these host systems.

> Appendixes E and F explain how to use the 7426 with the 3101 Model 837 Display Terminal, the IBM Personal Computer operating in 3101 emulation mode, and other ASCII displays and printers.

> Appendix F describes microcode enhancements that make the 7426 act as a general-purpose protocol converter.

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Preface

This publication introduces the IBM 7426 Terminal Interface Unit. It presents an overview of the 7426, programming considerations of the Distributed Processing Programming Executive (DPPX) and Distributed Processing Control Executive (DPCX), site planning information, initialization information, and Customer Problem Analysis and Resolution (CPAR).

Audience

Any user or potential user of the 7426, including managers, system programmers, application programmers, site planners, and operators, should be familiar with appropriate portions of and concepts of this manual, depending on individual needs.

Chapters 1 and 2 are of primary importance to programmers. Site planners should be familiar with the entire document. Operators will use "Logging On" in Chapter 2, as well as Chapters 3 and 4.

Organization

This manual has four chapters, eight appendixes, and a foldout:

- Chapter 1 describes the 7426, defines its purposes, and identifies the peripheral devices that can be attached to it.

- Chapter 2 describes DPPX and DPCX programming considerations as related to the 7426. The chapter contains detailed instructions for loading the 7426 diskette onto the 8100 disk. For operational compatibility of the 7426 and the 3276, keyboard entry differences are presented in chart form.

- Chapter 3 covers site planning needs such as dimensions of the unit, service clearances, and the two models available. The chapter contains a configuration diagram showing a host system and the two models of the 7426 with attached devices. It also contains cable-ordering information as well as a suggested site-planning checklist to guide your activities.

- Chapter 4 contains instructions for completing the Initialization Worksheet of Foldout 1.

- Appendix A schematically describes communication pin connections.

- Appendix B contains diskette customer setup procedures.

- Appendix C contains distribution tape reel customer setup procedures.

- Appendix D contains Request Formatted Maintenance Statistics (REQFMS).

- Appendix E describes the microcode for attaching the 3101 Model 837.

- Appendix F describes the microcode enhancements that make the 7426 act as a general-purpose protocol converter.

- Appendix G describes the microcode for attaching the 3101 Yale IUP Feature.

- Appendix H is a list of abbreviations.

- Foldout 1 contains 7426 setup worksheets.

Associated Manuals

IBM 7426 Terminal Interface Unit Customer Setup, Customer Initialization, Customer Problem Analysis and Resolution, GA23-0078

An Introduction to the IBM 3101 Display Terminal, GA18-2051

IBM 3101 Display Terminal Description, GA18-2033

IBM 3101 Setup Instructions, GA18-2034

IBM 3101 Operator Reference Information, GA18-2035

IBM 3102 Printer Description, GA18-2065

IBM 7485 Display Terminal Description, GA18-2075

IBM 7485 Display Terminal Setup Instructions, GA18-2073

IBM 7485 Display Terminal Model 53 Operator Reference Guide, GA18-2074

IBM 3270 Information Display System Data Stream Programmer's Reference, GA23-0059

IBM 3276 Control Unit Display Station Description and Programmer's Guide, GA18-2081

IBM 8100 Information System Site Planning Guide, GA27-2884

IBM Multiuse Communications Loop Planning and Installation Guide, GA27-3341

DPPX-Related Manuals

Distributed Processing Programming Base Commands: General Use, SC27-0404

Distributed Processing Programming Base Commands: Configuration and Operations, S227-0511

DPPX Distributed Presentation Services (DPPX/DPS) Version 1 User's Guide, SC33-0092

DPPX Distributed Presentation Services (DPPX/DPS) Version 2 Map Definition Reference Manual, SC33-0114

DPPX Distributed Presentation Services (DPPX/DPS) Version 2 Application Programming Reference Manual, SC33-0115

Library User's Guide, GC27-0522

DPCX-Related Manuals

IBM 8100 Information System Distributed Processing Control Executive Installation, SC27-0484

Host Prep Programming Statements Reference, SC27-0532

Host Prep Guide to Host Services, SC27-0577

DPCX Messages Manual, SC27-0523

Library User's Guide, GC22-9087

Other Programming-Related Manuals

ACF/VTAM Planning and Installation Reference, SC27-0610

ACF/VTAME Installation, SC27-0439

Small System Executive/VSE, Pregeneration Specifications, SC33-6152

VSE/Advanced Functions Operating Procedures, SC33-6097

CICS/VS System Programmer's Reference, SC33-0069

Downstream Load Utility Installation Guide and Reference, SC33-6127

Contents

Figures

Chapter 1. Introduction

The IBM 7426 Terminal Interface Unit (see Figure 1-1) offers new and improved ways of attaching IBM 3101 Display Terminals to a host system. The 7426 converts the protocol of the 3101 into the Synchronous Data Link Control/Systems Network Architecture (SDLC/SNA) protocol for transmission to the host system. Using the 7426 as an SDLC/SNA interface for 3101s offers several significant advantages:

- It eliminates the added processing burden placed on the 8100, 4321/4331, S/370, or 30XX host system processor when 3101 Display Terminals are attached through the start-stop facilities.

- It connects the following devices to directly attached or data-link-attached loops and data links, to coexist with other SDLC terminals:

  - 3101s
  - IBM Personal Computers operating in 3101 emulation mode (requires PN 60240420)
  - Certain other ASCII displays and/or ASCII printers

  Up to four of these devices, in any combination, can be attached to the 7426.

- It enables the use of the 3270 full-screen application programs consistent with 3101 display capabilities, including switched line/auto-answer connection of attached terminals.

- It provides recovery and system reliability, availability, and serviceability (RAS) support comparable to the 3276 SDLC/SNA support.
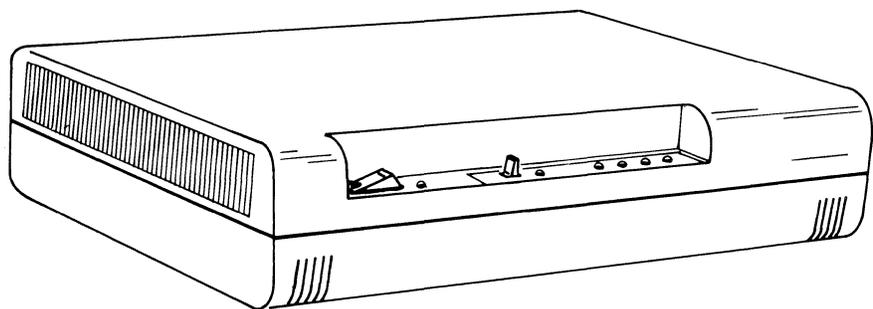
Figure 1-1. IBM 7426 Terminal Interface Unit (Design Model)

Functional Overview

The 7426 Terminal Interface Unit, which can be conveniently placed on a desk or a shelf, is available in two models:

- Model 1 is attached to the 8100 or 4321/4331 host system through directly attached loops at speeds up to 38,400 bps, and through data-link-attached loops at 1200, 2400, 4800, and 9600 bps.

- Model 2 is attached to the host system through direct connection or through remote SDLC data links. These links may operate at speeds of up to 9600 bps as determined by either the modem clock or by the host system's direct connect adapter clock. Remote data-link attachment requires the use of an external synchronous modem. A 3705 or 3725 communications controller is required on some hosts.

Both 7426 models provide four ports for attachment of up to four display terminals, with or without 3102 printers. Optionally, one or more of these ports may be used for attachment of American National Standard Code for Information Interchange (ASCII), TTY-compatible printers instead of the display terminal. Each of the four ports allows direct attachment of 3101 displays at distances of up to 1219 meters (4,000 feet), depending on the interface. Data is transmitted between the 7426 and its attaching device at speeds of up to 9600 bps.

The 7426 appears to the host system as an IBM 3276-12 Control Unit with attached 3278 display stations and 3287 printers. Emulation of the 3276 is performed by transforming the field-formatted SNA 3270 data stream produced by the host system into an ASCII TTY data stream for the devices attaching to the 7426. The 7426 operates under any one of the following operating systems:

> Distributed Processing Programming Executive (DPPX)
> Distributed Processing Control Executive (DPCX)
> MVS
> VS1
> VSE

using the same programming support as provided for the 3276 Control Unit plus downstream microcode load capability. The 7426 and its attached display cannot be used as an operator console when installing an operating system.

Application programs for the 7426 can be developed and tested with the existing support for the 3276/3278 with certain limitations. The limitations are described in Chapter 2.

The 7426 provides a 1920-character buffer for each of its four attaching devices. These buffers minimize the interaction between the 7426 and the host system, since the data entered at the display keyboard is first entered

into the 7426 buffer and then presented at the display. Functions such as editing, updating, data entry, and correction of typing errors are done between the 3101 and the 7426 before information is sent in its final form to the system.

To further reduce the volume of data transfers to and from the host system, the 7426 contains a 4800-byte block of storage that can be shared by its attaching devices. This 4800-byte block is referred to as the *format storage area,* since it can be used for storing preformatted display screens that are typically used in fill-in-the-blanks applications. The screens are formatted and distributed to the 7426 by user-written application code at the host system. The ability of the 7426 for storing formats most often used by an application reduces the volume of data transfers between the host and the 7426; this is referred to as *outboard formatting.* The external-formatting capabilities available through customer-provided application code are:

- Adding a format to the 7426 format storage area.

- Deleting a format from the 7426 format storage area.

- Fetching a format from the 7426 format storage area, merging it with variable data, and presenting it to the display.

Operation of the 7426 is dependent on transmission of microcode from the host system to the 7426; this is called *downstream loading.* A downstream load from the host is initiated automatically when the 7426 is powered on and activated by the host.

IBM distributes 7426 microcode to the customer's 8100 site on a diskette. The microcode module is installed by transferring the contents of the diskette into the host disk storage.

IBM distributes 7426 microcode to a customer's 4300, S/370, or 30XX site on a Distribution Tape Reel (DTR). The MVS, VS1, or VSE must have the Downstream Load Utility (DSLU) Program Product (5668-006) installed in order to read in the files from the DTR and load them into the 7426. VTAM Release 2.0 is required.

Attaching Devices

Figure 1-2 shows the configuration of the IBM 7426 device attachment to the host system. For applications requiring multiple terminals, the 7426 allows attachment of:

- IBM 3101 and 7485 displays
- Certain other ASCII Displays
- 3102 printers (attached to the associated 3101 displays)
- Printers conforming to the asynchronous (ASCII) TTY 33/35 protocol, such as the IBM 4975 Printer with the ASCII RPQ.

The 7426 supports the EIA RS-232-C interface and EIA RS-422-A interface (only in the 3101) for its attaching devices. The distance between the 7426 and an attaching device depends upon the interface used by the device: up to 12 meters (40 feet) for the RS-232-C interface and up to 1219 meters (4000 feet) for the RS-422-A interface.

The 7426 supports the following device attachments:

- IBM 3101 Display Terminal Model 10 or 12 (EIA RS-232-C interface).

- IBM 3101 Display Terminal Model 13 (selectable EIA RS-232-C or RS-422-A interface).

- IBM 3101 Display Terminal Model 20 or 22 (EIA RS-232-C interface) and Model 23 (selectable EIA RS-232-C or RS-422-A interface). These 3101-2X models must be set for character-mode operation when attached to a 7426.

- The IBM Personal Computer operating with the 3101 Emulation Program (6024042) in character mode.

- IBM 3101 Display Terminal Model 837 (selectable EIA RS-232-C or RS-422-A interface). This display is an RPQ (No. 8J0002) version of the 3101-13, which is available in the U.S. It has a keyboard layout similar to that of an IBM 3278 Display Station. See Appendix E for details.

- IBM 7485 Display Terminal Model 531 (EIA RS-422-A interface). This display is an RPQ of the 3101-13, which is available in the U.S.

- IBM 3102 Printer attached to 3101 Model 10, 13, 20, or 23.

- IBM 4975 Printer. This printer must have the ASCII interface RPQ DO9023.

- Certain ASCII printers conforming to EIA RS-232-C interface.

- Certain ASCII displays conforming to EIA RS-232-C interface. See Appendix F for details.

For Yale IUP emulation attachment support of 3101s, see Appendix G.

The 7426 can also operate on
data-link-attached loops at:

1200 bps
2400 bps
4800 bps
9600 bps

8100, 43XX, S/370, or
30XX host system

Up to 9600 bps

Directly Attached Loop
(8100 or 4321/4331 only)
9600 bps
38,400 bps

Model 2 can direct-connect or
data-link-attach to the host.

7426
Model 2

7426
Model 1

Printer

3102

Printer

3102

3101 or 7485 Display Terminals and
3102 Printers supported by 3101s

Figure 1-2. 7426 Models 1 and 2 Attachment to a Host System

Performance

The performance characteristics of the IBM 7426 depend on many factors, including system configuration, communication line or loop operating speeds, message sizes, and transaction rates. Other performance considerations relate to application design and to the host system.

Customer Setup, Initialization, and Problem Analysis and Resolution

The customer is to perform 7426 setup, initialization, and problem analysis.

Customer Setup

The customer performs setup by following the step-by-step instructions in *IBM 7426 Terminal Interface Unit Customer Setup, Customer Initialization, Customer Problem Analysis and Resolution* (CPAR), GA23-0078. The manual also contains instructions for relocating the 7426.

Initialization

Initialization is performed when it is desirable to change the 7426 parameters or when setup is completed. This is accomplished by connecting a 3101 or a 7485 display unit to port 0 of the 7426 and pressing the 7426 switch to Initialization mode. After the power-on diagnostics are completed, the 7426 responds with a prompt to the display screen, requesting the customer to key in the specific parameters pertaining to his operational environment.

Parameters such as loop carrier and data rates, parity selection and number of transmit bits, line characteristics, and types of attaching devices are entered at initialization. These parameters must be established by the customer's planning personnel as part of the overall application design and recorded on a worksheet provided in this manual. The person initializing the 7426 will enter information from this worksheet, following the step-by-step instructions in *IBM 7426 Terminal Interface Unit Customer Setup, Customer Initialization, Customer Problem Analysis and Resolution.*

The initialization information is entered into 7426 storage. The operating characteristics of the 7426 can be changed at any time by changing the initialization parameters. For example, changing of initialization parameters may be required when the 7426 is being relocated to another host system.

Customer Problem Analysis and Resolution (CPAR)

IBM 7426 Terminal Interface Unit Customer Setup, Customer Initialization, Customer Problem Analysis and Resolution contains sequential steps that a customer follows to identify problems relating to the 7426.

Diagnostic tests built into the 7426 are designed to verify the functional operation of the unit and to provide for effective CPAR by the customer. When a malfunction is isolated to the 7426, the customer replaces it with a spare unit and verifies that the new unit is operating correctly.

A defective 7426 unit is packed by the customer into the original IBM shipping container and sent to an IBM Repair Center. When the unit is repaired and tested, it is returned to the customer.

The customer should keep a sufficient number of spares to meet the operational requirements of the site. The recommended number of spare units is:

Number of 7426s Installed	Recommended 7426 Spares
1-74	1
75-199	2
200-499	3
500-699	5
700-999	6
1000	7

Chapter 2. Operation, Administration, and Programming Considerations

This chapter describes:

- The operational compatibility between the 3276 Display Station Control Unit and the 7426 Terminal Interface Unit.

- The administrative tasks required to activate a 7426 and its attached devices. This includes loading 7426 microcode from diskette or tape to the host system and activating the 7426 physical unit (PU) and its logical units (LUs).

- Programming considerations for using the 7426 format storage area.

Programming Support

The 7426 is supported by:

- DPPX
- DPCX
- MVS
- VS1
- VSE

Operational Compatibility

Except for the compatibility considerations described here, the operation of the 7426 Terminal Interface Unit with its attached displays and ASCII asynchronous printers is the same as the operation of the 3276 Model 12 Control Unit Display Station with its attached 3278 displays and 3287 printers.

When a terminal device attached to the 7426 via an RS-422-A interface is powered off, it should be left off for at least 10 seconds so that the *off* condition is reliably detected by the 7426. Power off on a terminal attached via an RS-232-C interface will be detected within 0.5 second.

Operation with 3101 and 7485 Display Terminals

For a description of the 3101 and 7485 Display Terminals, see the *IBM 3101 Display Terminal Description,* GA18-2033, and *IBM 7485 Display Terminal Description,* GA18-2075.

Note: References in this publication to the 7485 Model 531 apply to the 7485 Model 53 in *7485 Display Terminal Description.*

The 7426 supports the operation of these terminals with the following restrictions:

- The terminals must be operated in character mode.

- Transparent mode is not supported.

- The SET BLINK CURSOR and SET BLOCK CURSOR functions of the 7485 Display Terminal are not supported.

Compatibility with the 3276

The 7426 Terminal Interface Unit operates like a 3276 Model 12 Control Unit Display Station (1920-character screen) with the capability of attaching up to four devices (printers and/or keyboard/displays). Unlike the 3276, the 7426 is not equipped with a keyboard or display.

The 7426 does not support the following 3276 special features:

- Address Keylock
- APL/Text Control
- APL/Text
- Extended Function Base
- Color Display Attachment
- Extended Character Set Adapter
- Audible Alarm (although activation of alarms in attached terminals is supported)
- Encrypt/Decrypt
- Magnetic Reader Control
- SDLC/BSC Switch
- Security Keylock
- Selector Light Pen

The 3276, on the other hand, does not support the 7426 format storage facility or downstream load of microcode from the host.

3276 Equivalent Features

- The 7426 Model 1 contains the equivalent of the 3276 Loop Adapter feature.

- The 7426 Model 2 contains the equivalent of the 3276 External Modem Interface feature, for operation on private nonswitched communication facilities, and of the Communications Feature without Business Machine Clock.

The operation of the 3276 is described in *IBM 3276 Control Unit Display Station Description and Programmer's Guide,* GA18-2081. For application programming purposes, the 7426 operates like the 3276 Model 12 just described, with the following exceptions:

- For copy operations, printers are assigned during 7426 initialization rather than by default matrix or IDENT key as in the 3276. (The IDENT key is functional on an attached 3101 Model 837.)

- If the printout format in the write control character (WCC) is specified as either a 40- or a 60-character print line, the 7426 functions as though an 80-character print line were specified.

- The 3101 does not support Intensified Field. If an intensified-field attribute is received, the field-attribute positions at the beginning and end of that field will have displayed in them the 3101 highlight character designated during 7426 initialization. (The 3101 Model 837 and 7485 Model 531 do support Intensified Fields, Protected Fields, Numeric Fields, and Non-Display Fields.)

- The following characters are shown as they appear on a 3276 and as they appear on devices attached to the 7426:

  3276   7426-Attached Devices

  ¢   [
  | !
  ¬   ∧
  !   ]

- The following 3276 keyboard functions are not available on the display terminals attached to the 7426:

  ALT CURSOR
  CURSOR BLINK
  IDENT*
  BACK TAB*
  DOUBLE CURSOR MOVES*
  TEST
  CURSOR SELECT
  ERASE INPUT (supported for 3101, not on 7485)
  DUP*
  FIELDMARK*

  *These are supported on the 3101 Model 837.

- Modified Numeric Lock feature

  As in the 3276 with the typewriter keyboard, only the numerics (0 − 9), decimal point (.), and minus sign (-) can be entered into an unprotected numeric field. Unlike the 3276, the shift key on the display attached to the 7426 will not override the keyboard lock function as it does in the 3276.

- *Insert/delete* operates only on the display line containing the cursor. If the current field goes beyond the end of the line, *insert/delete* will not wrap at the end of the line.

- Operator Information Area — The information displayed in the Operator Information Area of the 3101 and 7485 is not the same as that in the 3276. For a description of the Operator Information Area, see *3101 Display Terminal Description,* GA18-2033, or *7485 Display Terminal Description,* GA18-2075. The 7426 displays two types of system-level indications:

  1. When in SSCP mode, the letters "SSCP" are displayed in the lower right corner of the screen.

  2. While awaiting system response (for example, after depressing the ENTER key) the cursor is put in the lower right corner of the screen.

When the 7426 detects an abnormal condition during a key entry operation, it sounds the alarm in that attached display. The alarm is also sounded, under program control, when the 7426 receives data with the WCC Sound Alarm bit set.

To the operating system, a 3101 or 7485 Display Terminal attached to a 7426 appears to be a 3278 Display Station. Therefore, when a 3101 Model 1X or 2X or 7485 is used, certain 3278 keyboard functions are simulated. Figure 2-1 correlates these 3278 keyboard functions with the 3101 and 7485 keyboards.

Downstream Load of Microcode

During SNA activation by the host, the 7426 will request that the host downstream load a particular microcode file to the 7426. The name of the microcode file is specified during 7426 initialization. The file must be loaded into the host from a diskette (8100 DPPX/DPCX) or a Distribution Tape Reel (MVS, VS1 or VSE).

Normally, once the 7426 has been downstream-loaded (DSL), it will not request another DSL as long as power remains on, even if it is reactivated.

A DSL may be initiated from the host without powering off the 7426. The following procedure must be used:

1. Do a Format Storage operation to any active LU in the 7426. Use X'F5' as the operation character.

2. Deactivate the physical unit via the DACTPU, SNA command.

3. Activate the physical unit via the ACTPU, SNA command.

3276, 3278, or 3101 Model 837	3101 Models 10, 13, 20, 23	7485-531	IBM (Note **6**) Personal Computer
ENTER	Note **1**	ACCEPT	Note **1**
Shift	Shift	Shift	Shift
ATTN	ALT a	ATTN	CTRL a
CLEAR	CLEAR	END	HOME
SYS REQ	ALT e	HELP	CTRL e
ERASE INPUT	ERASE INPUT	Note **2**	CTRL HOME
ERASE EOF	ERASE EOF	ERASE	END
CLICKER ON/OFF	CLICKER ON/OFF	Note **2**	Note **2**
Backspace	Backspace	Backspace	Backspace
FWD TAB	FWD TAB	FWD TAB	FWD TAB
PA1	ESC 1	PF27	ALT F1
PA2	ESC 2	PF28	ALT F2
Cursor moves	Cursor moves	Cursor moves	Cursor moves
Cursor home	Cursor home	Cursor home	CTRL PGUP
DEV CNCL	ESC S	ALT ACCEPT	ESC S
PRINT	ESC W (Note **4**)	PRINT	ESC W
RESET	ALT r	PF26	CTRL r
INSERT	ESC DEL (Note **5**)	INS CHAR(Note **5**)	ESC DEL
DELETE	DEL	DEL CHAR	DEL
PF1	PF1	PF1	F1
PF2	PF2	PF2	F2
PF3	PF3	PF3	F3
PF4	PF4	PF4	F4
PF5	PF5	PF5	F5
PF6	PF6	Note **2**	F6
PF7	PF7	Note **2**	F7
PF8	PF8	Note **2**	F8
PF9	ESC i	PF9	F9
PF10	ESC j	PF10	F10
PF11	ESC k	PF11	SHIFT F1
PF12	ESC l	PF12	SHIFT F2
PF13	ESC m	PF13	SHIFT F3
PF14	ESC n	PF14	SHIFT F4
PF15	ESC o	PF15	SHIFT F5
PF16	ESC p	PF16	SHIFT F6
PF17	ESC q	PF17	SHIFT F7
PF18	ESC r	PF18	SHIFT F8
PF19	ESC s	PF19	SHIFT F9
PF20	ESC t	PF20	SHIFT F10
PF21	ESC u	PF21	CTRL F1
PF22	ESC v	PF22	CTRL F2
PF23	ESC w	PF23	CTRL F3
PF24	ESC x	PF24	ESC X
NL	NL	NL	NL
Note **2**	Erase end of screen	Note **2**	PgDn(Er EOS)
Note **2**	BREAK Key (Note **3**)	Note **2**	Note **2**

Notes:

1 For 3101 keyboards Model 1X or 2X, the ENTER function is defined during 7426 initialization. (See Chapter 4, "Initializing the 7426.") One of the following options should be defined to cause ENTER:

- The simultaneous use of the ALT and d keys

- The New Line key

- The Backspace key

For 7485 keyboards, the ACCEPT key must be used for the ENTER function.

2 The function does not apply for this device.

3 The 3101 BREAK key is not supported. If the BREAK key is pressed repeatedly, the results are unpredictable.

4 For 3101 Model 2x, the PRINT key may be used.

5 To exit insert mode, do a reset.

6 This is for the IBM Personal Computer operating in 3101 emulation mode using the IBM 7426.SET specification file (requires PN 6024042). This keyboard mapping in the Personal Computer may be modified if desired.

Figure 2-1. Correlation between the 3276 and the 3101 and 7485 Keyboards

Note: For a 7426 attached to an integrated communications adapter on a 43XX processor, do the following:

1. Before downstream-loading microcode, activate the 7426 with MAXDATA = 265.

2. After downstream-loading, reactivate the 7426 with MAXDATA = 262.

Examples of Logging On to and Logging Off from an Operating System

This section demonstrates how to log on/log off to DPPX using a 3101 Display Terminal. The following examples use the ALT and d keys to cause ENTER. Keep in mind, when reviewing these examples, that *New Line* or *Backspace* may also be defined to cause *ENTER*.

Logon

Assume that your user ID is K64MGNOC and that your password is 123456. To log on to the DPPX command facility (CF) from a 3101:

1. While holding down the ALT key, press the e key. (This is the SYS REQ function.)

2. When SSCP appears in the lower-right corner of the screen, key in:

   LOGON APPLNAME(cf) USERID(k64mgnoc)

3. While holding down the ALT key, press the d key. (This is the ENTER function.)

4. If your system requires a password, the ENTER PASSWORD prompt is displayed.

   If your system does not require a password, you will not be prompted for it. When ENTER PASSWORD is displayed, key in your password:

   123456 (this is not displayed)

5. While holding down the ALT key, press the d key.

6. If your password is valid, the system responds with ENTER COMMAND. Wait until ENTER COMMAND is displayed before entering a command.

Logoff

To end a terminal session:

1. While holding down the ALT key, press the e key.

2. When SSCP appears in the lower-right corner of the screen, key in:

   LOGOFF

3. While holding down the ALT key, press the d key.

4. You will receive the message LOGOFF COMPLETE.

   This ends your terminal session.

Transferring 7426 Microcode from Diskette to the 8100 Disk

The 7426 has functions that are implemented by microcode. This microcode is distributed to 8100 systems via diskette and must be loaded into disk storage in the 8100. Once installed on the 8100, and defined to and activated by the operating system, the microcode is automatically loaded into the 7426 whenever 7426 power is turned on.

The diskette volume serial identification is *7426*. A diskette contains more than one data set. Instructions accompanying the diskette will contain the names of the data sets and their size in 256-byte records. Additional information pertaining to the data sets can be found in Chapter 4, "Initializing the 7426" and in Appendixes B and C.

Loading the 7426 Diskette onto Disk When Using DPPX

For DPPX, the 7426 microcode (all files on the diskette) is loaded onto your disk by the following procedure:

1. Use a terminal that is not attached to the 7426 you are installing.

2. Route system operator messages to this terminal:

   ```
   SW
   ```

3. Import the data set:

   ```
   IMPORT 7426 HDSKT1.DEV1 * REPLACE

   MOUNT 7426 ON DEV1.  REPLY GO OR CANCEL.
   ```

4. Delete any data sets that you do not need:

   ```
   DELDS data-set-name
   ```

5. Remove the diskette from the diskette reader, insert it in the protective envelope, and store it in a safe place.

The 7426 microcode is now stored on disk and ready to be loaded into the 7426 when it is turned on.

Loading the 7426 Diskette onto Disk When Using DPCX

For DPCX, the 7426 microcode is loaded onto your disk by the following procedure; the control operator or operator 255 selects SYSDS1 to copy the microcode from the diskette to DPCX system data set 1.

1. Use a terminal that is not attached to the 7426 you are installing.

2. With no other DPCX programs running, enter SYSDS1.

   The following prompt menu appears:

```
8775 FEATURES

ENTER
     1-LIST INSTALLATION DISKETTE
     2-LIST 8775 FEATURES IN DS-1
     3-INSTALL 8775 FEATURES
     4-DELETE 8775 FEATURES
     9-TERMINATE
```

   Note: In this prompt, references to the 8775 are actually to the 7426.

3. Insert the 7426 diskette.

4. Type a 3 and press the ENTER key to install the 7426 microcode.

5. When the transfer is completed, the following message appears:

```
END OF DISKETTE
COMPLETED SUCCESSFULLY
```

6. Press the ENTER key to display the prompt menu again.

7. Type a 9 to terminate the SYSDS1 function.

8. Remove the diskette from the diskette reader, insert it in the protective envelope, and store it in a safe place.

The 7426 microcode is now stored on disk and ready to be loaded into the 7426 when it is turned on.

If a module with the same name already exists in the system data set, it is replaced by the new module of that name. If the new module is larger (has more blocks) than the existing one, the old module receives a dummy name and the new module is added to the data set. The space occupied by the old module is unusable. To recover this space, enter SYSDS1. When the menu appears, press 4 to select option 4.

Transferring 7426 Microcode from DTR to Host Disk

For instructions on transferring 7426 microcode from DTR to a 43XX, S/370, or 30XX host, see *Downstream Load Utility Installation Guide and Reference,* SC33-6127.

Making the 7426 Known to the Operating System

The 7426 appears to the operating system as a 3276 Model 12 (PU type 2) with up to four LUs attached. It can be connected to a host system either by a directly attached loop, by a data-link-attached loop (8100 or 4321/4331), or by a data link. It can attach up to four of the following devices in any combination:

- IBM 3101 Display Terminal Model 10, 12, 13, 20, 22, or 23

- IBM Personal Computer operating in 3101 emulation mode (requires PN 6024042)

- IBM 3101 Display Terminal Model 837

- IBM 7485 Display Terminal Model 531 (RPQ 8K1000)

- Certain other ASCII Displays (see Appendix F).

- Certain ASCII asynchronous printers and keyboard/printers

When a 7426 is being added to a system, it is not necessary to wait until after physical installation is complete before updating the operating system with the necessary changes. The operating system must be updated, however, before the 7426 can be used.

In general a 7426 is added to a system as though it were a 3276-12 with up to four LUs.

The LU types supported are:

- For displays, LU Type 2 (full-screen 3270)

- For printers, LU Type 1 (SNA character string) or LU Type 3 (data stream compatibility)

For DPPX, if attachment is to a 38.4-K bps loop, specify MAXNSEG as 01.

For DPCX, beginning with DPCX Release 3, the 7426 should be defined as one of two control unit types (7426-384 or 7426). For a 7426 on a 38.4-K bps loop, the control unit type is 7426-384; for all other attachments, the control unit type is 7426. Each of these control unit types will have four associated devices. Use SYSIMOD to change to control unit type 7426 or 7426-384. Only control unit types with up to eight devices (see Figure 2-2) should be changed.

Primary Communication Adapter	Logical Address Range(hex)	Physical Address Range(hex)	Comments
First DLA	0100 - 0500 0600 - 0A00	01-05 06-0A	Control units with up to eight devices Control units with only one device
Second DLA	1100 - 1500 1600 - 1A00	11-15 16-1A	Control units with up to eight devices Control units with only one device
Third DLA	2100 - 2500 2600 - 0A00	21-25 26-2A	Control units with up to eight devices Control units with only one device
Fourth DLA	3100 - 3500 3600 - 3A00	31-35 36-3A	Control units with up to eight devices Control units with only one device
Fifth DLA	4100 - 4500 4600 - 4A00	41-45 46-4A	Control units with up to eight devices Control units with only one device
First DAL	5100 5200 - 5600 5700 - 5F00 CD00 - D200	51 52-56 57-5F CD-D2	3289 Model 3 Printer Control units with up to eight devices Control units with only one device
Second DAL	6100 6200 - 6600 6700 - 6F00 D900 - DE00	61 62-66 67-6F D9-DE	3289 Model 3 Printer Control units with up to eight devices Control units with only one device
Third DAL	7100 7200 - 7600 7700 - 7F00 E500 - EA00	71 72-76 77-7F E5-EA	3289 Model 3 Printer Control units with up to eight devices Control units with only one device

Figure 2-2. Logical and Physical Addresses of DLA-and DAL-Attached Control Units

Programming Considerations

7426 Format Storage Facility

To reduce the volume of information transferred between the 7426 and the host, up to 16 different, most frequently used, display formats can be stored in a 7426 by an application program in the host. After these formats are loaded into the 7426 format storage area, the application program causes the 7426 to send a particular stored format, with some appended data, to an attached display. The application program can load a maximum of 16 formats of varying size into the 4800-byte format storage area.

Each format contains one of the format storage operation characters and a format identifier. The format storage operations and associated hexadecimal codes (in parentheses) are ADD (F1), DELETE (F2), APPEND (F3), and CLEAR ALL (F4).

Data Sequence

The 7426 recognizes a format storage operation when it receives the following sequence:

Byte 1 - Erase/Write Command
       2 - Write Control Character (WCC)
       3 - Start Field Character
       4 - NON-DISPLAY PROTECTED Attribute
       5 - Start Field Character
       6 - INTENSIFIED DISPLAY PROTECTED Attribute
       7 - Format Storage Operation Character

              Hex F1 = ADD
                    F2 = DELETE
                    F3 = APPEND
                    F4 = CLEAR ALL
                    F5 = Reset Downstream Load Complete
                          (not a Format Storage Operation)

     8,9 - Format ID (two characters)
               EBCDIC 0 − 9, A − Z

     10 and subsequent bytes - Data
              For ADD or APPEND - 3270 data stream information.
              For DELETE or CLEAR ALL - there should be no data.

The two start-field characters may each be preceded by a display order sequence for setting the buffer address and inserting the cursor.

Bytes 4, 6, 7, 8, and 9 use the first five positions on the display screen.

All format storage operations are from a primary logical unit (PLU) to a secondary logical unit (SLU) type 2.

The format storage operations follow:

ADD(F1) - The data following the format ID (bytes 8 and 9) is stored in the 7426 format storage area in 3270 data stream form. The write control character (WCC) and 3270 display orders (for example, SBA and IC) that precede the operation character will be ignored.

DELETE(F2) - The designated format is deleted from the format storage area. The WCC operations are suppressed.

APPEND(F3) - The previously stored 3270 data stream information associated with the designated format ID is processed from the format storage area to the appropriate display image buffer in the 7426, beginning at row 1, column 6. Next, the data stream containing the APPEND is processed from the beginning as a normal 3270 data stream, including WCC operations. Then the complete display image buffer is sent to the attached display. Note that APPEND does not change the content of the format storage area.

CLEAR ALL(F4) - All formats are deleted from the format storage area. The WCC operations are suppressed.

The ADD, DELETE, and CLEAR ALL operations may be sent by the application program to any LU type 2 within the 7426. APPEND is the only operation that causes the display terminal screen to be updated and must be sent to the LU type 2 associated with the target display terminal.

Error Responses

The 7426 gives a negative SNA response (Request Error/Parameter Error) to a format storage operation in the following cases:

- The designated format ID is already present in the 7426 (ADD).

- The 7426 format storage area is full (ADD).

- There are already 16 formats stored in the 7426 (ADD).

- The designated format ID is not present in the 7426 (APPEND, DELETE).

- A character in the designated format ID is not in the range EBCDIC 0−9 or A−Z (ADD, DELETE, APPEND, and CLEAR ALL).

- Data follows the format ID in a DELETE or CLEAR ALL operation.

- The format storage operation character is not in the range hexadecimal F1 through F4.

- A previously initiated ADD operation has not been completed, and another ADD, DELETE, or CLEAR ALL has been attempted via a different SLU.

Usage Notes

1. Format storage operations may be directed to any SLU type 2 that is in PLU/SLU session and whose associated terminal is powered on.

2. An ADDed display panel is not considered *present* in the 7426 format storage area until the last segment in the chain has been processed.

3. The host application program should use one SLU for all ADD, DELETE, and CLEAR ALL operations to keep these operations in sequence and avoid conflicts.

4. If the host connection to the 7426 fails during an ADD, that partial ADD will be cleared when the connection is reestablished and another format storage operation is initiated to any SLU type 2.

5. Since the complete APPEND data stream is processed as a 3270 data stream, the operation character and the two ID characters will be displayed in row 1, columns 3, 4, and 5 − intensified − unless another part of the data stream overwrites them or a preceding Set Buffer Address places them elsewhere on the screen.

DPPX/DPS Format Storage Considerations

This section provides the DPPX programmer with the information necessary to support the 7426 format storage facility. Included is a description of how to use Distributed Presentation Services (DPS) under DPPX to define 7426 formats, and how to communicate with the 7426 so that the format storage operations can be exercised. Using DPPX/DPS, as suggested in the following examples, restricts the formats to a maximum of 1915 characters, which start at row 1, column 6 of the display.

The user is expected to have a working knowledge of DPS. Following are appropriate references:

DPPX/DPS Version 1 User's Guide, SC33-0092

DPPX/DPS Version 2 Map Definition Reference Manual, SC33-0114

DPPX/DPS Version 2 Application Programming Reference Manual, SC33-0115

IBM 8100 DPPX Implementation Handbook - Application Programmer's Guide, SG24-1504

To use the ADD, DELETE, and APPEND functions of the 7426 format storage facility, three versions of each screen format (map) are required. In the following, four versions are actually created. The extra version is present to simplify map maintenance; it is not logically required. For ADD and APPEND, two related versions of each map must exist. These versions are easier to maintain if a superset map is defined in the map specification library (MSL). This map is never used by DPS format management (FM). The other two versions are created by subsetting the superset map. Figure 2-3 shows a sample map.

```
      123456...
  1 | $$3XX$                        ORDER ENTRY
  2 |
  3 |   CUSTOMER NAME: $      $                                DATE:$      $
  4 |
  5 |   ACCOUNT: $        $
    |
    |
    |
    |
    |
    |
    |
    |
```

$ = Field attribute, which displays as a blank
3 = Format storage operation character—specifying APPEND
XX = Two-character format ID (any two characters A-Z, 0-9)

Note: The field attribute at row 1, column 6 is mandatory. In fact, the attribute can be positioned anywhere between column 6 and the start of the text ORDER ENTRY in row 1.

Figure 2-3. Sample Map

Defining the Superset Map

The map shown in Figure 2-4 is defined by DPPX/DPS interactive map definition (IMD). The variable fields in this map should be named and all functions defined in the usual manner with DPS IMD specifying a 3278 Model 2 as the device.

The superset map is the master version for both the ADD and APPEND maps. The superset map is defined first; the ADD and APPEND maps are then created from it. The superset map contains both constant and variable information. All the DPS IMD map editor frames are used to define the superset map. The application data structure (ADS) is fully defined as part of this map.

If maintenance (subsequent updating) is required, the superset map is updated and the ADD and APPEND maps are re-created from it.

In field attribute definition, the attribute at row 1, column 1 should be defined as DARK (non-display) PROTECTED, and the attribute at row 1, column 2, as BRIGHT (intensified) PROTECTED.

```
        123456...

1 │ Z.Z--------------FIELD DEFINITION----------GRP1S    MAP1    3278-2
2 │
3 │ ==>
4 │ LINES 001 020-------------C(#)V(?)S(/)----------------COLS 001 080
5 │ ##1XX#                        ORDER ENTRY
6 │   CUSTOMER NAME: ¬    #                                     DATE: ¬   #
7 │   ACCOUNT: ¬        #
```

Z.Z = IMD frame indicator
#   = Constant field attribute
¬   = Variable field attribute
1   = Format storage character—specifying ADD
XX   = Format ID associated with map consisting of 2 characters (A-Z, 0-9)

Figure 2-4. Superset Map Definition

Defining the ADD Map

To add a map to format storage, create an ADD map as follows:

1. Copy the superset map to the ADD map name.

2. Ensure that the operand at row 1, column 3 is a 1 (ADD).

3. Delete all attributes (¬) that start or end variable fields. (In field definition, use the spacebar.)

4. Delete the application data structure (ADS). (In ADS review, use the DELETE command.)

5. Define the map as output only (optional).

Figure 2-5 shows an example of the ADD map format.

```
  123456....
┌─────────────────────────────────────────────────────────────────────┐
1│          --------------FIELD DEFINITION----------GRP1A    MAP1    3278-2
2│
3│ ==>
4│ LINES 001 020-------------C(#)V(¬)S(/)----------------COLS 001 080
5│ ##1XX#                     ORDER ENTRY
6│  CUSTOMER NAME:                                          DATE:
7│  ACCOUNT:
 │
 │
 │
 │
└─────────────────────────────────────────────────────────────────────┘
```

#	=	Constant field attribute
¬	=	Variable field attribute
1	=	Control byte (character) specifying ADD
XX	=	Format ID associated with map consisting of 2 characters (A-Z, 0-9)

Figure 2-5. ADD Map Definition

Defining the APPEND Map

To append information to a map in format storage, create an APPEND map as follows:

1. Copy the superset map (after deleting the old version of APPEND map).

2. Ensure that the operand at row 5, column 3 is a 3 (APPEND).

3. Delete all attributes (#) that start or end constant fields, except the attribute at row 5, column 6 (row 1, column 6 of the map being created), which is mandatory. Do not delete variable field attributes (¬).

Figure 2-6 shows an example of the APPEND map format.

```
   123456...

1  |       --------------FIELD DEFINITION----------GRP1J    MAP1    3278-2
2  |
3  | ==>
4  | LINES 001 020-------------C(#)V(¬)S(/)----------------COLS 001 080
5  | ##3XX#
6  |                   ¬     #                                ¬     #
7  |            ¬        #
```

```
#   =   Constant field attribute
¬   =   Variable field attribute
3   =   Format storage character—specifying APPEND
XX  =   Format ID associated with map consisting of 2 characters (A-Z, 0-9)
```

Figure 2-6. APPEND Map Definition

Defining the DELETE Map

To delete a map from format storage, create a DELETE map.

The DELETE map must be specified as 1 line long and 5 characters wide. It begins at row 1, column 1 and is defined as output only. It contains 2 attributes (NON-DISPLAY PROTECTED and INTENSIFIED PROTECTED), the character 2 (DELETE), and the 2-character format ID. It may not be required in many applications.

Figure 2-7 shows an example of the DELETE map format.

```
123456...
```

```
1      --------------FIELD DEFINITION----------GRP1D   MAP1    3278-2
2
3   ==>
4   LINES 001 001-------------C(#)V(¬)S(1)----------------COLS 001 005
5   ##2XX
6
7
```

```
#   =   Constant field attribute
¬   =   Variable field attribute
2   =   Format storage character—specifying DELETE
XX  =   Format ID associated with map consisting of 2 characters (A-Z, 0-9)
```

Figure 2-7. DELETE Map Definition

Defining the CLEAR ALL Map

To delete all formats from the format storage area, create a CLEAR ALL map.

The CLEAR ALL map is similar to the DELETE map, but the format storage character 4 (CLEAR ALL) replaces the character 2 (DELETE). Only one CLEAR ALL map is required for each DPPX system. The CLEAR ALL map must be specified as 1 line long and 5 characters wide.

Figure 2-8 shows an example of the CLEAR ALL map format.

```
     123456...

1  ┌─────────────────FIELD DEFINITION──────────GRP1D    MAP1    3278-2 ─┐
2  │                                                                    │
3  │ ==>                                                                │
4  │ LINES 001 001─────────────C(#)V(¬)S(1)────────────────COLS 001 005 │
5  │ ##4XX                                                              │
6  │                                                                    │
7  │                                                                    │
   │                                                                    │
   │                                                                    │
   │                                                                    │
   │                                                                    │
   │                                                                    │
   └────────────────────────────────────────────────────────────────── ┘
```

```
#   =  Constant field attribute
¬   =  Variable field attribute
4   =  Format storage character—specifying DELETE
XX  =  Format ID associated with map consisting of 2 characters (A-Z, 0-9)
```

Figure 2-8. CLEAR ALL Map Definition

Map Group Utilization

The maps described above may be all in one map group, each in a different map group, or in any combination. Other maps may occupy the same map group, as is usual for DPPX/DPS. The superset map(s) should not normally occupy the same map group as any of the other types of maps, as they are intended for simplifying editing. They need never be generated, as they are never sent to the 7426. It is recommended that an installation standard be adopted for naming maps and map groups. In the example, the map group name is suffixed by a character to indicate the function of maps within it. Equally, the map name could be suffixed.

The ADD, DELETE, APPEND, and CLEAR ALL maps may or may not be in the same map group. Consider the following when selecting maps for map groups:

● For improved performance, maps or subsets of maps that are to be loaded into format storage at the start of a session should all be in the same map group.

- If a particular map is loaded each time it is needed and it always replaces the same map, then its ADD map version should be in the same map group as the DELETE map version of the map being replaced. You should also include the APPEND map version of the map being loaded in the same map group.

Remember that DPS must DELETE one map group from the DPPX user address space and LOAD the other into the DPPX user address space whenever the map group to be used changes. Minimizing the number of map groups minimizes the I/O overhead. However, all the maps in the map group simultaneously occupy the DPPX user's address space, so the inclusion of large numbers of infrequently used maps (for example, ADD maps) in a map group containing frequently used maps should be avoided.

Updating Maps

Either or both of the ADD or APPEND maps may be updated individually. However, this may cause synchronization problems. It is therefore recommended that the superset map be created and updated, and that the other maps be created from the superset map. This results in greater reliability and accuracy, though individual updates may be slightly more cumbersome.

Adding Maps to Format Storage

A map is added via a SEND (HCEPWRIT in COBOL) of the ADD map. The DPS application control area (HEBHDR in assembler, COBHDR in COBOL) must contain the following values:

HEBCLM = '1' (Create Logical Message)
HEBOPER = ' ' (Write)
HEBSYNC = '2' (Send data immediately; force immediate error
            notification)

The application data structure (ADS) can be a 1-byte field containing any value.

Multiple SENDs may be issued without intervening RECEIVEs; thus, several maps may be loaded one after another. Since normal DPS error-handling rules apply, errors (for example, format storage full) are not reported on such SENDs unless HEBSYNC = '2'. Therefore, HEBSYNC must be set to '2', and the application should test for an error code of '41' (input pending). If this value is returned, one or more RECEIVEs (HCEPREAD in COBOL) must be issued to obtain the error records, SNA negative responses, and sense information in the usual DPS fashion.

Deleting Maps from Format Storage

The mechanism is as described above for ADD; however, the DELETE version of the map is used.

Clearing All Maps from Format Storage

The mechanism is as described above for ADD; however, the CLEAR ALL map is used.

Appending Data to an Outboard Map

A write operation (HEBOPER = ' ') with a create logical message (HEBCLM = '1') causes the data in the application data structure (ADS), passed to DPPX/DPS, to be appended to the outboard map. Subsequent SENDs requesting rewrite (HEBOPER = '1') or reject (HEBOPER = '3') operations may be used to update the data on the display from the ADS. The outboard format information without appended application data can be displayed by causing all fields in the ADS to have selector adjuncts set to blank or, on DPPX/DPS Version 2, by setting the ADS length to zero on the send.

DPPX Non-DPS Format Storage Considerations

DPPX users who do not use DPPX/DPS, but do wish to use the 7426 format storage facility, should use available application programming tools (for example, DPPX assembler) to generate the following data sequence. The first 9 bytes of the sequence act as a header. Recognition of this header causes the 7426 to treat the header and subsequent data as a format storage facility request.

Byte	Description
1	Erase/Write Command
2	Write Control Character (WCC)
3	Start Field Character
4	NON-DISPLAY PROTECTED Attribute
5	Start Field Character
6	INTENSIFIED DISPLAY PROTECTED Attribute
7	Format Storage Operation Character
	Hex F1 = ADD
	F2 = DELETE
	F3 = APPEND
	F4 = CLEAR ALL
8,9	Format ID (2 characters)
	EBCDIC 0 − 9, A − Z

10 and subsequent bytes - Data
 For ADD or APPEND - 3270 data stream information.
 For DELETE or CLEAR ALL - there should be no data.

The operations called for by the WCC are performed only when the format storage operation is an APPEND. For other operations, the WCC must be supplied and must be valid, but will be ignored.

Note that bytes 4, 6, 7, 8, and 9 on an APPEND occupy the first five positions on the display. Thus the data in an ADD or APPEND sequence is destined to begin at row 1, column 6 unless a Set Buffer Address order starts in byte 10, causing the display data pointer to be repositioned. (It may be repositioned anywhere on the display.)

If columns 1 to 5 of row 1 are not overwritten by the APPENDed display formats, the stored format will contain the NON-DISPLAY PROTECTED attribute from byte 4 and the INTENSIFIED DISPLAY PROTECTED attribute from byte 6, followed by the operation character and the two ID characters. The last three characters will be displayed-intensified.

Sense Information for DPPX Applications

Regardless of the method of map creation (DPPX/DPS or DPPX/assembler), SNA negative responses are returned by the 7426 format storage facility with the 4-byte SNA sense information, as follows:

Byte 0   Hex 10   (Request Error)

Byte 1   05   (Parameter Error)

Byte 2 contains one of the following:
        Hex 01   Designated format is already present (ADD).
            02   Format storage area is full (ADD).
            03   There are already 16 formats in the format storage area (ADD).
            04   The designated format is not present (DELETE, APPEND).
            05   Format ID contains a character(s) not in the range EBCDIC $0-9$, $A-Z$ (ADD, DELETE, APPEND, CLEAR ALL).
            06   There is data following the format ID (DELETE, CLEAR ALL).
            07   The operation character is not in the range hex F1 through F4.
            08   A previously initiated ADD operation has not been completed (ADD, DELETE, CLEAR ALL by way of another SLU).

Byte 3   00

DPCX Format Storage Considerations

This section provides the DPCX programmer with the statements and guidance necessary to support the 7426 format storage facility. The programmer is expected to have a working knowledge of *Host Prep Programming Statements Reference,* SC27-0532, and of *Host Prep Guide to Host Services,* SC27-0577, which describe the Host Prep program product 5735-XR3.

The use of format storage may increase or decrease the size and the running time of the application program. Use of this feature is most profitable where a limited number of formats receive heavy usage or where the online creation of formats is required. Formats are a collection of 3270 display orders and may correspond to a DPCX full-screen panel.

The 7426 attached display functions like a 3278 when the 7426 format storage operations are not used. See "Compatibility with the 3276" earlier in this chapter.

The STARTPGM Programming Statement

ENVIR=FSP must be coded; the PRI= operand of STARTPGM must be one of the following:

DISPLAY
ANY
ALL
ANYSYS
3278

The GOTODEV Programming Statement

GOTODEV does not differentiate between a 3278 and a 7426. Coding GOTODEV 3278 identifies either a 3278 or a 7426. If PRI=3278 is coded on STARTPGM, GOTODEV does nothing. If PRI=3278 is not coded on STARTPGM, GOTODEV identifies all primary devices that are not 3278s or 7426s (for example, a 3277 Model 2). The DPCX macros and the PVS and DPCX symbolic machines do not differentiate between 3278s and 3276s.

Adding a Panel to Format Storage

The following example shows the Host Prep programming statements required to add a panel from the panel data set to 7426 format storage. In this example the GETPANEL statement causes its referenced data to be added to format storage; it is not displayed at this time. The panel ID is 1234, and the format ID is hexadecimal C1C1 (which is EBCDIC AA):

```
    .
    .
    .
SRC         '1234'
DEST        REG(3)
WRTDEV      DISPLAY,BEGIN,CONTROL=NEW
SRC         X'1D6C1DE8F1C1C1'
DEST        DISPLAY
GETPANEL    DISPLAY,REG(3)
GOTOIF      I(38),ON,ERROR1
WRTDEV      DISPLAY,END
    .
    .
    .
```

Notes:

1. *The above sequence from WRTDEV BEGIN through WRTDEV END (6 statements) is generated by FORMSTG ADD as described later in this chapter.*

2. *More than one panel can be designated under one format ID. To do this, include a separate GETPANEL statement for each panel to be added under the same format ID.*

Building a Format for Format Storage

The following is an example of the Host Prep program statements required to create a format for the 7426 format storage. This format may be built with information in the full-screen panel data set, in the relative sequential data set, in relative or index data sets, or from selected system services. This sequence adds the data to format storage. It is not displayed at this time. In the example, the format ID is 'BB' (X'C2C2'). Between DEST DISPLAY and WRTDEV DISPLAY,END, the program may use the full capabilities of DPCX to modify the screen. The limitations to this are the 4800-byte size of the format storage in the 7426 and those statements restricted from being between a WRTDEV DISPLAY,BEGIN and WRTDEV DISPLAY,END. This data is stored with format ID 'BB'. WRTDEV DISPLAY,END marks the end of the format and causes the data to be written to format storage. This is the 7426 ADD function with data dynamically assembled.

```
 .
 .
 .
WRTDEV      DISPLAY,BEGIN,CONTROL=NEW
SRC         X'1D6C1DE8F1C2C2'
DEST        DISPLAY
 .
 .
 .
WRTDEV      DISPLAY,END
 .
 .
```

Note: The above sequence from WRTDEV BEGIN through the first DEST DISPLAY (three statements) is generated by FORMSTG BUILD as described later in this chapter.

Deleting a Format from Format Storage

The following is an example of the Host Prep program statements required to delete a format from format storage. In the example, formats 'D2' (X'C4F2') and '51' (X'F5F1') will be deleted from the format storage. This is the 7426 DELETE function.

```
 .
 .
 .
WRTDEV      DISPLAY,BEGIN,CONTROL=NEW
SRC         X'1D6C1DE8F2C4F2'
DEST        DISPLAY
WRTDEV      DISPLAY,END
WRTDEV      DISPLAY,BEGIN,CONTROL=NEW
SRC         X'1D6C1DE8F2F5F1'
DEST        DISPLAY
WRTDEV      DISPLAY,END
 .
 .
```

Appending User Data and Displaying a Format

Following are the Host Prep program statements required to display a 7426 stored format and to append user data to it. In the example, the format ID is '0C' (X'F0C3'). Between DEST DISPLAY and WRTDEV DISPLAY,END, the program may use the full capabilities of DPCX to modify the screen. The limitations to this are those statements restricted from being between a WRTDEV DISPLAY,BEGIN and WRTDEV DISPLAY,END. These are one-time-only changes. This is the 7426 APPEND function.

```
    .
    .
    .
WRTDEV      DISPLAY,BEGIN,CONTROL = NEW,UNLOCK
SRC         X'1D6C1DE8F3F0C3'
DEST        DISPLAY
    .
    .
WRTDEV      DISPLAY,END
    .
    .
```

Note: The above sequence from WRTDEV BEGIN through the first DEST DISPLAY (three statements) is generated by FORMSTG APPEND as described later in this chapter.

Clearing Format Storage

Following is an example of the Host Prep program statements required to delete all formats from format storage. This clears format storage for all displays on the 7426. This is the 7426 CLEAR ALL function.

```
    .
    .
    .
WRTDEV      DISPLAY,BEGIN,CONTROL = NEW
SRC         X'1D6C1DE8F4F0F0'
DEST        DISPLAY
WRTDEV      DISPLAY,END
    .
    .
```

Note: The above sequence from WRTDEV BEGIN through WRTDEV END (four statements) is generated by FORMSTG CLEAR as described later in this chapter.

Transferring Data from the Host System

Following is an example of the Host Prep program statements required to transfer data from the host through DPCX to the 7426 format storage and to call it up for display. In the example, the program is not aware of the contents of the data from the host, but is expecting formats to be added. If this were an APPEND operation, the program would issue another WRTDEV to unlock the keyboard. For ADD, the data from the host starts with a '1' (X'F1'); for DELETE, a '2' (X'F2'); for APPEND, a '3'. The 2nd and 3rd bytes are the format ID. If you wish, the application can extract an FSP format number from the data and do a GETPANEL. To clear format storage, a '400' (X'F4F0F0') is sent.

```
         .
         .
         .
         WRTDEV  DISPLAY,BEGIN,CONTROL = NEW
         SRC     X'1D6C1DE8'
         DEST    DISPLAY
LOOP     MOVEBUF FROM = HOST(RD),TO = DISPLAY,LNG = REG(7)
         GOTOC   X'01',LOOP
         WRTDEV  DISPLAY,END
         .
         .
         .
```

Note: Host data pass-through will not be addressed by FORMSTG.

Errors and Condition Codes

See *Host Prep Programming Statements Reference* for a description of the condition codes and error indicators for the above statements.

Abnormal program ends (ABENDS) are described in *DPCX Messages,* SC27-0523.

Errors unique to format storage operations (ADD, DELETE, APPEND, and CLEAR ALL) will abend the program with a message to the control operator. These errors are:

ADD with active format ID.
ADD with format storage full.
ADD with 16 formats already in storage.
DELETE, APPEND with inactive format ID.
ADD, DELETE, APPEND, CLEAR ALL with invalid format ID.
DELETE, CLEAR ALL followed by data.

Note: ADD, DELETE, or CLEAR ALL may affect other logical units on the 7426.

PVS Considerations

PVS validation processes the required 7426 sequences as if they were intended for the 3278. The messages generated by PVS validation are valid for the 7426. PVS-run phase and interactive PVS generate error messages consistent with using these instructions on DPCX with a 3278 display. PVS cannot be used to simulate 7426 display output.

The assembler output for the formats should be consulted for the format length. The 4800-byte storage area should be carefully allocated: exceeding this limit causes the program to ABEND.

Panel Creation

The first five characters of the display are used by 7426 microcode. Two attribute characters, the operation character, and the two format ID characters are placed in row 1, columns 1 to 5. This occurs after the format is passed from the format storage to the display (starting at row 1, column 6) on an APPEND operation. If the APPENDed format starts with a Set Buffer Address to row 1, column 1, the first five characters are overlaid.

If wrap is desirable, these attributes must be overlaid in the APPENDed panel. This can be accomplished by starting the DPCX panel with:

```
STPANEL   PANELID = 6543,DIM(24,80)
LINE      1
ITEM      L = 1,ATTR = NO,INIT = ' '
  .
  .
  .
```

FORMSTG Macro

This section describes the FORMSTG macro (forms 1, 2, 3, 4, and 5), the DEST DISPLAY macro (form 4), the ITEM macro (form 2), and the WRTDEV macro (form 7) in the format shown in *Host Prep Programming Statement Reference*. You should add the FORMSTG macro to your application program or to your macro library. See the end of this section for the source listing of the FORMSTG macro.

FORMSTG - Form 1 will add an FSP panel into the format storage area of a 7426.

Name	Operation	Operands
(symbol)	FORMSTG	'aa',ADD,REG(r1)
		,ONERROR = symbname

'aa'

> The format ID to be added to the 7426 format storage. This operand is required. Use '0' – '9', 'A' – 'Z'.

ADD

> Indicates that an FSP panel is to be placed in the 7426 format storage. This operand is required.

REG(r1)

> Replace r1 with a register number. This register must contain the number of an FSP panel. The valid range is 0-7999. This operand is required.

ONERROR = symbname

> Replace symbname with the label of the statement you wish to get control if no such panel is found on the DPCX panel data set. This operand is optional.

Restrictions: Your program is terminated if:

- Any outstanding write sequence started with WRTDEV DISPLAY,BEGIN has not been completed before the FORMSTG statement is issued.

- A read sequence (RDDEV DISPLAY,TYPE = NOWAIT; RESCON; RDDEV DISPLAY, TYPE = COMPLETE) is not completed when a FORMSTG statement is issued.

- Full-screen processing is not used when a FORMSTG statement is issued.

- A primary device I/O error occurs, unless an appropriate command intercept routine is specified by the CMDINT operand of the STARTPGM statement.

- Another SLU is doing an ADD.

Example of Use

```
.
.
.
SRC       '2222'
DEST      REG(3)
FORMSTG   '07',ADD,REG(3),ONERROR = NOPANEL
.
.
```

FORMSTG - Form 2 will dynamically build a format and add it to the 7426 format storage.

Name	Operation	Operands
(symbol)	FORMSTG	'aa',BUILD

'aa'

> The format ID to be built and added to the 7426 format storage. This operand is required. Use '0' – '9', 'A' – 'Z'.

BUILD

> Indicates that a set of 3270 display orders is to be placed in the 7426 format storage. This operand is required.

Notes:

1. *This instruction will usually be followed by GETPANEL DISPLAY, DEST DISPLAY, and MOVEBUF TO = DISPLAY statements. This data will become part of the format stored in the 7426. No data will be displayed at this time. This instruction must be followed by a WRTDEV END before any other FORMSTG or WRTDEV BEGIN statements can be used.*

2. *If the BUILD process exceeds the 4800-character limit, the program will abend on the WRTDEV DISPLAY,END.*

Restrictions: Your program is terminated if:

1. Any outstanding write sequence started with WRTDEV DISPLAY,BEGIN has not been completed before the FORMSTG statement is issued.

2. A read-sequence (RDDEV DISPLAY,TYPE = NOWAIT; RESCON; RDDEV DISPLAY TYPE = COMPLETE) is not completed when a FORMSTG statement is issued.

3. Full-screen processing is not used when a FORMSTG statement is issued.

4. A primary device I/O error occurs, unless an appropriate command intercept routine is specified by the CMDINT operand of the STARTPGM statement.

ABENDs

BUILD (ADD) has an active format ID.
BUILD (ADD) has a full format storage.
BUILD (ADD) has 16 formats already in storage.
BUILD (ADD) has an invalid format ID.
A BUILD (ADD) initiated by another SLU has not completed its function.

Example of Use

.
.
.

```
FORMSTG  '07',BUILD
SRC      '1234'
DEST     REG(14)
GETPANEL DISPLAY,REG(14),ONERROR = NOPANEL
GOTOIF   I(38),ON,ERROR1
SRC      FLD = FTAGAAA
DEST     DISPLAY,ITEM = DTAGAAA
SRC      '666'
WRTDEV   DISPLAY,END
```

.
.

FORMSTG - Form 3 will delete a format from the format storage of a 7426.

Name	Operation	Operands
(symbol)	FORMSTG	'aa',DELETE

'aa'

    The format ID of the format to be deleted from the 7426 storage. This operand is required. Use '0' – '9', 'A' – 'Z'.

DELETE

    Indicates that a format is to be deleted from the 7426 format storage. This operand is required.

Restrictions: Your program is terminated if:

- A DELETE has an inactive format ID.

- A DELETE has an invalid format ID.

- Any outstanding write sequence started with WRTDEV DISPLAY,BEGIN has not been completed before the FORMSTG statement is issued.

- A read-sequence (RDDEV DISPLAY,TYPE = NOWAIT; RESCON; RDDEV DISPLAY, TYPE = COMPLETE) is not completed when a FORMSTG statement is issued.

- Full-screen processing is not used when a FORMSTG statement is issued.

- A primary device I/O error occurs unless an appropriate command intercept routine is specified by the CMDINT operand of the STARTPGM statement.

- An ADD initiated by another SLU has not completed its function.

Example of Use

.

.

.

FORMSTG '01',DELETE

.

.

.

FORMSTG - Form 4 will append user data (if present) to the format contained in the format storage and display it.

Name	Operation	Operands
(symbol)	FORMSTG	'aa',APPEND

'aa'
> The format ID of the format to be displayed from the 7426 storage. This operand is required. Use '0' – '9', 'A ' – 'Z'.

APPEND
> Indicates that a format is to be displayed. This operand is required.

The APPEND data will begin in line 1, position 6. If this is not acceptable, you should reset the current buffer address (using DEST DISPLAY,ITEM or DEST DISPLAY,REG or having an SBA in the data).

This form of FORMSTG will leave the display UNLOCKed. If this is not acceptable or if ALARM is wanted, the macro can be changed or the FORMSTG component statements can be used.

Note: This instruction may be followed by GETPANEL DISPLAY, DEST DISPLAY, and MOVEBUF TO = DISPLAY statements. This data will be part of the display only once. This instruction must be followed by a WRTDEV END before any other FORMSTG or WRTDEV BEGIN statements can be used.

Restrictions: Your program is terminated if:

- Any outstanding write sequence started with WRTDEV DISPLAY,BEGIN has not been completed before the FORMSTG statement is issued.

- A read-sequence (RDDEV DISPLAY,TYPE = NOWAIT; RESCON; RDDEV DISPLAY, TYPE = COMPLETE) is not completed when a FORMSTG statement is issued.

- Full-screen processing is not used when a FORMSTG statement is issued.

- A primary device I/O error occurs, unless an appropriate command intercept routine is specified by the CMDINT operand of the STARTPGM statement.

Example of Use:

Display without appended data:

.
.

```
FORMSTG   '27',APPEND
WRTDEV    DISPLAY,END
```

.
.

Display with appended data:

.
.

```
FORMSTG   'AC',APPEND
SRC       '666'
DEST      REG(14)
GETPANEL  DISPLAY,REG(14),ONERROR = NOPANEL
GOTOIF    I(38),ON,ERROR1
SRC       FLD = FTAGA
DEST      DISPLAY,ITEM = DTAGA
WRTDEV    DISPLAY,END
```

.
.

FORMSTG - Form 5 will clear the format storage of a 7426.

Name	Operation	Operands
(symbol)	FORMSTG	CLEAR

CLEAR
> Indicates that all formats will be deleted from the 7426 format storage. This operand is required.

Warning: This may destroy formats placed in the 7426 format storage by other applications.

Restrictions: Your program is terminated if:

- Any outstanding write sequence started with WRTDEV DISPLAY,BEGIN has not been completed before the FORMSTG statement is issued.

- A read-sequence (RDDEV DISPLAY,TYPE = NOWAIT; RESCON; RDDEV DISPLAY, TYPE = COMPLETE) is not completed when a FORMSTG statement is issued.

- Full-screen processing is not used when a FORMSTG statement is issued.

- A primary device I/O error occurs, unless an appropriate command intercept routine is specified by the CMDINT operand of the STARTPGM statement.

- An ADD initiated by another SLU has not completed its function.

Example of Use

```
.
.
.
FORMSTG  CLEAR
.
.
```

DEST - Form 4

DEST DISPLAY,INT = ON|OFF|BRIGHT specifies the display intensity of the data in the field or whether the data can be printed.

Name	Operation	Operands
(symbol)	DEST	DISPLAY,INT = ON|OFF|BRIGHT

ON
Display (not intensified) or print – this is the default.

OFF
Prevent displaying or printing.

BRIGHT
Intensify (highlight) the display or allow printing.

ITEM - Form 2

ITEM INT = ON|OFF|BRIGHT specifies the display intensity of an item in a line or whether the item can be printed.

Name	Operation	Operands
(symbol)	ITEM	INT = ON|OFF|BRIGHT

ON
Display (not intensified) or print – this is the default.

OFF
Prevent displaying or printing.

BRIGHT
Intensify (highlight) the display or allow printing.

WRTDEV DISPLAY,END causes the 3270 orders to be sent to the display. This is required to follow the WRTDEV DISPLAY,BEGIN (contained in the FORMSTG APPEND and FORMSTG BUILD).

Name	Operation	Operands
(symbol)	WRTDEV	DISPLAY,END

ABENDs

(in addition to those found in *Host Prep Programming Statements Reference*)

- APPEND with inactive format ID.

- BUILD, APPEND with invalid format ID.

- BUILD, where an ADD initiated by another SLU has not completed its function.

- BUILD when there are already 16 panels in format storage or when format storage is full.

This macro can be placed on your DPCX macro library at the host
System/370 or assembled with your DPCX programs.

```
               MACRO
&NAME          FORMSTG      &OPTION,&ONERROR=
               AIF          ('&OPTION' EQ 'CLEAR').CLER
               AIF          ('&OPTION'(1,1) NE '''').ERR1
               AIF          ('&OPTION'(4,4) NE '''').ERR1
               AIF          (N'&SYSLIST   EQ 2).NOTA
               AIF          (N'&SYSLIST   NE 3).ERR1
               AIF          ('&SYSLIST(2)' NE 'ADD').ERR1
.*  ITS FORMSTG   ADD
&NAME          WRTDEV       DISPLAY,BEGIN,CONTROL=NEW
               DC           X'B230071D6C1DE8F1',C&OPTION
               DEST         DISPLAY
               GETPANEL     DISPLAY,&SYSLIST(3)
               AIF          ('&ONERROR' EQ '').NOTO
               GOTOIF       I(38),ON,&ONERROR
.NOTO          WRTDEV       DISPLAY,END
               MEXIT
.*  ITS FORMSTG   CLEAR
.CLER          AIF          (N'&SYSLIST NE 1).ERR1
               AIF          ('&ONERROR' NE '').ERR1
&NAME          WRTDEV       DISPLAY,BEGIN,CONTROL=NEW
               SRC          X'1D6C1DE8F4F0F0'
               DEST         DISPLAY
               WRTDEV       DISPLAY,END
               MEXIT
.NOTA          AIF          ('&ONERROR' NE '').ERR1
               AIF          ('&SYSLIST(2)' NE 'BUILD').NOTB
.*  ITS FORMSTG   BUILD
&NAME          WRTDEV       DISPLAY,BEGIN,CONTROL=NEW
               DC           X'B230071D6C1DE8F1',C&OPTION
               DEST         DISPLAY
               MEXIT
.NOTB          AIF          ('&SYSLIST(2)' NE 'DELETE').NOTD
.*  ITS FORMSTG   DELETE
&NAME          WRTDEV       DISPLAY,BEGIN,CONTROL=NEW
               DC           X'B230071D6C1DE8F2',C&OPTION
               DEST         DISPLAY
               WRTDEV       DISPLAY,END
               MEXIT
.NOTD          AIF          ('&SYSLIST(2)' NE 'APPEND').ERR1
.*  ITS FORMSTG   APPEND
&NAME          WRTDEV       DISPLAY,BEGIN,UNLOCK,CONTROL=NEW
               DC           X'B230071D6C1DE8F3',C&OPTION
               DEST         DISPLAY
               MEXIT
.ERR1          MNOTE        8,'FORMSTG MACRO SYNTEX ERROR'
               MEXIT
               MEND
```

Printer Support

The 7426 supports the following types of printer attachments:

- ASCII printer, attached to a 7426 port

- 3102 printer, attached to a 3101 display

ASCII Printer

Certain ASCII start-stop output-only printers (such as the IBM 4975 with the ASCII RPQ), using TTY 33/35 protocol and the EIA RS-232-C interface, may attach to any port on the 7426. Consult your IBM Representative to establish compatibility between the 7426 and a particular printer.

3102 Printer

For local operations only, a 3102 Printer may be attached to the auxiliary port on a 3101 Display Terminal. Figure 2-9 illustrates one possible configuration for printer support.

Printer Initialization

The following example shows how local copy and ASCII TTY-compatible printer assignments are made during 7426 initialization. See **L** under "Initialization Worksheet Instruction," in Chapter 4 for more information.

Example: Using Figure 2-9 as a reference, assume that the following printer port address designations were made during 7426 initialization:

Display on Port	Printer Assignment	Comment
0	8	3102 attached to 3101A is the designated copy printer for 3101A.
		Note: If 3 is used instead of 8, the ASCII TTY-compatible printer would be the designated copy printer.
1	3	The ASCII TTY-compatible printer on 7426 port 3 is the designated copy printer for the 3101B.
2	3	The ASCII TTY-compatible printer on 7426 port 3 is the designated copy printer for the 7485.
		Note: Printer port assignment 8 should never be specified for a 7485, since a printer cannot attach directly to this display type.
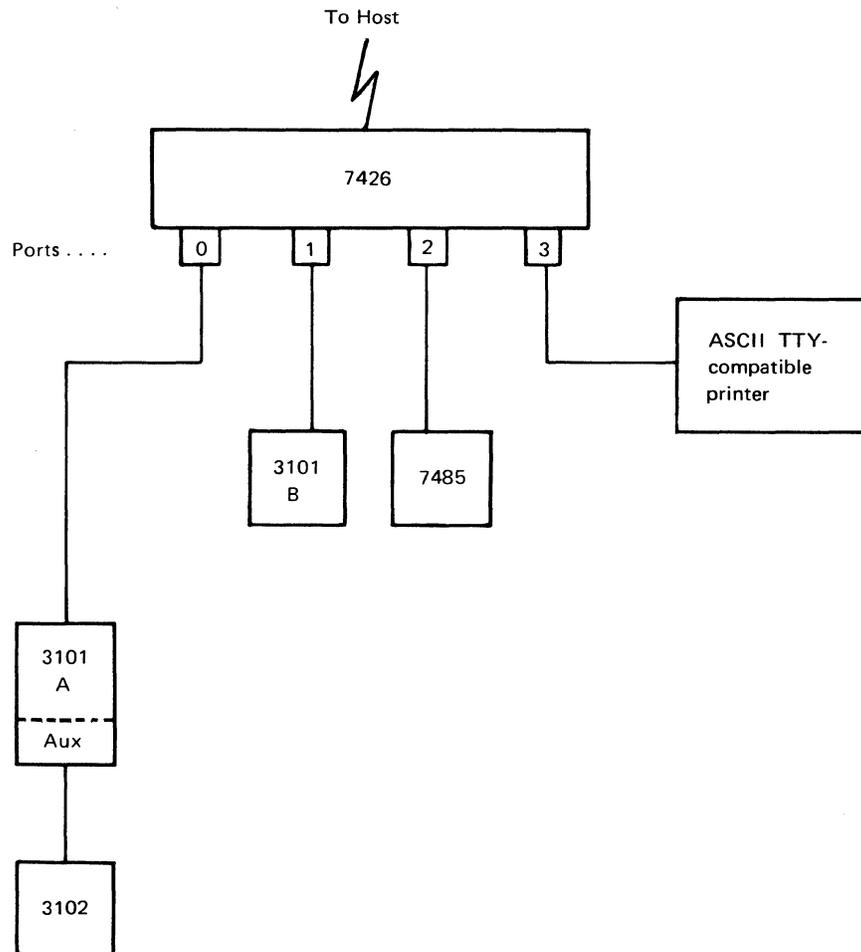
Figure 2-9. Example of Printer Support

Printer Operations

The 7426 supports the following types of printer operations:

- Host to ASCII Printer, LU Type 1

- Host to ASCII Printer, LU Type 3

- Local Copy

- Line Monitor

Host to ASCII Printer, LU Type 1

The SNA character string (SCS) is used to print on an ASCII printer attached to any port on the 7426 that has been defined as an LU Type 1. The following are the control codes for printers operating as LU Type 1:

From Host to 7426		From 7426 to Printer		Function	
Code	EBCDIC (Hex)	Code	ASCII (Hex)		Name
BS	16	BS	08		Backspace
BEL	2F	BEL	07		Bell
CR	0D	CR	0D		Carriage Return
ENP	14	Nothing	—		Enable Presentation
FF	0C	See SVF description below.	—		Forms Feed
HT	05	HT	09		Horizontal Tab
INP	24	Nothing	—		Inhibit Presentation
IRS	1E	CR LF*	0D 0A		Inter-record Separator
LF	25	LF*	0A		Line Feed
NL	15	CR LF*	0D 0A		New Line
SHF	2BC1	See description below.	—		Set Horizontal Format
SLD	2BC6	See description below.	—		Set Line Density
SVF	2BC2	See description below.	—		Set Vertical Format
TRN	35	See description below.	—		Transparent
VCS	04XX	LF*	0A		Vertical Channel Select
VT	0B	VT	0B		Vertical Tab

* For the possibility of additional output when the bottom margin is exceeded, see the SVF description below.

Set Horizontal Format (SHF) Function Description

The SHF Sequence has the following format:

(SHF) (cnt)(MPP) (LM) (RM) (T1) (T2)...(Tn)

where:

SHF = X'2BC1'

cnt = a one-byte binary count of the number of bytes to the end of the SHF sequence (including the count byte)

MPP = Maximum Print Position, a one-byte binary value. Any character that would normally be printed in the MPP + 1 print position will be preceded by a CR LF sequence to the printer.

LM = Left Margin (ignored by the 7426)

RM = Right Margin (ignored by the 7426)

T_1, T_2...Tn = Horizontal Tab settings (ignored by the 7426)

LM, RM, and Tn are one-byte binary values.

SHF Sequence Error Conditions: If the cnt byte = 0, a negative SNA response will be returned with a sense code of X'1005' (Parameter Error).

Use the following MPP values:

> If MPP = 0, set a default value of 132.
>
> If MPP = 1 − 254, set the value as the Maximum Print Position.
>
> If MPP = 255, ignore MPP setting (no automatic CR LF generation will be done by the 7426).
>
> At 7426 power on, the MPP setting is defaulted to 132.

Horizontal Format operations will also be disabled upon receipt of Set Vertical Format command with a maximum print line of 127 (see below). To reverse this, send an SVF with an MPL of 0 − 126, which will reactivate the MPP to the value that was valid before deactivation.

The current horizontal printer position stepping for MPP is shown below:

ASCII Character Sent to Printer	Stepping of Current Print Position Count
Graphics	+1
BS	-1 (no step if in Column 1)
**HT	No step
CR	Reset to Column 1
*FF	No step
*LF	No step
All Others	No step

* If the port is in Vertical Format Mode (see SVF description below) and an LF is transferred when the vertical line count is at the bottom margin or an FF is transferred, the horizontal print position count will be reset to Column 1.

** If tabs are set locally in the printer, the 7426 will not be able to keep an accurate print position count; therefore, when setting tabs locally at the printer use NL rather than SHF/MPP for stepping to the next line.

The above stepping definitions hold for transparent (TRN) data operations as well.

Set Vertical Format (SVF) Function Description

The SVF sequence has the following format:

> (SVF) (cnt) (MPL) (TM) (BM) (T_1, T_2,...Tn)

where:

SVF   = X'2BC2'

cnt   = A one-byte binary count of the number of bytes to the
          end of the SVF sequence (including the count byte).

MPL   = Maximum Print Line (allows page length from 1 to 126
          lines).

TM   = Top Margin

BM   = Bottom Margin

$T_1, T_2, ...Tn$ = Vertical Tab Setting which will be totally ignored.

MPL, TM, and BM are one-byte binary values which may be in the range
$0 - 127$.

The SVF sequence itself does not result in any forms movement. The
operator must position the form so that the print head is at the top margin
of the form.

Default Values: If, in a valid SVF sequence, MPL or TM or BM are not
received (e.g., cnt = 1, 2, or 3) or are 0, they will be set to the following
default values:

    MPL = 1
    TM = 1
    BM = MPL

Note: If MPL = 127, Vertical Format Mode will be exited and Horizontal
Format operation will be disabled.

SVF Sequence Error Conditions: The following error conditions will
cause the SVF sequence to be rejected as invalid with a SNA sense code of
X'1005' (Parameter Error):

    TM is greater than MPL.
    BM is greater than MPL or less than TM.
    Count Field = 0.
    MPL > 127
    TM > 127
    BM > 127

Detection of an invalid SVF sequence will not change the effect of a
previously received valid SVF sequence.

Vertical Format Operations: After 7426 power on, any port that is in an
LU1 session will be in Vertical Format Mode with default values of MPL =
1, TM = 1, and BM = 1.

Vertical Format Mode will be reset upon receipt of an SVF sequence with MPL = 127. If an EBCDIC Form Feed is received when Vertical Format Mode is reset, it will be sent to the printer as an ASCII FF character (X'0C').

Receipt of a valid SVF sequence will set the Vertical Format Mode for that port in the 7426.

When in Vertical Format Mode, receipt of an EBCDIC Form Feed will cause the 7426 to transmit the appropriate number of LF characters and one CR character in order to position the print head at Column 1 of the next top margin. This same operation will be used to skip to the next top margin if the bottom margin is exceeded while printing when that port is in Vertical Format Mode.

Set Line Density (SLD) Function Description

The SLD sequence has the following format:

(SLD) (cnt) (Parm)

where:

SLD = X'2BC6'

cnt = A one-byte binary count of 1 or 2.

Parm = One-byte line density parameter.

The 7426 will ignore the SLD sequence if the count is 1 or higher. If the cnt = 0, a negative SNA response will be returned with a sense code of X'1005' (Parameter Error).

Transparent Function Description

The Transparent sequence has the following format:

(TRN) (cnt) (Byte 1)...(Byte n)

where:

TRN = X'35'

cnt = A one-byte binary count of the number of bytes to the end of the TRN sequence (not including the count byte).

Byte 1...Byte n = The transparent data. It is user-defined and is not scanned for SCS codes or translated (except for Form Feed when in Vertical Format Mode; see SVF above). The low-order seven bits will be sent directly to the ASCII device.

2-44

To enter the Transparent Mode for an indefinite count, the cnt should equal 255. When in Transparent Mode, all data received will be treated as transparent. Transparent Mode will be exited upon reception of a EBCDIC X'FF' from the host or at End of Chain.

Note that Vertical Format and Maximum Print Position settings are still in effect for data in a TRN sequence. If this is undesirable, the user should precede the TRN sequence with:

● An SVF sequence with MPL = 127 to disable both vertical and horizontal formatting, or

● An SHF sequence with MPP = 255 to disable horizontal formatting only.

LU Type 1 Usage Notes

The format setting commands should be sent prior to the data in an SNA chain. Otherwise, printing results will be unpredictable.

Whenever a format change (SHF, SVF) occurs, the appropriate synchronizing function (CR, NL, FF, or manual adjustment of paper to top margin) must be done to maintain format integrity.

When any of the Parameter Error conditions described above is detected, printing will be aborted.

An SCS control code sequence (for example, SVF or SHF) should not span data chains. If it does, the results are unpredictable.

Vertical and horizontal format mode can be turned off via commands described above. Note that SNA session control commands will not affect the format settings.

Host to ASCII Printer, LU Type 3

The 3270 Data Stream Compatibility (DSC) data stream is used to print on an ASCII printer attached to any port on the 7426 that has been defined as an LU Type 3.

The Write Control Character (WCC) command may specify either formatted (80-column only) or unformatted printing. For unformatted printing, the following control characters are supported:

NL   New Line
CR   Carriage Return
FF   Form Feed
EM   End of Message

Local Copy

Local copy printing—printing the data presently on the screen of a display terminal—may be initiated by pressing the PRINT key (or its equivalent) or by a program in the host.

Local Copy, PRINT Key Initiated

- Copying from a display to a printer on another 7426 port.

  The data on the screen of a display terminal attached to the 7426 may be copied to an ASCII printer attached to another port on the 7426 by pressing the PRINT key or its equivalent (see Figure 2-1) on the display terminal. For example, in Figure 2-9 the screens on the displays attached to 7426 ports 1 and 2 can be copied to the printer on port 3.

  The local copy printer, to be used by a particular display, is assigned during 7426 initialization. See **L** under "Initialization Worksheet Instructions" in Chapter 4 for more information.

  Between Bracket Sharing is used to intermix local copying and normal printing to the same printer.

- Copying from a display to its attached printer.

  This form of local copy can be done only on a 3102 Printer attached to a 3101 Model 2X or 837 Display Terminal. Neither the 3101 Model 1X nor 7485 Display Terminal supports this type of copy.

  The data from the screen of a 3101 Model 2X or 837 Display Terminal may be copied to a 3102 Printer attached to the 3101 by pressing the PRINT key.

  Note: The operator should make sure the 3102 has completed printing before initiating another local copy operation. When the copy is completed, the cursor is placed in the home position on the display.

  The local copy printer assignment is made during 7426 initialization by entering an 8 in the **L** field for the port to which the display terminal is assigned.

  The line speed between the 3101 display and the 3102 (3101 auxiliary interface) does not have to match the line speed between the 7426 and the 3101.

Local Copy, Program Initiated

- Copying from a display to a printer on another 7426 port.

  This operation is similar to the PRINT key initiated local copy, described above. However, this operation is initiated by a program that sets the Start Print bit in the WCC of the output data stream to the display. The data is first displayed on the screen, then copied to the assigned printer.

- Copying from a display to its attached printer.

  This form of local copy can be done only on a 3102 Printer attached to a 3101 Model 2X Display Terminal. Neither the 3101 Model 1X nor 7485 Display Terminal supports this type of local copy.

  This operation is similar to the PRINT key initiated local copy, described above. However, this operation is initiated by a program setting the Start Print bit in the WCC of the output data stream to the display.

  Note: The 3102 may still be printing from its buffer after the Operation Complete response is sent back to the program. Therefore, the program should not send another copy request until it has been notified by the operator, via a program-defined keyboard response, that printing is complete. Failure to do this may result in a meaningless printout.

Line Monitor

All data and control characters received by a 3101 Display Terminal can be printed on a 3102 Printer attached to the 3101. This operation is initiated by pressing the AUX key on the 3101.

The assigned line speed between the 3101 and 3102 must be the same as the line speed between the 7426 and 3101.

This method of printing is useful when troubleshooting a data stream, but should not be used for normal print operations since all characters received by the 3101, including control characters, are printed.

Intervention Required

The only condition that will be reported to the host regarding a printer failure or an Intervention Required condition is one that causes the printer's Data Terminal Ready (DTR) line to go inactive. This is reported to the host as a terminal power-off condition.

If the Data Terminal Ready line goes inactive while an LU Type 1 printer is printing, the 7426 emulates the 3287 CANCEL key operation—to the host—before reporting the power-off condition. Thus, an operator can cancel an unwanted printout by turning off printer power for a few moments, then on again.

Printer Output Notes

1. If a printer is busy when a local copy request is attempted, the copy request is queued, the cursor moves to the lower right corner of the screen, and the display's keyboard is locked. Pressing the device CANCEL key or its equivalent (see Figure 2-1) cancels the copy request and unlocks the keyboard.

2. Host-to-printer (LU Type 1 or LU Type 3) operations cannot be done to the 3102 attached to a 3101.

3. For more details concerning printer attachment, see the Printers section of the *3276 Control Unit Display Station Description and Programmer's Guide.*

LU1 Keyboard Support for Printers and Displays

This feature handles input from a printer or display which is in an LU1 session. The 7426 port must be initialized as a printer. An attached display should be configured for scrolling. Since the return key acts as the enter key, this feature effectively provides line-at-a-time input. The feature also contains some "ease of use" functions such as character insert and delete, cursor forward, backspace, and the view input key which causes the complete buffered input to be reprinted.

This keyboard mapping assumes a normal ASCII keyboard. Where the name of the key is not the same as the ASCII character transmitted, the character is shown in parentheses in the chart below:

Function	Key	Comments
SYS REQ	CTL e (ENQ)	Prints "SSCP" when entering SSCP mode. Prints "*" when exiting SSCP mode.
ENTER	RETURN (CR LF)	CR does enter. LF character is always ignored.
ATTN	CTL a (SOH)	
DELETE CHAR	DEL	
INSERT	ESC DEL	
RESET	CTL r (DC2)	Resets insert mode.
VIEW INPUT	CTL v (SYN)	Does CR/LF, reprints input and does another CR/LF.
CURSOR FORWARD	CTL f (ACK)	Non-destructive cursor right.
BACKSPACE	BS	Non-destructive cursor left, stops at left margin.
GRAPHICS	GRAPHICS	

Notes:

1. *Use of keys or key sequences other than those defined above is not recommended.*

2. *For echoplex type of operation, the 7426 port should be initialized as device type 4. For half-duplex terminal operation, the port should be initialized as device type 3.*

2-48

3. *Insert/delete work on an 80-column basis. Nothing is printed on insert or delete operations.*

4. *On "View Input," a CR LF will be sent to the terminal every 80 characters during the reprint.*

5. *The ATTN key (CTL a) will be accepted by the 7426 only if that 7426 LU1 session is in receive state. If accepted, the 7426 will send an expedited flow Signal command to the host.*

6. *"Enter" and "View Input" both reset Insert Mode.*

7. *If the host is printing when a CRT print key on another port is pressed, the local copy will be delayed until the printer bracket is ended.*

8. *If a local copy is printing, a host output will be rejected with an SNA negative response.*

9. *If the printer port is in Vertical Format Mode, local CRT copies and keyboard operations that cause one or more line feeds will step the current vertical line count so that the next LU1 output operation will be in sync with the current paper position.*

Switched Line Support

Switched line support allows devices to attach to a 7426 via switched lines (modems).

Switched Line with Auto-Answer/Disconnect

Switched line with auto-answer/disconnect automatically establishes the connection between a 7426 and its modem-connected display terminal when the terminal operator dials the 7426. It is the Data Set Ready signal from the modem that establishes the connection. Once the connection is made, the operator can use the display terminal to log on to the application program, do the necessary work, then log off. Following logoff, the operator can disconnect from the 7426, either manually or by entering the DLE/EOT sequence. Enter the DLE/EOT sequence by simultaneously pressing the ALT and P keys, then simultaneously pressing the ALT and D keys on a 3101 Model 1X or 2X.

If the terminal goes "on hook," the 7426 will signal "terminal disconnected" (X'0831') to the host if the terminal is in session.

Any of the four ports on the 7426 can be configured for Auto-Answer/ Disconnect during 7426 initialization by specifying Line Interface type 4 or 5. See 🅷 under "Initialization Worksheet Instructions," in Chapter 4.

Note: The 7426 does not use CCITT circuit 125, Calling Indicator. The attached modem must therefore use CCITT circuit 108.2, Data Terminal Ready.

Switched Line Manual Answer

If Line Interface type 4 or 5 is specified during 7426 initialization, switched line calls can be manually answered. Disconnect can be done either manually or by the DLE/EOT sequence described above.

Switched Line with Intercharacter Time-Out

If Line Interface type 5 is specified during 7426 initialization, the 7426 will automatically disconnect from the line if no information is sent or received within a 10-minute period. This time-out capability can be specified for either manual or auto-answer.

Chapter 3. Site Planning and Preparation

This chapter contains site planning information needed to prepare your site for the IBM 7426 Terminal Interface Unit and the peripheral devices. A sample site planning checklist (Figure 3-9) at the end of the chapter contains a sequence of tasks that should be performed. It would be useful to designate a person in your organization to be responsible for ensuring that all these tasks are accomplished.

Customer Responsibility

The customer is responsible for all aspects of installation planning and setup, which includes:

- Site and setup preparation

- Loop installation

- Planning and service of communication facilities

- Ordering, installing, and maintaining all cables required in the 7426 operation

- Receiving, unpacking, and placing the 7426 and its devices

Site Preparation

Prior to the arrival of the 7426 Terminal Interface Unit at the designated site, a floor plan should be generated and all preliminary installation work completed. The information in this chapter covers host attachment requirements, device attachment cables, 7426 specifications, and environment requirements that will help you prepare the floor plan.

The floor plan should provide the following information:

1. The location of the 7426 should be shown.

2. The location of all attached devices should be shown. Labels on each device and on the ends of each cable are recommended to identify the device and the 7426 port to which the cable is assigned. See the 7426 Cable Connection Worksheet in Foldout 1.

3. A 7426-01 plan should show the location of the loop station connector. See the *IBM Multiuse Communications Loop Planning and Installation Guide* for information on physical planning for the loop.

4. A 7426-02 plan should show the location of the modem to be used in connecting to a host over a public communication facility or the location of the cable if directly connected to the host.

5. All required cables to the attached devices should be shown, including the proper routing information. Affix labels to each end of the cables, on installation, to designate the correct 7426 port locations.

6. The location of power receptacles should be shown for each attaching device, modem, and the 7426.

7. The 3101 or 7485 to be used for initialization should be clearly identified; see Chapter 4, "Initializing the 7426." If a different device is to be attached to port 0 after initialization, it should be noted.

In addition to the floor plan, the 7426 site should be provided with complete instructions for setting up each device. For 3101 setup information, see the *IBM 3101 Display Terminal Description;* for 7485 information, *IBM 7485 Display Terminal Description.*

See Chapter 4 for the necessary 3101 switch settings to initialize the 7426. These switch settings may be changed, if necessary, after initialization.

All device installation, setup, cable installation, labeling, power installation, and modem or loop installation should be completed before your 7426 arrives. The person performing customer setup (CSU) will need a copy of the floor plan and Foldout 1 from this manual to complete the 7426 CSU properly. It would be desirable to have completed installation of:

1. Either the 7426 microcode diskette on an 8100 system, or

2. The microcode tape on a 43XX, S/370, or 30XX system.

Refer to Figure 3-1 for an overview of the host, 7426, and the peripheral devices.

Relocation: If you move the 7426 to another location, use the original container to pack the unit. If necessary, you may order a container, PN 8545764.

Test Plugs: Test plugs are sent with each 7426. You can order replacements as follows:

● For Model 1, which uses three test plugs, PNs 7389282, 2720166, and 2720171.

● For Model 2, which uses two test plugs, PNs 2720171 and 2720166.

Test plugs are used on the 7426 port connectors and on the ends of communication cables during setup procedures or problem determination.
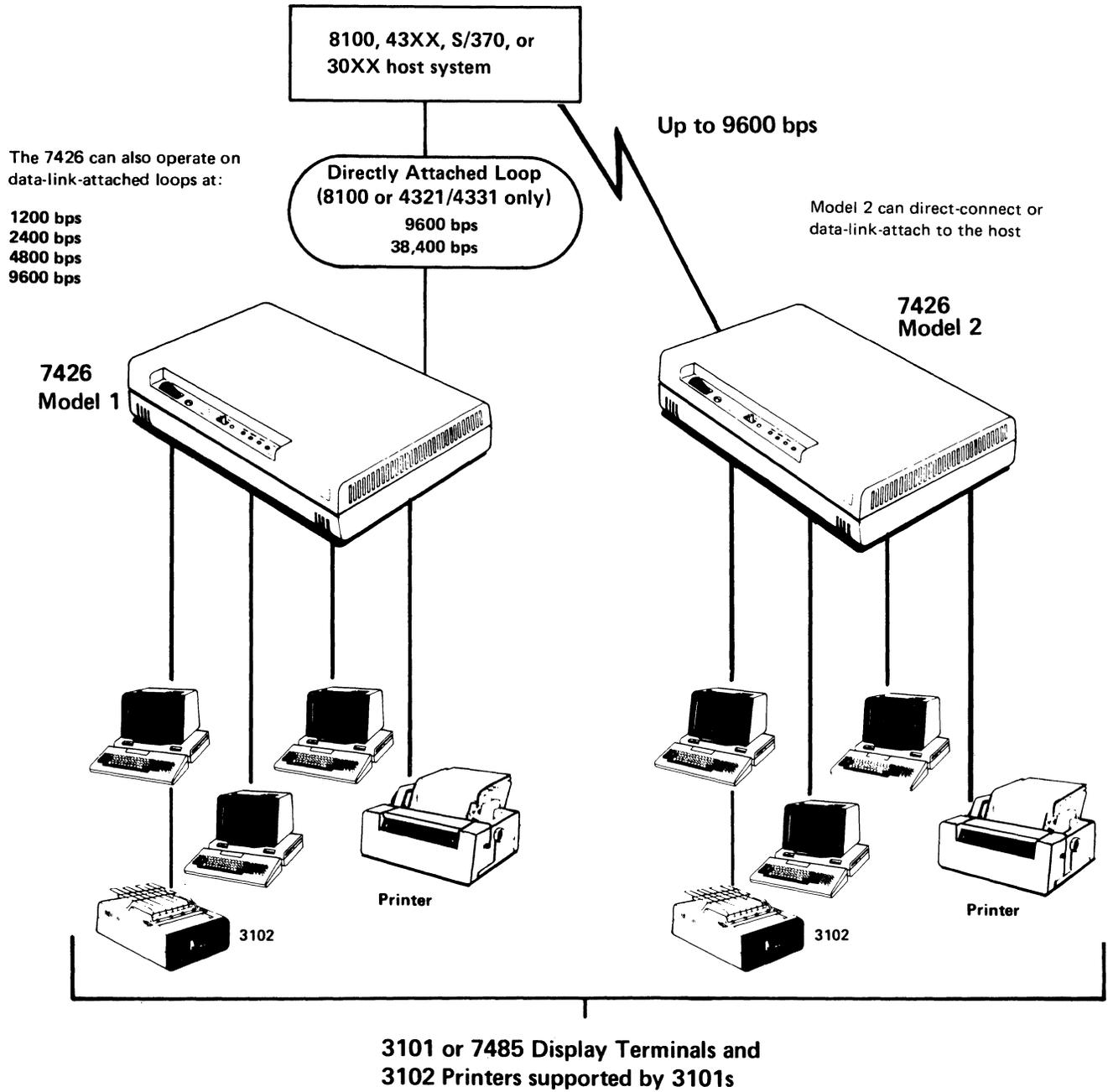
Figure 3-1. Overview of Host, 7426 Terminal Interface Unit, and Peripheral Devices

7426 Attachment Considerations

The 7426 has a permanently attached 1.8 m (6.0 ft) communication cable.
The 7426 Model 1 has a loop cable connector (see Figure 3-2). Model 2 has
a 25-pin, EIA-style connector (see Figure 3-3).

The 7426 Model 1 connects to an 8100 or 4321/4331 system through a
communication loop. The *IBM Multiuse Communications Loop Planning
and Installation Guide* provides the required attachment information.
Model 2 attaches to a host system through a direct-connect cable or
remotely through a modem.
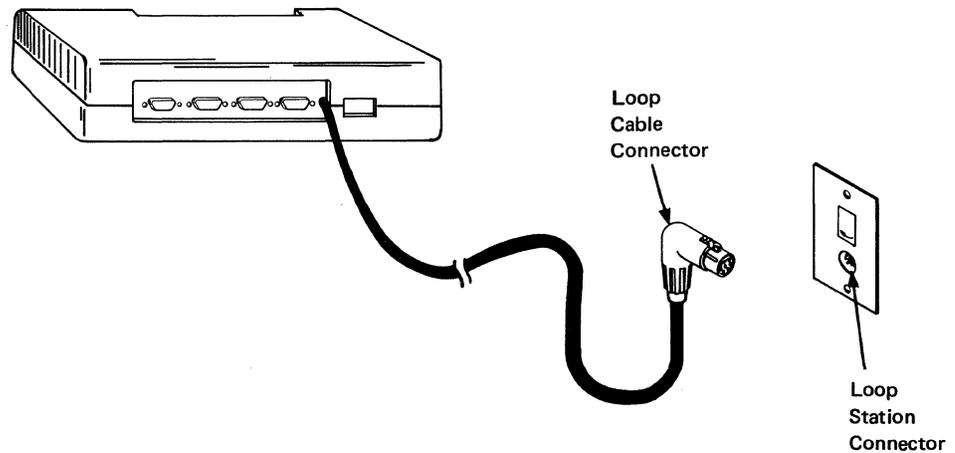
Figure 3-2. 7426 Model 1 with Loop Station Connector
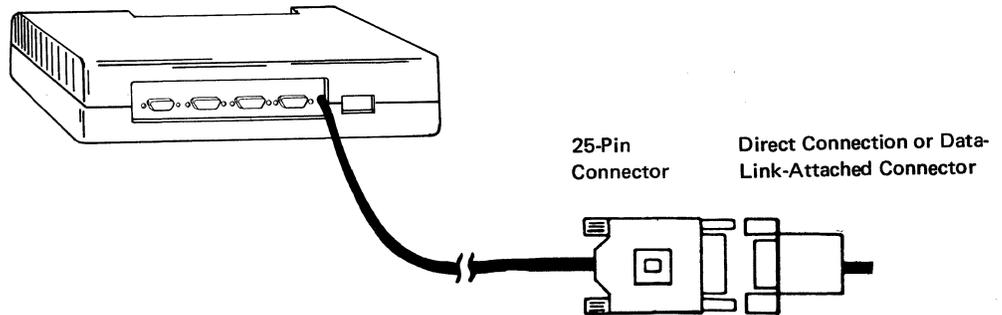
Figure 3-3. 7426 Model 2 with a Direct Connection or Modem Attachment

Device Attachment over Communication Facilities

Devices attached to the 7426 may be located remotely and connected over communication facilities (see Figure 3-4). The 7426 provides an EIA RS-232-C interface which will support an asynchronous modem (type 103J, 212A, or equivalent) operating in full duplex mode. Appendix A describes the 7426 EIA/CCITT communication interface supported. Private-line or switched-line support with automatic or manual answer is also provided.

For switched lines at 300 bps, use 103J type modems; for switched lines at 1200 bps, use 212A type modems.

Since initialization may be required, a 3101, an IBM Personal Computer operating in the 3101 emulation mode, or a 7485 must be available. These would be attached to port 0 via local attachment or private line modem, operating at 9600 bps.

The 7426 does not implement the Ring Indicator interface line. However, it will keep Data Terminal Ready active whenever the 7426 is ready to accept a call. Upon receiving a call the modem must answer and signal the 7426 that it is ready to communicate with the Data Set Ready line.
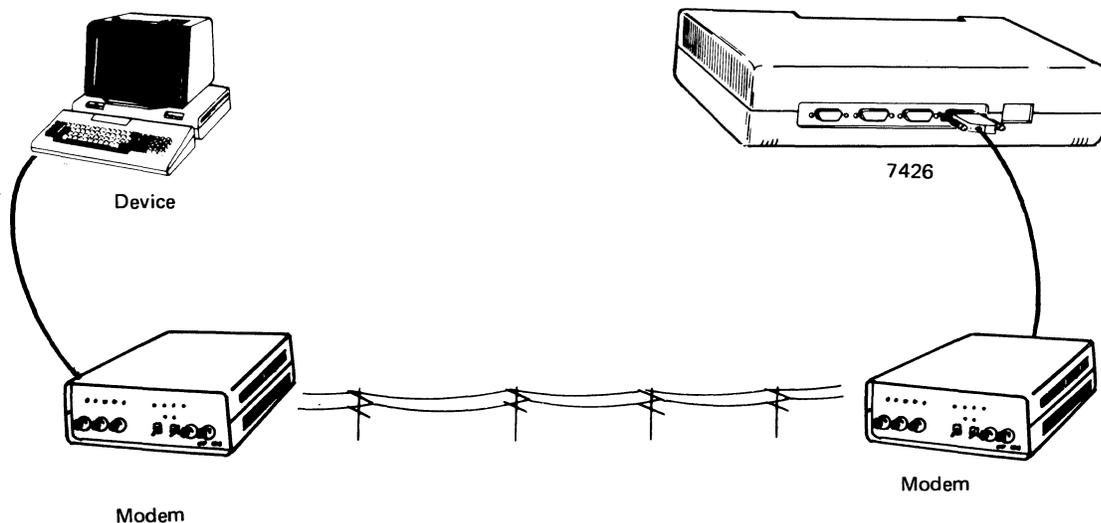
Figure 3-4. Communication Facilities between a Device and the 7426

Device Attachment Cables

Five cables are available for attaching devices to the 7426. These cables must be labeled during installation. (See item 2 under "Site Preparation" at the start of this chapter.) One of the following cables must be available between port 0 of the 7426 and the initialization display terminal:

- Cable 2720173 (RS-232-C) or 2720150 (RS-422-A) for the 3101

- Cable 2720150 for the 7485

  or

- Cable 6235645 for the IBM Personal Computer

None of the five cables are intended for outdoor or below-ground installation.

Refer to Figure 3-5 to order these cables through your IBM marketing representative. Cable specifications and communication pin connections are given in Appendix A. For non-IBM devices, use the specifications for those devices.

Terminal to Be Connected	Cable Assembly Part No.	Maximum Length[1,2]	Type of Connector	Interface[3]
1 3101	2720173	12 m (40 ft)	25-pin Male	EIA RS-232-C Direct Connection
2 3101/7485	2720150	1219 m (4000 ft)	25-pin Male	EIA RS-422-A Direct Connection
3 Modem	2720174	12 m (40 ft)	25-pin Male	EIA RS-232-C Modem Connection
4 Modem	2722052	Stub cable	25-pin Male	Japan only for attaching cable 2720174
5 4975 with ASCII RPQ	2720399	12 m (40 ft)	25-pin Female	EIA RS-232-C Direct Connection
6 IBM PC	6235645	12m (40 ft)	25-pin Female	EIA RS-232-C Direct Connection
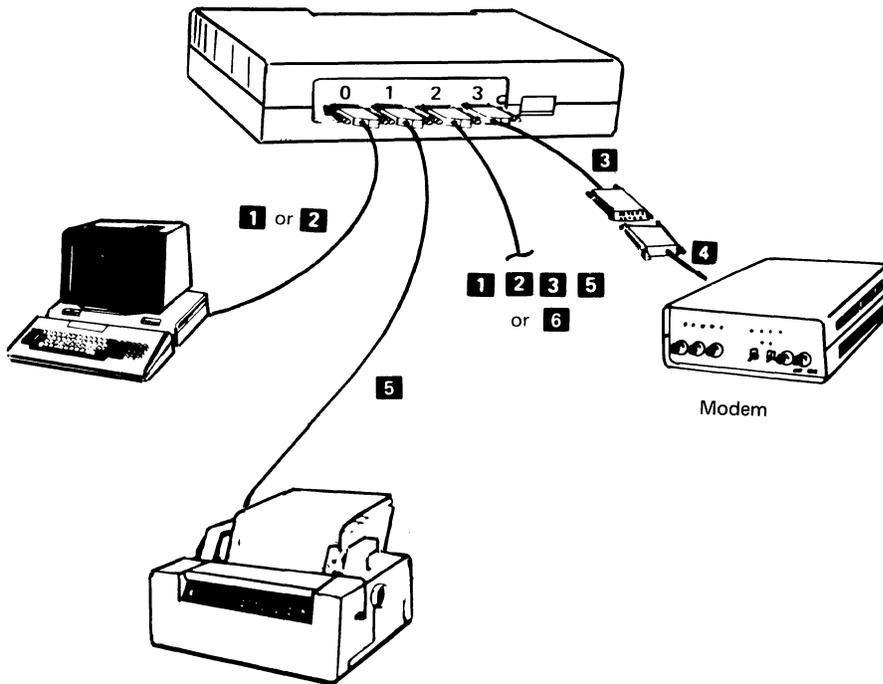
Notes:

1. Specify the desired length when ordering.

2. Maximum cable length between the 7426 and a device. If the device you plan to attach to the 7426 has its own cable, the length of the device cable must be considered in the maximum cable length.

3. Electronic Industries Association (EIA) Interface is shown in Appendix A.

Figure 3-5. Chart for Ordering Device Cables

7426 Physical and Electrical Specifications

Physical Specifications

Dimensions:

7426
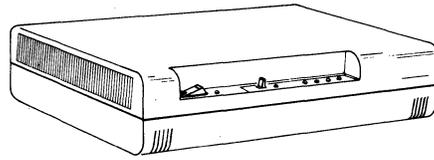
Front

	Front	Side	Height
mm	490	356	120
(inches)	(19.3)	(14.0)	(4.7)

Packing Box

	Front	Side	Height
mm	660	530	270
(inches)	(26.0)	(20.8)	(10.5)

Weight:

Unpacked	5.8 kg
	(12.8 lb)
Packed	9.1 kg
	(19.9 lb)

Heat Output:

watts	35
(BTU/hr)	(120)

Airflow:

Forced air 0.85 m³/min (30 cfm)

Operating Clearances:

The 7426 requires clearances for cabling and airflow as follows:

Rear   - 100 mm (3.9 in.)
Top   - 25 mm (1.0 in.)
Right   - 25 mm (1.0 in.)
Left   - 25 mm (1.0 in.)
Bottom - This area must be unobstructed to allow free airflow.

Electrical Specifications

VA	0.09 kVA
Phase	1
Plug Type	See Figure 3-7.
Power Cord Length	1.8 m (6.0 ft) for the U.S. and Canada 4.3 m (14.0 ft) for all other countries
Voltage	See Figure 3-6.
Branch Circuit	See Figure 3-6.

	Voltage			Branch Circuit Amperage (A)		
		Permissible Variance		U.S.	Americas	Europe, Middle East,
Frequency (Hz)	Nominal	Minimum	Maximum	and Canada	and Far East	and Africa
50	100	90	110	NA	10	NA
	110	96.5	119	NA	10	NA
	220	193	238	NA	NA	10
	240	210	259	NA	NA	10
60	100	90	110	NA	10	NA
	110	96.5	119	NA	10	NA
	120	104	127	15	10	NA
	127	111	137	NA	NA	NA
	200-208	180	220	NA	NA	10
	220	193	238	NA	10	NA
	240	208	254	NA	10	NA

NA = Not available

Figure 3-6. Power Requirements

Power Plugs

The 7426 has a removable power cord: 1.8 m (6.0 ft) in the U.S. and Canada; 4.3 m (14.0 ft) in all other countries. Attached will be the plug specified in Figure 3-7; the letters in the Voltage Range columns refer to plugs in Figure 3-8. The customer must supply the appropriate receptacle.

Branch Circuits and Grounding

The individual branch circuit should have suitable circuit protection in accordance with the local and national electrical codes. Each protector should be labeled to identify the receptacle it controls.

The 7426 power cord has a green or green/yellow, dedicated, insulated grounding conductor. This is not neutral. For safe operation, the branch circuit you provide for the 7426 must have an equipment grounding conductor. This grounding conductor must be connected either to the electrical service ground or to a suitable building ground.

	Voltage Range			Voltage Range	
Country	125V	250V	Country	125V	250V
Canada	**E**		Japan	**Q**	
Denmark		**G**	Saudi Arabia		**L**
France		**A**	South Africa		**J**
Germany		**A**	Spain		**A**
Ireland		**L**	Switzerland		**K**
Israel		**H**	United Kingdom		**L**
Italy		**N**	United States	**E**	

Notes:

1. *Asian and Latin American countries not listed will be shipped with plug* **E** *attached.*

2. *Europe, Middle East, and African countries not listed will be shipped with the most commonly used country plug attached.*

Figure   3-7.   Power-Plug Usage Chart

Pin View of Plug		Pin View of Plug	
A 250V 16A			
E 125V 15A NEMA 5-15P		**K** 250V 10A	
G 250V 10A		**L** 250V 13A	
H 250V 6-16A		**N** 250V 16A	
J 250V 15A		**Q** 250V/10A Locking 125V/15A	
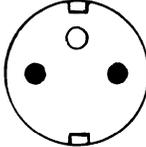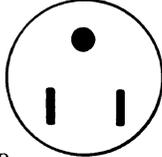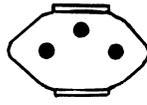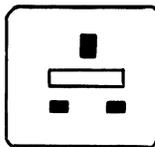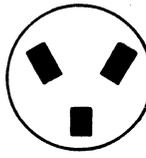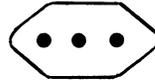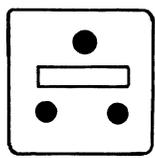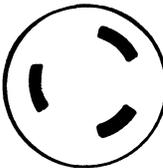
Figure 3-8. Power-Plug Diagrams

CAUTION

The power cord plug is approved for use with these units and meets the relevant testing laboratory or country/test-house standards. For the user's safety, the plug must be connected to a properly wired and grounded receptacle. An improperly wired receptacle could place a hazardous voltage on accessible metal parts. The customer is responsible for receptacle wiring.

Lightning Protection

Power Lines: The customer should install lightning protection on the customer (secondary) side of the power source if:

- The utility company installs lightning protectors on the primary source.
- The area is subject to electrical storms or power-line surges.

The customer must decide whether lightning protection is needed on the power distribution system, must select the required service protection, and must have it installed properly.

Communication Lines: The customer should ensure that lightning protection is provided on the communication common-carrier lines.

Data Loop Lines: Lightning Protection is covered in *Multiuse Communications Loop Planning and Installation Guide.*

Environmental Requirements

Operating Environment

The 7426 is designed to operate under conditions typical of most commercial business offices. If you plan to locate the 7426 in a non-typical environment (where airborne particles, vapors, or gases can subject the units to contamination), contact your IBM marketing representative for additional information or assistance.

Operating Environment:

Temperature	10°C to 40.6°C (50°F to 105°F)
Relative Humidity	8% to 80%
Maximum Wet Bulb	26.7°C (80°F)

Nonoperating Environment:

Temperature	10°C to 51.8°C (50°F to 125°F)
Relative Humidity	8% to 80%
Maximum Wet Bulb	26.7°C (80°F)

Storage Environment:

Temperature	0.6°C to 60°C (33°F to 140°F)
Relative Humidity	5% to 80%
Maximum Wet Bulb	29.4°C (85°F)

Shipping Environment:

Temperature	-40°C to 60°C (-40°F to 140°F)
Relative Humidity	5% to 100%
Maximum Wet Bulb	29.4°C (85°F)

Electromagnetic Compatibility

In some instances, the site chosen for setup may have ambient electromagnetic fields. These fields can result from nearby radio-frequency sources, such as transmitting antennas (AM, FM, television, and two-way radios), radar installations, or industrial equipment (radio-frequency induction heaters, arc welders, and insulation testers). Electrical equipment power distribution lines can generate magnetic fields that cause interference.

Other magnetic sources include transformers, distribution panels, rotating machinery, and electric floor heaters. To identify the location of such magnetic sources, check with your building engineer. As a precautionary measure, place the 7426 as far as possible from any magnetic sources.

Electrostatic Discharge

Electrostatic charges build up as a result of low humidity or movement on:

- People, carts, or furniture with high-resistant covering
- People in contact with furniture coverings such as plastic seats
- Carpeting without antistatic properties

Discharge of these charges to the unit, or to the furniture on which the unit sits, may cause interference with the operation of the 7426 and discomfort to the operating personnel.

Product and Environmental Safety

Safety is a major consideration in the design of IBM products. Environmental safety is the responsibility of the customer. The following factors should be considered:

- Emergency disconnection of power to the branch circuits serving the equipment.
- Operating clearances (see "Physical Specifications").
- Proper wiring and grounding of branch circuits (see "Branch Circuits and Grounding").
- Lightning protection for power and signal lines.

The installation must meet local and national requirements.

Site Planning Checklist

The planning checklist (Figure 3-9) is provided as a sample plan. The plan may have to be modified to accommodate your unique configuration. Make sure that the plan complies with "Environmental Requirements" described above.

Weeks before Delivery	Schedule Date	Tasks
16		Designate a person in your organization to be responsible for all phases of the installation, and review this checklist with that person.
		If environmental problems are evident: • Electromagnetic • Electrostatic • Gaseous • Particulates review the site with your IBM representative.
		Order and arrange for installation of communication cables from the 7426 to the devices and the electrical wiring.
		Identify and schedule data communication needs (if appropriate). Identify the source for communication facilities.
		Order related manuals.
		Determine whether changes to existing programs are required. If you have a DPCX system and are planning to use outboard formatting in the 7426, place the FORMSTG macro in the DPCX macro library.
		Determine whether changes to the host units are required. Schedule if necessary.
		Order spare IBM 7426 units as suggested.
14		Prepare the site plan for each 7426 location. Show the modems, loop station connectors (as appropriate), the 7426, the devices, and the power receptacles.
		Review the overall plan status with your IBM representative.
12		Define a training program for your employees.
10		Prepare the 7426 Initialization Worksheet.
		Review the progress of the plan. Resolve any conflicts of schedules, order, or configurations.
8		Review the installation plan, to define any exposure to schedule, with your IBM representative.
6		Distribute the appropriate manuals to the 7426 installation sites.
		Ship the completed Initialization Worksheet and floor plan worksheet to the 7426 installation sites.
		Start employee training.
4		Confirm the arrival of all cables.
		Install and label communication cables and power receptacles.
2		Complete the checkout of modems, cables, and power; complete continuity and polarity tests of communication cables, power receptacles. Review safety considerations.
		Complete any required change to programs or host units.
		Complete site preparations.
		Install TP lines and modems.
		Check with the host site that the 7426 Downstream Load diskette or tape has been received and installed. ▌1▐
Arrival of the units		Move the unit(s) to the site location. Use the unpacking instructions attached to the shipping carton.
		Use the Setup Instructions that are inside the carton.
		Provide a place to store the 7426 shipping container and packing material.

▌1▐ In Europe, the Middle East, and Africa, the diskette or tape is shipped with the 7426. The customer must send it to the host site.

Figure 3-9. Planning Checklist, Sample Plan

3-14

Chapter 4. Initializing the 7426

Initialization data must be entered into the 7426 to customize the unit to your system configuration. The data is entered through a 3101, an IBM Personal Computer (emulating a 3101), or a 7485-531 Display Terminal through port 0 of a 7426 either directly or through private line at a speed of 9600 bps. This data establishes the parameters for communication between the host system and the devices attached to the 7426.

The display terminal should be powered on before beginning the initialization procedure. If it is a 3101-837, set the TEST/NORMAL switch momentarily to TEST before starting.

While 7426 power is off, the initialization data is maintained in the 7426 by a long-life battery that is not customer replaceable.

When the IBM Personal Computer, operating in 3101 emulation mode, is used to initialize the 7426, it in turn is initialized by using the terminal specification file named *IBM7426.SET* with the line speed changed to 9600 bps. The ENTER key function on the IBM Personal Computer is achieved by pressing the CTRL and d keys simultaneously.

7426 Setup Worksheets

The customer setup personnel will initialize the 7426 with the information supplied by the site planner on Foldout 1 (at the back of this manual). This foldout contains the following:

- 7426 Cable Connection Worksheet
- 3101 Setup Switch Setting Checklist
- Initialization Worksheet

3101 Initialization Switch Settings

The 3101 Setup Switch-Setting Checklist in Foldout 1 shows 32 switches located on the 3101 terminal; 31 of the switches are premarked for their proper initialization position.

The site planner must mark switch 3 of group 1 on the 3101 Setup Switch-Setting Checklist to designate the EIA interface on port 0. The diagram below is an example of the switches of group 1 and the switch position to select either RS-232-C or RS-422-A.

Group 1 Switches

RS-232-C (up)

		3					

RS-422-A (down)
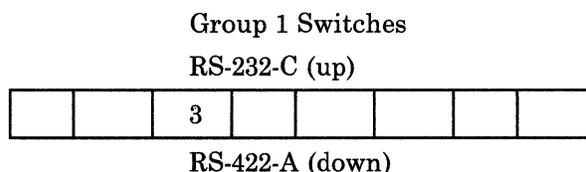
Initialization Worksheet

The site planner must complete the Initialization Worksheet in Foldout 1, using the "Initialization Worksheet Instructions" in this chapter. The entire foldout must then be sent to the site for use by the setup personnel.

3101 Switch Options

The preceding information is presented to simplify the task of the setup personnel, who may not be technical persons. The following information allows you to customize the 3101 for a particular operation.

If you have assigned 3101s to port 0, 1, 2, or 3, see Figure 4-1 for the proper 3101 switch settings for operating a 3101 display attached to a 7426. The *IBM 3101 Display Terminal Description* contains instructions for the 3101 setup and a Switch Setting Checklist that should be filled out for each 3101.

Switch	Mandatory Position	Suggested Position	Note
CHAR/BLOCK	CHAR	—	
HDX/FDX	FDX	—	
232C/422	—	—	**1**
PRTS/CRTS	PRTS	—	
REV CH	OFF	—	
TURN AROUND	ETX	—	
DUAL/MONO	DUAL	—	
STOP1/STOP2	—	STOP 1	**2**
PARITY		ODD	**2**
SEND LINE	—	—	**3**
NULL SUPP	—	—	**3**
TIME FILL	—	—	**3**
AUTO NL	ON	—	
AUTO LF	OFF	—	
CR/CR.LF	CR.LF	—	
SCROLL	OFF	—	
REV VIDEO	—	—	**4**
BLINK CURSOR	—	—	**4**
I/O RATE MAIN	—	9600	**2 5**
I/O RATE AUX	—	—	**5 6**

Notes:

1 RS-422-A may be chosen for 3101-13, 3101-23, or 3101-837; make sure that cable PN 2720150 has been ordered.

2 This suggested setting is mandatory when the 3101 is used for initializing the 7426.

3 Functions designated by these switches have no effect on the 7426 operation.

4 Customer preference; these are 3101 local options.

5 If a printer is attached to the 3101 Auxiliary Interface for line monitor operations, both data rate selections should match the printer.

6 When a printer is attached to a 3101 Model 2X auxiliary interface to perform copy operations, set I/O RATE AUX to match the print speed. Note that the rate may differ from that of I/O RATE MAIN.

Figure 4-1. 3101 Switch Settings for 7426-Attached 3101 Display Terminal

Initialization Worksheet Instructions

The following 3101 or 7485 display format contains fields that are represented by the characters (A) through (M). Using the Initialization Worksheet in Foldout 1 (at the back of the manual), place a number in the field areas to represent the initialization data required. A separate worksheet should be filled out for each 7426 to be installed.

Field (A) is a machine response to the person who is perorming the initialization of the 7426. Field (A) will display a 1 for a 7426 that has not been previously initialized. This field will change to a 2 when all fields containing valid data have been entered. It will change to 9 if an invalid (undefined) entry has been made. For initialization of the 3101-837, the Yale IUP 3101, and other ASCII Display Terminals see appendixes E, G, and F respectively. Step-by-step procedures for entering this data are contained in the *IBM 7426 Terminal Interface Unit Customer Setup, Customer Initialization, Customer Problem Analysis and Resolution*, which is shipped with the 7426.

Display Output Areas

IBM 7426-01
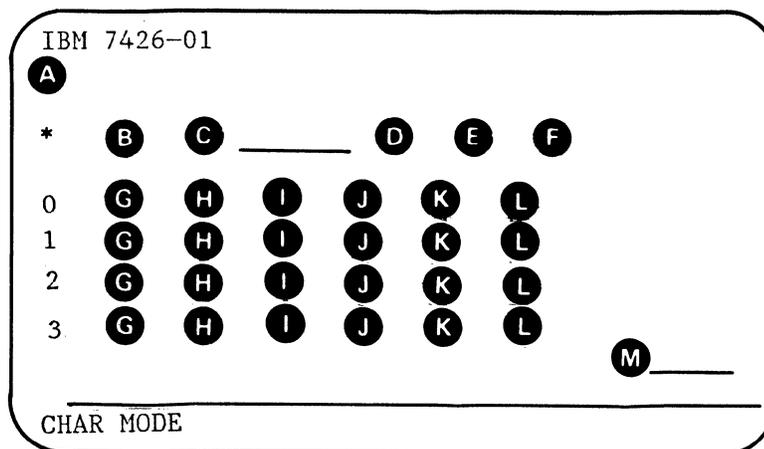
The letter field identifiers appear here to show the field positions. The 7426 uses an underscore for each field in the attached display.

CHAR MODE

(A) Output Message Field (ignore this field on worksheet)

1 Input (fill in all blanks).

2 Initialization data valid. (Changes may still be made.)

3 Requires operator action at the 7426 Init switch to complete initialization.

9 Error (re-input corrections).

In the first column, 0, 1, 2, and 3 identify the row for port: 0, 1, 2, and 3 respectively; * identifies the row for host system entries.

Fill out a copy of the Initialization Worksheet in Foldout 1 for each attached 7426 as follows:

B SDLC Station Address

Enter the desired hexadecimal SDLC station address 01 through FE. This entry must not duplicate the station address of another device on the same loop or communication line.

C Data Set Name

Enter the required data set name for the 7426 microcode as found on the diskette or DTR instructions. See Appendix B for diskette information or Appendix C for tape information.

D 3101 Highlight Character

Enter any alphanumeric or graphic character. This character will be displayed at the beginning and end of a highlighted field on a 3101 Model 1X or 2X. This entry does not affect the highlight function on a 7485 or 3101-837. No entry is required if highlighting is not used on a 3101 or if no 3101s are attached.

E (For Model 1) Loop Carrier Speed

Enter 1 or 2 for the carrier speed of the 8100 or 4321/4331 loop to which the 7426-1 will attach, as follows:

1 for a 38,400-bps directly attached loop
2 for a 9600-bps directly attached or data-link-attached loop

E (For Model 2) Line Type for Data Link Attachment

Enter 2, 3, or 4 for the type of communication line to which the 7426-2 will attach. A modem providing a communication clock up to 9600 bps is required except when directly connected to a host or a communications controller:

2 Conditional Request to Send (4-wire multipoint)
3 Permanent Request to Send (4-wire point-to-point or Direct Connect)
4 Conditional Request to Send with pad characters for synchronization (2-wire or 4-wire multipoint)

F (For Model 1) Loop Data Speed

Enter an integer (1 through 6) for the data speed of the 8100 or 4321/4331 loop to which the 7426 will attach, as follows:

1 for a 38,400-bps directly attached loop
2 RESERVED
3 for a 9600-bps directly attached loop,
   or a data-link-attached loop operating at 9600 bps
4 for a data-link-attached loop operating at 4800 bps
5 for a data-link-attached loop operating at 2400 bps
6 for a data-link-attached loop operating at 1200 bps

F (For Model 2) Modem Data Encoding

Enter 1 or 2 for the data encoding type required by your modem. Selection of NRZI or NRZ must match the selection used in the host system, as follows:

1 NRZI nonreturn to zero (inverted)
2 NRZ nonreturn to zero

G Attached Device Class

Enter an integer (0 through 5) for the class of device attached to each port, as follows:

0 Port is not used (items **H** through **L** not required)
1 3101 Model 1X or 2X Display or the IBM Personal Computer operating in 3101 emulation mode
2 7485 Display
3 Printer (any inbound keystrokes are not echoed)
4 Printer (any inbound keystrokes are echoed)
5 3101-837, Canadian-French 3101, or Katakana 3101 (the appropriate 7426 microcode data set must be in the host, and the name must be in Field **C** above).

H Line Interface

Enter an integer (1 through 5) for the line interface type:

1 EIA RS-232-C (directly connected)
2 EIA RS-422-A (directly connected 3101 Model 13, 23, or 837; or 7485)
3 EIA RS-232-C (private line modem-connected)
4 EIA RS-232-C (switched line)
5 EIA RS-232-C (switched line with 10-minute intercharacter time-out)

I Parity and Number of Transmitted Stop Bits

Enter an integer (0 through 3) for the type of parity required by the attaching device and the required number of stop bits for each used port:

0 Even parity/2 stop bits
1 Odd parity/2 stop bits
2 Even parity/1 stop bit
3 Odd parity/1 stop bit (use for a 7485)

J Port Speed

Enter an integer (1 through 8) for the required port speed of each port used, as required by the attaching device. No entry is required on an unused port. For remote attachment on communication facilities, use the communication line speed:

1 9600 bps (Use for a 7485)
2 4800 bps
3 2400 bps
4 1200 bps
5   600 bps

6   300 bps
7   150 bps
8   110 bps

(K) 3270 Enter Key

The 7426 emulation of the 3276 permits the 3101 Model 1X or 2X
operator to use the Alternate and d keys, the CR LF key, or the
BACKSPACE key to provide the function of a 3276 ENTER key. Enter
an integer (1, 2, or 3) for the enter operation desired for all 3101 Model
1X or 2X display ports. No entry is required on printer ports or for a
7485 display. For a 3101-837, enter a 1.

1   Alternate and d keys
2   (CR LF) New Line
3   Backspace

(L) (For a Display) Printer Assignment

Enter an integer (0–3, 8, or 9) for the port address of the printer to be
used on a full-screen copy. Multiple displays may share the same
printer. No entry is required on printer ports.

0   through 3 indicates the printer port number
8   for auxiliary printer support
9   if display is not to be assigned to a printer.

(L) (For a TTY 33/35 Compatible Printer) Carriage Return Idle Character

Time must be consumed with idle characters while the carriage is
returning for a new line. This procedure inserts idle characters to
prevent loss of information.

The following mathematical formula should be discussed with the sales
person for the printer. Only that person would know the number of idle
characters needed. If no idle characters are required, or if the printer
uses XON/XOFF or Clear to Send for synchronization, enter 0.
Otherwise use the following formula to calculate the **(L)** field value:

$$\frac{\text{Number of printer characters per line}}{\text{Number of idle characters required minus 3}} = \text{Quotient.}$$

Round the quotient to the next-lower integer. If the quotient is
greater than 9, place 9 in the **(L)** field.

$$\text{Example:} \quad \frac{120}{20\text{-}3} = \frac{120}{17} = 7\frac{1}{17} = 7 \quad (\text{7 would be placed in } \textbf{(L)}$$

4-6

M Japan NTT Use

This field must be left blank except for use during customer installation on an NTT facility in Japan. This field permits the operator to set the host RS-232-C and port RS-232-C interface lines to their high and low states for measurement by an NTT inspector. For instructions when using this field, see *IBM 7426 Terminal Interface Unit Customer Setup, Customer Initialization, Customer Problem Analysis and Resolution.*

Appendix A. Communication Interface

This appendix describes the operation, connector and cable specifications, line definitions, and electrical specifications of the EIA/CCITT interfaces.

EIA/CCITT Operation

The EIA/CCITT interface has two designations: EIA RS-232-C and CCITT V.24/V.28. Each designation identifies a communication interface standard (EIA RS-232-C) or a recommendation (CCITT V.24/V.28). The standard and the recommendation are in agreement upon the electrical characteristics of the drivers and receivers for the communication interface. The designation used depends upon the country in which the 7426 is located.

The EIA RS-232-C designation is used only in the U.S.A. and Canada. The CCITT V.24/V.28 designation is used elsewhere.

The EIA/CCITT interface provides drivers and receivers that have the electrical characteristics required by the EIA standard and by the CCITT recommendations.

Figures A-1 through A-4 show four EIA/CCITT interfaces that operate in asynchronous mode, up to 9600 bps. They connect the 7426 Model 2 to a modem or to 3101/7485 display units.

EIA RS-422-A Operation

The 7426 also has the capability of direct connection to the 3101 Models 13, 23, and 837 or of connection to the 7485-531 through a special interface using receivers and drivers that meet standard EIA RS-422-A.

Connector and Cable Specifications

The 7426 Model 2 has a 1.8-m (6.0-ft) communication cable that terminates with a 25-pin male connector. The cable is not removable. See Figure A-1.

A 12.1-m (40.0-ft) maximum length cable is available between the 7426 terminal port and a modem using an EIA RS-232-C interface. See Figure A-2.

A 12.1-m (40.0-ft) maximum length cable is available between the 7426 and a 3101, using an EIA RS-232-C interface. See Figure A-3.

A 12.1-m (40.0-ft) maximum length cable is available between the 7426 and a IBM 4975 printer, using an EIA RS-232-C interface. See Figure A-4.

A 1219-m (4000-ft) maximum length cable is available between the 7426 and a 3101 or 7485, using an EIA RS-422-A interface. See Figure A-5.

A 12.1-m (40.0-ft) maximum length cable is available between the 7426 and an IBM Personal Computer using an EIA-RS-232-C interface. See Figure A-6.

7426 Cable
(I/O Connector
Number 4)

DCE
Connector

Signal	Pin
+ Data Terminal Ready	20
+ Request to Send	4
- Transmit Data	2
+ Test Clock	24
+ Data Set Ready	6
+ Clear to Send	5
+ Receive Signal Detect	8
- Receive Data	3
+ Transmit Clock	15
+ Receive Clock	17
Signal Ground	7
Protective Ground	1

EIA/CCITT
Interface

```
            1  2  3  4  5  6  7  8  9  10 11 12 13
            ●  ●  ●  ●  ●  ●  ●  ●  ○  ○  ○  ○  ○

● Pins Used    ○  ●  ○  ●  ○  ○  ●  ○  ○  ○  ●  ○
              14 15 16 17 18 19 20 21 22 23 24 25
```

(Male)
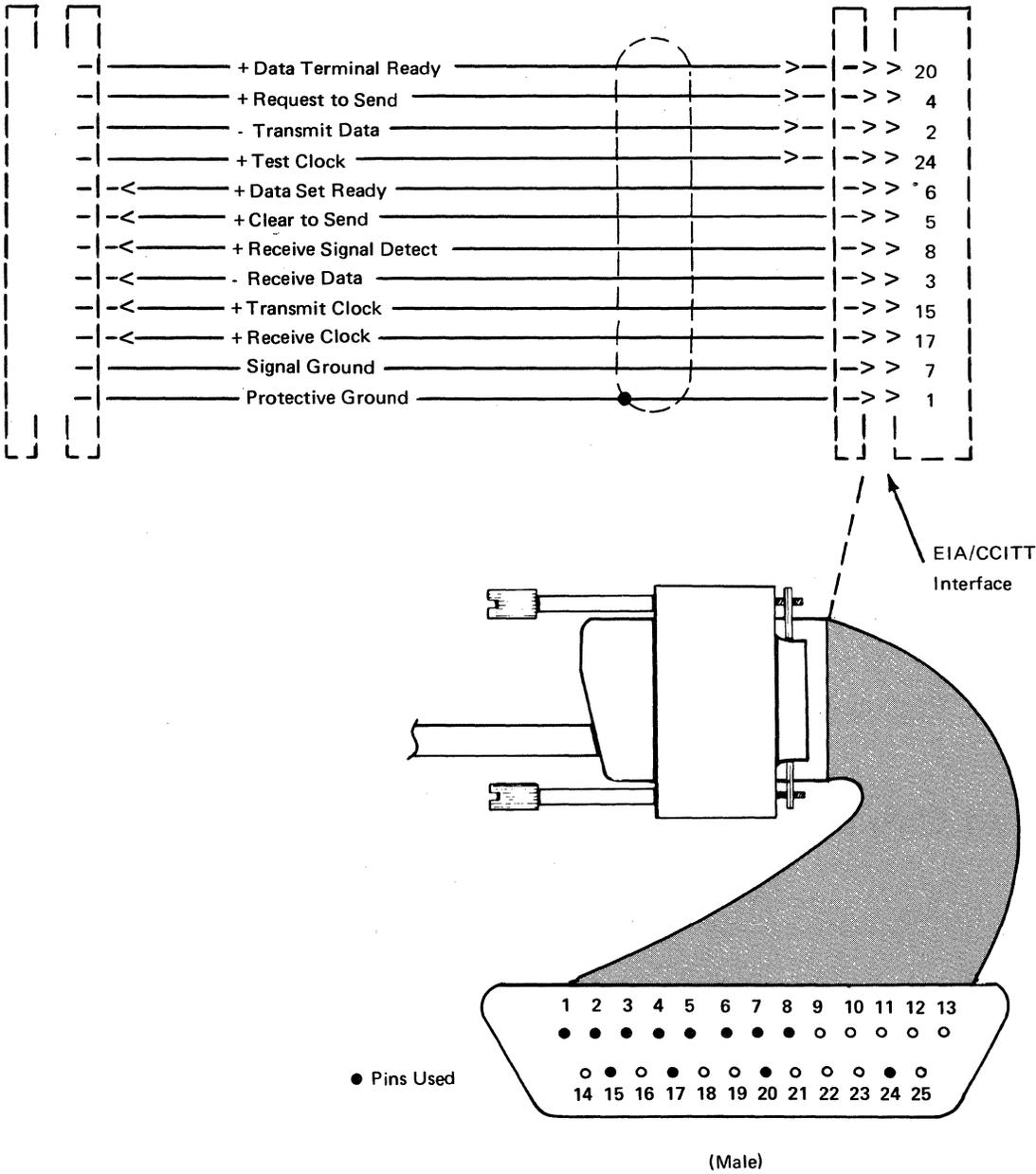
Figure   A-1.   EIA RS-232-C/CCITT V.24 Interface, 7426 Model 2 Permanently Attached Cable

```
7426 I/O                                                              Modem
Connector                                                            Connector

| 20  < <—|——————— + Data Terminal Ready* ————————————( )————————————>-|—> > 20 |
|  4  < <—|——————— + Request to Send* ———————————————————|  |——————————>-|—> >  4 |
|  2  < <—|——————— - Transmit Data* ————————————————————————————————————>-|—> >  2 |
|  6  < <—|—<————— + Data Set Ready* ———————————————————|  |——————————————|—> >  6 |
|  5  < <—|—<————— + Clear to Send* —————————————————————————————————————|—> >  5 |
|  8  < <—|—<——— + Receive Signal Detect* ——————————————————————————————|—> >  8 |
|  3  < <—|—<——— - Receive Data* ——————————————————————|  |——————————————|—> >  3 |
|  7  < <—|——————— Signal Ground ——————————————————————( )————————————————|—> >  7 |
|  1  < <—|——————— Protective Ground ———————————————●————————————————————|—> >    |
| 19  < <—|—>¬
| 15  < <—|—<┘     * Shielded conductor with shield connected to
| 25  < <—|—>¬       signal ground (pin 7) at both ends of the cable.
| 17  < <—|—<┘       This shield must be isolated from the outer
                    shield (protective ground) of the cable.
```

Red Label

White Label

```
    1  2  3  4  5  6  7  8  9  10 11 12 13            1  2  3  4  5  6  7  8  9  10 11 12 13
    ●  ●  ●  ●  ●  ●  ●  ●  ○  ○  ○  ○  ○            ○  ●  ●  ●  ●  ●  ●  ●  ○  ○  ○  ○  ○
      ○  ●  ○  ●  ○  ●  ●  ○  ○  ○  ○  ●                ○  ○  ○  ○  ○  ○  ●  ○  ○  ○  ○  ○
      14 15 16 17 18 19 20 21 22 23 24 25              14 15 16 17 18 19 20 21 22 23 24 25
```

● Pins Used

(Male)   (Male)
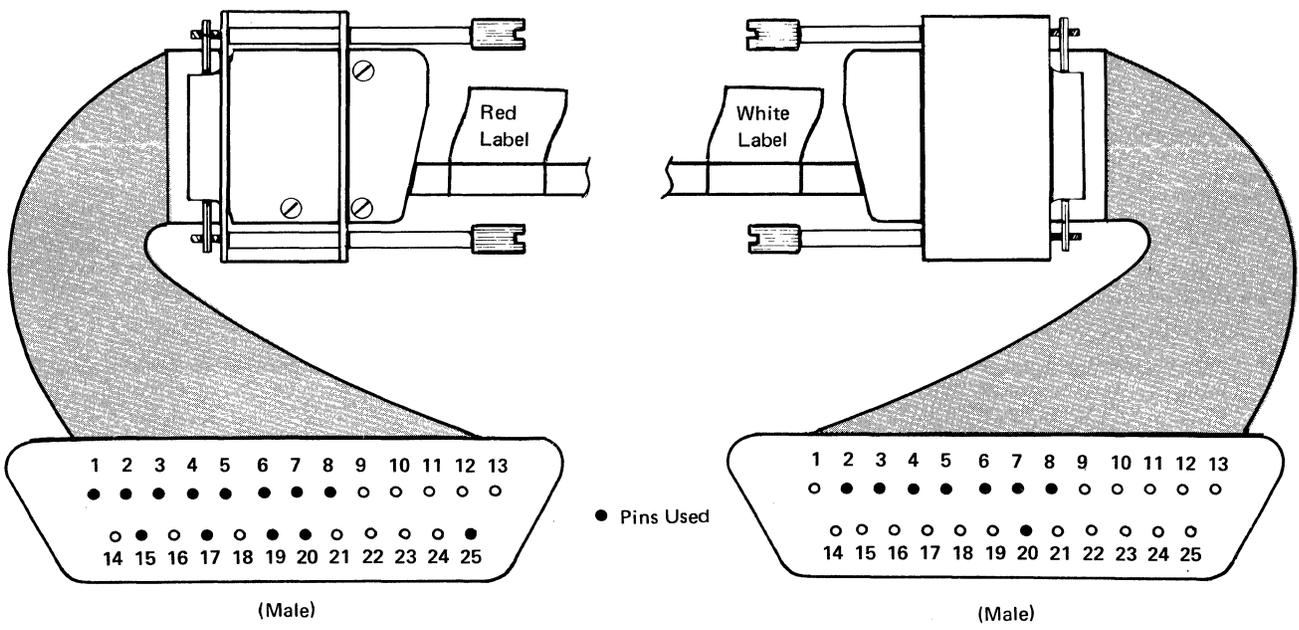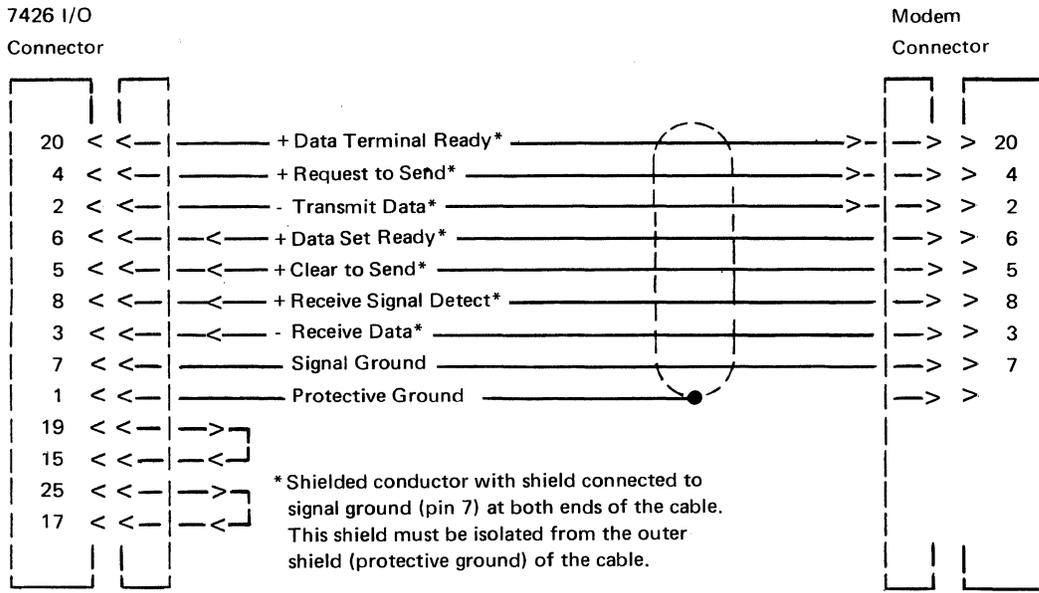
Figure   A-2.   EIA RS-232-C/CCITT V.24 Interface (Modem), IBM Part 2720174, 12.1 m (40.0 ft) Maximum

```
20  < < ─ | ──────+ Data Terminal Ready* ─────────────────> ─| ─ > >  6
 6  < < ─ | ─<──────+ Data Set Ready* ──────────────────────| ─ > >  20
 4  < < ─ | ─> ──+ Request to Send, Receive Signal Detect* ───> ─| ─ > >  8
 5  < < ─ | ─< + Clear to Send* ───────────────────────> ─| ─ > >  5
 8  < < ─ | ─< ──+ Receive Signal Detect, Request to Send* ──────| ─ > >  4
 2  < < ─ | ────── - Transmit Data, Receive Data* ─────────────> ─| ─ > >  3
 3  < < ─ | ─<── - Receive Data, Transmit Data* ──────────────| ─ > >  2
 7  < < ─ | ────── Signal Ground ────────────────────────| ─ > >  7
 1  < < ─ | ─● Protective Ground
19  < < ─ | ─>
15  < < ─ | ─<
25  < < ─ | ─>
17  < < ─ | ─<
```
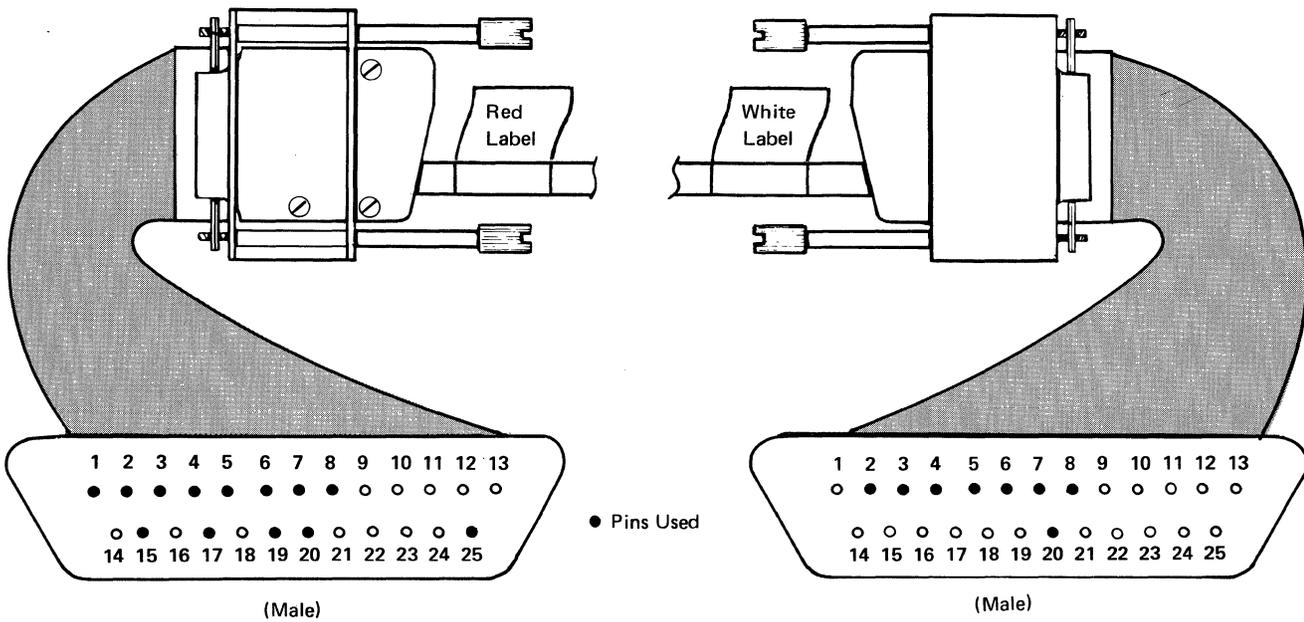
* Shielded conductor with shield connected to
signal ground (pin 7) at both ends of the cable.
This shield must be isolated from the outer
shield (protective ground) of the cable.

Red
Label

White
Label

```
 1  2  3  4  5  6  7  8  9  10 11 12 13
 ●  ●  ●  ●  ●  ●  ●  ●  ○  ○  ○  ○  ○

 ○  ●  ○  ●  ○  ●  ●  ○  ○  ○  ○  ●
14 15 16 17 18 19 20 21 22 23 24 25
```

(Male)

● Pins Used

```
 1  2  3  4  5  6  7  8  9  10 11 12 13
 ○  ●  ●  ●  ●  ●  ●  ●  ○  ○  ○  ○  ○

 ○  ○  ○  ○  ○  ○  ●  ○  ○  ○  ○  ○
14 15 16 17 18 19 20 21 22 23 24 25
```

(Male)
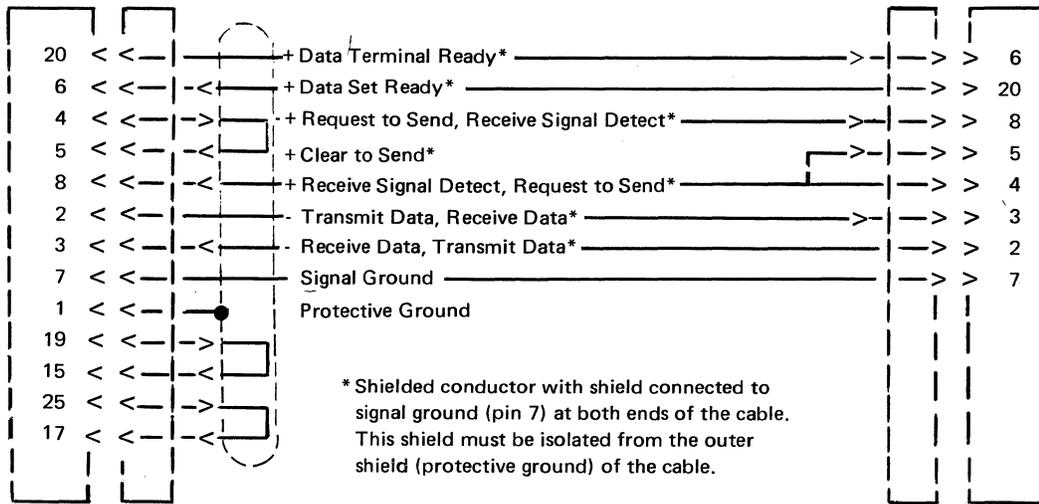
Figure   A-3.   EIA RS-232-C/CCITT V.24 Interface (3101 Direct Connect), IBM Part 2720173, 12.1 m (40.0 ft)
Maximum

A-4

```
 20  < < —  |  —┤  ├+ Data Terminal Ready* ——————————————————>─|  —<  <   6  |
  6  < < —  |-<┤  ├+ Data Set Ready* —————————————————————|  —<  <  20  |
  4  < < —  |->├   + Request to Send, Receive Signal Detect* —————>─|  —<  <   8  |
  5  < < —  |-<├   + Clear to Send*                    ┌—>─|  —<  <   5  |
  8  < < —  |-<└—+ Receive Signal Detect, Request to Send* ——— └———|  —<  <   4  |
  2  < < —  |  —┤  ├- Transmit Data, Receive Data* —————————————>─|  —<  <   3  |
  3  < < —  |-<┤  ├- Receive Data, Transmit Data* ————————————|  —<  <   2  |
  7  < < —  |  —┤  ├ Signal Ground ——————————————————————|  —<  <   7  |
  1  < < —  |  —●  ├ Protective Ground
 19  < < —  |->
 15  < < —  |-<         * Shielded conductor with shield connected to
 25  < < —  |->            signal ground (pin 7) at both ends of the cable.
 17  < < —  |-<            This shield must be isolated from the outer
                           shield (protective ground) of the cable.
```

Red
Label

White
Label

```
 1  2  3  4  5  6  7  8  9 10 11 12 13
 ●  ●  ●  ●  ●  ●  ●  ●  ○  ○  ○  ○  ○
                                        ● Pins Used
    ○  ●  ○  ●  ○  ●  ●  ○  ○  ○  ○  ●
   14 15 16 17 18 19 20 21 22 23 24 25
               (Male)
```

```
 1  2  3  4  5  6  7  8  9 10 11 12 13
 ○  ●  ●  ●  ●  ●  ●  ●  ○  ○  ○  ○  ○

    ○  ○  ○  ○  ○  ○  ●  ○  ○  ○  ○  ○
   14 15 16 17 18 19 20 21 22 23 24 25
              (Female)
```
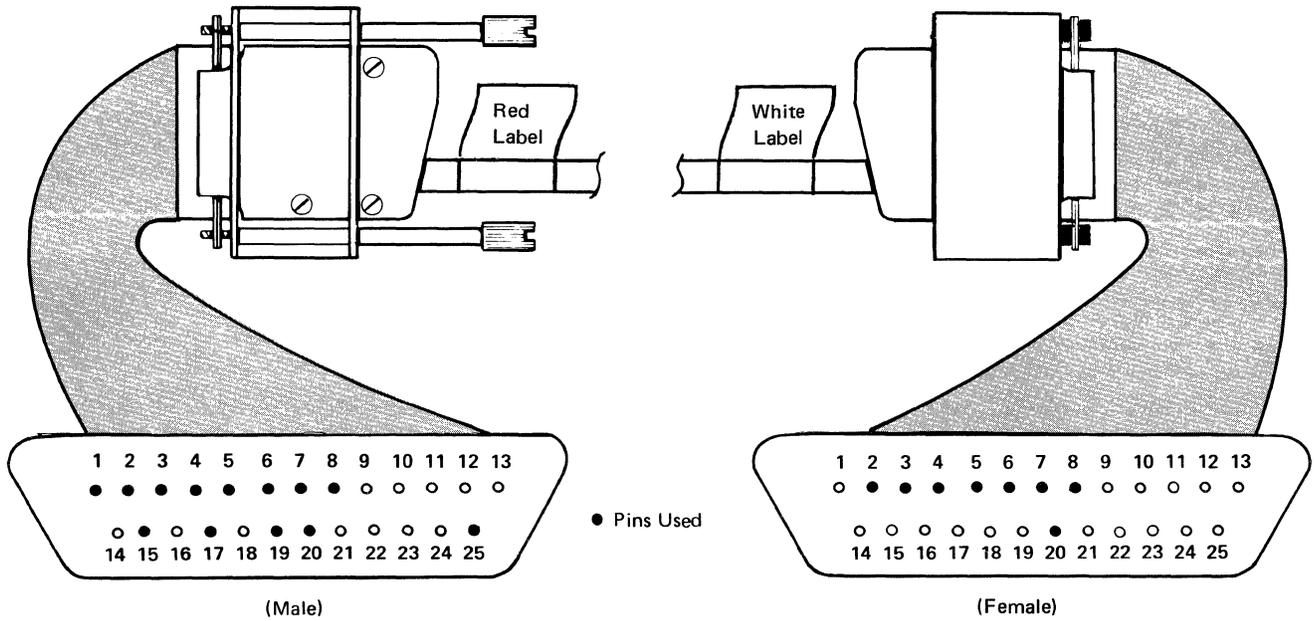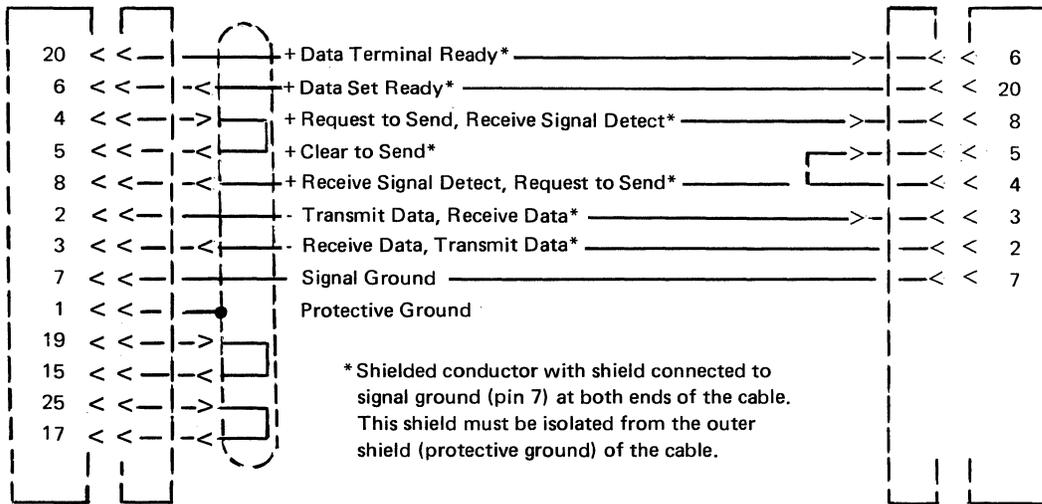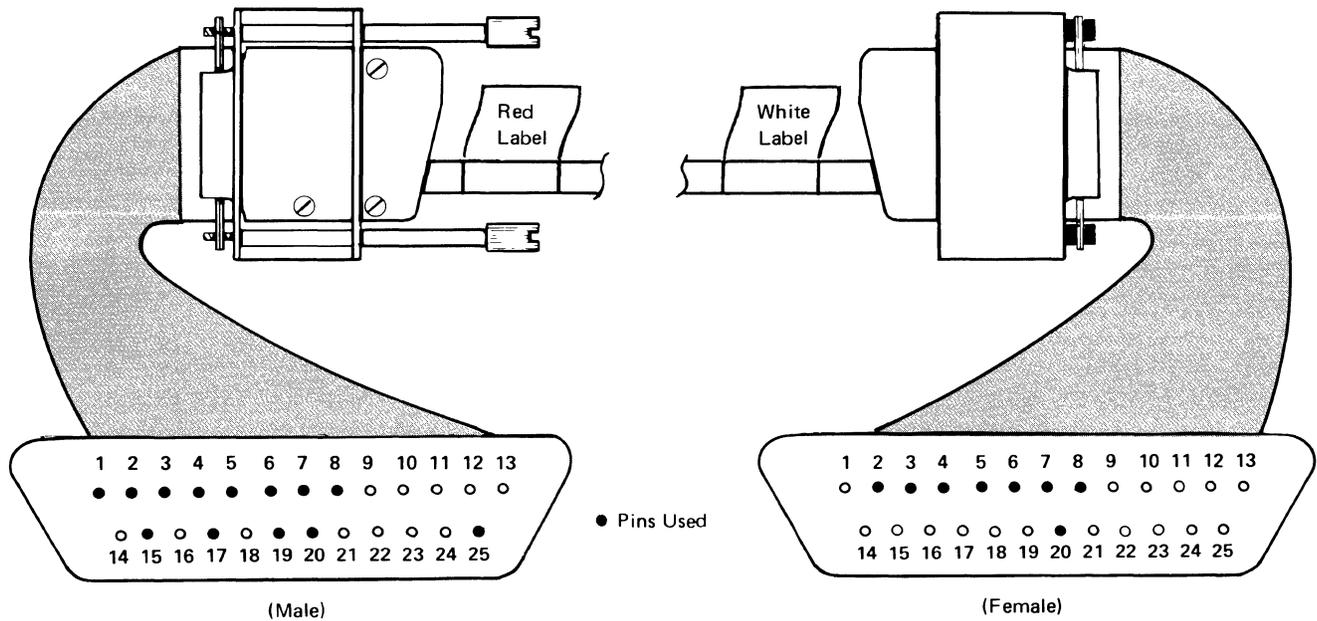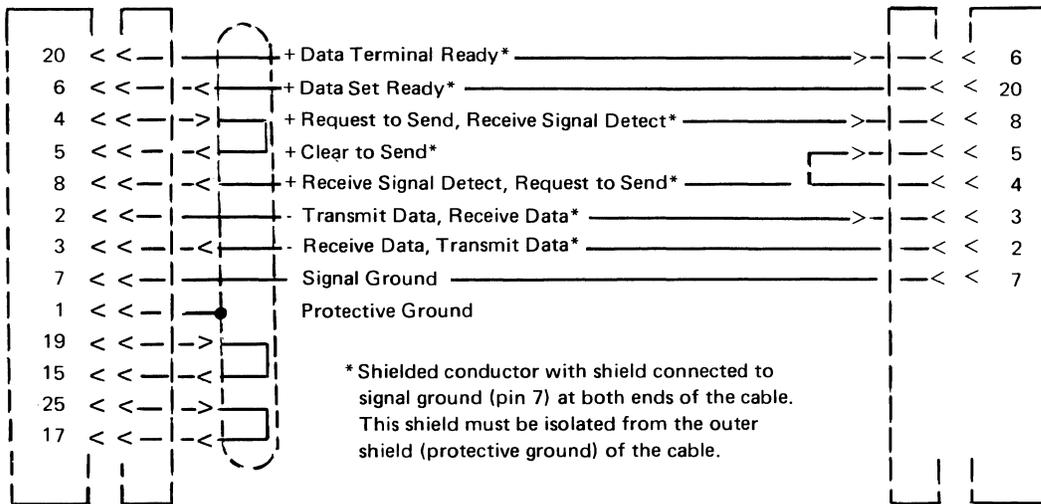
Figure   A-4.   EIA RS-232-C/CCITT V.24 Interface (IBM 4975 Printer Direct Connect), IBM Part 2720399, 12.1 m (40.0 ft) Maximum

7426 I/O Connector

```
25 < < — | ——( )—— Minus Transmit Data A ————————— >— |— >  > 15
19 < < — | ——|——  Plus Transmit Data B  ————————— >— |— >  > 17
15 < < — | —<|——  Plus Receive Data B  —————————————|— >  > 25
17 < < — | —<|——  Minus Receive Data A —————————————|— >  > 19
 1 < < — | ——●——  Protective Ground
```

Device Connector

● Pins Used

```
1  2  3  4  5  6  7  8  9  10 11 12 13
●  o  o  o  o  o  o  o  o  o  o  o  o
 o  ●  o  ●  o  ●  o  o  o  o  o  ●
14 15 16 17 18 19 20 21 22 23 24 25
```

(Male)

Red Label

White Label

```
1  2  3  4  5  6  7  8  9  10 11 12 13
o  o  o  o  o  o  o  o  o  o  o  o  o
 o  ●  o  ●  o  ●  o  o  o  o  o  ●
14 15 16 17 18 19 20 21 22 23 24 25
```

(Male)

Figure   A-5.   EIA RS-422-A Interface (3101 or 7485 Direct Connect), IBM Part 2720150, 1 219 m (4000.0 ft) Maximum

A-6

20 < < —   + Data Terminal Ready* ————————————————>— —< < 6

6 < < —   + Data Set Ready* ———————————————————— —< < 20

4 < < —   + Request to Send, Receive Signal Detect* ——————>— —< < 8

5 < < —   + Clear to Send* —————————— ——>— —< < 5

8 < < —   + Receive Signal Detect, Request to Send* ———— ——— —< < 4

2 < < —   - Transmit Data, Receive Data* ————————>— —< < 3

3 < < —   - Receive Data, Transmit Data* ———————— —< < 2

7 < < —   Signal Ground ———————————————— —< < 7

1 < < —   Protective Ground

19 < < —

15 < < —

25 < < —

17 < < —

*Shielded conductor with shield connected to
signal ground (pin 7) at both ends of the cable.
This shield must be isolated from the outer
shield (protective ground) of the cable.

Red
Label

White
Label

1 2 3 4 5 6 7 8 9 10 11 12 13
● ● ● ● ● ● ● ● ○ ○ ○ ○ ○
○ ● ○ ● ○ ● ● ○ ○ ○ ○ ●
14 15 16 17 18 19 20 21 22 23 24 25

(Male)

● Pins Used

1 2 3 4 5 6 7 8 9 10 11 12 13
○ ● ● ● ● ● ● ● ○ ○ ○ ○ ○
○ ○ ○ ○ ○ ○ ● ○ ○ ○ ○ ○
14 15 16 17 18 19 20 21 22 23 24 25

(Female)

Figure A-6. EIA RS-232-C/CCITT V.24 Interface (IBM Personal Computer Direct Connect), IBM Part 6235645, 12.1 m (40.0 ft) Maximum

Line Definitions

The EIA/CCITT interface lines are defined by the EIA standards RS-232-C and RS-422-A, and CCITT recommendation V.24. For detailed information on the EIA/CCITT interface lines, refer to the following publications:

- *Electronic Industries Association (EIA) Standards RS-232-C*

- *Electronic Industries Association (EIA) Standards RS-422-A*

- *CCITT, Data Transmission over the Telephone Network, Orange Book,* Volume VIII.1 for recommendation V.24

Modem Connections for 7426 Model 2 Host Attachment

The following chart shows the interface lines used by the 7426 when the host interface is connected to data communication equipment (DCE). When there is a difference between the EIA and the CCITT nomenclature, that of the CCITT is shown in parentheses.

Connector Pin No.	Designation EIA	CCITT	Name	Function
1	AA	101	Protective Ground	Ground
7	AB	102	Signal Ground	Ground
2	BA	103	Transmit Data	Data
3	BB	104	Receive Data	Data
4	CA	105	Request to Send	Control
5	CB	106	Clear to Send (Ready for Sending)	Control
6	CC	107	Data Set Ready	Control
20	CD	108.2	Data Terminal Ready	Control
8	CF	109	Receive Line Signal Detector **1** (Data Channel Received Line Signal Detector)	Control
15	DB	114	Transmitter Signal Element Timing **2** (to 7426)	Timing
17	DD	115	Receiver Signal Element Timing **3** (to 7426)	Timing
24	See Note	See Note	Test Clock	Test

Note: Not defined by EIA/CCITT. The EIA RS-232-C specification does not define the test clock interface lines. The test clock interface line provides a clock signal which is used by the 7426 self-checking test to provide the TSET and RSET signals.

1 This line is sometimes called the common name Carrier Detect or RLSD.
2 This line is sometimes called the common name Transmit Clock or TSET.
3 This line is sometimes called the common name Receive Clock or RSET.

DCE Connections to Devices

The following chart shows the interface lines used by the 7426 when the device interface is connected to Data Communication Equipment (DCE). When there is a difference between the EIA and the CCITT nomenclature, that of the CCITT is shown in parentheses.

Connector Pin No.	Designation EIA	CCITT	Name	Function
1	AA	101	Protective Ground **1**	Ground
7	AB	102	Signal Ground	Ground
2	BA	103	Transmit Data	Data
3	BB	104	Receive Data	Data
4	CA	105	Request to Send	Control
5	CB	106	Clear to Send (Ready for Sending)	Control
6	CC	107	Data Set Ready	Control
20	CD	108.2	Data Terminal Ready	Control
8	CF	109	Receive Line Signal Detector **2** (Data Channel Received Line Signal Detector)	Control

1 Pin No. 1 is used at the 7426 I/O connector only as a ground terminating point for the cable shield.

2 This line is sometimes called the common name Carrier Detect or RLSD.

EIA/CCITT Direct Connection to Devices

The following chart shows the interface lines used by the 7426 when the interface is connected directly to a terminal, using an EIA/CCITT Interface. When there is a difference between the EIA and the CCITT nomenclature, that of the CCITT is shown in parentheses.

Connector Pin No.	Designation EIA	CCITT	Name	Function
1	AA	101	Protective Ground **1**	Ground
7	AB	102	Signal Ground	Ground
2	BA	103	Transmit Data	Data
3	BB	104	Receive Data	Data
4	CA	105	Request to Send	Control
5	CB	106	Clear to Send (Ready for Sending)	Control
6	CC	107	Data Set Ready	Control
20	CD	108.2	Data Terminal Ready	Control
8	CF	109	Receive Line Signal Detector **2** (Data Channel Received Line Signal Detector)	Control

1 Pin No. 1 is used at the 7426 I/O connector only as a ground terminating point for the cable shield.

2 This line is sometimes called the common name Carrier Detect or RLSD.

EIA RS-422-A Direct Connection to Devices

The following chart shows the interface lines used by the 7426 when the interface is connected directly to a 3101 Model 13, 23, 37, or to a 7485-531 through an RS-422-A interface.

7426 Connector

Pin No.	Name	Function
1	Protective Ground	Ground
25	- Transmit Data A	Data
19	+ Transmit Data B	Data
15	+ Receive Data B	Data
17	- Receive Data A	Data

Electrical Specifications

The EIA/CCITT interface is designed in accordance with the electrical specifications of the EIA standard RS-232-C and CCITT recommendation V.28. For information on the electrical specifications of the EIA/CCITT interface, refer to the following publications:

● *Electronic Industries (EIA) Standards RS-232-C*

● *CCITT, Data Transmission over the Telephone Network, Orange Book,* Volume VIII.1 for recommendation V.28

The EIA RS-422-A is designed in accordance with the electrical specifications of the EIA standard RS-422-A. For information on the electrical specifications, see the publication *Electronic Industries Association (EIA) Standard RS-422-A.*

Appendix B. Microcode Diskette Installation

The diskette is used to install, on the 8100 system disk, microcode that controls some of the 7426 functions. Once installed, the microcode is available to all attached 7426s. The 7426s will request this microcode each time they are powered on. The procedure for installing the microcode on the 8100 disk is given in Chapter 2.

Obtaining Diskettes

Diskettes are obtained by specifying the appropriate specify feature code when ordering the first 7426 attached to an 8100 system. For Americas/Far East, the diskette is ordered by PN 2720177. It should be specified on only one 7426 for each 8100 system.

The address of the 8100 system should be entered as the shipping address for the diskette. IBM will then ship the diskette 4 weeks before the associated 7426, permitting the diskette data to be transferred to the 8100 disk before the arrival of the 7426. In Europe, the Middle East, and Africa, however, the diskette is shipped with the 7426; the customer must send the diskette to the 8100 site.

Microcode Updates

An updated level of the 7426 microcode may be made available periodically by an engineering change. The updated microcode will automatically be shipped for 7426 units through a current Maintenance Agreement with IBM. Otherwise, it may be ordered through an IBM branch office (PN 2720177).

When an updated diskette is received, it should be installed on the 8100 disk by using the procedures described in Chapter 2 under "Transferring 7426 Microcode from Diskette to the 8100 Disk." When an updated diskette is installed on the 8100 disk, *do not* delete the previous microcode level from the 8100 disk until all 7426s have successfully completed initialization for the new data set name.

7426 Initialization

The 7426 requests the microcode by name, from the 8100, each time the 7426 is powered on. Therefore, each 7426 attaching to the 8100 must be provided with the data set name of the microcode on the 8100 disk.

The instructions that accompany the diskette list and describe the microcode data sets and show the number of 256-byte records required for each. Choose the data set name that is appropriate for your installation.

Locate the Initialization Worksheet for each 7426 (Foldout 1, at the back of this manual), and enter the data set name in field C. Chapter 4 contains the worksheet instructions. Send the updated worksheet to the 7426 location. For a new 7426 installation, this worksheet should be available at the 7426 location before the arrival of the 7426 unit.

Appendix C. Microcode Distribution Tape Reel (DTR) Installation

The DTR is used to install, on the 4321/4331, S/370, or 30XX host system disk, microcode that controls some of the 7426 functions. Once installed, the microcode is available to all attached 7426s. The 7426s will request this microcode each time they are powered on. The procedure for installing the microcode on the host disk is given in Chapter 2.

Obtaining DTRs

DTRs are obtained by specifying the appropriate specify feature code when ordering the first 7426 attached to a host system. For Americas/Far East, DTRs are ordered by part number (see below). It is required for only one 7426 for each host system.

The address of the host system should be entered as the shipping address for the DTR. IBM will then ship the DTR four weeks before the associated 7426, permitting the DTR data to be transferred to the host disk before the arrival of the 7426. In Europe, the Middle East, and Africa, however, the DTR is shipped with the 7426; the customer must send the DTR to the host site.

Microcode Updates

An updated level of the 7426 microcode may be made available periodically by an engineering change. The updated microcode will automatically be shipped for 7426 units through a current Maintenance Agreement with IBM. Otherwise, it may be ordered through an IBM branch office, using the following part numbers:

PN 2720253   9/600 BPI

PN 2720254   9/1600 BPI

PN 2720255   9/6250 BPI

When an updated DTR is received, it should be installed on the host disk by using the procedures described in Chapter 2 under "Transferring 7426 Microcode from DTR to Host Disk." When an updated DTR is installed on the host disk, *do not* delete the previous microcode level from the host disk until all 7426s have successfully completed initialization for the new data set name.

7426 Initialization

The 7426 requests the microcode by name, from the host, each time the 7426 is powered on. Therefore, each 7426 attaching to the host must be provided with the data set name of the microcode on the host disk.

The instructions that accompany the DTR list and describe the microcode data sets and show the number of 256-byte records in each. Choose the data set name that is appropriate for your installation.

Locate the Initialization Worksheet for each 7426 (Foldout 1, at the back of this manual), and enter the data set name in field C. Chapter 4 contains the worksheet instructions. Send the updated worksheet to the 7426 location. For a new 7426 installation, this worksheet should be available at the 7426 location before the arrival of the 7426 unit.

Appendix D. Request Formatted Maintenance Statistics Format

This appendix describes the formats of the four RECFMS responses the 7426 can send to the host system in response to an REQMS command.

Counters in type 1, 2, and 3 responses do not wrap when they exceed their maximum value.

The log areas are reset when:

- The 7426 is turned off (types 1, 2, and 3).

- The execution of RECFMS is completed normally as the response to an REQMS with a RESET request (types 1, 2, and 3).

REQMS Request Type 1 − Link Test Statistics

Bytes 14,15 = Number of times the Test command was received with good FCS.

Bytes 16,17 = Number of times the Test command was transmitted.

REQMS Request Type 2 − Summary Counters

Byte 14   = Mask bits of the summary counters supported. All supported counters, including those containing zero count, are sent to the host by RECFMS.

bit 0 = 1   = Machine Check
bit 1 = 1   = Communication Check
bit 2 = 1   = Program Check (not used)
bits 3-7   = Reserved

Bytes 15,16 = Reserved
Bytes 17,18 = Machine Check Summary Counter
Bytes 19,20 = Communication Check Summary Counter
Bytes 21,22 = Program Check Summary Counter

REQMS Request Type 3 – Communication Adapter Data Error Counts

Byte 14	= Adapter Type
	= X'01'
Byte 15	= Mask bits of the Communication Adapter Error Counters supported. All supplied counters, including those containing zero count, are sent to the host by RECFMS.
bit 0 = 1	= Nonproductive Time-Out*
bit 1 = 1	= Reserved
bit 2 = 1	= Write Retry*
bit 3 = 1	= Overrun**
bit 4 = 1	= Underrun**
bit 5 = 1	= Connection Problem*
bit 6 = 1	= FCS Error*
bit 7 = 1	= Primary Abort*
Byte 16	= Mask bits of the Communication Adapter Error Counters supported. All supported counters, including those containing zero count, are sent to the host by RECFMS.
bit 0 = 1	= Command Reject*
bit 1 = 1	= DCE Error**
bit 2 = 1	= Write Time-Out**
bits 3-7	= Reserved
Byte 17	= Reserved
Byte 18	= Nonproductive Time-Out Counter
Byte 19	= Idle Time-Out Counter
Byte 20	= Write Retry Counter
Byte 21	= Overrun Counter
Byte 22	= Underrun Counter
Byte 23	= Connection Problem Counter
Byte 24	= FCS Counter Error
Byte 25	= Primary Abort Counter
Byte 26	= Command Reject Counter
Byte 27	= DCE Error Counter
Byte 28	= Write Time-Out Counter

*In communication check summary counter.
**In machine check summary counter.

REQMS Request Type 5

7426 Machine Level Information

Appendix E. 3101 Model 837 Attachment

Introduction

This feature microcode load supports the attachment of the IBM 3101 Model 837. The 3101-837 is an RPQ version of the 3101 (RPQ 8J0002). It is similar to the 3101-23 but has a keyboard labeled like an IBM 3278 Display Station.

Dataset Name

This feature is contained in a downstream microcode load data set named AANLBnMr where n and r represent the latest base and feature levels respectively (for an example, AANLB3M1).

Description

1. Keyboard Mapping

   The keyboard layout is the same as that of the 3278 keyboard with 24 PF keys. It provides a definite improvement over the 3101-1X/2X keyboard since the required 3270 keyboard functions are clearly labeled. The Cursor Blink and ALT CURSOR keys are not functional. All other keys, including Back Tab, Double Cursor Moves, DUP, FM, and the IDENT key, are supported.

2. Printer Re-Assignment

   A 3101-837 operator may change the assignment of the target printer for local copies by use of the IDENT key. The operator simply presses the ALT and IDENT keys and then keys the desired target printer port number as follows:

   - For port 0, key 0
   - For port 1, key 1
   - For port 2, key 2
   - For port 3, key 3
   - For his own auxiliary port, key 8
   - For no printer, key 9

   If the operator keys a port not assigned to a printer, the 7426 will send a beep to the display. The current assignment is displayed on the 25th line. If the 7426 is powered off, then on, the printer assignment will revert to the originally initialized value.

3. 25th Line Indications

   The 7426 supplies two more 25th line indications than are displayed by the 3101-837 (for example, upshift):

   SSCP   This is displayed on the left end of the 25th line when that port is in SSCP Mode.

   P = N   This is displayed in the middle of the 25th line and indicates the current printer assignment for that port (that is, P = 3 if printer number 3 is assigned.)

4. Screen Field Highlighting

   The 3101-837 does support highlighted fields.

Initialization

1. 7426 Initialization for 3101-837 Port

   Use the same procedure as for a 3101-23 except make:

   Attached device class = 5 (Field G)

   3270 enter key = 1 (Field K)

2. 3101-837 Terminal Initialization

   Same as for 3101-23. Note that the EIA-RS-422-A interface is available as well as RS-232-C.

3. Using the 3101-837 for Initializing the 7426

   The 3101-837 has two modes of operation: Model 837 Mode and Model 23 Mode. When the 3101-837 is powered on, it will come up in Model 23 Mode. The 7426 will change it to Model 837 Mode as soon as the appropriate downstream load is received. The 3101-837 can be used for initializing the 7426 only when it is in Model 23 Mode.

Compatibility with Other Attachments

With this feature load, neither Katakana or Canadian French is available. Device class attachments 1 − 4 may be used as described in Chapter 4, "Initializing the 7426."

Cable Requirements

Same as for 3101-23.

Appendix F. Enhanced Function Microcode

Overview

The 7426 microcode enhancements described below make the 7426 act as a general-purpose protocol converter. The enhancements, included in the microcode load file AANLB3S1, include the following:

- Auto-Baud Rate and Parity Detection

- Display Terminal Menu Selection

- OEM Display Terminal Operation

Auto-Baud Rate and Parity Detection

Note: Auto-detection is supported for ports initialized to EIA-RS-232-C interface only.

If an RS-232-C terminal port is initialized for auto baud rate/parity detect, a detection operation will occur every time the attached terminal powers on or makes a switched line connect. The 7426 will detect either 300 or 1200 baud and even or odd parity.

Note: If you are using a 3101-837, switch the terminal to Test and back to Normal before doing an auto-detect operation.

After the attached terminal powers on or makes a switched line connection, press the RETURN (or Arrow New Line) key repeatedly until the terminal gives one of the following responses:

Terminal/Printer	Response
Device Type 5	Displays terminal selection menu.
Device Type 1	Displays **3101**.
Device Type 3 or 4 (printer)	Performs a Carriage Return/Line Feed operation.

Display Terminal Menu Selection

When a terminal interface becomes active and the initialized device type = 5, a 7426 port will output an initial selection menu as follows:

```
*************************
WHAT IS YOUR TERMINAL?
   1 = 3101-1X/2X
   2 = IBM PC (3101)
   3 = 3101-837
   4 = VT52
   5 = VT100
   6 = ADM3A
   7 = TV910/950
ENTER NUMBER TWICE_
```

The terminal operator should do the following:

1. Type the number associated with the terminal (1−7).

2. If the number typed is correct, verify that number by typing it again.

   If the number typed is incorrect:

   a. Type the correct number over the original entry.

   b. Verify the correct number by typing it again.

3. If the terminal beeps, check the number associated with the terminal (1−7). Repeat steps 1 and 2, entering only valid values from 1−7.

The following indications tell the operator that the terminal selection has been completed:

1. The screen clears and displays the terminal type in the upper left corner.

2. The terminal beeps.

3. The cursor returns to the home position.

OEM Display Terminal Operation

The OEM terminals supported by the menu-select function are:

- DEC VT52

- DEC VT100

- Lear Seigler ADM3A

- Televideo 910

- Televideo 950

- Any other terminals that are compatible with one of the above terminal protocols

The IBM terminals also supported by the menu-select function are:

- IBM 3101-1X (3101 Model 10, 12 or 13)

- IBM 3101-2X (3101 Model 20, 22, or 23)

- IBM 3101-837

- IBM Personal Computer operating in 3101 emulation mode (Program 6024042).

For this microcode load, 3101s attached as device type 1 will have the same keyboard mapping as those attached via device type 5 (menu select). This mapping is different from that used for the basic load (AANLBS03).

Notes:

1. *Attachment cables are the customer's responsibility. Attaching cables to the 7426 is described in Appendix A.*

2. *Display terminal scrolling is not supported.*

3. *Only the 1920-character screen size (24 lines of 80) is supported.*

4. *Local tab settings in a display terminal have no effect on tabbing operations.*

5. *An IBM 3101 terminal or a terminal that emulates a 3101 must be used to initialize the 7426 via a direct attachment to port 0 at 9600 bps. After initialization, port 0 may be used for a different attachment.*

6. *Only the English language is supported.*

7. *Dual intensity display fields are supported only on the 3101-837.*

8. *Displays attached via the menu function may only be bound in an LU type 2 session.*

7426 Initialization Definition Changes

The microcode enhancements change the definitions of some display format fields (described under "Initialization Worksheet Instructions" in Chapter 4). The affected fields are listed below:

(G) Device Type Field

Setting   Option

5   Device type 5. Designates a menu-select port.

(K) Auto-Baud Rate/Parity Detection Field

Note: This field is valid for displays only.

Setting   Option

1   No auto-baud rate or parity detection (initialized values will be used).

2   Auto-baud rate and parity detection enabled.

(L) Auto-Baud Rate/Parity Detect Function and Carriage Return Idle Character Quotient Field

Note: This field definition is valid for printers only (device types 3 and 4). The definition for displays remains unchanged.

This field definition allows you to combine any option of the auto-baud rate/parity detection function with several options of the carriage return idle character quotient. The following chart lists the appropriate setting for each combination:

Setting	Number of Idles	Auto Detection
0	0	
1	0	X
2	6	
3	6	X
4	7	
5	7	X
6	8	
7	8	X
8	9	
9	9	X

Display Terminal Setup

- Display terminals must be set for full-duplex character mode operation.

- XON/XOFF may be enabled.

- ASCII character size should be set for 7 bits per character plus a parity bit.

- Parity must be set for either odd or even, but not for mark or space.

Display Keyboard Mapping

The 7426 microcode enhancements allow the following functions to be mapped to ASCII terminal keyboards:

Key Function	Definition
SYS REQ	Enter/exit SSCP mode for logon and logoff.
ENTER	Send data to host.
CLEAR	Clear screen and alert host.
ATTN	Signal host.
PA 1—3	Program attention keys #1—3 to host.
PF 1—24	Program function keys #1—24 to host.
HOME	Move cursor to row 1, column 1.
CURSOR RIGHT	Move cursor one character position to the right.
CURSOR LEFT	Move cursor one character position to the left.
CURSOR UP	Move cursor one character position up.
CURSOR DOWN	Move cursor one character position down.
NEW LINE	Move cursor to the next line's first input field.
TAB	Move cursor to the next input field.
BACKTAB	Move cursor to the last input field.
ERASE EOF	Erase from cursor to end of field (or end of line).
ERASE INPUT	Erase all input (unprotected) fields.
DELETE	Delete character at cursor position.
INSERT	Enter character insert mode.
KBD RESET	Reset insert mode and host keyboard lock condition.
FM KEY	Field mark character inputted; semicolon (;) appears on screen
DUP KEY	Dup character inputted; asterisk (*) appears on screen; tab
PRINT	Do local display to printer copy.
DEV CANCEL	Reset local copy request waiting for busy printer.
REFRESH	Repaint screen from 7426 buffer.

The following eight sections show how these functions are achieved on each of the ASCII terminals supported by the menu select function.

Function	Key
SYS REQ	ESC S
ENTER	NEWLINE ARROW
CLEAR	ALT CLEAR
ATTN	ALT A
PA 1	ESC ,
PA 2	ESC .
PA 3	ESC /
PF 1—8	ALT PF 1—8 or ESC 1—8
PF 9—12	ESC 9, 0, -, =
PF 13—24	ESC UPSHIFT 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, -, =
HOME	ALT HOME ARROW
CURSOR RIGHT	RIGHT ARROW
CURSOR LEFT	LEFT ARROW
CURSOR UP	UP ARROW
CURSOR DOWN	DOWN ARROW
NEW LINE	BACKSPACE
TAB	—>|
BACKTAB	ESC TAB
ERASE EOF	ERASE EOF
ERASE INPUT	ALT ERASE INPUT
DELETE	DEL
INSERT	ESC DEL
KBD RESET	ALT R
FM KEY	ALT F
DUP KEY	ALT D
PRINT	ALT P (PRINT on 3101-2X)
DEV CANCEL	ALT X
REFRESH	ESC R

Notes:

1. The 3101 does not transmit anything when the BACKTAB, SEND, DELETE CHAR, or INSERT CHAR keys are pressed.

2. The ERASE EOS key is equivalent to the ESC key.

3. The 3101 switches should be set as follows:

    DDLUDDDX DUPDDDDD DDUDDDXX YYYYZZZZ

    Where:

    D = Down
    U = Up
    X = Operator's choice
    L = Up for RS-232-C; down for RS-422-A
    P = Up for even parity; down for odd parity
    Y = Display baud rate
    Z = Auxiliary port baud rate
        Baud rate examples:

Switch Setting	Baud Rate
DDUU	300
DUDU	1200
UDDU	9600

IBM Personal Computer (3101) Keyboard Mapping

Function	Key
SYS REQ	ESC S
ENTER	NEWLINE ARROW
CLEAR	PG DN
ATTN	CTRL A
PA 1	CTRL F1 or ESC ,
PA 2	CTRL F2 or ESC .
PA 3	CTRL F3 or ESC /
PF 1—10	F1—F10 or ESC 1, 2, 3, 4, 5, 6, 7, 8, 9, 0
PF 11, 12	UPSHIFT F1, F2, or ESC -, =
PF 13—24	ESC UPSHIFT 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, -, =
HOME	HOME
CURSOR RIGHT	RIGHT ARROW
CURSOR LEFT	LEFT ARROW
CURSOR UP	UP ARROW
CURSOR DOWN	DOWN ARROW
NEW LINE	BACKSPACE
TAB	—>|
BACKTAB	ESC TAB or CTRL B
ERASE EOF	END
ERASE INPUT	CTRL HOME
DELETE	DEL
INSERT	ESC DEL
KBD RESET	CTRL R
FM KEY	CTRL F
DUP KEY	CTRL D
PRINT	CTRL P
DEV CANCEL	CTRL X
REFRESH	ESC R

Notes:

1. In the IBM Personal Computer, the IBM 3101 Emulation Program (6024042) must be used with setup file IBM7426.SET.

2. If a baud rate other than 1200 is required, the IBM Personal Computer setup must be modified to reflect the new baud rate. (See instruction with the 3101 Emulator Program.)

3101-837 Keyboard Mapping

The 3101-837 has a 3278-style keyboard. Use the keys as labeled. The IDENT key function is operational.

The 3101-837 switches should be set as follows:

DDLUDDDX DUPDDDDD UDUDDDXX YYYYZZZZ

Where:

D = down
U = up
X = operator's choice
L = up for RS-232-C; down for RS-422-A
P = up for even parity; down for odd parity
Y = Display baud rate
Z = Auxiliary port baud rate

Examples:

Switch Setting	Baud Rate
DDUU	300
DUDU	1200
UDDU	9600

LS ADM3A Keyboard Mapping

Function	Key
SYS REQ	ESC S
ENTER	RETURN
CLEAR	CTRL C (See Note 1)
ATTN	CTRL A
PA 1	ESC ,
PA 2	ESC .
PA 3	ESC /
PF 1–12	ESC 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, :, -
PF 13–24	ESC UPSHIFT 1, 2, 3, 4, 5, 6, 7, 8, 9, :, -, [
HOME	CTRL HOME
CURSOR RIGHT	CTRL RIGHT ARROW
CURSOR LEFT	CTRL LEFT ARROW
CURSOR UP	CTRL UP ARROW
CURSOR DOWN	CTRL DOWN ARROW
NEW LINE	CTRL Z
TAB	CTRL T
BACKTAB	CTRL B
ERASE EOF	CTRL E
ERASE INPUT	ESC I
DELETE	SHIFT RUB
INSERT	ESC SHIFT RUB
KBD RESET	CTRL R
FM KEY	CTRL F
DUP KEY	CTRL D
PRINT	CTRL P
DEV CANCEL	CTRL X
REFRESH	ESC R

Notes:

1. Do not use the CLEAR key because it immediately clears the screen without sending the cleared screen command to the 7426. If the CLEAR key is accidentally pressed, press CTRL C for a valid clear operation.

2. Set the LS ADM3A switches as shown on the following page.

Internal Switch	Setting
SPACE—ADV	SPACE
UCDISP—U/LDISP	Either UCDISP or U/LDISP
DISABLE—KB LOCK	DISABLE
DISABLE—CLEAR SCREEN	CLEAR SCREEN
50HZ—60HZ	60HZ
12LINE—24LINE	24LINE
CUR—CTL/OFF	CURSOR
LOCAL—OFF	OFF
103—OFF	MODEM DEPENDENT
202—OFF	MODEM DEPENDENT
CODE—SEC CHAN	SEC CHAN
ETX—OFF	OFF
EOT—OFF	OFF

Front Panel Switch	Setting
BIT 8—0/1	0
PARITY/INH	PARITY
STOP—1/2	1
DATA—7/8	7
PARITY—ODD/EVEN	Either ODD or EVEN
LC EN/UC	Either LC EN or UC
AUTO NL/OFF	OFF
RS232/CL	RS232
HDX/FDX	FDX
BAUD RATE	Any baud rate except 75, 1800, or 19,200

DEC VT52 Keyboard Mapping

Function	Key
SYS REQ	ESC L
ENTER	ENTER or RETURN
CLEAR	CTRL C
ATTN	CTRL A
PA 1	ESC ,
PA 2	ESC .
PA 3	ESC /
PF 1—9	1—9 (numeric pad) or ESC 1, 2, 3, 4, 5, 6, 7, 8, 9
PF 10—12	Blue, red, gray (numeric pad), or ESC 0, -, =
PF 13—24	ESC UPSHIFT 1,2,3,4,5,6,7,8,9,0,-,=
HOME	ESC H
CURSOR RIGHT	RIGHT ARROW
CURSOR LEFT	LEFT ARROW
CURSOR UP	UP ARROW
CURSOR DOWN	DOWN ARROW
NEW LINE	LINE FEED
TAB	TAB
BACKTAB	BACKSPACE or ESC TAB
ERASE EOF	CTRL E
ERASE INPUT	ESC I
DELETE	DELETE
INSERT	ESC DELETE
KBD RESET	CTRL R
FM KEY	CTRL F
DUP KEY	CTRL D
PRINT	CTRL P
DEV CANCEL	CTRL X
REFRESH	ESC T

Note: Set the DEC VT52 options as follows:

Option	Setting
Auto-repeat	ON
Auto XON/XOFF	ON
Wraparound	ON
New line	OFF
Bits per character	7
Parity	ON
Parity sense	ODD or EVEN
Speed	Any allowed by 7426 (refer to Chapter 4)

DEC VT100 Keyboard Mapping

Function	Key
SYS REQ	ESC S
ENTER	RETURN or ENTER
CLEAR	CTRL C
ATTN	CTRL A
PA 1	ESC ,
PA 2	ESC .
PA 3	ESC /
PF 1—9	1—9 (numeric pad) or ESC 1—9
PF 10—12	PF 1—3 or ESC 0,-,=
PF 13—24	ESC UPSHIFT 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, -, =
HOME	ESC H
CURSOR RIGHT	RIGHT ARROW
CURSOR LEFT	LEFT ARROW
CURSOR UP	UP ARROW
CURSOR DOWN	DOWN ARROW
NEW LINE	LINEFEED
TAB	TAB
BACKTAB	BACKSPACE
ERASE EOF	CTRL E
ERASE INPUT	ESC I
DELETE	DELETE
INSERT	ESC DELETE
KBD RESET	CTRL R
FM KEY	CTRL F
DUP KEY	CTRL D
PRINT	CTRL P
DEV CANCEL	CTRL X
REFRESH	ESC R

Note: Set the DEC VT100 options as follows:

Option	Setting
Auto-repeat	On
Auto XON/XOFF	On
Wraparound	On
New line	Off
Bits per character	7
Parity	On
Parity sense	ODD or EVEN
Speed	Any allowed by 7426 (refer to Chapter 4)

Televideo 910 Keyboard Mapping

Function	Key
SYS REQ	ESC S
ENTER	ENTER or RETURN
CLEAR	CTRL C
ATTN	ESC A
PA 1	ESC ,
PA 2	ESC .
PA 3	ESC /
PF 1–12	ESC 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, -, =
PF 13–24	ESC UPSHIFT 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, -, =
HOME	HOME
CURSOR RIGHT	RIGHT ARROW
CURSOR LEFT	LEFT ARROW
CURSOR UP	UP ARROW
CURSOR DOWN	DOWN ARROW
NEW LINE	CLEAR SPACE or CTRL Z
TAB	TAB
BACKTAB	BACKTAB
BACKSPACE	BACKSPACE
ERASE EOF	CTRL E
ERASE INPUT	ESC CTRL E
DELETE	DEL
INSERT	ESC DEL
KBD RESET	CTRL R
FM KEY	CTRL F
DUP KEY	CTRL D
PRINT	CTRL P
DEV CANCEL	CTRL X
REFRESH	ESC R

Note: Set the TV910 switches as shown on the following page.

Switch	Setting
S1-1—S1-4	Baud rate
	DUUD = 300 UDDD = 1200 DDDD = 9600
S1-5	U (7 bits)
S1-6	U (parity)
S1-7	U (even) or D (odd)
S1-8	U (2 stop)
S1-9	D (no auto wrap)
S1-10	D (CR)
S2-1, S2-2	DD (TV910)
S2-3	U (60 Hz)
S2-4, S2-5	XX (cursor display)
S2-6	U (FDX)
S2-7	X (reverse video)
S2-8	D (DSR connected)
S2-9	D (DCD connected)
S2-10	D (DTR connected)

U = Up
D = Down
X = User's choice

Televideo 950 Keyboard Mapping

Function	Key
SYS REQ	ESC S
ENTER	ENTER/RETURN
CLEAR	CTRL C
ATTN	ESC A
PA 1	ESC ,
PA 2	ESC .
PA 3	ESC /
PF 1—11	F1—F11 or ESC 1,2,3,4,5,6,7,8,9,0,-
PF 12	ESC =
PF 13—24	ESC UPSHIFT 1,2,3,4,5,6,7,8,9,0,-,=
HOME	HOME
CURSOR RIGHT	RIGHT ARROW
CURSOR LEFT	LEFT ARROW
CURSOR UP	UP ARROW
CURSOR DOWN	DOWN ARROW
NEW LINE	CLEAR SPACE
TAB	TAB
BACKTAB	BACKTAB
BACKSPACE	BACKSPACE
ERASE EOF	LINE ERASE
ERASE INPUT	SHIFT PAGE ERASE
DELETE	CHAR DELETE
INSERT	CHAR INSERT
KBD RESET	CTRL R
FM KEY	CTRL F
DUP KEY	CTRL D
PRINT	CTRL P
DEV CANCEL	CTRL X
REFRESH	ESC R

Note: Set the TV950 switches as shown on the following page.

Switch	Setting
S1-1—S1-4	Baud rate for display
	DUUD = 300
	DDDU = 1200
	DDDD = 9600
S1-5	U (7 bits)
S1-6	D (1 stop)
S1-7—S1-10	(baud rate for printer)
S2-1	U (duplex)
S2-2	X (cursor blink)
S2-3—S2-5	Parity
	DUU = even parity
	DDU = odd parity
S2-6	X (reverse video)
S2-7, S2-8	DU (full duplex)
S2-9	U (60 HZ)
S2-10	X (key click)

U =   Up
D =   Down
X =   User's choice

Appendix G. 3101 Yale Installed User Program (IUP) Feature

This 3101 Yale Installed User Program (IUP) feature supports attachment of 3101s with keyboard mapping and logon capabilities similar to the IUP support on the IBM Series/1. It is designed to support 3101s connected via the switched network. (3101s may be connected directly to the 7426, but must be activated by switching the 3101 to Test and then back to normal.) The IBM 3101-837 is not supported. Initialization of the 7426 cannot be done via a switched line auto-answer connection.

This feature is contained in a downstream microcode load named AANLBnYm where N and M represent the latest base and feature levels respectively (for an example, AANLB3Y1).

With this microcode load, the IBM 7485 Display Terminal cannot be attached. Also, the only type of operation available for an attached 3101 is as described above. Printers and printer/keyboards can be attached as usual as Device Types 3 and 4.

Keyboard Mapping

The 7426 will map keyboards of attached 3101s in the following manner:

Function	Key
Clear	Clear
Enter	Backspace
Erase EOF	Erase EOL/EOF
Home	Home
Tab	Tab
Backtab	Erase EOS-Tab
Cursor Moves	Cursor Moves
Char Delete	Delete
Char Insert	Erase EOS-Delete (Toggles Insert)
New Line	New Line
Print	ESC W (Upper Case)
Dev Cancel	ESC S (Upper Case)
KBD Reset	ALT t
Redisplay	ALT v
PF keys	See Figure G-1.
PA keys	See Figure G-1.
FM keys	See Figure G-1.
DUP key	See Figure G-1.

Figure G-1 shows the mapping for the PA, PF, DUP, and FM keys. Each key must be preceded by the Erase EOS key.

1 PF1	2 PF2	3 PF3	4 PF4	5 PF5	6 PF6	7 PF7	8 PF8	9 PF9	10 PF10	11 PF11	12 PF12

Q PF13	W PF14	E PF15	R PF16	T PF17	Y PF18	U PF19	I PF20	O PF21	P PF22	LBKT PF23	| PF24

A	S	D	F	G	H	J	K	L	; FM	' DUP	|

Z PA1	X PA2	C PA3	V	B	N	M	, PA1	. PA2	/ PA3		

Figure   G-1.   3101 Yale IUP Keyboard Mapping: PA, PF, DUP, and FM Keys

Keyboard Mapping Notes

1. The following special Yale IUP functions are not supported:

> Indent key
> Undent key
> Column tab key
> Column back tab key
> Setup functions (set tabs, set new line, etc.)
> APL
> Type ahead
> Keyboard lock when error is detected in received character.

2. Clear and home keys have basic 3270 function only.

3. Delete and insert operations will not wrap at the end of a line.

4. There is no 3270 System Request key function.

5. There is no 3270 Attention key function.

Code Translation

The following are new definitions for the 7426/3101 support:

	ASCII		**EBCDIC**
Code	**Name of Key**	**Code**	**Name of Character**
X'5E'	Circumflex	X'5F'	Logical "not" sign
X'5C'	Reverse slash	X'4A'	Cent sign
X'5B'	Open square bracket	X'AD'	Open square bracket
X'5D'	Close square bracket	X'BD'	Close square bracket
X'21'	Exclamation point	X'5A'	Exclamation point
X'7C'	Vertical bar	X'4F'	Vertical bar

Automatic Logon

When the 7426 first establishes a connection to a 3101 that has dialed in, it will, if the LU is active, go into SSCP mode and simulate the terminal user typing in "logon" followed by an ENTER key. The keyboard will be locked until the host responds.

If the LU is not active, none of the above will occur. In this case it is understood that, when the host activates the LU, it will then attempt a bind to make contact with a connected user.

Host Disconnect

If the host wishes to disconnect a line, it should send a chain including the following:

> Erase Write command
> WCC
> SBA order
> X'FF'
> X'FF'

The 7246 will disconnect the line and give a negative SNA response with a sense code of "0831."

7426 Port Initialization

Device type	1 — 3101
Line type	4 — for switched line auto-answer *or*
	5 — for switched line auto-answer with 10-minute idle line time out
	or
	1 — for direct connect RS232
	2 — for direct connect RS422
	3 — for dedicated modem attach
Parity/stop bits	3 — odd/one stop bit
Line speed	*
ENTER key	3 — backspace
Copy printer port	*

*Customer option

3101 Setup Switch Settings

SW	GRP1	GRP2	GRP3	GRP4
1	CHAR	STOP1	AUTO NL	BAUD RATE MAIN*
2	FDX	ODD	No AUTO LF	BAUD RATE MAIN*
3	RS-232-C	ODD	CR LF	BAUD RATE MAIN*
4	PRTS	N/A	NO SCROLL	BAUD RATE MAIN*
5	N/A	N/A	N/A	BAUD RATE AUX
6	ETX	N/A	N/A	BAUD RATE AUX
7	ETX	N/A	*	BAUD RATE AUX
8	DUAL	N/A	*	BAUD RATE AUX

*Customer option

Appendix H. List of Abbreviations

ADS. Application data structure.
ASCII. American Standard Code for Information Interchange.
bps. Bits per second.
CCITT. Consultative Committee on International Telephone and Telegraph.
CF. Command facility.
CPAR. Customer problem analysis and resolution.
CSU. Customer setup.
DAL. Directly attached loop.
DLA. Data link adapter.
DPCX. Distributed Processing Control Executive.
DPPX. Distributed Processing Programming Executive.
DPS. Distributed Presentation Services.
DSC. Data stream compatibility.
EBCDIC. Extended binary-coded decimal interchange code.
EIA. Electronic Industries Association.
FAC. Features for attaching communications.
FCC. Federal Communications Commission.
FM. Function management.
FSP. Format storage panel.
ID. Identification.
I/O. Input/output.
IMD. Interactive map definition.
LU. Logical unit.
MPP. Maximum print position.
MSL. Map specification library.
OEM. Original equipment manufacturers.
PLU. Primary logical unit.
PU. Physical unit.
PVS. Program validation service.
RAS. Reliability, availability, and serviceability.
RPQ. Request for price quotation.
SDLC. Synchronous Data Link Control.
SLU. Secondary logical unit.
SNA. Systems network architecture.
TP. Communication common carrier line.
TTY. Teletypewriter.
WCC. Write control character.

Glossary

This glossary includes terms and definitions from the *IBM Vocabulary for Data Processing, Telecommunications, and Office Systems,* GC20-1699.

A

ASCII. American National Standard Code for Information Interchange. The standard code, using a coded character set consisting of 7-bit coded characters (8 bits including parity check), is used for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters.

C

communication common carrier. In the U.S.A., a government-regulated private company that furnishes the general public with telecommunication service facilities; for example, a telephone or telegraph company.

communication facility. Anything used or available for use in furnishing data communication service.

communication line. (1) Any physical link, such as a wire or a telephone circuit, that connects one or more remote terminals to a communication control unit, or connects one communication control unit with another. (2) Contrast with *data link*.

D

data access arrangement (DAA). (SC1) Data communication equipment that permits attachment of privately owned data terminal equipment and of data communication equipment to the network.

data circuit-terminating equipment (DCE). (SC1) The functional unit of a data station that establishes, maintains, and releases a connection and provides those functions necessary for any code or signal conversion between the data terminal equipment and the data transmission line.

data communication. The transmission and reception of data.

data link. (1) (SC1) The assembly of parts of two data terminal equipments that are controlled by a link protocol, together with their interconnecting data circuit, that enables data to be transferred from a data source to a data sink. (2) The communication channel, modem, and communication controls of all stations connected to the communication channel, used in the transmission of information between two or more stations. (3) The physical connection and the connection protocols between the host and communication controller nodes via the host data channel.

data terminal equipment (DTE). (SC1) The functional unit of a data station that serves as a data source or as a data sink and provides for the data communication control function to be performed in accordance with a link protocol.

DSC. 3270 Information Display System data-stream compatibility.

E

EBCDIC. Extended binary-coded decimal interchange code. A coded character set consisting of 8-bit coded characters.

external modem. A modem that is separate from the unit with which it operates. Contrast with *integrated modem*.

I

integrated modem. A modem that is an integral part of the device with which it operates. Contrast with *external modem*.

M

modem (modulator-demodulator). A device that modulates and demodulates signals transmitted over data communication facilities.

P

plug. The removable half of an electrical connector.

S

Synchronous Data Link Control (SDLC). A discipline for managing synchronous, code-transparent, serial-by-bit information transfer over a link connection.

SNA character string (SCS). A character string composed of EBCDIC controls, optionally intermixed with end-user data, that is carried within a request/response unit.

T

telecommunication. (1) (SC1) Communication over a distance, as by telegraph or telephone. (2) Data transmission between a computing system and remotely located devices via a unit that performs the necessary format conversion and controls the rate of transmission.

terminal. (1) A point in a system or communication network at which data can either enter or leave. (2) A device, usually equipped with a keyboard and some kind of a display, capable of sending and receiving information over a communication channel.

3

3270 data-stream compatibility (DSC). In 8100, the facility that provides access to System 370 applications that communicate with 3270 Information Display System terminals.

Index

operating environment   3-12
operation with 3101 and 7485 display terminals   2-1
operation, administration, and programming
   considerations (Chapter 2)   2-1
operational compatibility   2-1
organization   iii
outboard map, appending data to   2-21

P

panel creation   2-27
performance   1-6
power plugs   3-9
printer initialization   2-39
printer operations   2-40
   host to ASCII printer, LU Type 1   2-41
   host to ASCII printer, LU Type 3   2-45
   local copy printing   2-46
   output notes   2-47
   Set Horizontal Format (SHF) function
      description   2-41
   Set Vertical Format (SVF) function
      description   2-42
   SHF sequence error conditions   2-42
printer output notes   2-47
printer support   2-39
   ASCII printer   2-39
   3102 printer   2-39
product and environmental safety   3-13
programming considerations   2-10
programming support   2-1
programming-related manuals   vi
PVS considerations   2-27

R

Relocation   3-2
REQMS request type 1 − link test statistics   D-1
REQMS Request Type 2 − summary counters   D-1
REQMS Request Type 3 − communication adapter
   data error counts   D-2
REQMS Request Type 5   D-2
request formatted maintenance statistics
   format   D-1
restrictions on FORMSTG macros
   FORMSTG - Form 1   2-28
   FORMSTG - Form 2   2-30
   FORMSTG - Form 3   2-32
   FORMSTG - Form 4   2-33
   FORMSTG - Form 5   2-35

S

sense information for DPPX applications   2-22
Set Horizontal Format (SHF) function
   description   2-41
Set Line Density (SLD) function description   2-44
Set Vertical Format (SVF) function
   description   2-42
      default values   2-43
      error conditions   2-43
      vertical format operations   2-43
setting up OEM terminals   F-5
SHF sequence error conditions   2-42
site planning   3-1
site planning checklist   3-13
site preparation   3-1
STARTPGM programming statement   2-23
switched-line support   2-49
   manual answer   2-50
   with auto-answer/disconnect   2-49
   with intercharacter time-out   2-50

T

Televideo 910 keyboard mapping   F-19
Televideo 950 keyboard mapping   F-21
terminal setup   F-5
test plugs   3-2
transferring data from the host system   2-26
transferring 7426 microcode from diskette to the
   8100 disk   2-7
transferring 7426 microcode from DTR to host
   disk   2-9
Transparent function description   2-44

U

updating maps   2-20
usage notes   2-12

V

vertical format operations   2-43

W

WRTDEV - Form 7   2-37

Numerics

7426 Terminal Interface
Unit Description, Site Planning,
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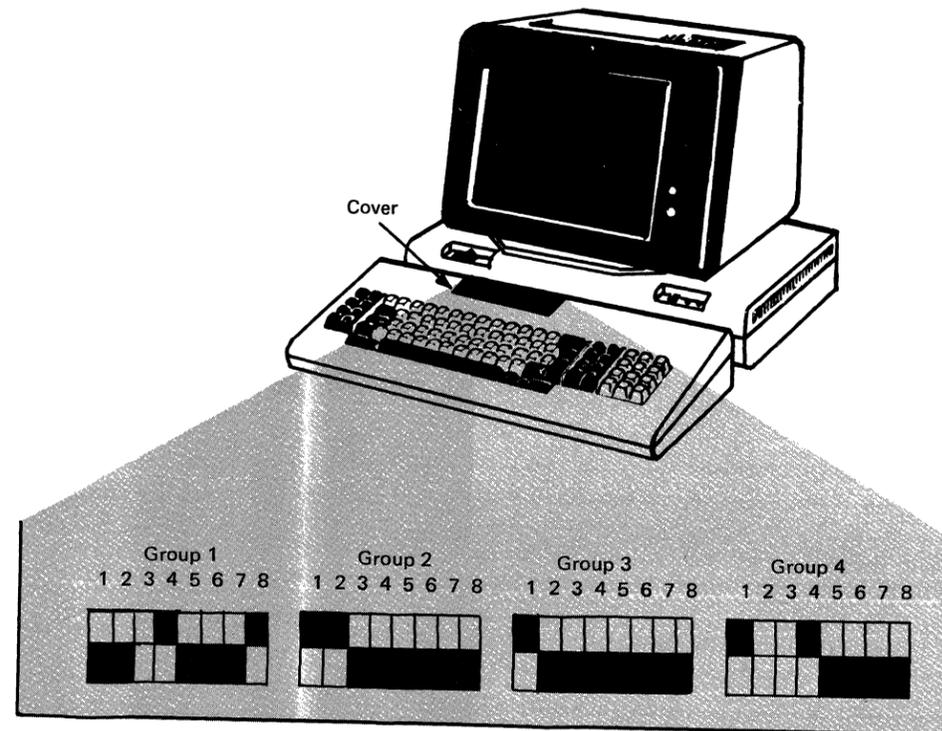PRINTED IN U.S.A.   GA23-0077-2

7426 CABLE CONNECTION WORKSHEET

The communication cables from the devices should be labeled to match the communication sockets of the 7426.

1. Insert the connectors into the sockets.

2. Finger-tighten the retaining screws.

3101 SETUP SWITCH-SETTING CHECKLIST

Cover

Group 1
1 2 3 4 5 6 7 8

Group 2
1 2 3 4 5 6 7 8

Group 3
1 2 3 4 5 6 7 8

Group 4
1 2 3 4 5 6 7 8

Setting the Switches

There are 32 setup switches on the keyboard unit of the 3101. Lift the cover and move each switch to the position indicated by the dark area.

INITIALIZATION WORKSHEET

Two formats are shown below. One is for the 7426 Model 1; the other, for the Model 2. You will notice the Model 2 does not have an F position. Use only one of the formats.

```
IBM 7426-01
A
*   _   _____   _   _   _
0   _   _   _   _   _   _
1   _   _   _   _   _   _
3   _   _   _   _   _   _

CHAR MODE
```

7426 Model 1 Format

```
IBM 7426-02
A
*   _   _____   _   _
0   _   _   _   _   _   _
1   _   _   _   _   _   _
2   _   _   _   _   _   _
3   _   _   _   _   _   _
                        _
CHAR MODE
```

7426 Model 2 Format

- The **A** position is a machine response to the operator. When ENTER is pressed, it will automatically change to a **2** if all fields are VALID. An INVALID entry will cause a **9**.

- The numbers in the format (0, 1, 2, and 3) represent port positions. Do not change these numbers.
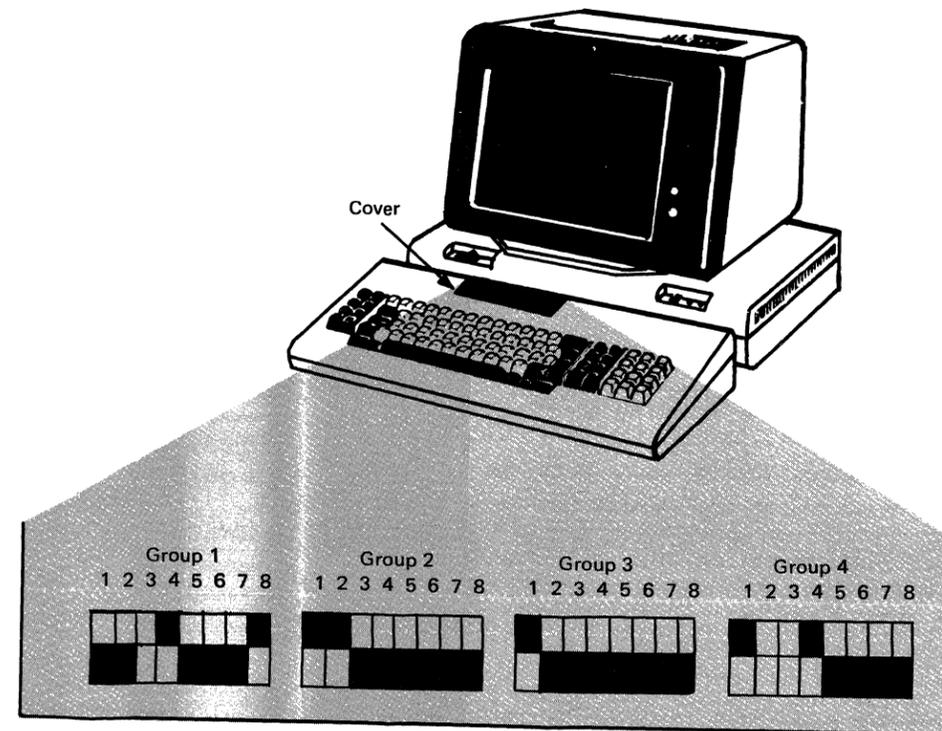
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 A
 *    —    ———    —   —   —
 0    —    —    —    —    —
 1    —    —    —    —    —
 3    —    —    —    —    —

CHAR MODE
```

7426 Model 1 Format

```
IBM 7426-02
 A
 *    —    ———    —   —
 0    —    —    —    —    —    —
 1    —    —    —    —    —    —
 2    —    —    —    —    —    —
 3    —    —    —    —    —    —

CHAR MODE
```

7426 Model 2 Format

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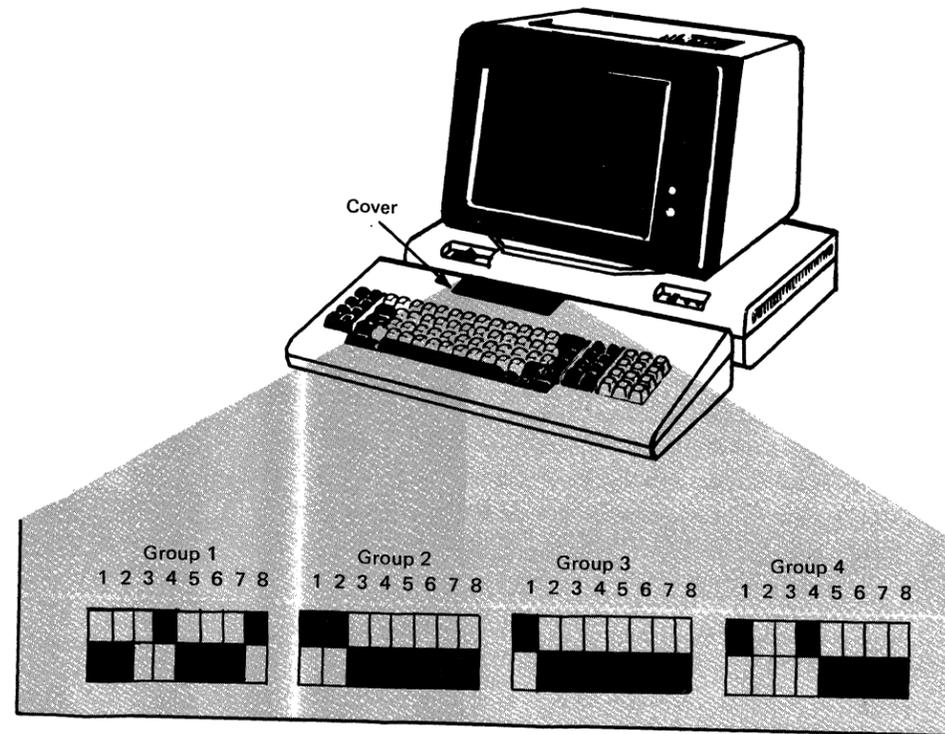- The numbers in the format (0, 1, 2, and 3) represent port positions. Do not change these numbers.

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A
*    —    ——        —    —
0    —    —    —    —    —    —
1    —    —    —    —    —    —
3    —    —    —    —    —    —
                              ——
CHAR MODE
```

7426 Model 1 Format

```
IBM 7426-02
A
*    —    ——        —    —
0    —    —    —    —    —
1    —    —    —    —    —
2    —    —    —    —    —
3    —    —    —    —    —
                          ——
CHAR MODE
```

7426 Model 2 Format

- The **A** position is a machine response to the operator. When ENTER is pressed, it will automatically change to a **2** if all fields are VALID. An INVALID entry will cause a **9** .

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