5280

IBM

IBM 5280
Distributed Data
System

Planning and Site Preparation Guide

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This guide will serve as a workbook for individuals responsible for planning the installation and implementation of IBM 5280 products. The 5280 system is designed so that you, the customer, can do your own planning, site preparation, setup, and system configuration.

Planning and site preparation consists of two main parts: the planning required to convert to the 5280, and the preparation of a physical site. Both parts should be completed before your system arrives.

The amount of planning required to convert to the 5280 will depend upon the number and complexity of your applications. This guide contains information to assist you in this planning so that you can determine the content and sequence of your conversion tasks. A specific sequence is recommended for the activities associated with preparing a physical site.

Use the list of planning activities in Chapter 1 to identify all of the planning activities required for installing your 5280 system. By scheduling these activities carefully, you can set up and begin using your system promptly.

The guide is organized to coincide with the activities that typically make up planning and site preparation:

Chapter 1 outlines the main topics to consider when you are preparing for the system, lists the various planning activities, and suggests an approximate order for their completion.

Chapter 2 provides ordering procedures and IBM part numbers for 5280 supplies.

Chapter 3 describes the education and training opportunities available from IBM for 5280 users.

Chapter 4 presents a broad range of system design considerations, including diskette usage and job scheduling.

Chapter 5 lists some factors that could influence conversions from specific types of devices.

Chapter 6 identifies the 5280 utility programs and equipment used for data communications.

Chapter 7 provides information required to set up your system when it arrives.

Chapter 8 provides information required to select and prepare a physical site.

PREREQUISITE PUBLICATIONS

Before using this guide, the reader should be familiar with the *IBM 5280 General Information*, GA21-9350. A bibliography of the 5280 publications appears in Chapter 2 of this guide.

List Your Important Phone Numbers:

	Name	Phone Number
• IBM 5280 Marketing Representative	_____	_____
• Supplies Marketing Representative	_____	_____
	_____	_____
	_____	_____
	_____	_____
• IBM System Engineer	_____	_____
• IBM Customer Engineer	_____	_____
• Other contacts		
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Contents

The IBM 5280 Distributed Data System offers many features to improve upon the data entry methods currently available, as well as a broad range of data communications facilities. Many of these capabilities, such as the advanced checking and editing functions of DE/RPG, are described in the *IBM 5280 General Information* manual. More detailed information about these capabilities appears in this guide wherever it is related to planning or site preparation.

As a customer setup system, the 5280 enables you to quickly respond to any changes in application requirements. By following a defined sequence of simple instructions, you can first prepare for and later set up your 5280 units at your convenience. The main areas of planning and site preparation are shown in the following illustration; setup instructions accompany all 5280 units when they are shipped to you.

PLANNING AND SITE PREPARATION

System Design Considerations   Site Preparation

- Converting programs and procedures

- Defining data sets and job schedules

- Testing programs and procedures

- Selecting a physical site

- Making a floor plan and ordering cables

- Preparing the site

ALSO: Ordering supplies
Arranging for education and training
Installing data communications facilities
Preparing for system setup

To benefit from your new system without delay, a smooth transition from your existing methods is required. The key to a smooth transition is an effective planning schedule for the necessary preparations.

After you have completed your planning activities, you will be ready for your new system. Detailed setup instructions accompany all 5280 units. It will be necessary for you to receive the machines at your receiving area, transport them to the prepared site, unpack the units, connect the machines with cables, and to then check out the units as directed.

IBM offers a variety of educational opportunities to help you prepare for the 5280. Testing facilities are provided at many IBM locations so that you can test programs before setting up your 5280 system. Consult your IBM representative for more information.

DESCRIBING YOUR 5280 SYSTEM

In order to complete certain planning activities, information about the units that make up your system is required. You will want to know how many diskette drives are available, how many printers will be set up, what each auxiliary data station will be attached to, and similar details about the system. The system summary worksheet that follows is provided so that you can fill in this information. This worksheet will prove useful throughout your planning cycle, especially during any meetings that you hold with IBM representatives or other consultants.

5280 SYSTEM SUMMARY WORKSHEET

Circle or fill in the appropriate information.

Programmable Device	Storage (in K)	No. of Attached Auxiliary Data Stations	No. of Attached Printers	No. of Diskette Drives	Type of Diskette Drive	Display Size	Keyboard Type	Features
5285 Programmable Data Station		0 or 1	0 or 1	1 or 2	1 or 2D	480, 960 or 1920		
5286 Dual Programmable Data Station		0 or 1		2	1 or 2D	480		
5288 Programmable Control Unit		, 2, 3, or 4	0, 1, 2, 3, 4, or 5	1, 2, 3, or 4	1 or 2D			

Attached Auxiliary Data Stations	Type	No. of Diskette Drives	Type of Diskette Drive	Display Size **	Keyboard Type	Features
No. 1 (see note)	5281 or 5282	0, 1, or 2	1 or 2D			
No. 2	5281 or 5282	0, 1, or 2	1 or 2D			
No. 3	5281 or 5282	0, 1, or 2	1 or 2D			
No. 4	5281	0, 1, or 2	1 or 2D			

**All display sizes for a 5280 system must be the same size.

Attached Printers   **Type and Model**

1. _____
2. _____
3. _____
4. _____
5. _____

Keyboard Types

1. Typewriter
2. Data Entry
3. Data Entry with Proof Arrangement

Feature Numbers: Place the number of the appropriate feature(s) in the Features columns above.

1. Elapsed Time Counter
2. Magnetic Stripe Reader
3. Keylock (programmable devices only)
4. Communications Line Attachment
   a. EIA/CCITT
   b. Integrated Modem (1200 bps)
   c. DDSA
5. Second Application Microprocessor

Note: If your system has a 5288 Programmable Control Unit, when the order was placed you specified whether the first attached data station is a 5281 Data Station or a 5282 Dual Data Station. Make sure that you identify the correct type of data station as number 1.

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IDENTIFYING ACTIVITIES AND ASSIGNING RESPONSIBILITIES

The following worksheet lists potential planning activities. This manual provides more complete information for many items on the list. Read through the list, and then, if necessary, scan through the manual to determine which activities apply to your 5280 installation. Cross out any activities that do not apply. Space is provided for any additional items.

One individual should serve as the project manager or overall coordinator for your planning efforts. One person is generally responsible for most or all of planning and site preparation, but it is also possible to divide responsibilities in terms of system design versus site preparation.

The worksheet also identifies areas in the manual where specific information on a planning activity can be found. Remember that this manual is not designed to be read from cover to cover. Instead, you should go to the specific area when you need information in order to complete a planning activity.

(

Delivery Dates: System Units _____   Program Products _____

Setup Date: _____

Startup Date: _____

Weeks Before Delivery	Planning Activity	Schedule Date/Person Responsible		Reference
16-18	*Site Selection*			Site Selection in Chapter 8
	Identify installation site	_____	_____	
	Make floor plan	_____	_____	
	Order cables	_____	_____	
	Order furniture, if necessary	_____	_____	
	Arrange for site preparation	_____	_____	
12	*Ordering Supplies*			Chapter 2
	Publications and coding sheets	_____	_____	
	Diskettes	_____	_____	
	Printer paper and ribbons	_____	_____	
	Establish Dates for Progress Reviews			See note below
10	*Education and Training*			Chapter 3
12	Define education plan	_____	_____	
10	Obtain education materials	_____	_____	
4	Complete programmer training	_____	_____	
4	Complete supervisor training	_____	_____	
2	Complete operator training	_____	_____	

Note: It is suggested that regular reviews be held to evaluate the progress of your preparations. Such progress reviews might be held with IBM representatives, or might be conducted totally within your organization.

Weeks Before Delivery	Planning Activity	Schedule Date/Person Responsible		Reference
4-10	*System Design*			Chapter 4
	Review current procedures	_____	_____	
	Establish priorities for conversions	_____	_____	
	Develop backup plan	_____	_____	
	Establish security procedures	_____	_____	
	Develop programs	_____	_____	
	Define data maintenance methods	_____	_____	
	Establish tentative job schedules	_____	_____	
	Determine diskette requirements	_____	_____	
	Define diskette control plan	_____	_____	
	Create operator run books	_____	_____	
	Test programs and procedures	_____	_____	
	Data Communications			Chapter 6
16	Define communications needs	_____	_____	
12	Contact the telephone company	_____	_____	
4	Receive communications equipment	_____	_____	
2	Install communications equipment	_____	_____	
	Site Preparation			Chapter 8
2	Complete physical alterations	_____	_____	
	Setup Preparations			Chapter 7
2	Complete setup form	_____	_____	
2	Label cables	_____	_____	
2	Review and update floor plan	_____	_____	
2	*Prepare for System Configuration*			Appendix E
	Complete partition layout form	_____	_____	
	Complete system summary checklist	_____	_____	Appendix B
	_____	_____	_____	
	_____	_____	_____	
	_____	_____	_____	

ESTABLISHING A SCHEDULE

The importance of a good schedule for your planning activities should not be underestimated. A good schedule ensures that the necessary materials are on hand at each stage of planning, and that all effected personnel are ready to use the new equipment when it arrives. A good schedule is comprehensive, and should be kept up-to-date throughout the planning cycle.

As a basis for your schedule, identify the delivery dates for system hardware, the System Control Programming diskette, and any program products you may have ordered. When defining your setup date, consider what the workload will be throughout the planning cycle, and what will be happening when the system arrives. Extra-heavy workloads and vacation schedules might require consideration.

Establish a completion date for each planning activity. Approximate dates for some activities are shown on the chart, but the sequence of other activities will vary with your unique requirements. Many activities require the prior completion of other tasks. For example, cable lengths cannot be accurately determined until a floor plan has been made, and education schedules will determine the completion dates for application program development. Periodic evaluations of the planning progress should be conducted to ensure timely completions. Often these progress reviews can be arranged with IBM representatives.

The following graph shows a typical overall sequence for planning activities.

Gantt Scheduling Chart — Date / Week

Activities	Feb 2	Feb 9	Feb 16	Feb 23	Mar 2	Mar 9	Mar 16	Mar 23	Mar 30	Apr 6	Apr 13	Apr 20	Apr 27	May 4	May 11	May 18	May 25	Jun 1
(Week)	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Identify Site & Make Floor Plans	├	—	┤															
Order Cables & Furniture	├	—	┤															
Site Preparation	├	—	┤													├	┤	
Identify Personnel Req					├	—	—	┤										
Order Supplies							├	┤										
Define Education Plan						—	—	┤										
Obtain Education Materials							├	—	┤									
Complete Training											Prog./Super.			Operator				
System Design										├	—	—	┤					
Develop Programs											├	—	—	┤				
Test Programs														├	—	┤		
Data Communications			├	┤		├	┤							—	┤	—		
Set-up Preparation																├	┤	
Prepare for Sys. Conf.																├	┤	

Appendix A contains a blank scheduling form that you can use to create a detailed schedule for your planning and site preparation.

This chapter contains specifications and ordering procedures for 5280 supplies. Information is provided to help you determine the types and quantities of publications, diskettes, and printer supplies that you should obtain.

PUBLICATIONS

Various IBM publications exist to directly or indirectly support the 5280 system. The IBM System Library Subscription Service (SLSS) will help you keep your system library up-to-date.

The following diagram illustrates the 5280 publications that support your system. As indicated in the diagram, several publications (indicated by an *) are shipped with the system. It is important that you order the other 5280 publications that you want early in your planning cycle. For new users of communicating devices, the *Data Communications Concepts*, GC21-5169, may be of particular interest.

GUIDE TO 5280 PUBLICATIONS

Question	Publication	Description
What is the 5280 System?	IBM 5280 General Information, GA21-9350	Components, capabilities, program products, sample environments
What must be done before the system arrives?	IBM 5280 Planning and Site Preparation Guide, GA21-9351	System design, ordering supplies, physical planning, preparing for setup
What are some of the concepts of the system?	IBM 5280 System Concepts, GA21-9352	Diskette and data set concepts, partitions, system capacities
How do I set up 5280 units?	* User's Setup Procedures: 5280 System, GA21-9365 5222 Printer, (to be available at a later date) 5225 Printer, GA34-0085 5256 Printer, GA21-9290	Physical setup, checkout, and problem determination procedures
How do I start using the 5280 System?	IBM 5280 System Control Programming Reference/Operation Manual, GC21-7824	System Configuration and other programs fundamental to the system
How do I operate the 5280 System? With a printer?	* IBM 5280 Operator's Guide, GA21-9364 IBM 5225 Printer Operator's Guide, GA34-0045 IBM 5222 Printer Setup Procedure and Operating Instructions (to be available at a later date) IBM 5256 Printer Operator's Guide, GA21-9260	Functions of all keys and switches, how to compile and run programs
What if I encounter an error condition?	* IBM 5280 Message Manual, GA21-9354	Error messages and recovery procedures
How can I be sure that the system is set up to operate correctly?	* IBM 5280 Machine Verification Manual, GA21-9357	Instructions for running programs that check out machine connections
Where can I find information about 5280 object code?	IBM 5280 Functions Reference Manual, GA21-9353	Functions of object program instructions
How can I find information in the publications?	IBM 5280 Master Index, GA21-9356	Includes index entries for program product publications

Publications for 5280 Program Products

IBM 5280 Introduction to DE/RPG, SC21-7803

IBM 5280 DE/RPG User's Guide, SC21-7804

IBM 5280 DE/RPG Reference Manual, SC21-7787

IBM 5280 DE/RPG Debugging Template and Reference Card, GX21-9363

IBM 5280 DE/RPG Problem Determination Procedures for the Programmer, SC21-7852

IBM 5280 COBOL Language Reference Manual, GL23-0031

IBM 5280 COBOL Programmer's Guide, SL23-0032

IBM 5280 COBOL Host Compilers Problem Determination Manual, SL23-0043

IBM 5280 Communications Reference Manual, SC34-0247

IBM 5280 Utilities Reference/Operation Manual, SC21-7788

IBM 5280 Sort/Merge Reference/Operation Manual, SC21-7789

IBM 5280 Assembler Language Reference Manual, SC21-7790

Supplementary Publications

IBM Forms Design Guide for Printers, GA24-3488

Data Communications Concepts, GC21-5169

IBM 5280 Data Areas and Diagnostic Aids Handbook, SY31-0595

Using SLSS

The IBM System Library Subscription Service (SLSS) is an automatic publications updating service for technical documentation related to programming, operating, and maintaining IBM data processing systems. SLSS subscriptions are available through your IBM Marketing Representative, without charge or at a fee in accordance with normal publication practices.

The success of a new data entry operation is often dependent upon the speed and accuracy with which programs are developed, debugged, and installed. This, in turn, depends upon ready access to the documentation describing the system and programs. An SLSS subscription should be entered early in the planning cycle so that implementation of the system design can be started early and be based on the latest, most complete documentation.

Two methods of subscribing are provided under SLSS: by order number and by interest profile (or both). The former method requires that the specific eight-character order numbers of the desired documents be listed. Whenever a major revision or an update (technical newsletter) is released pertaining to the documents listed, the subscriber receives copies. The order-number subscription procedure is used (1) when multiple copies of a document are required, or (2) to subscribe to documents not available by profile (for example, program listings and logic manuals).

The profile method of subscribing is useful because it not only provides revisions and updates for the documents ordered, but also provides new publications related to the interests indicated on the SLSS form. The following chart identifies the 5280 publications that can be ordered by profile:

Publication	Subject Code
IBM 5280 Planning and Site Preparation Guide, GA21-9351[1]	15
IBM 5280 Master Index, GA21-9356	00
IBM 5280 System Concepts, GA21-9352	20
IBM 5280 Message Manual, GA21-9354[2]	01
IBM 5280 Machine Verification Manual, GA21-9357[2]	01
IBM 5280 Operator's Guide, GA21-9364[2]	01

Publication	Program Number
IBM 5280 Introduction to DE/RPG, SC21-7803	5708-DE1
IBM 5280 DE/RPG User's Guide, SC21-7804	5708-DE1
IBM 5280 DE/RPG Reference Manual, SC21-7787	5708-DE1
IBM 5280 DE/RPG Problem Determination Procedures for the Programmer, SC21-7852	5708-DE1
IBM 5280 DE/RPG Debugging Template and Reference Card, GX21-9363	5708-DE1
IBM 5280 Utilities Reference/Operation Manual, SC21-7788	5708-UT1
IBM 5280 Communications Reference Manual, SC34-0247	5708-DC1
IBM 5280 Sort/Merge Reference/Operation Manual, SC21-7789	5708-SM1
IBM 5280 System Control Programming Reference/Operation Manual, GC21-7824	5708-SC1
IBM 5280 COBOL Language Reference Manual, GL23-0031	5708-CB1, CB2[3]
IBM 5280 COBOL Programmer's Guide, SL23-0032	5708-CB1, CB2[3]
IBM 5280 COBOL Host Compilers Problem Determination Manual, SL23-0043	
IBM 5280 Assembler Language Reference Manual, SC21-7790	5708-AS1

[1]You will not receive a copy of this publication with your SLSS order. However, you will receive any future updates to this publication.

[2]Since these publications are shipped with each 5280 system, you will not receive a copy of these publications with your SLSS order. However, you will receive one copy of any future updates to these publications. For the operator's guide and message manual, you should order one additional copy of the updates for each keyboard on your system.

[3]CB1 for OS/VS, CB2 for DOS/VSE.

The following example shows how part of the SLSS subscription might be completed for a 5280 system with the following program products:

- DE/RPG

- COBOL

- Utilities

- Sort/Merge

- Communication Utilities

SUBSCRIBER PROFILE

| Should Initial Library be shipped? | Check One (√) ☑ Yes ☐ No |

Section A: Type of Service *(check one):*
- ☐ (PUB-) No Profile: Order No. subscription only.
- ☐ (PUBG) Profile applicable to use Key G items only.
- ☑ (PUBS) Profile applicable to use Key G and S items. (Invalid for non-IBM non-billable subscriptions)

Section C: Are any of these systems used in a Communications mode? ☑ Yes ☐ No

Section B (#): Systems for which libraries are required. *(Show Processor No., e.g. 3145, 5410).* `A 5 2 8 0` ☐ ☐ ☐

Section D (#): Specify subjects of interest: See System Library Bibliographies for subject codes and lists of related publications.

A 00	General Systems Information		21	Assembler	**A** 32	Utilities		
A 01 to 08	Processor, Storage Devices, Channels and I/O		22	APL	**A** 33	Sort/Merge		
			23	BASIC		34	System Planning, Generation, Installation	
	09	Communications Devices	**A** 24	COBOL				
	10	Auxiliary Equipment		25	FORTRAN		35	Simulation, Emulation
	13	Special Features Information		26	ALGOL	**A** 36	Control Program	
	14	Custom Features and Supporting Programs	**A** 28	RPG, RPGII		37	RAS, Testing, Service Aids, Problem Determination	
			29	PL/I				
A 15	Physical Planning Information		30	Access Methods, Data Management, I/O Control Programs		38	Remote Job Entry	
A 20	Programming Systems—General Information		31	Support Programs		39	Time Sharing, Interactive Facilities	
					A 40	Programming System Operation		

01-15: Specify type numbers of components in Section F.   20-40: Specify program numbers in Section E2.

Section E1 (#): Specify any Type I programming systems used with major systems:

1130—	1800—	Model 20—	Other System/360—		System 360/370—	
☐ (01) Card/Paper Tape	☐ (03) Card/Paper Tape	☐ (06) Card	☐ (09) BPS	☐ (12) 44 PS	☐ (13) TSS	☐ (17) OS TSO
☐ (02) Disk Monitor	☐ (04) TSX	☐ (07) Tape	☐ (10) BOS		☐ (14) DOS	☐ (18) OS-ASP
	☐ (05) MPX	☐ (08) Disk	☐ (11) TOS		☐ (16) OS	☐ (19) CALL-OS

Section E2 (#): Specify system control programming, selectable unit identifiers, and licensed programs used with major systems:

`A 5 7 0 8 — D E 1`   `A 5 7 0 8 — D C 1`   `A 5 7 0 8 — C B X`   ☐

`A 5 7 0 8 — S C 1`   `A 5 7 0 8 — U T 1`   ☐   ☐

The next example shows how additional updates to the operator's
guide and message manual can be ordered:

ORDER NUMBER SUBSCRIPTION:

Specify publications by order number when (1) not available by profile matching or (2) multiple copies are required.

Note: Use Key L and Z items are available on IBM Internal subscriptions only. Use Key S items are available outside IBM on Billable and User subscriptions only.

New and Added Items, Quantity Change (Place X in box after order number if you requested **Initial Library** but require only **update service** on this item):

	ORDER NUMBER (Omit Suffix)	x	NEW OR CHANGED QUANTITY	ORDER NUMBER (Omit Suffix)	x	NEW OR CHANGED QUANTITY	ORDER NUMBER (Omit Suffix)	x	NEW OR CHANGED QUANTITY
1st Screen	GA2L-9354	X	4	For this example, the					
	GA2L-9364	X	4	5280 system has four keyboards.					
2nd Screen									

Coding Sheets

For DE/RPG Applications

To assist you in describing your DE/RPG applications, three types of coding sheets are available. The Data Description Specifications (A specification) is used to describe the characteristics of the records and the fields in the records. The General Utility Specifications (Z specification) is used to identify the job and the data sets used in the job, and also to specify the record sequences expected during job execution.

A third form, the RPG Calculation Specifications (C specification) can be used to describe special routines for extensive calculations and for program-controlled use of I/O devices beyond primary data entry needs.

The forms are divided into fields, and contain keyword summaries for ease of use. Frequently, coding sheets serve as the basis for an operator's run book, or simply as historical records of system applications.

Coding sheets come in separate pads of approximately 50 sheets each. They should be ordered through your IBM representative, so as to be on hand for program development.

Type of Coding Sheet	IBM Form Number
IBM 5280 Data Description Specifications (A specification)	GX21-9362
IBM 5280 General Utility Specifications (Z specification)	GX21-9361
RPG Calculations Specifications (C specification)	GX21-9093

For COBOL Applications

The COBOL Coding Form, GX28-1464 can be used for COBOL applications. In addition, the Data Description Specifications (A specifications) can be used to code the characteristics and editing controls for the data station screens written with transaction I/O.

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Program

Programmer

RPG CALCULATION SPECIFICATIONS

C

Indicators

Line

Form Type

Control Level (L0-L9),
LR, SR, AN/OR)

And   And

Factor 1

Operation

Factor 2

Result Field

Name   Length

Resulting Indicators
Arithmetic
Plus Minus Zero
Compare

Date

Keying Instruction

Graphic
Key

Card Electro Number

Page 1 2 of

GX21-9093- UM/060*
Printed in U.S.A.

Program Identification 75 76 77 78 79 80

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IBM 5280 DATA DESCRIPTION SPECIFICATIONS

Job No.

Operator

Dataset

Date

Keying Instruction

Graphic
Key

Source Document

Printed in U.S.A.

Page of

A

Sequence

Reserved

Dataset/Record/
Field/Table Name

Length

Location

Line Pos

Checks=CHECK (code . . .)

Auto Dup	=AD
Auto Skip	=AS
Blank Check	=BC
Bypass	=BY
Bypass on Verify	=BV
Data Required	=DR
Dup Disable	=DD
Field Exit Required	=FE
Lower Case	=LC

Mandatory Entry	=ME
Mandatory Fill	=MF
Rt Adj–Blank Fill	=RB
Right to Left	=RL
Rt Adj–Zero Fill	=RZ
Self-Check	=nxx
D–M/G (Check/Gen)	
xx=Modulus	

Editing

Functions

'ADD (name)
'AUXDUP (name)
'AUXST (name)
'COMP ('test fld')@   fldn
  'literal' (indicator))
'DSPATR ('attr. . .)
'EDTCDE (code 'float')
'ERROR (code ['message'))
'EXSR (subroutine)
'INSERT (fld')@   fldn 'literal')
'LOOK (table [index])

PMT (prompt)
'RANGE (low high)
'RANGET (table [index])
'RESET [['TOT'] [name])
'SEQ (' test)
'SETOF (ind)
'SETON (ind)
SHIFT ('shift)
'SUB (name)
'SUBST

IBM® International Business Machines Corporation

IBM 5280 GENERAL UTILITY SPECIFICATIONS

Printed in U. S. A.

Job

Operator

Date

Keying Instruction

Graphic
Key

Description

Page of

Z

Sequence

Form Type

Name Type

Format ID (1-9, A0-29)

Job/Format/
Subroutine Name

Reserved

Repeat (1-9, N)

Mode (E/R)

AND(A)

Test Conditions

Position to be Tested
(*POSnnnn)

Reserved

Condition

Character to Test for ('C')

Reserved

Next Format ID (0-9, A0-29)

Reserved

Options

Job Line

CFILE (data set)
DATE (•DMY/•YMD)
EDITC (cuptd)
ENTRATR ('attr. . .)
EXITATR ('attr. . .)
JOBOPT [[•NOPMT][[•NOOPEN]]
PRTFILE (data set)
SHARE (names)
SHARER (names)
STATUS (name)
TFILE (data set [del/req])

'attr=BL,CS,HI,ND,RI,UL

Entry Lines

CLRL (number)
EOJ [[('job' dev] [•PASS],)]
SLNO (line)
WRITE (name)

1 2 3 4 5 6	7	8 9	10...21	22	23 24 25 26	27 28 29 30	31 32	33 34	35	36 37	38...44	45 46	47...54	55...80
0 1	Z				*P O S		E Q		'	'				
0 2	Z				*P O S		E Q		'	'				
0 3	Z				*P O S		E Q		'	'				
0 4	Z				*P O S		E Q		'	'				
0 5	Z				*P O S		E Q		'	'				
0 6	Z				*P O S		E Q		'	'				
0 7	Z				*P O S		E Q		'	'				
0 8	Z				*P O S		E Q		'	'				
0 9	Z				*P O S		E Q		'	'				
1 0	Z				*P O S		E Q		'	'				
1 1	Z				*P O S		E Q		'	'				
1 2	Z				*P O S		E Q		'	'				
1 3	Z				*P O S		E Q		'	'				
1 4	Z				*P O S		E Q		'	'				
1 5	Z				*P O S		E Q		'	'				
	Z				*P O S		E Q		'	'				
	Z				*P O S		E Q		'	'				
	Z				*P O S		E Q		'	'				
	Z				*P O S		E Q		'	'				

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 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

*Number of sheets per pad may vary slightly.

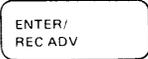Ordering Supplies for Your 5280 System   19

Other Publications

A label package, GX21-9339, is required as you prepare for customer setup (see Chapter 7). This label package is used for labeling your system cables prior to the 5280 system arriving from IBM. If you do not have this label package, include the label package with your publications order.

There are several other publications that might assist you in generating your job documentation. Job documentation is discussed in Chapter 4, *System Design Considerations*. These publications are the data entry keytop graphic decals, the typewriter keytop graphic decals, and the keyboard template.

The keytop graphic decals are peel-off decals that you can stick in your job documentation to identify which keys should be pressed for a specific operation. For example, an instruction in the job documentation might be:

6. Press the ENTER/ REC ADV **key to advance to the next record.**

You should select the appropriate keytop graphic decals depending upon the type of keyboard(s) on your system:

- *IBM 5280 Data Entry Keytop Graphics*, GX21-9355

- *IBM 5280 Typewriter Keytop Graphics*, GX21-9358

The *IBM 5280 Functions Reference Manual*, GA21-9353, contains information that might assist you in writing assembler programs. You should order this manual if you have also ordered the Assembler Program Product.

The *IBM 5280 Keyboard Template*, GX21-9360, contains blank squares where you can write in special functions that are given to certain keys by an assembler or COBOL program. This keyboard template can be placed over the template that is permanently attached to the keyboard above the keys. You should order this template only if you are using assembler programs that give some keys a special function.

If you plan to purchase bulk cables and assemble them, or to order cables from a source other than IBM, you should order the *IBM 5280 Cable Assembly Manual*, GA21-9341, for specifications and assembly procedures.

DISKETTES

Because the 5280 is a diskette-based system, ordering diskettes is a particularly important planning activity. Diskettes are generally ordered twice during the planning cycle: first, to provide an initial supply, and then later, when the system design has determined how many diskettes will be used on a regular basis.

A diskette is a thin, flexible disk permanently enclosed in a semi-rigid, protective, plastic jacket. Data can be written onto and read from the diskette's magnetic recording surface. More information on what a diskette is and how diskettes function appears in the *System Concepts* manual.

The 5280 system supports three types of diskettes:

- One-sided, where data is recorded at single density (diskette 1)

- Two-sided, where data is recorded at single density on both sides (diskette 2)

- Two-sided, where data is recorded at double density on both sides (diskette 2D)

A diskette drive is the part of a 5280 device that performs the read/write operations on a diskette. Two types of diskette drives are available in the 5280 system:

- The compact diskette drive supporting diskette 1 only. (This diskette drive will be referred to as the diskette 1 drive.)

- The compact diskette drive supporting diskette 1, diskette 2, and diskette 2D. (This diskette drive will be referred to as the diskette 2D drive.)

Index Hole

| One-Sided Diskette (Diskette 1) | Two-Sided Diskette (Diskette 2 or 2D) |
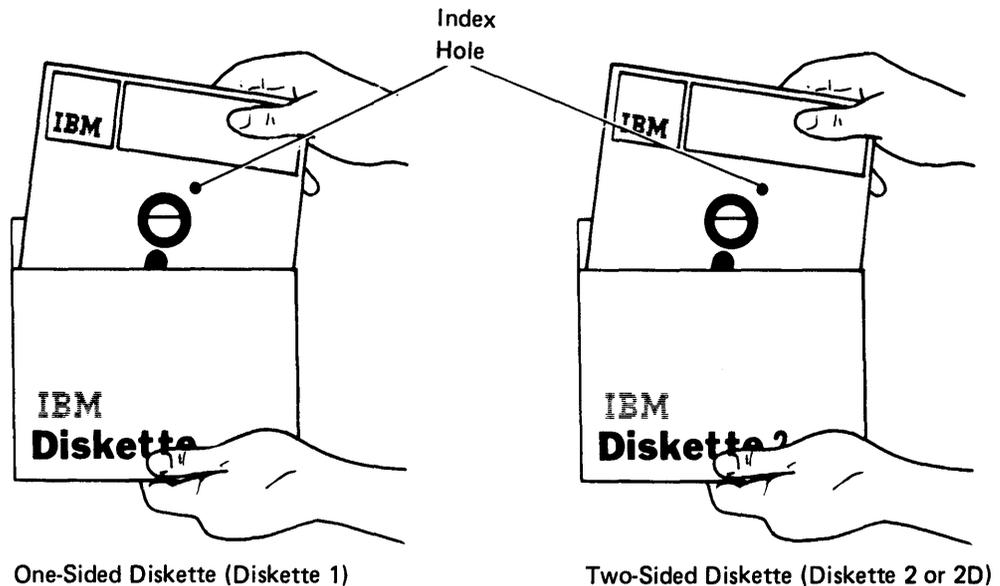
Ordering Your Initial Diskette Supply

As programs and procedures are developed, diskettes will be needed
for storing and distributing the programs, for operating certain utility
programs, and possibly for educational activities undertaken at your
site. It is recommended that you order at least two additional boxes of
diskettes (10 diskettes per box) to provide for the needs previously
discussed. Be sure to order your initial diskette supply early, to ensure
that your preparations can proceed on schedule.

If your system has diskette 1 drives, IBM diskette 1 (part 2305830) is
recommended. If your system has diskette 2D drives, IBM diskette 2D
(part 1766872) is recommended. The recommended diskette 1 has
128-byte sectors and can be used for basic and I data exchange. The
recommended diskette 2D has 256-byte sectors and can be used for H
and I data exchange. Data exchange is discussed next.

If diskettes will be physically exchanged between the 5280 system and
another system, be sure to order a diskette type that both systems
can support. The 5280 supports three data exchange types, called
basic, H, and I. The diskette 1 recommended in the previous
paragraph fulfills the requirements for basic and I data exchange, and
the diskette 2D recommended above can be used for H and I
exchange. The following chart lists several IBM products and the data
exchange types supported by each:

Product	Data Exchange Type
S/3	Basic
S/32	Basic
S/34	Basic, H, and I
S/370	Basic
3741	Basic
3774	Basic
3790	Basic
5110	Basic and H
5120	Basic and H
S/38	Basic, H, and I
5260	Basic and H
8100	Basic and H
Series/1	Basic

Ordering Your Regular Diskette Supply

Diskettes should be ordered a second time during your planning cycle,
after data sets have been defined and program development is
underway. Guidance for estimating the number of diskettes required
on a regular basis appears at the end of Chapter 4, *System Design
Considerations.*

PRINTER PAPER AND RIBBONS

Printer paper and ribbons are the only supplies required if your system has a printer. When ordering paper for printing, consider using standard sizes, thereby minimizing the time required for setup. Paper dimensions should be determined with attention to the print width of the printer, because damage to the print heads can occur when the paper is too narrow.

The format of your printout (forms design) may vary, and specific forms should be tested in the printer to ensure that the print quality is acceptable for your application. For additional information on forms, consult the *IBM Forms Design Guide for Printers*, GA24-3488.

Ordering Paper for the Printers

The 5222 printer can use individual cut or continuous paper forms. The forms can be single-part (without carbon copies) or multipart (with carbon copies). The maximum number of copies for multipart forms is the original plus three copies (four parts).

	Individual Cut	Continuous
Width:		
Maximum	15 inches (381 mm)*	15 inches (381 mm)
Minimum	5.75 inches (146 mm)	3 inches (76.2 mm)
Length:		
Maximum	14 inches (355.6 mm)	14 inches (355.6 mm)
Minimum	3 inches (76.2 mm)	3 inches (76.2 mm)

The maximum print width for either type of form is 13.2 inches (335.28 mm).

*The maximum form width is 12 inches if a Rear Document Insertion Device is installed.

The 5225 printer uses continuous paper forms. The forms can be single-part (without carbon copies) or multipart (with carbon copies). The maximum number of copies for multipart forms is the original plus five copies (six parts).

Width:
Maximum	17.7 inches (450 mm)
Minimum	3 inches (76.2 mm)

Length Between Perforations:
Maximum	12.5 inches (318 mm)
Minimum	3 inches (76.2 mm)

The minimum length between folds is 6 inches (152.4 mm). The maximum print width is 13.2 inches (335.28 mm).

The 5256 printer can use individual cut or continuous paper forms. The forms can be single-part (without carbon copies) or multipart (with carbon copies). The maximum number of copies for multipart forms is the original plus five copies (six parts).

	Individual Cut	**Continuous**
Width:		
Maximum	14.5 inches (367.5 mm)	15 inches (381 mm)
Minimum	6 inches (152.4 mm)	3 inches (76.2 mm)
Length:		Length between Perforations:
Maximum	14 inches (355.6 mm)	14 inches (355.6 mm)
Minimum	3 inches (76.2 mm)	3 inches (76.2 mm)

The maximum print width for either type of form is 13.2 inches (335.28 mm).

Ordering Printer Ribbons

The 5222 printer uses a cartridge type cloth ribbon. The IBM ribbon is part 7034535.

The 5225 printer uses fabric ribbons wound on disposable spools. The IBM ribbon is part 4412372.

The 5256 printer uses fabric ribbons wound on disposable spools (IBM part 1136653) or a cartridge type ribbon (IBM part 7034535) depending on your machine.

IBM offers a variety of education courses to meet 5280 specific requirements. The availability of each course is outlined in course schedules, which can be obtained from your IBM representative. Course offerings include detailed training for persons who will implement the system design as well as for those who will write programs or operate data stations.

IDENTIFYING COURSE REQUIREMENTS

Education for managers, supervisors, programmers, and operators should be included in the planning schedule. Care should be taken to ensure that adequate training has been completed before related planning activities begin. The following analysis of educational and training needs is not meant to be all-inclusive, but rather to serve as a guide for specific planning and specific needs.

Management

A one-day *Management Seminar* introduces the basic concepts and components of the 5280 system. The objective of this seminar is to provide management with an introduction to the IBM 5280 system hardware, software, features, and concepts so that the benefits and justification of the system can be better understood. The course enables management to understand the functions of the hardware and software, and to understand the advantages of the system in different operating environments. System installation activities and responsibilities are also discussed.

Lead Programmer

The lead programmer of an installation with multiple 5280 systems communicating with a host system should attend the one-day *Introduction and Installation Planning* course and the four-day *Programming and Communications Implementation* course.

The *Introduction and Installation Planning* course provides an introduction to the IBM 5280 system concepts, hardware and software, and communications functions. The course also guides you through installation planning, scheduling, and customer set-up.

The *Programming and Communications Implementation* course is intended for businesses that have multiple 5280 systems (and implementers) and desire to have at least one person with in-depth technical knowledge who can act as a focal point for implementation activities within that organization.

DE/RPG Programmer

Programmers should attend the *Introduction and Installation Planning* class and take the *DE/RPG Programming* self-study course. The programmer should also attend the *Communications Implementation* class if the installation will be using communications.

The *DE/RPG Programming* self-study course consists of three modules that provide the formatting and programming information required to program the 5280 system. The first module describes the use of the basic formatting capabilities of the DE/RPG Program Product. The second module is intended to teach basic programming concepts and the use of DE/RPG operation codes to students with little or no programming experience. The third module explains the use of all the formatting and programming capabilities of the DE/RPG Program Product.

The *Communications Implementation* class describes the features of the Communications Program Product and the different environments in which it can be utilized.

Supervisor and Operators

Supervisor and lead operators should attend the *Introduction and Installation Planning* class and should complete Module 1 of the *DE/RPG Programming* self-study course. This course will provide them with a good grasp of the DE/RPG functions, and will aid in the conversion of current jobs. Supervisors may want to take the *5280 Operator Training* self-study course, which should be completed by at least one of the lead operators.

Data Entry Operators

All data entry operators should take the *Operator Training* self-study course. This course teaches the use of the 5280 system and many utility functions using a 'hands-on' method of instruction.

Machine training schedules should be established as early as possible. It is suggested that supervisors and lead operators be trained first. These individuals need a thorough understanding of 5280 operations in order to revise existing procedures as necessary, to set up initial job conversions, and to supervise operator training.

Your schedule for job conversions determines when each operator should be trained. If plans are such that one application at a time is to be converted to the 5280, the operators who normally enter the related data should be trained first. Once they have developed speed and accuracy with on-the-job practice, the next application can be converted, additional operators trained, and the process repeated until all jobs have been converted and all operators trained. In the event that all jobs are to be converted simultaneously, it is recommended that the more experienced operators be trained first (more skilled operators require less time for training).

ARRANGING TO TAKE 5280 COURSES

Course schedules and outlines can be obtained from local IBM marketing representatives. Arrangements for attending classroom courses and for obtaining self-study materials can be made with the same individuals. The following table summarizes the educational and training needs previously discussed:

Course	Management	Lead Programmer	Other Programmers	Supervisor/ Lead Operator	Data Entry Operators
Management Seminar	R				
Introduction and Installation Planning		R	R	R	
Programming and Communications Implementation		R			
DE/RPG Programming			R	R	
Communications Implementation			O		
Operator Training				R	R
R = Recommended O = Optional					

Deriving the full benefits of any system requires both detailed planning and an idea of how the system will operate as a whole. This phase of planning is called system design because it involves laying out, step-by-step, the entire sequence of events that must be followed to achieve the desired results. The general planning considerations are summarized in the following chart, which also indicates where in this chapter related information appears. If you will be using data communications facilities, you must consider the influence of communications during the system design.

System Design Steps

1. What applications will be performed? How will jobs be converted?

   See *Application Analysis*

2. How will data and/or programs be grouped in diskette data sets?

   See *5280 Diskette Data Sets*

3. What programs must be written to perform an application? How will system storage be partitioned?

   See *5280 Utility Programs*

4. What control measures and procedures should be implemented?

   See *Establishing Control Measures*

5. How will new job schedules be developed?

   See *Establishing Job Schedules*

APPLICATION ANALYSIS

A thorough review of the applications currently performed can help determine how to use your 5280 system most effectively. Such a review involves analyzing how the organization communicates internally, and, if applicable, the jobs currently executed. Upon completion of the reviews, you should prepare documentation to indicate which applications the system will perform.

Analyzing Current Procedures

You should complete a detailed analysis of your current procedures, and prepare good documentation, before you begin designing new programs and procedures. Some areas to consider include:

- Data flow: from the source department to the 5280 area, through the 5280 system, and back to the source. This might be restructured so that source departments submit entries directly into the 5280 system, or it might include data communications with a host system

- Required processing

- Required checks and controls

- Output desired

- Host scheduling constraints

- Error detection and correction procedures

To help visualize how the organization communicates internally, you might make a diagram showing how information from various transactions passes from one department to another. Pay close attention to how the data is grouped when it first arrives in the work area. Note whether control records are attached and when batch numbers are assigned. You should also determine how long the source documents remain in the work area after the data has been entered. All of this information will be useful to you when establishing control, transfer, and error-correction procedures.

As you analyze the work flow, consult with the personnel who will be operating the new system. They can help identify potential problems and anticipate special circumstances. By participating in the planning process, they will gain confidence in the new equipment and procedures.

Analyzing Current Jobs

A job is a set of programs and the data that define an application. Work on the 5280 system is identified, scheduled, and controlled through the job to which it belongs.

The following form, *Job Analysis*, is an example of a form that can be used to gather information regarding current jobs. Once completed, these forms can be used to establish priorities for job conversions and an order for the creation of programs.

Job Analysis

Job Name: _____

	Program Name	Record Length	Number of Fields	Edit Functions	Comments
1.					
2.					
3.					
4.					
5.					
6.					

Frequency Run: Daily _____ Weekly _____ Monthly _____ Other _____

Batches Per Day _____ Batches Per Run _____

Records Per Batch: Minimum _____ Maximum _____ Average _____

The number and complexity of the jobs will be a major determinant of the time required for conversion. The sequence in which jobs should be converted will vary with your operating requirements. Jobs could be moved to the 5280 in a way that nearly duplicates the present system, or you can modify existing procedures and job schedules to take advantage of 5280 capabilities. Information is provided later in this chapter regarding procedures and job schedules.

5280 DISKETTE DATA SETS

The 5280 system recognizes the traditional data categories, with records consisting of one or more fields, and fields containing one or more character positions. The category of data set, or file, also applies. A data set can be defined as a group of related records stored as a single unit on diskette. The *System Concepts* manual contains information on diskette concepts, which might be of interest if you are unfamiliar with this medium.

Space must be allocated on a diskette for every data set, based on the number of records and their characteristics. The diskette label maintenance utility enables you to allocate data set space, or space can be allocated dynamically, as described in this section. This section describes various considerations for establishing diskette data sets, and should be reviewed by the programmer during the planning cycle. Consult the *System Concepts* manual for further discussion of diskette data sets.

Designing 5280 Records

The applications and required processing determine what data is needed in a record. You should study your applications and then decide the layout of the record. Layout means the arrangement of fields in a record. When you design a record, you determine the field length (size), location, and name. The *Introduction to DE/RPG* and the *DE/RPG User's Guide* explain how to design DE/RPG records; the following topics outline the considerations involved.

Determining Field Size

There are no firm rules for determining field size. The major problem involves fields with variable-length data. For example, if a name field is planned for 15 positions and there are 19 characters in a new customer's name, a problem arises when the new record is added to the data set. The last four characters could be lost. To avoid this problem, try to estimate the largest length of the data that will be contained in a field, including blank positions. Use this length to determine field size.

Determining Record Size and Placement

Records can be stored on diskette in one of two placement schemes:

- Unblocked, unspanned

- Blocked, spanned

The primary benefit of blocking and spanning records is the efficient use of diskette space. Blocking of data on diskette might increase the speed with which accesses are accomplished. Spanning records enables you to store the records right next to each other, without wasting space between sets of data. Records will be stored in a blocked and spanned manner unless you specify otherwise in the coding of a DE/RPG, COBOL, or assembler program.

Different diskette exchange types support different record placement schemes; if your 5280 will be exchanging data with another system, you should consider the requirements for data exchange that are discussed in the *System Concepts* manual.

Providing for Record Expansion

Usually, it is best to reserve extra space so that data can be added to a record. For example, suppose that a name-and-address data set were created with the fields described, and at a later time each customer's telephone number is needed. If all positions in the record are used, there is no place to add the telephone number. While still in the planning cycle, you can allow for such additions to this record. Although it is often difficult to imagine what data might be added, you should reserve extra space; a minimum of 10% is suggested.

Defining Data Sets

Frequently, data sets are classified as either master data sets or transaction data sets. Defining the contents of your master and transaction data sets is an important step in designing your applications, and will influence the amount of storage required.

Master data sets are permanent collections that are typically used for several applications or programs. For example, a master data set may contain a record for each customer of a business; this record would be used for various transactions, such as accounts receivable and orders to be shipped. Standard data such as the company name, address, shipping instructions, credit status, and account number would be included for each customer. Diskette storage space can be used most efficiently when the same information is not duplicated on different diskettes, but is instead centralized in a single master data set.

A transaction data set is a collection of data created by one application or program. It is data processed for a particular task such as inventory control or payroll.

As you begin outlining the applications that you will use, maintain a list of the types of data that will be used repeatedly. This list will give you a good idea of what you might include in your master data sets. The following illustration shows an example of master data set information. (These items are from a master data set.)

```
BILL TO:  IDEAL HARDWARE COMPANY          SHIP TO:  THOMPSON HARDWARE COMPANY.
          HQ PURCHASING DEPT                        1725 PINE STREET
          1150 EGLINTON AVENUE                      BOSTON, MASS.   02100
          SYRACUSE, N.Y.   13200
```

CUSTOMER NO	SHIPPED VIA	CUST. ORDER NO	INVOICE NUMBER	INVOICE DATE
38548	WHITE TRUCKING	20022	42530	02/06/79

PART NUMBER	DESCRIPTION	QUANTITY	UNIT PRICE	AMOUNT
5431236	HINGE, 2"	12	.36	4.32
2468024	BROOM	25	2.50	62.50
3636169	ELECT OUTLET BOX	10	.60	6.00
4785902	WIRE, #14	100	.10	10.00
			SUBTOTAL	82.82

Determining Data Set Size

To determine the size of a data set, you must estimate how many records will be in the data set at a specified time, and how large the records will be.

To determine the number of records in a data set, consider several factors. First, you must know how many records will be in the data set when it is created. If the data set already exists, perhaps as a disk file or catalog, use the number of records in this file as a base.

You must also know whether records will be added or deleted. If additions are expected, how many records are expected, and how often will the additions occur. If records will be tagged for deletion, consider periodically removing them from the data set.

Only after considering these factors and the applications that use the data set can you determine the number of records in the data set. In general, the data set should be set up to be large enough for all of the appropriate records. Do not forget to consider expansion for a reasonable time into the future (at least six months).

With DE/RPG, you can provide for future updates or additions to a data set by implementing a program that periodically inserts blank record spaces between records that contain data. The *System Concepts* manual explains how blank (deleted) record spaces are created whenever a specified number of records have been entered.

Calculating Space for the Index of a Key-Indexed Data Set

If a data set is key-indexed, the system places the index in a separate data set. To determine the storage space needed for this index data set, you must know the size of an index entry. An index entry consists of a key field and the relative record number. Four character positions are reserved for each relative record number.

Size of index entry = length of key field + 4

Note: Index entries are always 8, 16, or 32 character positions long. For example, if the key field is at least 5 and no more than 12 characters long, the index entry is 16. Similarly, for key fields that are 13 to 28 characters long, the index entry is 32.

Storing Data Sets on Diskettes

Data sets are stored and retrieved by data set name. By making each data set name as descriptive as possible, you can facilitate job scheduling and ease of use in general. A maximum of eight character positions is allowed for each data set name.

Generally, there is a limit to the number of data sets that can be stored on a diskette:

Diskette Type	Maximum Number of Data Sets
Diskette 1	19
Diskette 2	45
Diskette 2D	71*

*This is the standard number, but it can be expanded with the use of the diskette initialization utility. Refer to the *Utilities Reference/Operation Manual* for details on this utility.

Determining how many data sets should be stored on one diskette also depends upon the application. If you designate the maximum number of data sets without using all of the available space, then the remaining space is unavailable for storing new data sets.

Single vs. Multiple Data Sets Per Diskette

One of the earliest system design decisions is whether to use single data set diskettes only or to use multiple data set diskettes as well. A single diskette may hold multiple data sets, but for easy management of the work flow, one data set per diskette is suggested.

There are many advantages to keying single data sets on diskettes. One significant advantage of keying single data sets is that job scheduling and distribution is kept simple. No coordination of retention and conversion cycles, of key entry operations, or of data set groupings is necessary for regular jobs. Since jobs are scheduled independently, there are no delays; each job proceeds through the work area according to its usual schedule. Therefore, there are no unknowns in job completion, or efforts spent in creating new schedules. Once keyed, data sets are ready for processing.

If a diskette containing multiple data sets is to be processed, some specially designed procedures apply, which provide for proper handling of individual data sets. For example, if data on a diskette is to be transmitted (via data communications), and that diskette also contains another data set to be transmitted, these procedures must ensure that the system will differentiate the data sets.

Allocating Diskette Space for Data Sets

IBM diskettes are initialized before being shipped to you. When a diskette is initialized by IBM, one large data set is allocated for the entire diskette. When your diskettes are received from IBM, you may use the diskette data set clear utility to delete that data set from the diskette. You can then reallocate the diskette space according to your specific needs. Diskette space can be allocated for individual data sets in several ways:

- With the diskette label maintenance utility

- With some utility programs

- With DE/RPG programs

- With assembler programs

The diskette label maintenance utility prompts the operator to enter the data set name, the length of the data set's records, and the number of records in the data set. The *Utilities Reference/Operation Manual* provides detailed information on the operation of this utility.

The DE/RPG method for allocating data set space is one of dynamic allocation. Coding in the utility programs or in a DE/RPG program enables the system to allocate space, providing enough available cylinders exist on the diskette. At the beginning of the job, the operator simply specifies the data set name, the record length, and the number of records. This method has the advantage of not requiring the use of the diskette label maintenance utility, but may restrict the ease with which the data set is expanded at a later time.

Assembler includes a specific statement to be used in coding for the allocation of data set space. Consult the *Assembler Language Reference Manual* for detailed information.

For COBOL programs, you may allocate data sets with the diskette label maintenance utility.

Maintaining Data Sets

After a data set has been created, maintenance of that data set is often necessary. Maintenance consists of performing activities to keep the data set up-to-date, such as adding, deleting, or updating records. Developing a plan for the maintenance of data sets is often integral to the process of defining data sets, and should also be considered when selecting an access method.

Typical maintenance programs add or remove customer names from a master data set, change addresses, or add new items to a master data set that consists of inventory items. Master data set maintenance programs are usually run at the end of the day, or whenever access to the master data set is not required for other purposes.

Data sets can be maintained by DE/RPG, COBOL, or assembler programs, by some utility programs (such as the copy utility program), and by the sort or merge programs. The diskette label maintenance utility allows you to modify data set labels and delete data sets.

Distributing Data Sets and Program Diskettes

There are two basic approaches to distributing data sets or programs, and both approaches influence how maintenance is accomplished.

The first approach is used in many of today's card punch installations, where operators maintain their own program cards.

The second approach involves creating a master program diskette, and is the recommended method. This requires that a supervisor, lead operator, programmer, or systems analyst create all of the programs and store them on diskette. Copies of the master program diskette are made for the operators, who then have their own program diskettes, as in the first approach; the important difference is that the programs were centrally prepared and compiled. Whether to distribute data sets according to the first or second method depends upon data set size and application requirements.

Centrally prepared diskettes can be maintained by changing existing data sets or programs, or by adding new ones. Copies of the updated master diskette are then distributed to the operators; the external diskette label can be used to indicate that the diskette is the latest version. This master diskette approach relieves operators from responsibilities for format and program development responsibilities during the initial installation period, as well as later.

Distributing data sets or programs often requires precise coordination between the sending and receiving parties. Careful planning is particularly important if distribution will be accomplished via data communications facilities.

ESTIMATING DISKETTE REQUIREMENTS

The number of diskettes needed to support each data station in your 5280 system depends on your backup procedures and the number of master and transaction data sets. The following summary can serve as a guide for estimating average requirements.

Transcriptive Data Entry

Batch Size: Estimate one diskette for each separate batch that an operator enters during a day.

In some applications, prompt customer service dictates that key entry jobs be broken into many small batches; thus increasing the number of diskettes required.

Stations Used to Verify: Stations that you regularly use for verifying do not require additional diskettes and should be excluded from the estimates. However, each 5280 station can also be used for entering data. If you anticipate that, due to the nature and scheduling of jobs, all or most stations might be used for entering data on some days of the month, then you should provide diskettes for this purpose.

Retention Cycle: Normally you will retain the diskette for at least one day before using it again, just as cards are retained until processing is assured. Diskettes are then used only every other day, which increases diskette life. In such a case, the total number of diskettes required will be twice the number that are in use on any particular day.

Data Storage for Weekly Runs: In some situations, input for weekly computer runs arrives and is entered daily but is then retained temporarily in the 5280 work area. Therefore, batches on diskette will be accumulated and stored at the data stations. Consider any such storage periods for your estimate.

Peak Load: If monthly, quarterly, or annual peaks result in overtime and an increase in the amount of data keyed, diskette requirements will increase.

Local Source Department

When stations are set up in local source departments such as payroll
or accounts payable, requirements can be estimated the way they are
in transcriptive data entry. Reduction in diskette requirements because
of larger batches might be partially offset by longer retention cycles
caused by diskette *float* in an interdepartment mail system.

Remote Source Department

Units in remote locations usually create larger batches on a diskette to
facilitate data communications. You should retain diskettes for at least
one day to assure that valid data has been received by the main
processing system. Keep some spare diskettes at remote sites if it is
difficult to obtain additional diskettes quickly.

Example of Estimating Diskette Requirements

Use the following example for comparison with your own considerations:

- Installation consists of 12 data stations
  (Assume one operator per station)

- One fourth of all machine time is used for key verifying
  (Assume then, three verify operators)

- Each entry of the nine entry operators key four batches of data per day

- Each batch of data is recorded on a separate diskette

- The retention cycle is such that a diskette can be reused every third day

To determine how many diskettes are needed, first calculate the number of stations used entirely for entering data.

1. 1/4 of 12 = 3   Although each station will be used for entering as well as for verifying data, the equivalent of three stations will be dedicated entirely for verification purposes.

2. 12 - 3 = 9   This is the number of stations used entirely for entering data.

   Next, calculate the number of diskettes needed.

3. 9 x 4 = 36   The number of entry stations times the number of batches per day per operator equals the number of diskettes needed each day.

4. 3 x 36 = 108   Diskettes can be reused every third day; therefore, three days of diskettes are needed.

5.   1 x 12 = 12   It is recommended that each
operator have a
program diskette.

6.   108 + 12 = 120   The total number of diskettes
needed is the sum of steps
4 and 5.

General Considerations

- Allocate at least one diskette per machine for program storage.

- You might want an additional diskette for recording daily production statistics.

- You might want additional diskettes for a backup plan. Important master data sets or IBM-supplied programs should be copied.

- Contingencies should be provided for if diskettes are not available locally.

An Additional Diskette Requirement

In addition to the regular diskette requirements, you should have a diskette available in case your service representative requests that you take an absolute dump of the system. An absolute dump is when the entire contents of the systems internal user storage is written to a diskette. This information can then be used when servicing the system. The diskette used for absolute dumps must be formatted using the SYSDUMP program which is on the machine verification diskette shipped with your system. The absolute dump diskette should be prepared as soon as your system is set up and operational. This diskette should be labeled and stored with your other system diskettes. For more information, refer to the *IBM 5280 Machine Verification Manual*, GA21-9357.

5280 UTILITY PROGRAMS

Key Entry Utility

This utility allows you to write programs that control record formatting and assist the operator as data records are being keyed. This provides an alternative means of record format control without involving the use of the DE/RPG compiler program.

The functions implemented by this utility that are features on the 3740 include:

- Production statistics

- Verify mode

- Record insert

Functions provided in this utility that are not available with the 3740 system include:

- Diskette sector sizes greater than 128 bytes

- I exchange record placement (blocked and spanned)

Testing User Programs

The importance of preinstallation testing should not be underestimated. Testing not only reduces the time required to complete the actual installation, it also helps protect against the risk of losing critical data during initial operations. Supervisors, programmers, and operators all benefit from testing; even simple formats should be tried out before they are used on a regular basis.

If possible, make arrangements with your IBM representative to test your programs at IBM locations before your 5280 arrives.

Utility Programs

In addition to the Key Entry utility, the following utility programs are available for use with the 5280 system. Detailed descriptions and operating instructions are provided in the *Utilities Reference/Operation Manual*.

Diskette/data set clear: To clear the data portion of a data set, to drop or free data set labels, or to drop or free an entire diskette of data

Diskette compress: To consolidate unused portions of diskettes or data sets

Diskette copy: To duplicate or replace data sets, parts of data sets, or the entire diskette contents

Diskette initialization: To reinitialize diskettes; often to a different sector size or sequence

Format conversion aid: To convert IBM 3740 formats to DE/RPG-like source programs

Diskette label maintenance: To allocate data sets, delete data sets, or modify data set labels

Diskette label list: To print or display data set labels or related information

Diskette print: To print the contents of data sets or of entire diskettes

Resource allocation table: To establish or modify logical device addresses

System status: To determine the status of each partition in the system or to determine the configuration for a user-defined IPL diskette

Sort/Merge Program

Sort/merge: To rearrange in sequence and/or combine data into a new data set, leaving the original data set unchanged

Data Communications Utility Programs

The 5280 Communications Utility Programs include:

- The Communications Access Method (CAM) to provide a link between the communications program executing in the 5280 and the communications network

- Three utility programs to transfer data over a Binary Synchronous Communications network

- Two utility programs to transfer data over a Systems Network Architecture/Synchronous Data Link Control network

- Three preparation utility programs to support either of the above

- The Communications Load Utility to load CAM

Chapter 6 describes the communications utilities more completely. Detailed information and operating instructions for communications utility programs appear in the *Communications Reference Manual*.

ESTABLISHING CONTROL MEASURES

Control measures and procedures are necessary to ensure that system resources are effectively used and maintained. Consideration must be given to a range of topics, including diskette control, data recovery, and the physical security of the system.

Diskette Control

The three primary factors in diskette control are diskette labeling, diskette library maintenance, and physical handling of the diskette.

External Diskette Labels

External labels are visible labels that are physically attached to the diskette. It is recommended that a fiber- or felt-tip pen be used to write information on diskette labels. Two kinds of labels are frequently used in combination. The first type is the permanent diskette label, which contains information such as the type of diskette (for example, diskette 1 or diskette 2D). These permanent labels are affixed to the upper-left corner of each diskette.

The second type of external label is usually a paper label with adhesive backing. This label is for information such as what data is recorded on the diskette (job name and number), who keyed the data, whether the data is to be verified, whether it is ready for processing, and the date the job is to be processed. We suggest that this label be no larger than 2.0 inches by 5.5 inches (51 mm by 140 mm). If you use IBM diskettes, this second label should be affixed just to the right of the permanent IBM label.

Information should be written on a label while the diskette is in the envelope. This prevents damage and contamination of the recording surface. The diskette envelope is designed with a slot which exposes the label area. When a new job is begun, the old label information should be crossed out–not erased. Eraser particles could get inside the diskette permanent envelope and interfere with its being read.

In addition to keeping the diskette clean, use of labels can make record-keeping easier. When the entire label is full, it should be removed and replaced by a new label. (If new labels are simply pasted on top of the old labels, the label buildup can affect machine operation.) Do not affix labels to the reverse side of the diskette and do not cover any of the holes of the diskette. Labels should be replaced every six months; otherwise the adhesive may harden and make label removal difficult.

Colored labels provide a good way to convey information at a glance. Each installation can work out a system to increase the security of certain classes of diskettes and reduce handling time and other requirements. Color coding for a hypothetical insurance installation might consist of:

- Red labels: Reserved for program storage; not to be used for data

- Green labels: For general data use; available for use if the label shows that the previous job was processed

- Blue labels: Reserved for claims, which constitute 65 percent of the work load

- Yellow labels: Local or personal files not to be used for general data (operator or job statistics, lists of job numbers, source or object programs, and so on)

To avoid mismatching the diskette and envelope, do not write information on the protective cardboard envelope.

Diskette Library

The second major factor in diskette control is the diskette library. Setting up and maintaining an effective diskette library is more than a matter of providing storage space; it requires procedures that are reliable and integrated with the operations of the total system. Diskette control should involve procedures that are simple and constant for all applications. Several possible library systems would satisfy these conditions. One possible system, based on the use of four storage areas for diskettes passing through the data processing cycle, is as follows.

After receiving a diskette from the manufacturer, give it a unique number and log it in on a master diskette log sheet.

MASTER DISKETTE LOG SHEET		
Serial Number	Comments	Date Received
103	IBM 2D- ORDER ENTRY	2/23

Then place the diskette in a scratch file containing all diskettes that are available for immediate use. The operator goes to the scratch file to select a diskette. A blank job card is inserted in the envelope of each scratch diskette.

```
+-------------------------------------------------+
|              Job and History Card               |
|                                                 |
|                                                 |
|      Job Number  _____          |
|                                                 |
|      Job Name  _____          |
|                                                 |
|      Date  _____          |
|                                                 |
|      Serial  _____          |
|                                                 |
|      KE# _____  Volume _____           |
|                                                 |
|      KV# _____  Errors _____           |
|                                                 |
|                                                 |
|      Release                                    |
|      OK  _____          |
|                                                 |
|      Release                                    |
|      Date  _____          |
|                                                 |
+-------------------------------------------------+
|      Miscellaneous                              |
|                                                 |
|                                                 |
|                                                 |
+-------------------------------------------------+
```

Use this card to show the status of the job as it progresses through the installation. Once the source data has been entered, the operator updates the job card, showing such information as job number, job name, date, diskette serial number, operator's initials (KE#), and the number of records entered (volume).

Next, the operator places the diskette, job card, and source documents with a to-be-verified collection of diskettes. The verify operator verifies the data, updates the job card with the verify operator's initials (KV#) and number of errors, and retains the diskette until any other diskettes for the job are completed. The diskettes can then be retained until the computer application using that data has been processed. The operator then places the diskettes in a scratch file to begin another cycle. The job card becomes a history card for that particular diskette and is filed by serial number.

The third factor in effective diskette control is proper physical handling of the diskette. Your diskette might contain information that is valuable to your installation. Proper care, handling, and storage will extend the useful life of your diskette. Consider the following points as you establish your diskette care, handling, and storage procedures.

- Keep the diskette in its protective cardboard envelope when the diskette is not being used. Place the diskette in the envelope so that the adhesive label is visible.
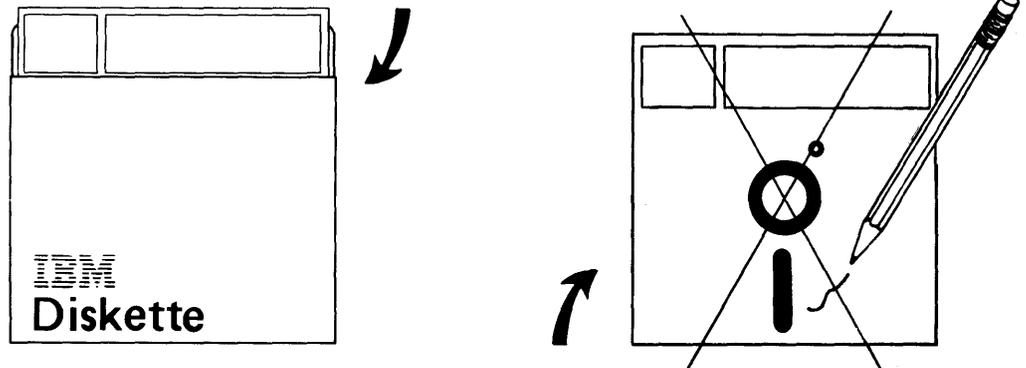
- Do not erase labels attached to the diskette, or make any erasures on or near the diskette. Erasure residue could get on the diskette. Instead of pencils, use a fiber- or felt-tip pen when marking on the diskette labels. Mark temporary labels before attaching them to the diskette. Alter temporary labels only when the diskette is in the envelope. Also, you should remove old labels before attaching a new label.

- Handle the diskette by the label area to avoid touching the recording surface. Fingerprints on the surface might cause permanent diskette errors.
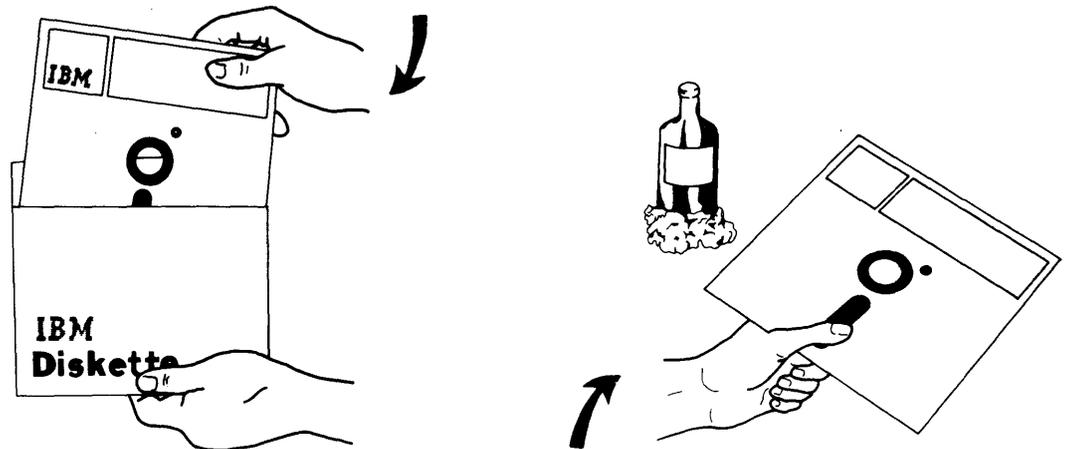
- Do not clean the exposed diskette recording surface.

- Carry the diskette in a file folder or carrier envelope.

- Do not bend or fold the diskette. Do not use rubber bands or paper clips on the diskette.
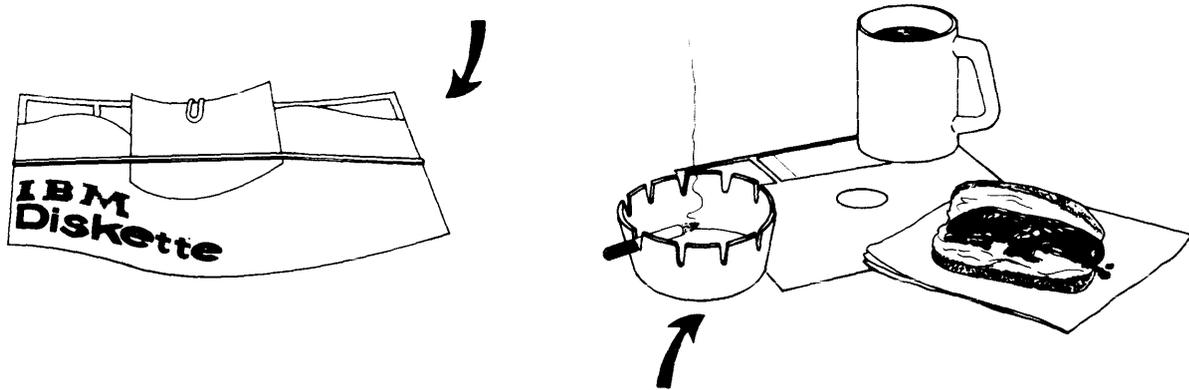
- Do not eat, drink, or smoke while handling the diskette.

- Store diskettes needed for immediate use flat in their envelopes, in stacks of ten or less.
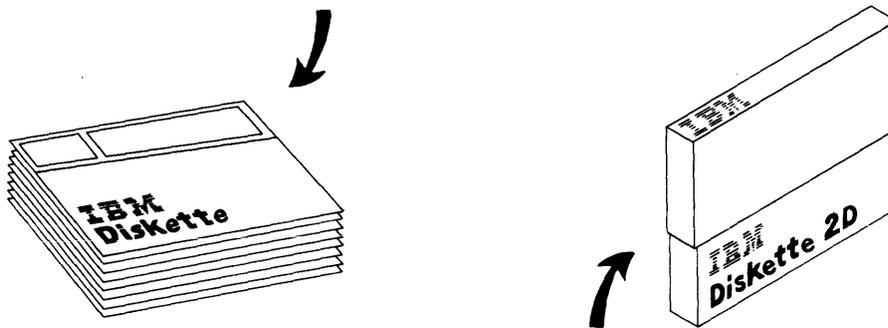
- Store diskettes not needed for immediate use in their original shipping cartons, with each diskette in its protective envelope. Shipping cartons can be stored either vertically or horizontally.

- Do not place heavy objects on a diskette or diskette carton.
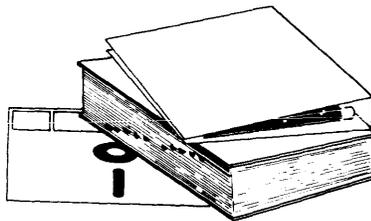
- Do not place the diskette near a magnetized object. Magnetic fields can erase information from the diskette.
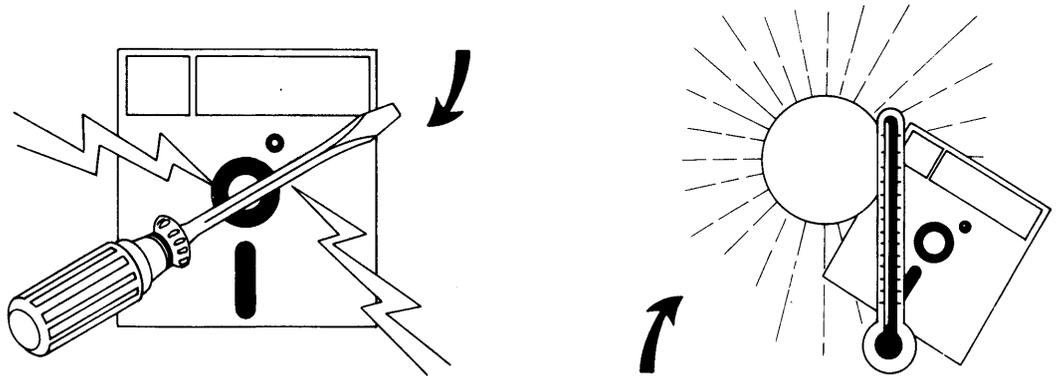
- Do not place the diskette in areas with excessive heat or high humidity. See *Environmental Considerations and Requirements* in Chapter 8 for more information on diskette environments.

Replace the diskette if it is physically damaged (torn, folded, creased) or if the recording surface becomes contaminated. It is particularly important that you do not use diskettes that are contaminated with sticky fluids (soft drink, coffee) or abrasive substances (metal filings) on the recording surface. Placing a contaminated diskette in a device can contaminate the read/write head, causing operation errors. In addition, contaminants can be passed to clean diskettes.

If a substance is spilled on the diskette jacket and can be carefully removed, the data can be recovered only if the contaminant does not reach the recording surface. After recovering the data, discard the diskette.

When shipping a diskette, always label the package DO NOT EXPOSE TO HEAT OR SUNLIGHT. When receiving a diskette, check the carton and the diskette for damage.

To pack one diskette:

- Place the diskette in its protective envelope.

- Put the envelope in a single-diskette carton.

To pack multiples of 10 diskettes:

- Place the diskette in its protective envelope.

- Put 10 diskettes in a 10-diskette box.

- Put spacers between each 10-diskette box to prevent damage during shipping.

- Place the 10-diskette boxes in the appropriate size carton.

- Insert top and bottom pads in the carton.

- Fill the open spaces in partially-filled cartons and 10-diskette boxes with a filler that cannot contaminate the diskette or enter the diskette jacket.

CAUTION
Do not use so much filler that diskettes are tightly compressed; compression can warp the diskettes.

System Backup

Developing a backup plan for your system is part of ensuring data recovery. Damaged equipment can be replaced, but lost programs and data might be impossible or too expensive to replace. Companies have had their main data processing facility completely destroyed and, because of good backup, have recovered very quickly.

The purpose of a backup plan is to perform the following functions:

- Minimize the possiblity of data loss

- Reduce the impact of data loss

- Ensure timely recovery of data that is vital to the continuation of business activity

Developing a backup plan involves analyzing the effects of an operator error or system failure at each step of an application, defining appropriate recovery procedures, and testing those procedures.

- Procedures must be defined so that application actions are recorded on a log or similar document.

- Important historical information, such as device addresses, or the responses to a system configuration program, must be copied and securely stored.

- Important master data sets, IBM-supplied programs, and user programs should be copied.

In many instances, the transaction data set is the key factor in a successful recovery from a system failure. Incorporating adequate copying routines within programs, for all or only part of a diskette, is one way to protect your operation from loss of data or programs.

Backup plans must also consider backup supplies, particularly for remote sites where replacements cannot be quickly obtained.

Finally, system backup might include installing extra equipment, which can be brought into operation when needed. (Physical requirements must be evaluated if extra equipment is part of your backup plan.)

If an operator should mistakenly write over data, the data must be recreated from source or backup materials. To recover a partially destroyed data set, it is important that the operator reestablish the EOD (end of data) address. You might also need to recover access to a data set in the event of a power failure. The close failure recovery program is provided to aid you in recovering from such mishaps. (See the *System Control Programming Reference/Operation Manual*, for more information about this program.)

Although diskettes infrequently develop irregularities through wear, irregularities may occur if some foreign material has been present on the diskette. Each installation should have a standard procedure to be followed in case a data record cannot be read or written onto a diskette. A common procedure is to use a backup diskette on which the data was previously copied. A second method involves copying the data onto a new diskette and manually entering the affected records. Other methods depend on the mode of operation the station is in at the time the error is encountered. (See the *System Concepts* manual for more information about these procedures.)

The operator should note any diskette irregularities on the external label of the diskette. After recovering data from an irregular cylinder, the operator should reinitialize the diskette. This will exclude the irregular cylinder(s) and substitute one or both of the alternate cylinders provided. If both of the alternate cylinders are used up, consider the following before replacing the diskette:

> Is a full record capacity necessary? Operators at many installations key batches that are 300 to 500 records in size. Such batches would not require a full diskette capacity.

Note: If there are more than two irregular cylinders detected, no alternate cylinders are assigned.

Security and Integrity

System security is the protection of computer data, programs, and equipment against damage, loss, or unauthorized use. System integrity involves the assurance of complete and accurate data, and is often based on an audit trail.

Unfortunately, both security and integrity are frequently neglected, or at best added on after the system design has been established. You should ensure that security and integrity measures are developed as integral parts of the system design.

Security

Techniques for security include computer hardware features, programmed routines, and the usual physical means of safeguarding property with security personnel, locks, keys, and so forth.

Hardware security features for the 5280 include the Magnetic Stripe Reader (available for all units) and the Keylock feature (available for 5280 controlling devices only). Refer to your System Summary Worksheet in Chapter 1 to confirm which units will use these security features.

Numerous programmable security measures are also available:

- Terminal ID feature for communications terminals and station addressing

- Volume identification for access to a diskette

- Required access code for a data set or job

- Restricted shared access to a data set

- Restricted access to a data field, based on specified conditions

It is not the purpose of this manual to instruct you on how each of the above measures can be implemented. (For this information, refer to the appropriate reference manual.) During planning, potentially confidential data sets should be identified and appropriate security measures should be defined. For example, if a data set consisting of employee payroll information is to be confidential, access to this data set could be restricted by requiring volume identification.

DE/RPG can also be used to create a security table, which provides a means for keeping track of who should have access to data. Such a table typically lists:

- Level of usage

- Job definition

- Prerequisites that must be fulfilled

Routine security measures that you might consider include restricting access to the 5280 work area or to the building itself.

Communications terminals and data stations located at remote sites require special attention, both before and after system setup. Define the identification sequences and network address before the units are set up.

Security risks often occur during the program testing phase, when test data is exposed to a greater number of people than usual. Carelessness can result as system personnel hurry to get the system up and running; to prevent mishaps, consider testing your program at IBM locations before your system is delivered. Test data should be authentic, but preferably nonconfidential, and extra copies generated during program testing should be destroyed.

Integrity

Audit trails are the most commonly used method for assuring data integrity. Personnel from outside the 5280 work area often require the information provided by an audit trail; individuals such as the company auditor or accountant can often help define an effective audit trail.

Some of the items that an audit trail must include are:

- How information is processed through the system

- What access restrictions apply

- Transaction logs showing who accessed what, when, and why

- Summaries of mismatched IDs and access codes

Circulate audit documents among responsible supervisors, so that you can detect and resolve any unusual usage patterns.

One benefit that often arises as a result of using audit trails is that overused and underused data sets become apparent. Overused data sets might be divided up; underused data sets might be candidates for deletion.

Always address two factors in particular during audit trail analysis. The first is the continual changes in data sensitivity and users' needs. The second is the risk that an overly elaborate security plan impedes users and leads to performance degradation.

The design and implementation of security and integrity measures is rarely a one-time effort. Periodic reevaluations are required to adapt to equipment or program changes, personnel changes, and application requirements.

ESTABLISHING JOB SCHEDULES

Numerous factors determine how jobs are accomplished, and these factors must be evaluated during the planning cycle so that operating schedules can be established. A foremost consideration is the volume of your transactions, and the resulting application requirements. If data will be exchanged with another system, then the requirements and schedules of that system will influence your job schedules. In addition, job schedules will be determined by the use of partitions and printer operations, and also by certain capabilities of DE/RPG.

Planning for Peak Periods

Your applications should be scheduled to handle the peak periods of your business, and not simply the average work load. You should identify when the peak periods occur and plan how to manage them. One method is to schedule your jobs to level the peaks.

For example, for the following chart, batch programs would be run before 10 AM, at noon, and again at 6 PM. These are the times when they will least affect the interactive programs used to enter orders.
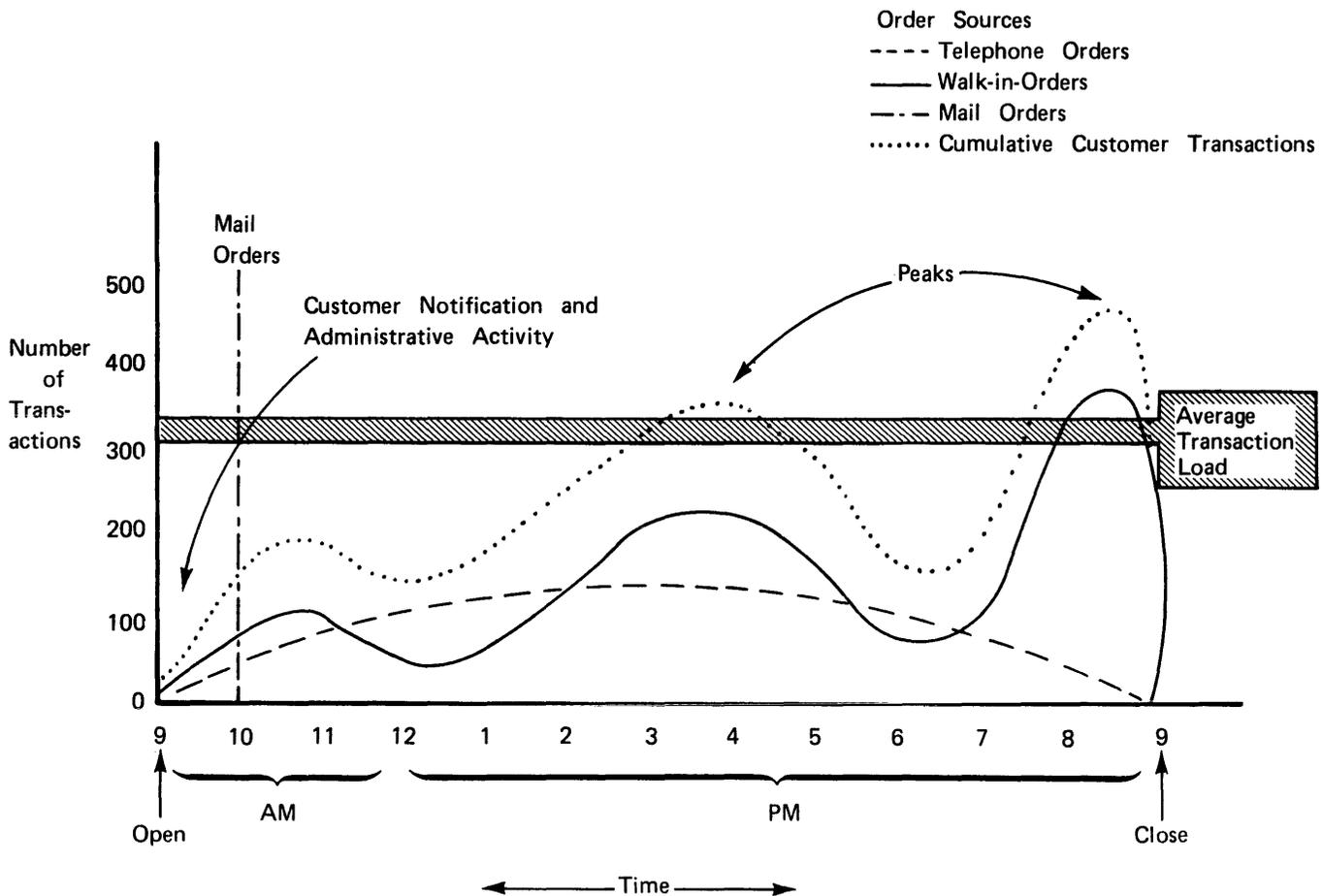
Order Sources
- - - - Telephone Orders
———— Walk-in-Orders
—-— Mail Orders
······· Cumulative Customer Transactions

Other general scheduling considerations you might account for in your plans include:

- Application deadlines

- Lead time for data to be transferred from source departments to the 5280 system

- Output schedules and output mode, whether dedicated or concurrent (coffee breaks and lunch times might be considered here)

- Shift changes

Printer Operations

The use of input/output devices such as printers may require an exit from a program, and the number and characteristics of program exits can influence job schedules. For example, some applications require extensive printing; it may be desirable (though not always necessary) to schedule printing for a time when other demands on the system are low.

The 5222, 5225 or 5256 printer can be attached to a 5280 system. The operator guide for these printers provides detailed instructions on their use. Information on formatted and unformatted printing also appears in the *DE/RPG User's Guide*, the *DE/RPG Reference Manual*, and the *Assembler Language Reference Manual*.

Rated printing speed with the 5222 printer is 80 characters per second (cps).

Rated printing speeds with the 5225 printer are:

	10 Characters Per Inch	15 Characters Per Inch
Model 1	280 lines per minute (lpm)	195 lpm
Model 2	400 lpm	290 lpm
Model 3	490 lpm	355 lpm
Model 4	560 lpm	420 lpm

Rated printing speeds with the 5256 printer are:

Model 1	40 characters per second (cps)
Model 2	80 cps
Model 3	120 cps

Production Statistics

Production statistics can be kept for all jobs, and procedures for reading or recording these statistics must be accounted for in job schedules. Statistics can be maintained for either an individual job or for work done at the station overall. Job statistics are normally maintained for only the duration of the job; when the job ends, the statistics from the job can be written to a data set. They will also be added to those for the data station as a whole.

The following counters are kept for all DE/RPG programs:

* Keystrokes

* Records

* Elapsed time in minutes (if Interval Timer is installed)

* Marked records

* Verify correction keystrokes (verify mode only)

Counters kept on a station basis provide a similar summary of system activity; the number of jobs is also recorded. Consult the *DE/RPG Reference Manual* for further information on production statistics.

DE/RPG and Job Scheduling

DE/RPG makes possible several procedures which save keystrokes and quicken system work flow. The *Introduction to DE/RPG, DE/RPG User's Guide,* and the *DE/RPG Reference Manual* each address the following capabilities:

Format Chaining

A sequence of formats can be specified in DE/RPG coding, thus relieving the operator from manually selecting formats. Formats can also be data-directed; that is, they can be chained together in response to entries made in previous records. This capability also exists when the key entry utility is used.

Multiple Access to a Data Set

A data set can be shared by several operators at the same time. DE/RPG keywords govern access to the data set and specify which operators or programs may both read and write to the data set, and which operators or programs may only read the data set. This capability is particularly valuable when master data sets are being accessed and used. This feature can be used to reduce both the time and the number of diskettes required to perform an application.

Dynamic System Design

After a program is loaded into the system, the display screen prompt requests the name of the transaction data set and the address of the diskette drive from which the program will be loaded. For convenience, the operator can alter either of these designations from your routine design. If such changes are not desirable, a DE/RPG keyword used in the program prevents the operator from making alterations.

Job Documentation

An essential part of planning and site preparation is the development and testing of job documentation. The documentation required for your system depends upon the programming of each application. To aid the operator, a job run sheet (or run book) with step-by-step instructions should be provided.

A job run sheet is a record of the steps that an operator must follow to perform a job. Maintaining good job documentation not only simplifies daily operations, but also reduces the time required to train new operators.

To allow operators to focus their full attention on building speed and productivity on the new units rather than on filling gaps in the documentation, run sheets should reflect 5280 terminology. For example, references to terms such as verify punches, overpunching, header cards, etc, should be removed from any old documentation that you modify for use with the new devices.

A job run sheet might include:

• Job name and number

• Source documents used

• Name, location, and telephone number of programmer

• Printer setup instructions

• Diskettes and diskette drives required

• Expected output

• Parameter usage

• Instructions for starting and ending the job

• Instructions for halting or continuing the job if a system error is encountered (summary of error messages)

• Instructions for backing up and/or recovering data sets

• Security prompting

• Summary of special keys and functions

• How and when to obtain job statistics

The following page contains an example of a sample run sheet.

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Job No.	Op. Code	Frequency	Due In		Due Out		DSN = _____ ☐ 80 Col ☐ 128 Col
			Time	Day	Time	Day	
Job Name							**Diskette Retention** _____
Source Document Used			**Received From**				**Other** _____

Special Instructions

Disposition of Output

Section	Job No –Dept	Oper

Disposition of Documents

Field Description	Function	Columns			Remarks
		From	Thru	Total	
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Job run sheets for several jobs might be collected in one document, with an introductory section that explains common procedures and functions. Completed DE/RPG coding sheets might be used to form such a run book for your 5280 applications. Run books might also tell which procedures to execute on specific days, and briefly explain what is occurring in the application as a whole.

Documenting the Design

At this stage of your planning, you should document as many of the following items as possible.

- Important decisions made during the planning of applications, the reasons for the decisions, and the individual(s) responsible

- Specific functions and operations expected of your system

- Programs to be used

- Content of master data sets

- Plans for the security and integrity of the system

- Tentative job schedules

This chapter describes various factors to consider when planning to convert from a 3740 device to the 5280 system.

Although differences exist between the two systems' keyboards, overall similarities will enable operators to make the transition with relative ease. Two conversion aids are available to aid in the conversion of your programs. Refer to the *Utilities Reference/Operation Manual* and the *Assembler Language Reference Manual* for operating instructions.

- The format conversion utility program helps you convert IBM 3740 formats (also called programs) to DE/RPG source programs. To estimate the number of records in the data set that will contain converted formats, multiply the number of fields in the 3740 records by three.

- The 3741 ACL 5280 to Assembler Language conversion aid helps you convert ACL programs into assembler source code. Allot three assembler record spaces for every ACL record when estimating program size.

Your education program should ensure that these aids are operated by individuals who have been introduced to DE/RPG and/or assembler.

The purpose of this chapter is to help you arrange for the installation of communications equipment and the communications configuration utility program. To complete these activities, you must consider the type of communications network and the programs that will be employed. Specific information is required when you run the communications configuration utility, and this chapter will help you gather some of the information in advance.

Several types of communications features are available for the 5280 system. These features are used on 5280 communicating devices, either the 5285 Programmable Data Station or the 5288 Programmable Control Unit. (Throughout this chapter, these two machines are referred to as 5280 communicating devices.) The communications features involve different methods of connecting a 5280 communicating device to another system by communications (telephone) lines.

Someone in your company may have already selected the communications features for your site. To do the job of planning, it is not necessary to be an expert in data communications. Some basic information, however, will be helpful.

BASIC INFORMATION

Data processing machines do not *talk* to each other by telephone the same way that people do. Instead of voices, machines use code to communicate information. 5280 communicating devices use standard computer codes, such as ASCII and EBCDIC.

For machines to talk to each other, they must speak the same language. This means that the machines must use the same code, have the same type of communications features, and operate at the same speed. Speed is measured in bits per second (bps).

In addition to code, feature type, and speed, data communications are also dependent on distance. People talking close to each other usually do not need a microphone, an intercom, or a telephone. As the distance between people gets greater, however, such instruments become necessary.

Communications features are designed for installations where the machines that must exchange data are far enough apart (remote) to require communications or telephone lines. In some installations, however, communications features and lines might be used even though the distance between machines is relatively short.

Modems

Distance between a 5280 communicating device and another system
also affects the quality of the electrical signals that carry the code.
The longer the line, the weaker the signals due to the resistance of the
line. This is one reason why data communications networks usually
make use of modems. A modem is a machine that connects a
communicating device to a communications line.

The signals produced by a communicating device are weak and
generally not in the form used by communications lines. A modem
amplifies the signals and changes them into a form that the
communications line can handle. At the receiving end of the
communications line, another modem changes the signals back into
the form used by the data processing machine.

Although modems are needed for most 5280 communications features,
it is possible to connect two devices without a modem by using the
Digital Data Service Adapter (DDSA) feature. This type of connection
is described in this chapter under *5280 Data Communications
Equipment*.

Communications Lines

A communications line is used to transfer information from one
location to another. A line that is used to transfer information in one
direction for a while, and then in the opposite direction for a while, is
called a half-duplex line. Changing the direction of transmission is
referred to as turnaround, and this requires a certain amount of time.

To reduce turnaround time, a full-duplex line is sometimes used. A
full-duplex line allows information to be transferred in both directions
at the same time.

5280 communications features are designed to operate in a half-duplex
mode, but can be connected to a full-duplex line. When connected to
a full-duplex line, 5280 communicating devices do not transfer
information in both directions at the same time, but turnaround time is
reduced.

Communications lines can be either switched or nonswitched.
Switching is done by dialing, and the lines are generally owned by a
communications company. (A communications company is also called
a common carrier; a telephone company often serves in this role.)
Nonswitched lines can be privately owned or leased from a
communications company.

Networks

Communications lines, modems, and other communications equipment can be arranged in several ways, depending on the intended use. The different arrangements of this equipment are called networks. The basic types of networks are:

- Point-to-point, nonswitched

- Point-to-point, switched

- Multipoint (nonswitched)

Following are illustrations of these basic types of networks:

Point-to-Point Network, Nonswitched

- 5280 communicating device connected to another system

- Nonswitched, permanent connection

| Other system |——| Modem |—z—| Modem |——| 5280 communicating device |

Point-to-Point Network, Switched

- Any or all remote devices can be a 5280 communicating device

- Switched, temporary connection to one device at a time

- Connection only occurs during actual communication

Other system	——	Modem	—z—	Modem	——	Remote device
Modem	——	Remote device
Modem	——	Remote device

Multipoint Network (Nonswitched)

- Any or all remote devices can be a 5280 communicating device

- Nonswitched, permanent connection

- Other system calls (polls) remote devices by their unique address

- Only the called device answers

- Other remote devices wait their turn for a call

```
                                      ┌──┤Modem├──────┤Remote device│
                                      │
                                      │
┌Other system├──┤Modem├──╱──or───────┼──┤Modem├──────┤Remote device│
                                      │
                                      │
                                      └──┤Modem├──────┤Remote device│
```

For a more complete introduction to the basic principles and
components of data communications, see the general information
manual, *Data Communications Concepts*.

WHAT TO DO WITH THIS CHAPTER

Now with a basic understanding of data communications, you are ready to arrange for the necessary communications equipment. The main steps you should complete are:

- Meet with your IBM representative or someone in your company who is responsible for communications networks.

- Get an exact list of the 5280 communications features that have been ordered.

- Determine the type of network to be established (refer to the following pages on system design for communications).

- Identify the type of communications connection and programs to be used.

- Meet with someone from a communications company and place an order for equipment, services, or both.

- Fill in your responses to the questions listed at the end of this chapter.

System Design for Data Communications

The first step in defining a communications network involves documenting the application parameters. This information should be gathered through consultations with the system analyst, system programmer, and/or any host system personnel:

- Number and locations of communicating machines

- Information flow patterns between programmable data stations, programmable control units, and/or main processors

- Types of transactions

- Volume of each type of transaction

- Urgency of the information to be transmitted

- Number of stations that will simultaneously require access

- Reservations for increases in transaction volumes, types

- Reliability and availability requirements

- Security and addressing procedures

- Financial resources available

Host Considerations

Host system planning must begin early in the planning cycle. By notifying the affected personnel early, time can be allotted for programming or other changes required to support the 5280. The following items should be defined:

- Access method (for example, BTAM, VTAM, or TCAM)

- Security procedures

- Error-detection procedures

- File-sharing arrangements

- Program storage requirements

- Network addresses and identification procedures

Compatibility

Experience has proven that compatibility among components is a major consideration for new installations. To reduce delays caused by incompatibility, we recommend that you consult your IBM representative and, if necessary, a representative of a communications common carrier company. These representatives can aid you in identifying any trade-offs among alternatives, and can review your selection of facilities. The following factors must be identical at both ends of a communications connection.

Transmission protocol:	SDLC or BSC
Transmission code:	EBCDIC or ASCII
Network type:	Point-to-point or multipoint
Line connection:	Switched or nonswitched
Line type:	Full- or half-duplex
Line speed:	600, 1200, 2400, or 4800 bits per second
Modem characteristics:	Integrated or external auto or manual answer internal (machine) or external (modem) clocking
Functions:	Batch, inquiry, or RJE

Your planning schedule should reflect the dates of any meetings with IBM representatives or communications company personnel.

THE 5280 COMMUNICATIONS PROGRAM PRODUCT

The Communications Program Product consists of communications access method (CAM) support, a set of communications utility programs, and the support for user-written communications programs. The *Communications Reference Manual*, provides information about 5280 data communications.

The CAM provides a necessary link between a communications program, either IBM-supplied or your own, and the communications network. With the CAM, the utility programs can perform the following data transfer functions in either a BSC or SNA/SDLC network:

• Send data to a terminal or host computer

• Receive data from a terminal or host computer

• Inquire into host subsystem files and receive replies

• Submit, execute, and obtain results of jobs from a host subsystem

The utility programs can be divided into two groups: those that are used to prepare for communications (called preparation utilities), and those that actually transfer data over a communications line (called execution utilities). Storage requirements for the utility programs appear in Appendix E.

Preparation Utilities

The preparation utilities consist of interactive programs in which you specify the characteristics of your execution utilities and communications configuration. Your responses to the prompts are saved on diskette for convenient reuse. The preparation utilities and their purposes are as follows:

• The communications configuration utility is used to describe the communications environment.

• The data communications description utility is used to describe transmit, receive, and inquiry functions for the following execution utilities: BSC batch transfer, BSC data communications, and SNA data communications.

• The RJE description utility is used to describe jobs for the MULTI-LEAVING remote job entry and SNA remote job entry utilities.

• The communications load utility is used to load a CAM into storage for the communication execution utilities or communications programs that you have written.

Execution Utilities

Each execution utility is specifically designed for and can be used in only one type of network, either BSC or SNA/SDLC. The utility programs can also communicate with certain IBM systems and host subsystems.

- The BSC batch transfer utility enables the 5280 to send and receive batch data to and from diskette over communications lines.

- The BSC data communications utility enables the 5280 to send and receive batch data, and to send inquiries and receive replies from a host subsystem.

- The MULTI-LEAVING remote job entry utility enables the 5280 to submit, execute, and obtain results of jobs from a host RJE subsystem using BSC link protocol.

- The SNA data communications utility transmits and receives batch data and sends inquiries and receives replies from a host subsystem. Up to four LU-LU sessions can operate concurrently using the same CAM.

- The SNA remote job entry utility enables the 5280 to submit, execute, and obtain results of jobs from a host RJE subsystem using SDLC link protocol.

The accompanying chart shows which utility programs of the program product can be used to communicate with IBM systems and host subsystems.

With Binary Synchronous Communications, the 5280:

Can appear to be a:	When it uses	To communicate with
3741 Work Station	BSC Data Communications Utility or BSC Batch Transfer Utility	S/3 with CCP or RPG II S/32 with RPG II S/34 with RPG II or SSP-ICF
		3741 Models 2 and 4 3747 5265 Other 5280 units

		System/370, 3031, 3032, 3033, 4331, and 4341 processors
		    OS/VS CICS
		    DOS/VSE CICS
		    OS/VS IMS

3780 Data Communications Terminal	BSC Data Communications Utility	System/370 (RJE): DOS/VSE POWER

System/3 MRJE Work Station	MULTI-LEAVING Remote Job Entry Utility	System/370 (RJE):
		    OS/VS1 RES
		    OS/VS2 JES2
		    OS/VS2 JES3

With Systems Network Architecture/Synchronous Data Link Control, the 5280 can act as a secondary station for System/370, 3031, 3032, 3033, 4331, and 4341 processors:

By using	With System/370 subsystem	
SNA Data Communications Utility	CICS: IMS:	OS/VS and DOS/VSE OS/VS
SNA Remote Job Entry Utility	RJE:	DOS/VSE POWER OS/VS1 RES OS/VS2 JES2 OS/VS2 JES3

Acronyms

BSC: Binary synchronous communications

SNA/SDLC: Systems Network Architecture/Synchronous Data Link Control

5280 DATA COMMUNICATIONS EQUIPMENT

The BSC/SDLC adapter is required for communications; it must be connected to one of the following:

- External modem

- Internal modem

- Adapter for digital data service

External Modem

When ordering modems to be used with an EIA/CCITT feature, use the following specifications:

Interface: EIA RS232C (CCITT V. 24/28 outside of the United States)
Transmission speed: 600 to 4800 bits per second (bps)

The 5280 can provide the internal clocking for your external modem, if the external modem does not supply the clocking. The internal clocking provided by the 5280 enables transmission speeds of 600 or 1200 bits per second (bps).

Communications Line Connection (Nonswitched Line Connector)

You attach the 5280 system with integrated or external IBM modems to a nonswitched line connector by a cable with a four-prong plug. The plug attaches to a connector (404B, 549A, 493A, or a compatible type), which should be requested from your local telephone company.

If one of these connectors is not available, you must request that the telephone company install a SE-625A modular jack. A cable (part 1853134) can be purchased from IBM to attach the 5280 cable to the 625A jack. You must have the cable wired as shown in the following illustrations.

Four-Wire Nonswitched

Two-Wire Nonswitched

Note: Attach the red and white leads to either of the terminals that have a lead from the suppliers wiring.
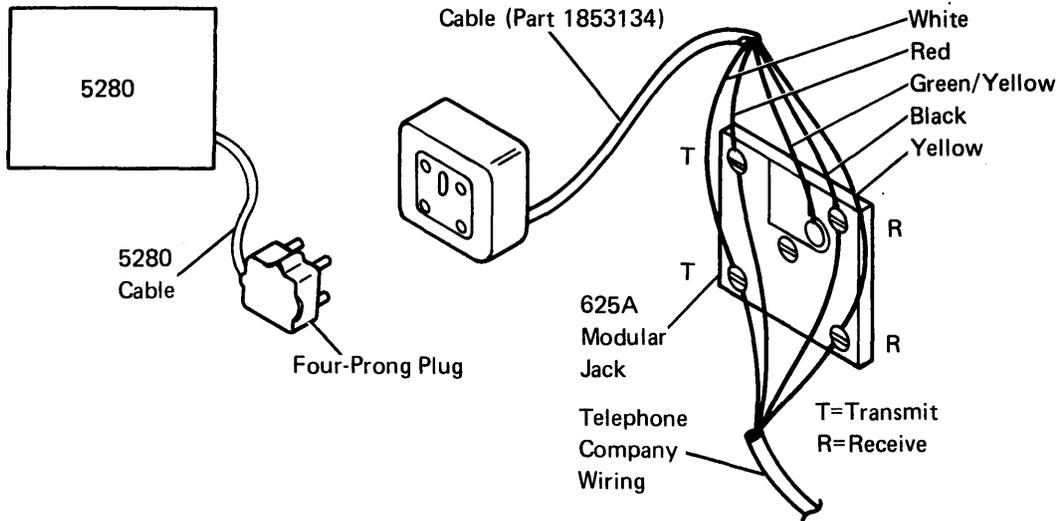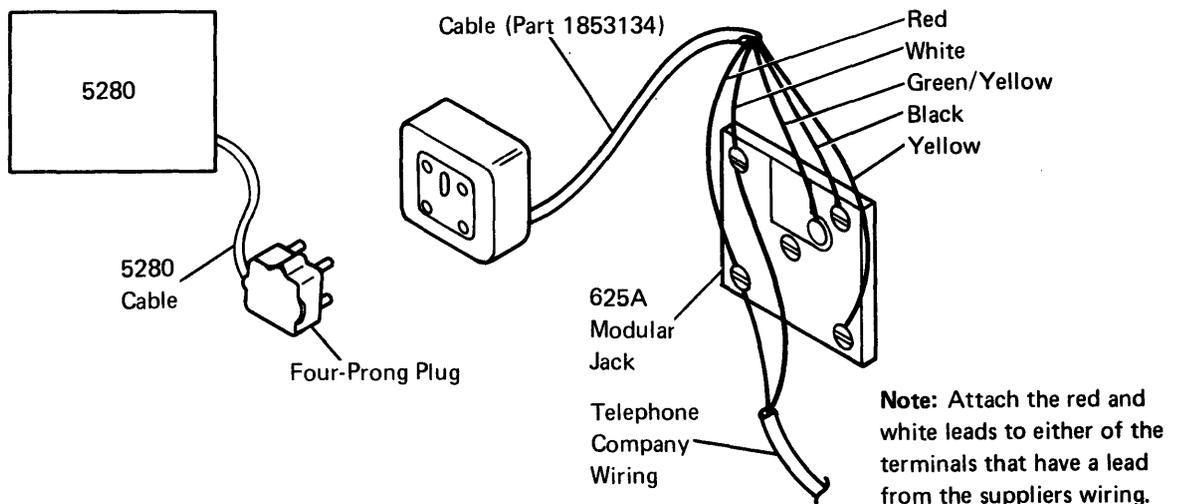
The cable is attached to the 5280 four-prong plug when the machines are set up. Modem connection for other modem suppliers is not addressed in this manual. Contact your supplier to make sure all the requirements are satisfied.

If you are planning to connect an IBM integrated modem, an IBM 3872, 3874, or 3875 modem, or non-IBM modems to the U.S. Public Switched Network, be sure that the modems are attached to an FCC registered protective coupler (Data Access Arrangement). The couplers should be available from the telephone company or other manufacturers. You can obtain a list of registered devices by contacting the FCC or the state commission that regulates telephone companies.

Integrated Modem

If you ordered a 5280 communicating device with an integrated modem, you must also order a communications line suitable for data transmission at 600 or 1200 bits per second. Internal clocking is provided with the integrated modem.

In countries other than the United States and Canada, no additional equipment is needed on a switched or nonswitched line. However, in the United States and Canada, you must provide a CBS-type data coupler (sometimes referred to ɩs a data access arrangement) if the 5280 device is to be attached to a public switched network.

In the United States, for ease of setup and optimum performance, a programmed CBS-type data coupler (ordered with a transformer and a DC power cable) is recommended. Such a coupler should have the following characteristics:

- Adjusts automatically to the maximum allowable transmit power level without operator intervention

- Accepts 0 decibel power level from a 5280 unit

- Has a receive-data path delivering maximum power levels to the integrated modem (that is, a path not degraded by transmit power level attenuation circuitry)

- Complies with Part 68 of the FCC Rules and Regulations

Any data coupler meeting the above specifications can be used. You can obtain a list of registered devices by contacting the FCC or the state commission that regulates telephone companies.

Digital Data Service Adapter

The Digital Data Service Adapter (DDSA) enables you to attach the 5280 system to a nonswitched digital data service network through a Channel Service Unit (CSU). The speeds that are supported by the DDSA are 2400 and 4800 bps. Specify the same data transmission speed that you ordered for your 5285 or 5288.

Line Information for a Programmable Data Coupler

If you elect to install a programmed CBS-type data coupler (on a United States switched line), contact your local telephone company and inform them that you wish to connect a registered data coupler to their line. You will need to know the Registration number and the Ringer Equivalence number. (If you wish to order your communications line before your data coupler arrives, contact your supplier for this information.)

To order a communications line for use with a programmable type data coupler, specify the line connection USOC-RJ45S.

You will also need a telephone set with an exclusion key (USOC-RTC) with the following options:

A1   Telephone set controls line

B3   Aural monitoring not provided

C5   C6-rotary dial

Summary of Possible Line Speeds

Switched-line network using:

- External modem with   600 to 4800 bps
  external clock

- External modem with   600/1200 bps
  internal clock

- Internal modem   600/1200 bps

Nonswitched-line network using:

- External modem with   600 to 4800 bps
  external clock

- External modem with   600/1200 bps
  internal clock

- Internal modem   600/1200 bps

- Digital data service   2400 or 4800 bps
  adapter (full duplex only)

Relocation of a System

If a system with a communications feature is to be shipped to a country other than the country for which it was ordered, changes may be required to the line plug adapter and homologation labels.

PREPARING FOR THE COMMUNICATIONS CONFIGURATION UTILITY

The communications configuration utility enables you to define your communications environment by selecting parameters to:

- Control the operation of communications hardware

- Control the execution of the communications access method

- Describe certain characteristics of the system or terminal with which your device will be communicating

This utility program requires that you respond to a series of prompts which appear on a display. Your responses are stored on diskette as configuration records in a data set; this data set is used when beginning a communications job. Multiple configuration records can be created for different environments.

Approximately one-fourth of the prompts which make up the communications configuration utility are listed below. The list below covers some of the more general topics; a complete list of all the prompts, along with explanations of the alternatives, appears in the *Communications Reference Manual*. By completing the following list, you can begin preparing for this utility. Your modem supplier, host system, common carrier company, and IBM representative may be able to supply the information required.

Sample Communications Configuration Utility Prompts

Indicate whether your 5280 system will use:

1. Nonswitched line, switched line, or multipoint line

    _____.

2. Integrated modem, EIA/CCITT for external modem,
    or DDSA _____.

3. Switched network backup _____.

4. Automatic answering _____.

5. Internal clocking or modem clocking _____.

6. A utility program to allow the 5280 to appear as another device
    to the host system
    (which utility and which device)

    _____   _____.

7. The terminal ID feature _____.

8. The host ID feature _____.

9. Record transmission in a blocked or unblocked fashion

    _____.

10. If SNA/SDLC, how many stations will communicate with the host
    system at one time (maximum is four) _____?

11. If SNA/SDLC, will the host system require a log-on procedure
    with each utility or application _____?

12. If SNA/SDLC, which host subsystem will be used (SRJE or
    DB/DC) _____?

13. Will your 5280 device initiate communications or will the other
    system _____?

14. Which line code will be used, EBCDIC or ASCII
    _____?

These sample prompts do not contain the exact wording that appears
on the display screen during the operation of the communications
configuration utility. The *Communications Reference Manual* explains
each prompt of the utility, and should be consulted as you prepare to
install communications facilities.

If you have an auxiliary data station or printer on your 5280 system, this chapter describes the activities you should perform before your system arrives from IBM. These activities consist of:

- Completing the appropriate system setup form

- Labeling the cables

- Preparing the system configuration checklist

The completion of these activities will assist the person setting up the 5280 system when it arrives from IBM.

For each auxiliary data station that is attached to a programmable data station or programmable control unit, there is one cable (the data station cable) that connects the auxiliary data station's display and keyboard(s) to the programmable unit. Also, if the auxiliary data station has one or two diskette drive(s), there is another cable (the diskette cable) that connects the diskette drives to the programmable unit. For each printer that is attached to a programmable unit, there is one printer cable required. There are two methods for attaching printers to a 5280 system. One method is where each printer is attached directly to the programmable unit, for example:
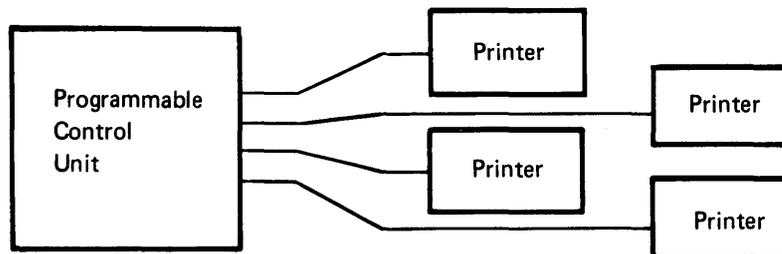
The other method is where the first printer is connected to the programmable unit and the remaining printers are connected as follows:

```
┌──────────────┐  ┌─────────┐  ┌─────────┐  ┌─────────┐  ┌─────────┐  ┌─────────┐
│              │  │         │  │         │  │         │  │         │  │         │
│ Programmable │──│ Printer │──│ Printer │──│ Printer │──│ Printer │──│ Printer │
│ Unit         │  │         │  │         │  │         │  │         │  │         │
│              │  └─────────┘  └─────────┘  └─────────┘  └─────────┘  └─────────┘
└──────────────┘
```
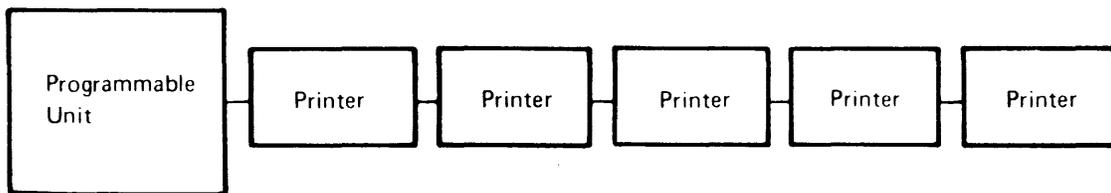
As you complete the system setup form, you will identify which sockets on the programmable unit are used to connect the cables from the auxiliary data stations and printers. You will also identify the device address that will be associated with each diskette drive and printer. After the setup form is completed, you can label the cables prior to the installation of your 5280 system. The labeled cables, along with the *User's Setup Procedures*, will allow the system to be easily set up. (The *User's Setup Procedures* is shipped from the factory with the machine.)

COMPLETING THE SYSTEM SETUP FORM

Appendix C contains a system setup form for each of the following programmable units:

- IBM 5285 Programmable Data Station

- IBM 5286 Dual Programmable Data Station

- IBM 5288 Programmable Control Unit

Use the following procedures to complete the system setup form:

Getting Your Forms Ready

1. Make sure you have an accurate floor plan of how the machines will be arranged in the room or area. This floor plan should have been started early in the planning activities, during the site selection.

2. Remove the appropriate system setup form from Appendix C.

Completing the Floor Plan

3. Number the units on the floor plan according to the following rules:
   a. If you have a 5285, number that unit 0.
   b. If you have a 5286, number that unit 0/1. (You use the number 0/1 because there are two keyboards attached to this unit.)
   c. If you have a 5288, number the first auxiliary data station 0 for a 5281 or 0/1 for a 5282. (The system summary worksheet specifies which auxiliary data station is the first unit.) The following illustration shows how the auxiliary data stations would be numbered if the first data station is a 5281, the second data station is a 5282, and the third data station is a 5281.
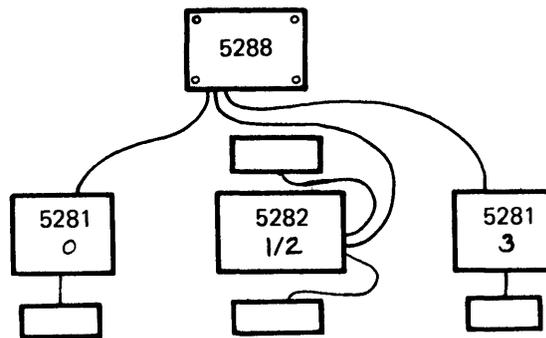
   Note: Often times when you are working with computers, you will find that the first item in a series starts with the number 0. This is the case with the data stations in a 5280 system.

   d. Number the remaining data stations consecutively. If the data station is a 5281, use one number. For example, 1, 2, or 3. If the data station is a 5282, use two numbers. For example, 1/2 or 2/3.

      Note: If you have a 5288 and one of the *remaining* auxiliary data stations is a 5282, the 5282 is always connected next to the first auxiliary data station (0 or 0/1). See the previous illustration.

   e. Number the printers consecutively starting after the last number used for the data stations.

4. Go to step:
   - 5 if you have a 5285 Programmable Data Station
   - 5 if you have a 5286 Dual Programmable Data Station
   - 10 if you have a 5288 Programmable Control Unit

Completing the System Setup Form for a 5285 Programmable Data Station or 5286 Dual Programmable Data Station

5. If you do not have an auxiliary data station on your system, go to step 8.

The Data Station Cable

6. Fill in the blanks with the information required for the data station cable. For example:

Aux Data Station ___5282___
Location Unit ½ on the floor plan
Socket On Prog Unit ___Green Square___

Identify the type of auxiliary data station that is attached to the 5285 or 5286.

The data station cable will be connected to the socket on the 5285 or 5286 that is identified with a green square.

The Diskette Drive Cable

7. If your auxiliary data stations have one or two diskette drives, fill in the blanks with the information required for the diskette drive cable. For example:

```
┌─────────────────────────────────────────────┐
│                                             │
│           ┌───┐      ┌───┐                  │
│           │ □ │      │ □ │                  │
│           └───┘      └───┘                  │
│                                             │
└─────────────────────────────────────────────┘
        ┌──────────────────────────────────────┐
        │ Aux Data Station   5282              │
        │ Location  Unit ½ on floor  plan      │
        │ Socket On Prog Unit  Yellow Square   │
        │ Device Address  4800/4C00            │
        └──────────────────────────────────────┘
```

If your auxiliary data station has one diskette drive, the device address is 4800. If your auxiliary data station has two diskette drives, the device address is 4800/4C00 as shown in this example.

8. If you have a printer attached to your system, fill in the information required for your printer cable. For example:

For a 5225 or 5256 printer

```
┌──────────────────────────────────────────────────┐
│                                                    │
│   20                                               │
│   ◯                      ▢        ▢                │
│                                                    │
└──────────────────────────────────────────────────┘
```

```
┌─────────────────────────────────────┐
│  Printer Type   5256                 │
│  Location  Unit 2 on the floor plan  │
│  Socket On Prog      20              │
│  Device Address    8000              │
└─────────────────────────────────────┘
```

For a 5222 printer

```
┌──────────────────────────────────────────────────┐
│                                                    │
│   21                                               │
│   ◯                      ▢        ▢                │
│                                                    │
└──────────────────────────────────────────────────┘
```
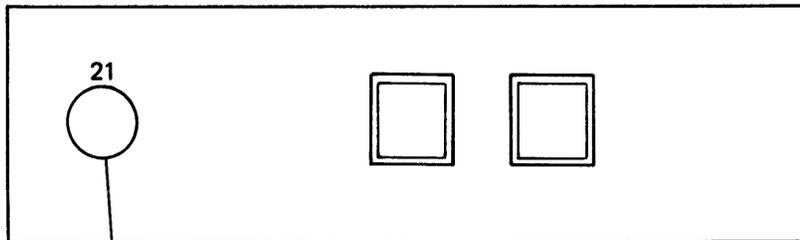
```
┌─────────────────────────────────────┐
│  Printer Type   5222                 │
│  Location  Unit 3 on floor PlAN      │
│  Socket On Prog      21              │
│  Device Address    8008              │
└─────────────────────────────────────┘
```

9. Go to *Labeling the Cables* later in this chapter.

Completing the System Setup Form for a 5288 Programmable Control Unit

The Data Station Cables

10. Using the floor plan, write the numbers you assigned to each unit in the squares for the four (data station) sockets. If you have less than four auxiliary data stations in your system, use only the required number of sockets. For example, if the first auxiliary data station for the 5288 is a 5282 Dual Data Station and the only other auxiliary data station is a 5281 Data Station, you would write the information on the system setup form as follows:
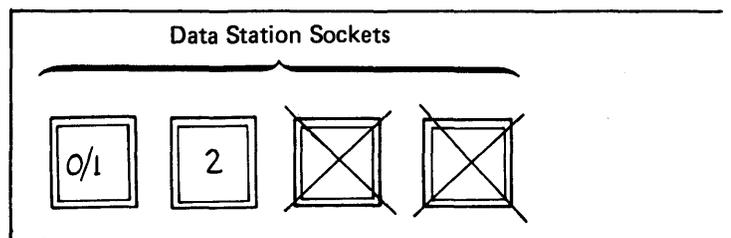
Cross out any of the unused data station sockets.

11. Fill in the blanks with the information required for each data station cable. For example:

12. Now, using the floor plan and the system summary sheet, determine how many diskette drives are in each auxiliary data station. The diskette drive sockets on the 5288 have specific device addresses assigned to each socket. Sockets 5, 8, and 11 have two device addresses assigned to the socket, the other sockets have one device address assigned to the socket. For example:

Device
Addresses

4800			5000			5800		
4C00	4800	4C00	5400	5000	5400	5C00	5800	5C00
5	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
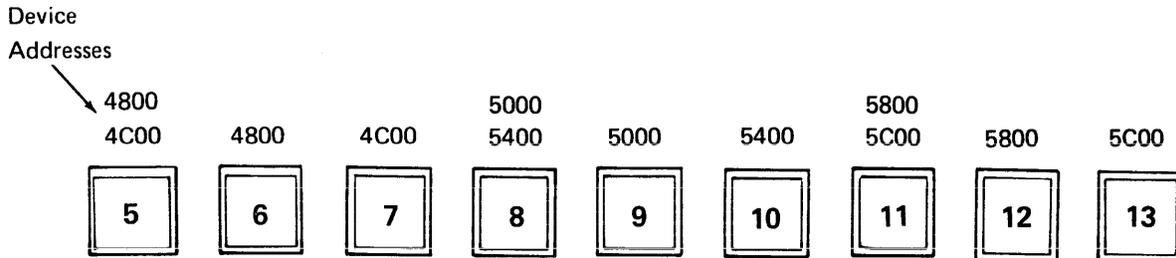
When a data station with two diskette drives is attached to the 5288, a socket with two device addresses (5, 8, or 11) must be used. In this case, the next two sockets *cannot* be used because the device address assigned to the socket is no longer available. When a data station with one diskette drive is attached to the 5288, a socket with one device address must be used. In this case, the next socket to the left with two device addresses cannot be used.

Now, assign the 5288 diskette drive sockets to the auxiliary data station based on the following rules:

a. If your 5288 has three or four diskette drives, cross out sockets 5, 6, and 7 on the system setup sheet.

b. If your system configuration has less than 7 diskette drives, cross out sockets 11, 12, and 13.

c. If the auxiliary data station has two diskette drives, you must assign a socket with two device addresses (socket 5, 8, or 11) to that data station. In this case, cross out the next two sockets. For example:

5000		
5400	5000	5400
8	**9**	**10**

d. If the auxiliary data station has one diskette drive, you must assign an available socket with one device address to that data station. For example:

```
5000
5400      5000      5400
 [X]       [9]       [10]
```

e. As you assign the 5280 diskette drive sockets to the auxiliary data stations, fill in the blanks with the information required for each diskette cable. For example:

```
○      ○      ○      ○      ○
```

```
4C00/          5000/          5800/
4800   4800   4C00   5400   5000   5400   5C00   5800   5C00
[X6]  [X6]  [X7]  [8]  [X9]  [X10]  [11]  [12]  [13]
```

Aux Data Station_____
Location_____
Socket On Prog Unit_____
Device Address_____

Aux Data Station_____
Location_____
Socket On Prog Unit_____
Device Address_____

Aux Data Station___5282___
Location_Unit O/L on floor plan
Socket On Prog Unit___8___
Device Address _5000/5400_

Note: For this example, the 5288 has four diskette drives. Therefore, the first three diskette drive sockets are crossed out. Also, the first auxiliary data station has two diskette drives.

Draw in the dashed line as you complete the appropriate block of information.
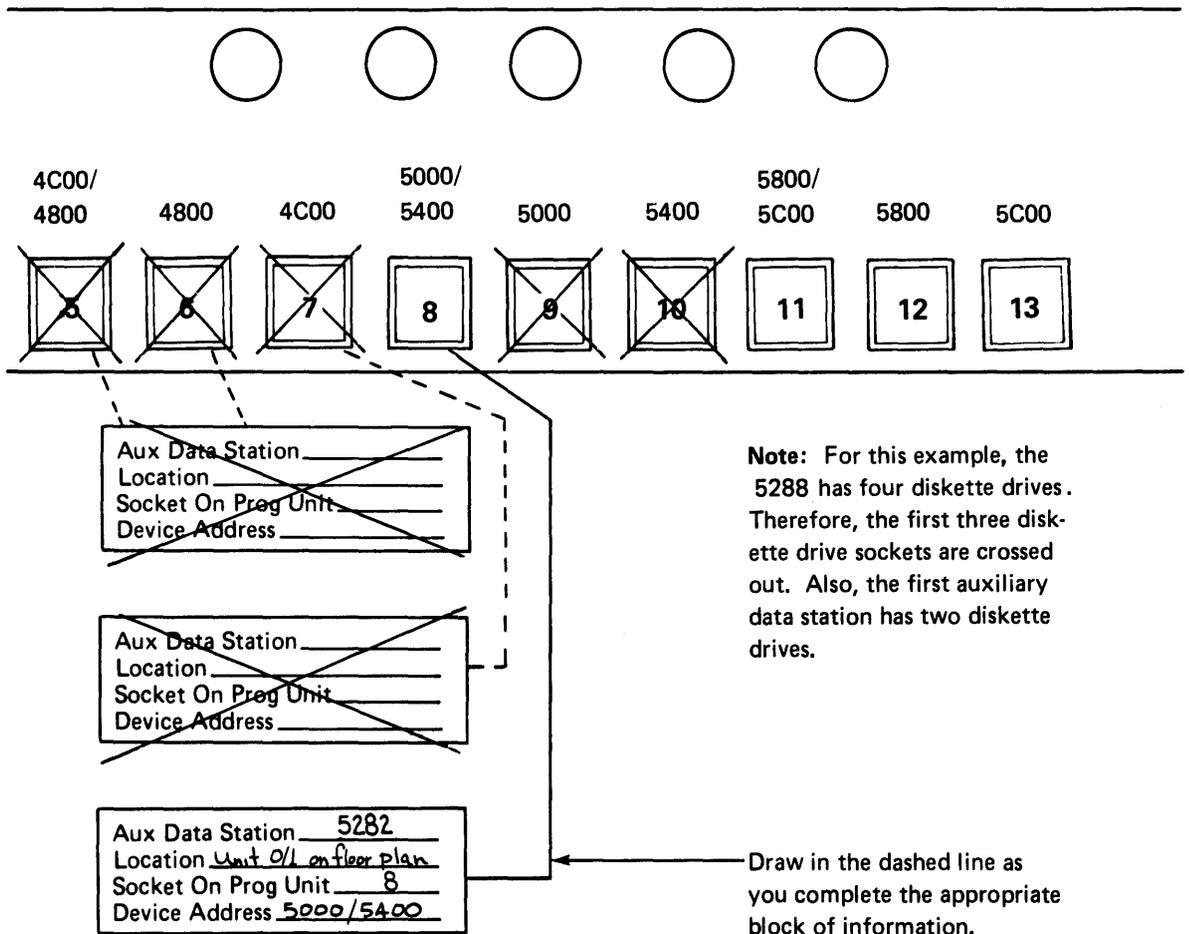
13. If you have any diskette sockets that are unused after all auxiliary work stations have been assigned, cross out these sockets on the system setup form.

14. Using the floor plan, determine how many printers will be attached directly to the 5280. Printers that are cabled through another printer are not directly attached to the 5280. Then assign the printer to a 5280 printer socket and fill in the blanks for the information required for each printer cable. See the following examples.

For 5225 and 5256 printer only:

| 20 | 21 | 22 | 23 |

4800	4C00	5000 5400	5000	5400	5800/ 5C00	5800	5C00
6	7	8	9	10	11	12	13

Printer Type _____
Location _____
Socket On Prog Unit ___20___
Device Address ___8000___

Printer Type _____
Location _____
Socket On Prog Unit ___21___
Device Address ___8008___

Printer Type _____
Location _____
Socket On Prog Unit ___22___
Device Address ___8010___

Printer Type _____
Location _____
Socket On Prog Unit ___23___
Device Address ___8018___

94
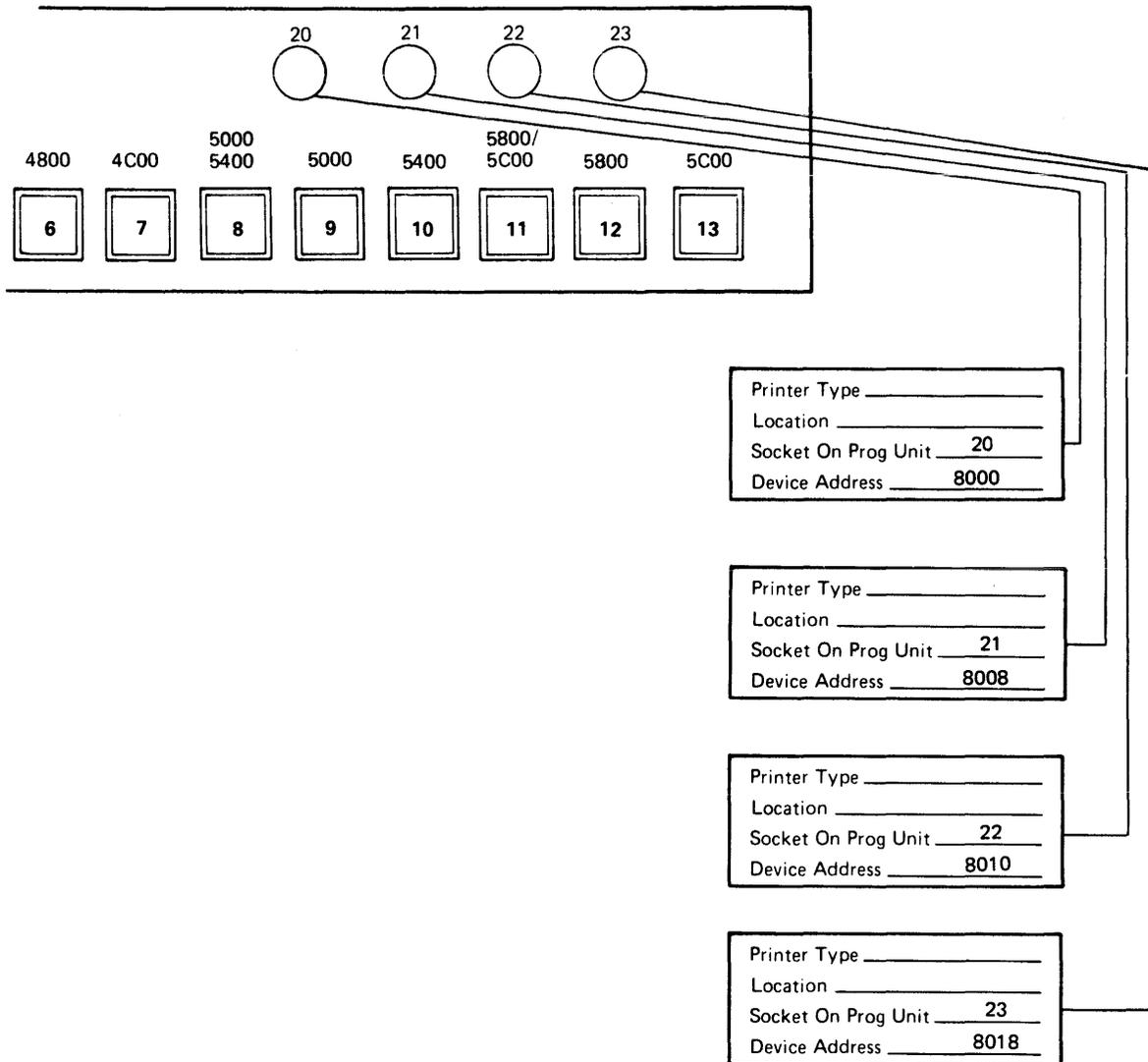
For 5222, 5225 and 5256 printers:

| | 20 | 21 | 22 | 23 | 24 |

| 4800 | 4C00 | 5000 5400 | 5000 | 5400 | 5800/ 5C00 | 5800 | 5C00 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
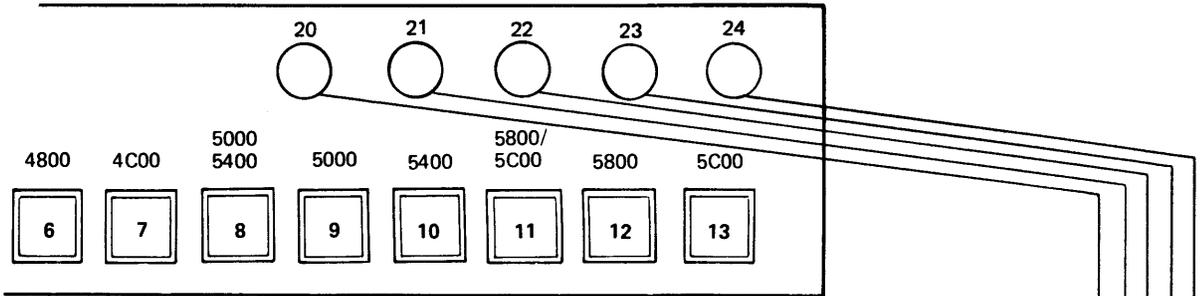
This socket is for twinaxial
cable (5225 and 5256 printers) only.

Printer Type _____
Location _____
Socket On Prog Unit ___20___
Device Address ___8000___

Printer Type _____
Location _____
Socket On Prog Unit ___21___
Device Address ___8008___

Printer Type _____
Location _____
Socket On Prog Unit ___22___
Device Address ___8010___

These sockets are for
5222 printers only.

Printer Type _____
Location _____
Socket On Prog Unit ___23___
Device Address ___8018___

Printer Type _____
Location _____
Socket On Prog Unit ___24___
Device Address ___8020___

LABELING THE CABLES

Once the system setup sheet has been completed and your ordered cables have arrived, you can use the system setup sheet to assist you in labeling the cables. Cables that are installed under a raised floor, through walls, and so on, should be labeled before they are installed. Once the cables are labeled with the proper information, the system can easily be set up. The package of labels (GX21-9339) required for labeling the cables can be ordered from your IBM marketing representative.

```
Aux Data Station_____
Location_____
Socket On Prog Unit_____
Device Address_____
```

You will need two labels for each data station cable, diskette cable, and printer cable on your system.

Labeling the Data Station Cables

If you ordered your display
cables from IBM, there will
be a green square on the
cable connector.

First, transfer the information from the system setup form to the labels
for the data station cables. For example:

Information from the Setup Form

Data Station Cable Label

Remember, you need to complete two labels for each cable. Now you
must use the floor plan to determine which data station cable goes
between the programmable unit and the appropriate auxiliary data
station. Then tie the appropriate labels to each end of the cable(s).

Labeling the Diskette Cables

If you ordered your diskette
drive cables from IBM, there
will be a yellow square on
the cable connector.

As with the data station cables, transfer the information from the
system setup form to the labels. Then use the floor plan to determine
which diskette cable goes between the programmable unit and the
appropriate auxiliary data station.

Labeling the Printer Cables

5225 and 5256 Printer Cable
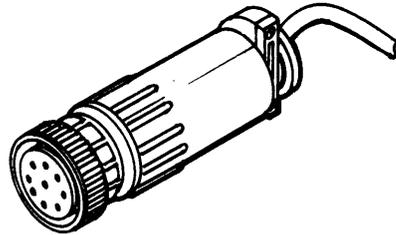
5222 Printer Cable (See note)

As with the data station and diskette cables, transfer the information
from the system setup form to the labels. Then use the floor plan to
determine which cable goes between the programmable unit and the
printer. Now, tie the appropriate label to the ends of each printer
cable(s).

Note: The 5222 printer cable is attached to the printer and, therefore,
is not available until the machine arrives.

PREPARING THE SYSTEM CONFIGURATION CHECKLIST

Appendix B contains the system configuration checklist. Use this checklist when executing the system configuration program to generate user-defined IPL (initial program loader) diskettes. An IPL diskette contains the initial program and data areas that must be loaded into the system before you can use the system. IBM supplies you with a starter IPL diskette so that you can run your first program. Generally, the first program you run is the system configuration program. This program uses your responses to prompting messages to generate a user-defined IPL diskette. A user-defined IPL diskette allows you to load an IPL program and data areas that are tailored to your specific system. Some of the information you need when responding to the system configuration prompting messages is contained in this publication. The system configuration checklist in Appendix B identifies where the required information can be found. Fill in the blanks for the information that can be found in this manual. The system configuration checklist can then be completed by the person who will be running the system configuration program.

PREPARING FOR YOUR 5280 SYSTEM OPERATION

Your planning for the 5280 system should include plans for operating the system once it has been set up. Unless an efficient plan for conducting operations is developed beforehand, the initial period of operation is likely to be extremely disorganized. To aid in this effort, the following checklists and suggestions are offered:

Summary Checklist

To ensure that all the preinstallation activities have been addressed, complete the following checklist:

Cables Ordered

☐   Data station cables

☐   Diskette drive cables

☐   Printer cables

☐   Communication cable length specified

Program Products Ordered

- ☐ System control programming
- ☐ DE/RPG
- ☐ Utilities
- ☐ Communications utilities
- ☐ Sort/Merge
- ☐ Assembler

Publications Ordered

- ☐ *System Concepts,* GA21-9352
- ☐ *Introduction to DE/RPG,* SC21-7803
- ☐ *DE/RPG User's Guide,* SC21-7804
- ☐ *DE/RPG Reference Manual,* SC21-7787
- ☐ *Utilities Reference/Operation Manual,* SC21-7788
- ☐ *System Control Programming Reference/Operation Manual,* GC21-7824
- ☐ *Sort/Merge Reference/Operation Manual,* SC21-7789
- ☐ *Assembler Language Reference Manual,* SC21-7790
- ☐ *Communications Reference Manual,* SC34-0247
- ☐ *Master Index,* GA21-9356
- ☐ *Functions Reference Manual,* GA21-9353
- ☐ *DE/RPG Problem Determination Procedures for the Programmer,* SC21-7852
- ☐ *COBOL Language Reference Manual,* GL23-0031
- ☐ *COBOL Programmer's Guide,* SL23-0032
- ☐ *IBM 5280 COBOL Host Compilers Problem Determination Manual,* SL23-0043

Coding Sheets Ordered

☐   Data description specifications (A specifications), GX21-9362

☐   General utility specifications (Z specifications), GX21-9361

☐   RPG calculation specifications (C specifications), GX21-9093

☐   DE/RPG debugging template and reference card, GX21-9363

☐   COBOL Coding Form, GX28-1464

☐   Printer/Display Layout Sheet, GX21-9174

Communications Arrangements

☐   Completed arrangements with the local telephone company

☐   Modem ordered

☐   Data access arrangement (if required)

Diskettes Ordered

☐   Diskette 1

☐   Diskette 2D

Printer Supplies Ordered

☐   Printer ribbons

☐   Paper (check paper width with printer specifications)

Education Completed or Plans Confirmed

☐   Supervisors and lead operators

☐   Programmers (DE/RPG or key entry utility)

☐   Operators

Programming

☐   Are the initial programs written and tested?

Documentation

☐ Is the documentation completed for the initial programs?

  ☐ Operator keying instructions

  ☐ Record layouts

  ☐ Machine setup instructions (for example, program name, transaction data set name, printer setup instructions)

Conversion Plans

☐ Have the plans been made and tested to convert applications from your present method to the 5280?

Diskette Control

☐ Has a system been designed to control the use of your diskette media?

  ☐ External diskette labels (what information will be on the labels)

  ☐ Data set labels (controls to avoid the use of duplicate names)

  ☐ Diskette library (controls for the use of the diskette, for example, retention times, keeping a history of each diskette's use, *scratching* procedures—clearing the diskette)

Backup Procedures

☐ Are procedures set up for the possibility that the 5280 system will be inoperative for some period of time?

  ☐ Keying applications

  ☐ Communications applications

☐ Are recovery procedures set up in case a master data set is accidentally destroyed?

☐ Are recovery procedures set up in case a power failure occurs and the jobs are terminated?

Systems Setup Pointers

- When you begin the setup procedures for the 5280 Distributed Data System, set up the auxiliary devices first (5281 or 5282), the printers next, and then the controllers (5285, 5286 or 5288).

- Before testing the printer be sure that it is cable-connected to the controller (5285 or 5288).

- The customer setup manual for printers is located in the shipping carton that contained the printer.

- Printers that are not equipped with the Cable Thru feature do *not* have address switches; therefore, the device addresses will be as follows:
  - If the printer is attached to socket No. 20, the address is 8000.
  - If the printer is attached to socket No. 21, the address is 8008. } **5285 or 5288**
  - If the printer is attached to socket No. 22, the address is 8010.
  - If the printer is attached to socket No. 23, the address is 8018. } **5288 only**
  - If the printer is attached to socket No. 24, the address is 8020.

- The machine verification manual and diskette are located in a binder shipped with each programmable unit.

- The operator guide and message manuals are located in a binder shipped with each data station.

- Upon satisfactory completion of the machine verification test, turn your system off. The next step is to start the IPL for the system using the IBM-supplied IPL (Initial Program Loader) diskette and run the system configuration program. The output of this program is written on a diskette and thus becomes the user-defined IPL diskette for your system. If you use a *new* diskette (one that has not been used) for your output diskette, a message is displayed warning you that the output diskette contains data. This is because the program is checking for available space to write and a new diskette is initialized allocating the entire diskette to one data set. Provisions are made to allow you to continue with the configuration process.

  Note: Before you continue, check to make sure that the diskette you are using does not contain data that you do not want to destroy.

- It is recommended that you prepare an absolute dump diskette using the SYSDUMP program on the machine verification diskette. After the absolute dump diskette is prepared, it should be stored with your other system diskettes.

- It is recommended that all program product diskettes that are ordered be copied onto one of your own diskettes. Store the original diskette for backup and use the copied diskettes for day-to-day use.

- It is recommended that new diskettes be processed against the diskette/data set clear utility using the diskette free option (prompt 25-01) and the no option (prompt 25-02) before using the diskettes for application processing.

The information in this chapter is provided to help you identify and prepare an installation site. Use the first section of this chapter when making a floor plan. The second section provides unit specifications; the third section contains information for anyone installing the cables.

Experience has shown the importance of having a working environment and operator furniture that promotes optimum operator performance, safety, and comfort. Consider the following factors and physical requirements when selecting and preparing an installation site.

FURNITURE CONSIDERATIONS

The table you set your data station(s) on should allow for adequate operator comfort. The recommended table size for optimum operator performance is:

- Table height: 660 to 690 millimeters (26 to 27 inches).

- Knee clearance: 635 millimeters (25 inches) from the underside of the table to the floor.

- Depth: For single data stations, a minimum of 760 millimeters (30 inches); for dual data stations, a minimum of 1.12 meters (44 inches) to a maximum of 1.22 meters (48 inches).

- Width: For single data stations, 1.14 meters (45 inches); for dual data stations, a minimum of 1.68 meters (66 inches).

- Tables should be strong enough to support the weight of the data stations. (See the specifications later in this chapter for the weight of each data station.)

Note: Standard tables with a height of 660 to 690 millimeters (26 to 27 inches) might not be available. If you have to special order the tables, make sure you allow six to eight weeks for delivery.

The following is one example of a table arrangement suitable for 5282 and 5286 dual data stations. Notice that placing a cabinet on either side of the table not only provides storage close at hand, but work space to place your working documents when you have a dual data station. Placed lengthwise, this table can be used for the 5281 and 5285 data stations.
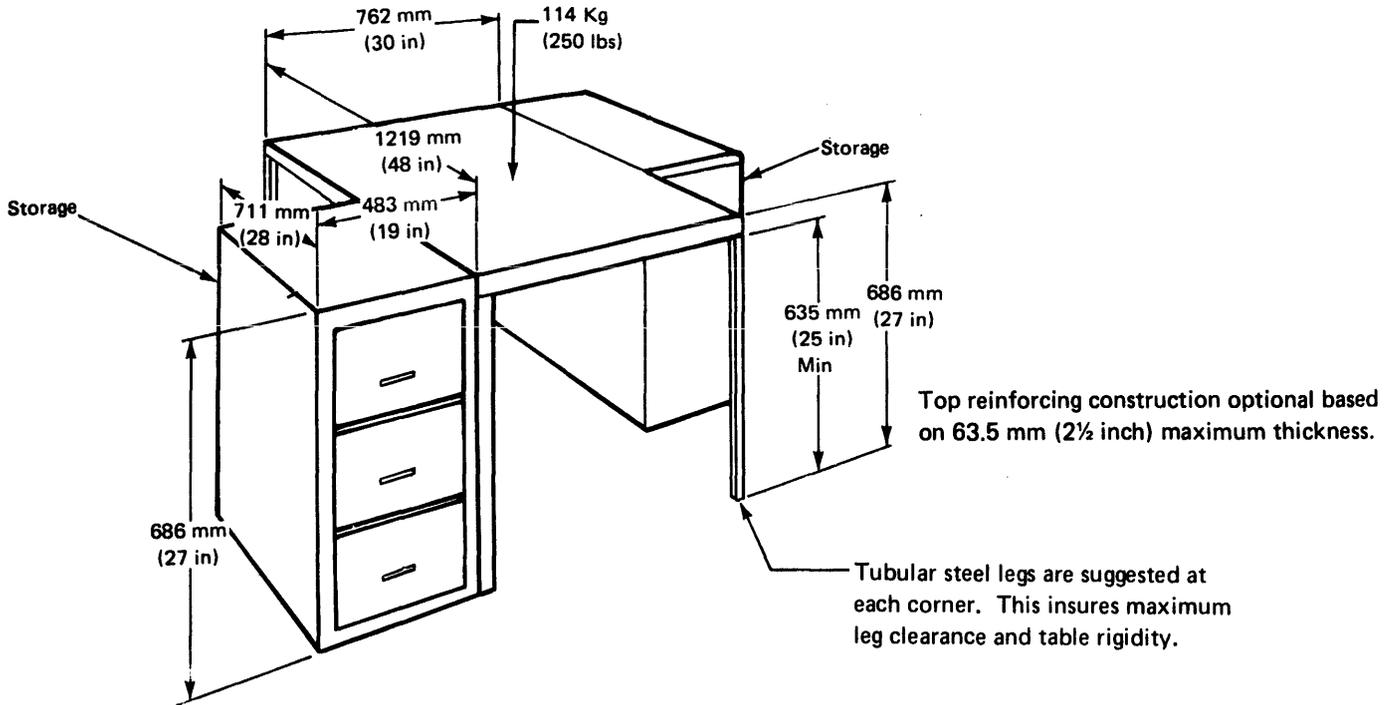
Top reinforcing construction optional based on 63.5 mm (2½ inch) maximum thickness.

Tubular steel legs are suggested at each corner. This insures maximum leg clearance and table rigidity.

Following are considerations for the previously described table:

- Plastic laminate top with a matte or satin finish.

- Must be able to sit at ends or sides of table. Cross braces between table legs cannot be lower than the 635 mm (25-inch) minimum specified dimension.

The table you set your 5222 or 5256 printer on should allow for knob clearance, paper movement, and the storage of any printer-related materials. The recommended table size is:

- Height: 675 to 750 millimeters (27 to 30 inches)

- Depth: 500 to 900 millimeters (20 to 36 inches)

- Width: 600 to 750 millimeters (24 to 30 inches)

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The style and height of chair you provide should enable an operator to sit at the data station for extended periods with comfort. The following guidelines will help you select the most suitable chair.

- Chairs should be adjustable. Each operator using a particular chair should be able to rest his or her feet flat on the floor with a slight allowance to relieve pressure on the lower thigh. (This will allow circulation to continue in the operator's lower extremities.)

- Chairs should have a back rest that supports the lower back.

635 mm
(25 inches)

660–690 mm
(26–27 inches)
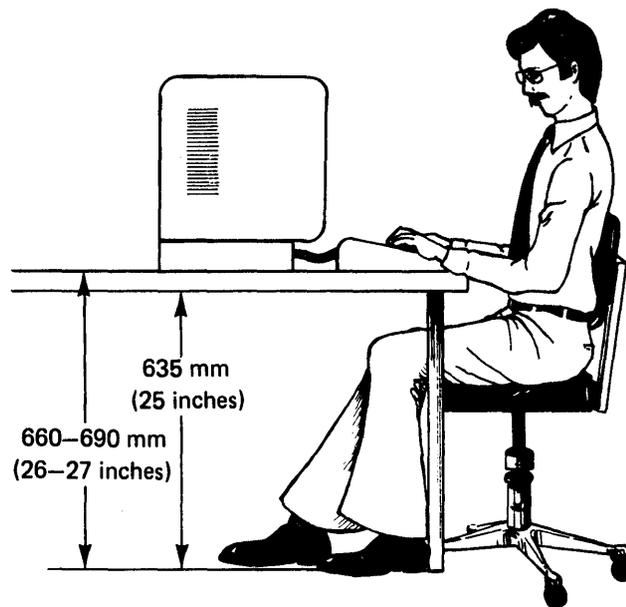
The following lighting factors should be considered when you prepare a physical site for 5280 units:

- Offices might be painted in light colors with white ceilings to enable reflection (rather than absorption) of light.

- To lessen glare, ensure that windows are not in the operator's field of vision or directly facing the display screen.

- It is best to have a low level of general lighting (300 to 500 lux); ideally, with adjustable local lighting at each data station.

- To avoid eye fatigue, ensure that sources of light are compatible. Universal white fluorescent lamps are compatible with both incandescent lamps and daylight. (Daylight fluorescent lights are not compatible with daylight.)

- Align the data stations so that they are parallel (front to back) to fluorescent lights.

Data Station

Keyboard

Fluorescent Lights
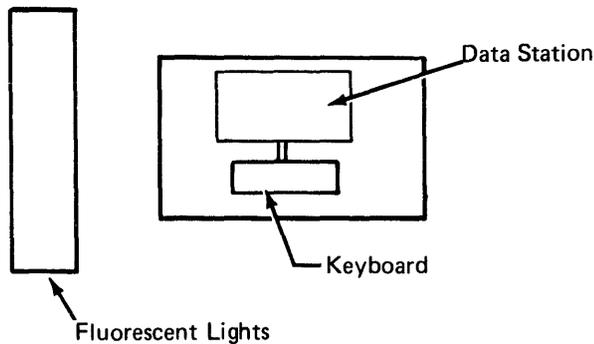
- Align data stations so that direct sunlight does not create a glare on the display screen.

Display Screen Filter

A display screen filter is available as an accessory on the 5281 Data Station and the 5285 Programmable Data Station. The antiglare filter increases screen contrast and reduces glare to improve readability for the operator.

MAKING A FLOOR PLAN

The arrangement of your 5280 units should provide for efficient workflow and should make economical use of existing facilities. To aid you in preparing a floor plan, Appendix D contains floor-plan drawings of the 5280 machines, scaled at 1 millimeter = 50 millimeters (1/4 inch = 1 foot). Sheets of grid paper are also provided. When floor-plan drawings are cut out and placed on a grid-paper drawing of the work area, the devices can be moved about to help define the best room arrangement.

Draw the dimensions of the room or area to scale on the grid paper. Be sure to include doors and windows.

In addition to those factors previously listed under *Furniture Considerations*, the following space requirements and considerations must be reviewed when a floor plan is made:

☐ The 5222 or 5256 printer should be placed on a table for convenient operation. The printer must not be placed on top of a 5288 Programmable Control Unit. The 5288 is not designed to support other machines.

☐ To ensure proper servicing, set up the first auxiliary data station (see the system summary worksheet in Chapter 1) that is connected to a 5288 Programmable Control Unit within easy viewing distance of the programmable control unit. It is recommended that the first auxiliary unit be within 6 meters (20 feet) of the programmable control unit.

☐ Reserve adequate storage space by each 5280 unit for storing documentation. A storage device large enough to hold the maintenance and operator information is shipped with each unit.

☐ Subject to local requirements, each 5280 unit has a power cord that is 2.4 meters (8 feet) long. Consider allocating one grounded electrical outlet for each device, with an extra outlet reserved for service and miscellaneous needs.

☐ If you have ordered a printer, consider installing the printer within sight of a data station. This arrangement will facilitate program testing and will make it easier to check on proper printer operations.

☐ Miscellaneous equipment: consider other items that will be or should be in the same area as your system, such as office equipment and furniture.

☐ Consider the possible future expansion of your system workload and facilities.

ELECTRICAL REQUIREMENTS

Voltage and Frequency

The 5280 machines operate at the following voltages:

Nominal Voltage	60 Hertz		50 Hertz	
	Minimum	Maximum	Minimum	Maximum
100	90	110	90	110
110			99	121
115/120	104	127		
123.5			111	136
200	180	220	180	220
208	187	229		
220	198	242	198	242
230	207	253		
235			212	258

The allowable voltage variation is plus or minus 10%.

Power Cords and Receptacles

Each machine has a three-wire power cord that includes an equipment ground wire. See the *System Specifications* section in this chapter for detailed information on power cord lengths, plug styles, and cord styles.

Branch Circuits and Grounding

The power cords have either a green, or yellow and green equipment ground wire. For safety, each branch circuit must have an insulated wire conductor, equal to the size of the phase conductor, for grounding the equipment. All branch-circuit ground wires should run from the distribution panel, and a single ground wire should run from the distribution panel to a service ground or a suitable building ground.

Safety Precaution: The conduit must not serve as the only means of grounding because it might not be continuous. The system neutral must be electrically isolated from the ground conductor except at the building ground station.

ENVIRONMENTAL CONSIDERATIONS AND REQUIREMENTS

(

Temperature, Relative Humidity, and Wet Bulb

The following chart shows the temperature and humidity limits for the 5280 system.

Operating Environment (System is turned on)	
Temperature	16° to 32°C (60° to 90°F)
Relative Humidity	8% to 80%
Maximum Wet Bulb	23°C (73°F)
Nonoperating Environment (System is turned off)	
Temperature	10° to 43°C (50° to 110°F)
Relative Humidity	8% to 80%
Maximum Wet Bulb	27°C (80°F)
Storage Environment	
Temperature	0° to 60°C (33° to 140°F)
Relative Humidity	5% to 80%
Maximum Wet Bulb	0° to 30°C (33° to 85°F)
Shipping Environment	
Temperature	-40° to 60°C (-40° to 140°F)
Relative Humidity	5% to 100% (including condensation, excluding rain)
Maximum Wet Bulb	0° to 30°C (33° to 86°F)

If your site environment is outside the specified temperature or humidity ranges, you should consult an air-conditioning or humidity-control expert.

You should also make note of the humidity limits of your supplies. These limits might vary for different materials, such as printer forms, carbonized printer forms, printer ribbons, and diskettes. If operating and storage areas cannot be maintained at similar temperature and humidity levels, allow enough time for the supplies to adapt to operating room conditions before using them.

Diskette Environment

Temperature:	10° to 51° C (50° to 125° F)
Relative humidity:	8% to 80%
Maximum wet bulb temperature:	29° C (85° F)

Electrostatic Discharge

With low humidity levels, static charges generated by the movements of people, carts, furniture, and paper are more readily stored in certain types of floor construction, floor coverings, and furniture. These charges might create an annoying static shock when discharged upon contact with another person or object. If discharged to or near data processing or other electronic equipment, these charges can cause intermittent interference. To minimize electrostatic discharge, maintain suitable humidity levels and avoid the use of the following materials:

- High-resistance floor surface material

- Carpeting that lacks antistatic properties

- Plastic seat covers

Lotions and sprays are commercially available for carpeting that tends to store static charges. If low humidity levels and the static charges that result are a recurrent problem, you might consider installing a humidifier.

Electromagnetic Compatibility

Do not install the machines in areas where high electromagnetic interference can be radiated or conducted. Such areas might exist near some radio-frequency sources, such as:

- Radio-transmitting antennas (AM, FM, TV, or two-way radio)

- Radar (FAA or military)

- Certain industrial machines (rf induction heaters, rf arc welders, or insulation testers)

- Time clocks

- Certain electrical heating systems

- High-energy power lines

If your proposed installation site is near any of the above, determine what special installation or product considerations are necessary to ensure normal operation. Your IBM representative can help you determine what, if any, adjustments are appropriate.

Atmospheric Contaminants

Particulate, liquid, and gaseous atmospheric contaminants in some industrial environments, especially those in the process industries, can corrode copper and other metals used in the 5280 units. Extensive corrosion in any computer equipment can produce electrical short circuits or contact failures. These conditions can in turn cause system malfunctions.

If you are in doubt about the atmospheric conditions of your installation site, consult your IBM representative.

CABLING CONSIDERATIONS

Four types of cables are used to connect the devices together within a 5280 system:

- Data station cable

- Diskette drive cable

- Printer cable

- Modem cable

The *data station cable* is always required when auxiliary data stations (5281 or 5282) are attached to a programmable unit (5285, 5286, or 5288).

The *diskette drive cable* is required if the auxiliary data station has one or two diskette drives. This cable is required in addition to the data station cable.

The *printer cable* is required to connect a 5225 or 5256 printer to a 5285, 5288, or each other. An attachment cable connects the 5222 printer to a 5285 or 5288 and is supplied with the printer.

The *modem cable* is used to connect a 5280 programmable unit to a communications facility and is supplied with the communications feature.

Data station, diskette drive, and printer cables can be obtained from IBM or from other sources. Communications cables are a part of the communications feature and come from IBM.

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Order your cables early. Length restrictions are noted in the following chart. Normally the data station and diskette drive cables will be the same length for any one particular data station. Consult your floor plan as well as the following considerations when determining cable lengths.

Type of Cable	Between Programmable Unit And:*	Length
Data station multiconductor	Auxiliary keyboard/display	1.5 to 61 meters (5 to 200 feet)
Diskette drive multiconductor	Auxiliary diskette drive(s)	1.5 to 61 meters (5 to 200 feet)
Twinaxial	Printers (5225 and 5256)	Up to 1525 meters (5000 feet)
Four-conductor, double-twisted pair	Printer (5222)	6 meters (20 feet). Up to 55 meters (180 feet) of extension cabling can be ordered as an accessory
Communications multiconductor	Communications facility (modem, etc.)	6.1 or 12.2 meters (20 or 40 feet)
*5280 programmable units are the 5288 Programmable Control Unit, the 5285 Programmable Data Station, and the 5286 Dual Programmable Data Station		

Use your floor plan when determining cable lengths.

☐ Allow enough cable to move the machines for servicing. A minimum of 0.6 meters (2 feet) at both ends is recommended beyond the required length to connect the units.

☐ Consider how the cables will be routed in the building. Care should be taken to ensure that the cables do not present obstacles to easy movement and are not exposed to possible damage.

☐ If ordering preassembled cables, remember that each end of the cable will have a connector of the following dimensions:

21 mm (28/32 in)

273 mm (2 7/8 in)

5222 Printer Cable

23 mm (29/32 in)

Data Station & Diskette Drive Cable

5225 and 5256 Printer Cable

Do not remove any connectors. If the cable must pass through a wall, be sure that a large enough opening can be provided.

☐ If cables will be installed in the ceiling, consider the distance from the ceiling to each machine. Similarly, consider the distance from the floor to each machine if the cable route will be on or beneath the floor.

☐ Only twinaxial (printer) cables can be installed outside. Station protectors should be obtained for such outside installations. See the *Cables* section of this chapter.

☐ Cable runs, both horizontal and vertical, must be supported every 3 meters (10 feet).

☐ Cables can be run in the same conduit as telephone lines, provided adequate openings are made for cable connectors.

Note: When installing cables label each cable at both ends. This very important step is explained in Chapter 7, *Preparing for Customer Setup*.

Once you have identified the types of cables needed and their lengths, you should order the cables. Plan to have all cables and connectors in your possession no later than four weeks before the 5280 units arrive.

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Ordering Data Station, Diskette Drive, and Printer (Twinaxial) Cables

Preassembled cables can be ordered through your IBM representative by specifying the part number and the desired length.

- Data station cable, part 7364212

- Diskette drive cable, part 7364208

- 5225 and 5256 printer cable, part 7362267

- Extension cabling for the 5222 printer, up to 55 meters (180 feet), IBM part 6846671

If you plan to purchase bulk cables and assemble them, or to order cables from another source, refer to the *IBM 5280 Cable Assembly Manual*, GA21-9341, for specifications and assembly procedures. A package of labels (GX21-9339) for labeling your cables can be ordered from your IBM marketing representative.

Ordering Communications Cable

A communications cable is provided by IBM when the communications feature is ordered, but you must specify the length desired, either 6 meters (20 feet) or 12 meters (40 feet).

Signal Separation Guide for Multiconductor/Twinaxial Cable

The following distances are a guide for voltages up to 440 volts. Signal cables should not be installed near power lines transmitting or electrical equipment using more than 440 volts.

The minimum distance between signal cable and fluorescent, neon, or incandescent lighting fixtures is 127 millimeters (5 inches).

The minimum distance between signal cable and unshielded power lines or electrical equipment depends upon the power consumption of the equipment:

- 2 kVA or below: 127 millimeters (5 inches)

- 2-5 kVA: 305 millimeters (12 inches)

- Over 5 kVA: 610 millimeters (24 inches)

The minimum distance between signal cable and unshielded power lines or electrical equipment with the signal cable enclosed in a grounded metallic conduit is:

- 2 kVA or below: 63.5 millimeters (2.5 inches)

- 2-5 kVA: 152 millimeters (6 inches)

- Over 5 kVA: 305 millimeters (12 inches)

The minimum distance between signal cable and power lines in a grounded metallic conduit is:

- 2 kVA or below: 63.5 millimeters (2.5 inches)

- 2-5 kVA: 152 millimeters (6 inches)

- Over 5 kVA: 305 millimeters (12 inches)

The minimum distance between signal cable enclosed in a grounded metallic conduit and power lines enclosed in a grounded metallic conduit is:

- 2 kVA or below: 30.5 millimeters (1.2 inches)

- 2–5 kVA: 76 millimeters (3 inches)

- Over 5 kVA: 152 millimeters (6 inches)

COMMUNICATIONS CONSIDERATIONS

If you have ordered a programmable unit with the communications feature, consider the following:

- A telephone with an outside line (not the same one used for data transmission) might be located near the 5280 unit to aid in problem determination and communication with the other system.

- Communications equipment should be within reach of communications cables, which come in lengths of 6 meters (20 feet) or 12 meters (40 feet).

- Space and power must be available for external modems or digital communications equipment.

- Lightning protection should be provided on nonswitched communications lines. Protective devices can be installed by the common carrier company when your lines are connected.

SYSTEM SPECIFICATIONS

Standard Symbols and Specifications

Standard symbols used on the specifications pages and physical planning cutouts are:

T   Nonraised floor power cord exit (power cords are measured from the power cord exit)

— — — —   Service area boundary

T   Signal cable entry

O   Glide

— — — —   Optional equipment

Plan view dimensions are shown in millimeters (inches).

Power Plugs and Receptacles

The following specifications are for plugs and receptacles used in the United States and Canada.

Plug Type	Volts	Rating			Description	Plug Number[1]	Receptacle Number[1]	Receptacle Configuration
		Amperes	Phase	Wires				
H	115	15	1	3	Nonlocking	5-15P	5-15R	
J	115	15	1	3	Locking	L5-15P	L5-15R	
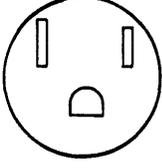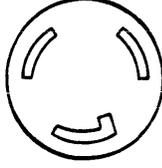
[1] The plug and receptacle numbers shown are National Electrical Manufacturers' Association (NEMA) configuration numbers.

Power Plug Requirements for Countries Other than the United States and Canada

The following plug, designated by country, will be installed on your machine unless you order an attachment cord without a plug.

Country	Plug Number	Country	Plug Number
Algeria	4	Jamaica	3
Argentina	6	Japan	3,9,12
Australia	6		
Austria	1	Malaysia	5
		Mexico	3
Bahamas	3		
Barbados	3	Netherlands	1
Belgium	4	Netherlands Antilles	3
Bermuda	3	New Zealand	6
Bolivia	3	Nicaragua	3
Brazil	3	Norway	1
Bulgaria	1		
		Panama	3
Chile	6	Paraguay	6
Colombia	6	Peru	3
Costa Rica	3	Phillippines	3
		Poland	1
Denmark	8	Portugal	1
Dominican Rep	3		
		Rumania	1
Ecuador	3		
El Salvador	3	Singapore	5
		South Africa	7
Finland	1	Spain	1
France	4	Sweden	1
		Switzerland	2
Germany	1		
Greece	4	Taiwan	3,12
Guatemala	3	Thailand	3,12
		Trinidad	3,6
Honduras	3	Turkey	1
Hungary	4		5
		United Kingdom	5
Iceland	1	Uruguay	6
Indonesia	1		
Iran	1	Venezuela	6
Ireland	5		
Israel	11	Yugoslavia	4
Italy	10		

Plug/Number	Amperage/Voltage
1	16 A Max, 250 V
2	10 A Max, 250 V
3	15 A Max, 125 V
4	16 A Max, 250 V
5	13 A Max, 250 V
6	10 A Max, 250 V
7	13 A Max, 250 V
8	10 A Max, 250 V
9	15 A Max, 125 V
10	16 A Max, 250 V
11	10 A Max, 250 V
12	15 A Max, 200 V

If you order an attachment cord without a plug, see the following chart
for cable specifications:

Power Cord Specification Chart

| Power Cord Style | Cable O.D. | | Shield | Conductor | | |
| | mm | in | | Qty | Nominal O.D. | |
					mm	in
A	10.2	0.40	0	3	1.0	0.040
B	10.2	0.40	0	3	1.3	0.051

Installation of a Power Plug

Because different plugs are used in different countries, it is not
possible to cover all plug installations in one procedure.

If you have ordered a power cord without an attached plug, consider
the following three points:

1. Steps should be taken to assure that the grounding wire and/or
    the drain (shield) wire cannot come in contact with (touch) the
    other (hot) wires.

2. The grounding wire (green-green/yellow) should be properly
    attached to the grounding terminal in the plug.

3. The power cord should be well secured to the plug in order to
    prevent strain on the plug/wire contacts.

5222 PRINTER

Plan View

435
(17)

305
(12")

Forms
Stand.

460
(18)

420
(16.5)

5222

580
(22.8)
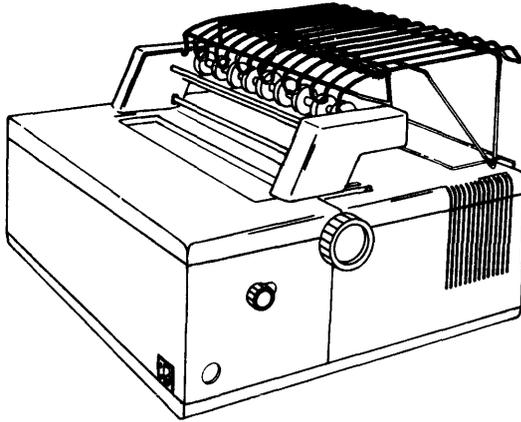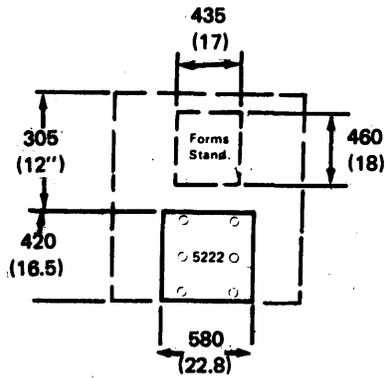
Specifications

Dimensions:[1]

	Width	Depth	Height
Millimeters	580	420	221
Inches	22.8	16.5	8.7

Service Clearances:*

	Front[1]	Rear	Right	Left
Millimeters	37	305	100	100
Inches	1.5	12	4	4

Weight: 31.7 kg (70 lb)

Heat Output: 125 watts (427 Btu/hr)

Airflow: 0 m³/min (0 CFM). The
5222 printer can operate in a
static airflow environment.

Power Requirements:

Voltage	120
kVA	0.1
Phase	1
Plug type[1]	H
Power cord style[1]	**

Operating and Nonoperating Environment: See *Environmental Considerations and Requirements* in this chapter.

[1]The power cord is 1.8 meters (6 feet) long and is pluggable at both ends. For more information, see *Power Plugs and Receptacles* in this section.

*Provide for operator access and forms carrier.

**The power cord is 6 meters (20 feet) long. For more information, see *Power Plugs and Receptacles* in this section.

5225 PRINTER

Plan View

Specifications

Dimensions:	Width	Depth	Height
Millimeters	1100	750	1000
Inches	43-3/4	29-1/2	39-1/2

Service Clearances:

	Front[1]	Rear	Right	Left
Millimeters	1000	1000	0	900
Inches	39-1/2	39-1/2	0	35-1/2

Weight: 250 kg (550 lb)

Heat Output:

	Model 1	Models 2, 3, and 4
Btu/hr	1880	2900
Watts	550	850

Airflow: 4.5 m³/min (150 cfm)

Power Requirements:

	Model 1	Models 2, 3, and 4
Voltage	120, 208, 240	120, 208, 240
kVA	.75	1.0
Phase	1	1
Plug type[1]	H, J, K or L	H, J, K, or L
Power cord style[1]	A8	A8

Operating and Nonoperating Environment: See *Environmental Considerations and Requirements* in this chapter.

[1]The power cord is 2.4 meters (8 feet) long. For more information, see *Power Plugs and Receptacles* in this chapter.

5256 PRINTER

Plan View
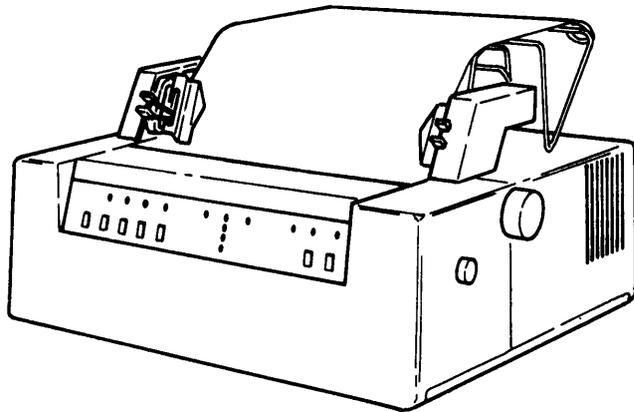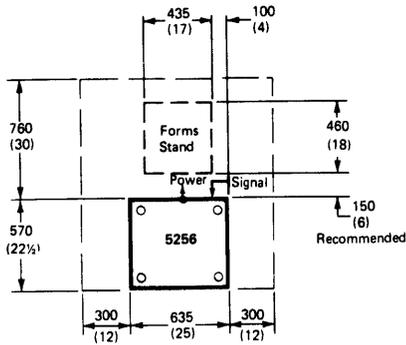
Specifications

Dimensions:

	Width	Depth	Height
Millimeters	635	570	370
Inches	25	22-1/2	14-1/2

Service Clearances:

	Front[1]	Rear	Right	Left
Millimeters	0	760	300	300
Inches	0	30	12	12

Weight: 36 kg (78 lb)

Heat Output: 185 watts (630 Btu/hr)

Airflow: 1.3 m^3/min (45 cfm)

Power Requirements:

Voltage	115
kVA	0.2
Phase	1
Plug type[1]	H or J
Power cord style	B

Operating and Nonoperating Environment: See *Environmental Considerations and Requirements* in this chapter.

[1]The power cord is 2.4 meters (8 feet) long. For more information, see *Power Plugs and Receptacles* in this chapter.

5281 SINGLE DATA STATION

Plan View
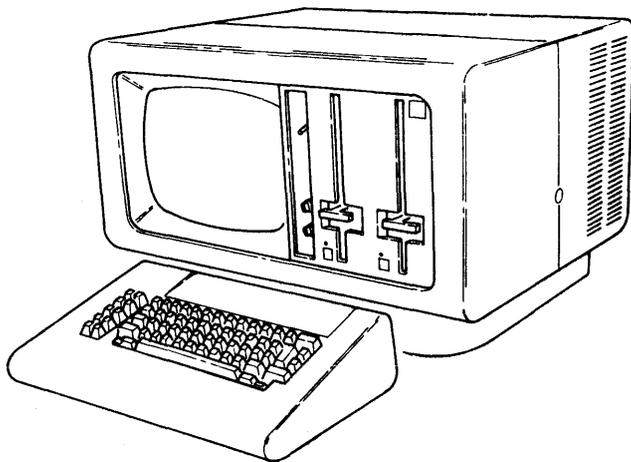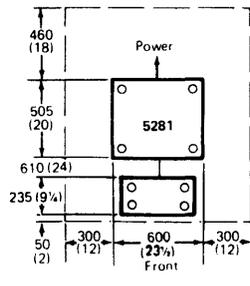
Specifications

Dimensions:[1]

	Width	Depth	Height
Millimeters	600	505	400
Inches	23-1/2	20	15-3/4

Service Clearances:

	Front[1]	Rear[1]	Right	Left
Millimeters	50	460	300	300
Inches	2	18	12	12

Weight: 50 kg (110 lb)

Heat Output: 200 watts (680 Btu/hr)

Power Requirements:

Voltage	115
kVA	0.3
Phase	1
Plug type[2]	H or J
Power cord style[2]	A

Operating and Nonoperating Environment: See
Environmental Considerations and Requirements in this chapter.

[1] Keyboards are 100 millimeters high (4 inches); 235 millimeters deep (9-1/4 inches); and are available in two lengths: 485 millimeters (19 inches) or 410 millimeters (16-1/4 inches).
[2] The power cord is 2.4 meters (8 feet) long. For more information, see *Power Plugs and Receptacles* in this chapter.

5282 DUAL DATA STATION

Plan View
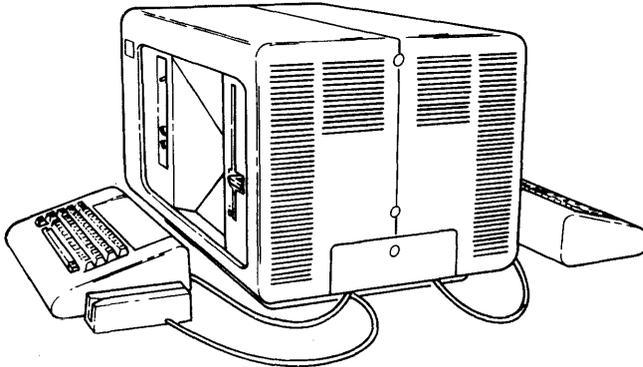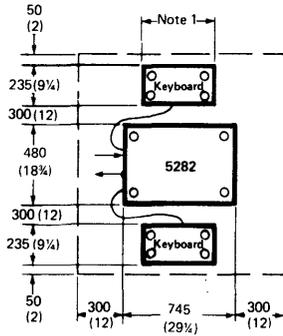
Specifications

Dimensions:[1]

	Width	Depth	Height
Millimeters	745	480	435
Inches	29-1/4	18-3/4	17

Service Clearances:

	Front[1]	Rear[1]	Right	Left
Millimeters	50	50	300	300
Inches	2	2	12	12

Weight: 59 kg (130 lb)

Heat Output: 200 watts (680 Btu/hr)

Power Requirements:

Voltage	115
kVA	0.3
Phase	1
Plug type[2]	H or J
Power cord style[2]	A

Operating and Nonoperating Environment: See
Environmental Considerations and Requirements in this chapter.

[1]Keyboards are 100 millimeters high (4 inches); 235 millimeters
deep (9-1/4 inches); and are available in two lengths: 485
millimeters (19 inches) or 410 millimeters (16-1/4 inches).
[2]The power cord is 2.4 meters (8 feet) long. For more
information, see *Power Plugs and Receptacles* in this chapter.

5285 PROGRAMMABLE DATA STATION
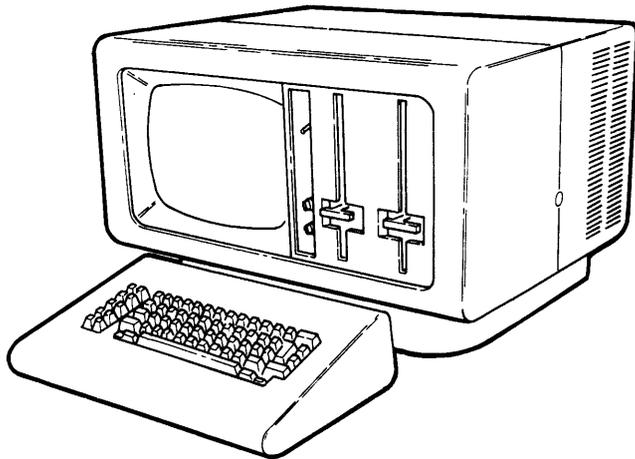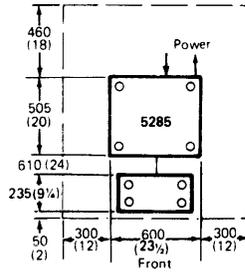
Plan View

Specifications

(

Dimensions:[1]

	Width	Depth	Height
Millimeters	600	505	400
Inches	23-1/2	20	15-3/4

Service Clearances:

	Front[1]	Rear	Right	Left
Millimeters	50	460	300	300
Inches	2	18	12	12

Weight: 64 kg (141 lb)

Heat Output: 300 watts (1040 Btu/hr)

Airflow:

Power Requirements:

Voltage	115
kVA	0.4
Phase	1
Plug type[2]	H or J
Power cord style[2]	A

Operating and Nonoperating Environment: See *Environmental Considerations and Requirements* in this chapter.

[1]Keyboards are 100 millimeters high (4 inches); 235 millimeters deep (9-1/4 inches); and are available in two lengths: 485 millimeters (19 inches) or 410 millimeters (16-1/4 inches).
[2]The power cord is 2.4 meters (8 feet) long. For more information, see *Power Plugs and Receptacles* in this chapter.

128

5286 DUAL PROGRAMMABLE DATA STATION

Plan View

Specifications

Dimensions:[1]

	Width	Depth	Height
Millimeters	745	480	435
Inches	29-1/4	18-3/4	17

Service Clearances:

	Front[1]	Rear[1]	Right	Left
Millimeters	50	50	300	300
Inches	2	2	12	12

Weight: 73 kg (160 lb)

Heat Output: 200 watts (680 Btu/hr)

Power Requirements:

Voltage	115
kVA	0.4
Phase	1
Plug type[2]	H or J
Power cord style[2]	A

Operating and Nonoperating Environment: See
Environmental Considerations and Requirements in this chapter.

[1]Keyboards are 100 millimeters high (4 inches); 235 millimeters
deep (9-1/4 inches); and are available in two lengths: 485
millimeters (19 inches) or 410 millimeters (16-1/4 inches).
[2]The power cord is 2.4 meters (8 feet) long. For more
information, see *Power Plugs and Receptacles* in this chapter.

5288 PROGRAMMABLE CONTROL UNIT

Plan View
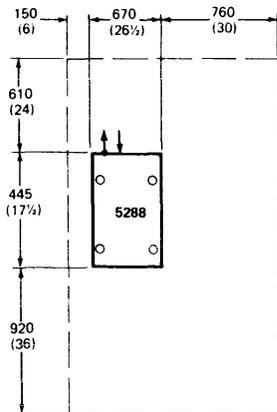
Note: To ensure service access, do not store objects on top of this unit.
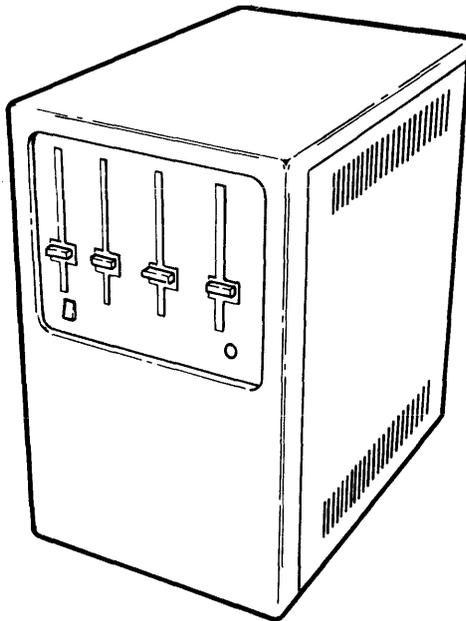
Specifications

Dimensions:

	Width	Depth	Height
Millimeters	445	670	735
Inches	17-1/2	26-1/2	29

Service Clearances:

	Front[1]	Rear	Right	Left
Millimeters	920	610	760	150
Inches	36	24	30	6

Weight: 89 kg (195 lb)

Heat Output: 510 watts (1740 Btu/hr)

Airflow:

Power Requirements:

Voltage	115
kVA	0.6
Phase	1
Plug type[1]	H or J
Power cord style[1]	A

Operating and Nonoperating Environment: See *Environmental Considerations and Requirements* in this chapter.

[1]The power cord is 2.4 meters (8 feet) long. For more information, see *Power Plugs and Receptacles* in this chapter.

CABLING FOR AN AUXILIARY DATA STATION

Note 1

```
┌──────────────┐        ┌──────────────┐
│              │   /    │              │
│ 5285, 5286,  ├──/─────┤  5281 or     │
│ or 5288      ├──\─────┤  5282        │
│              │   \    │              │
└──────────────┘        └──────────────┘
```

Note 2

One 5281 or 5282 can be attached to a 5285 (w/o SF2500 communications adapter) or 5286. 5281 or 5282, for a total of no more than four keyboards, can be attached to the 5288.

Notes:
1. The multiconductor data station cable (IBM part 7364212) is always required when auxiliary data stations (5281 or 5282) are attached to a programmable unit (5285, 5286, or 5288).
2. The multiconductor diskette drive cable (IBM part 7364208) is required if the auxiliary data station has one or two diskette drives. This cable is required in addition to the data station cable.

CABLING FOR PRINTERS

The twinaxial printer cable (IBM part 7362267) is required to connect a 5225 or 5256 printer to a 5285, 5288 or each other. Each 5222 printer is attached individually to a 5285 or 5288 by a 6-meter (20-foot), four-conductor, double-twisted pair cable. Up to 55 meters (180 feet) of additional 5222 cable can be ordered as an accessory (IBM part 6846671).

The following examples illustrate how the printers may be connected to the 5280 system using the various printer attachments available:

One printer can be attached to the 5285.
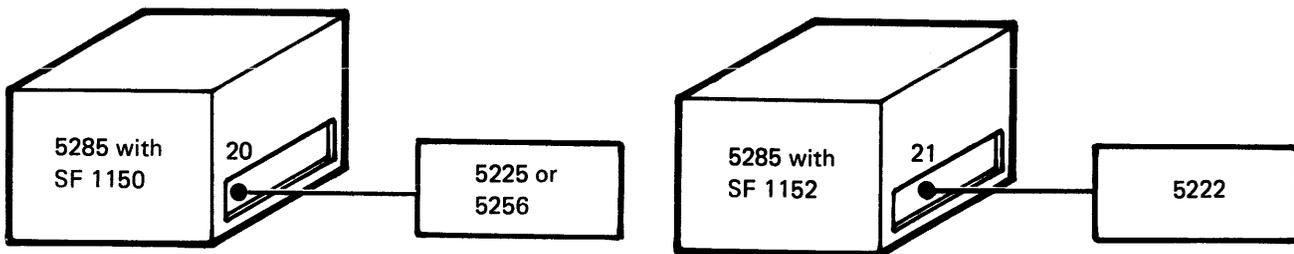
A maximum of 5 printers can be attached to the 5288. The 5222 is always attached individually to a 5285 or 5288.

Example A

Four sockets provide for the attachment of four 5256 printers and one 5225 printer
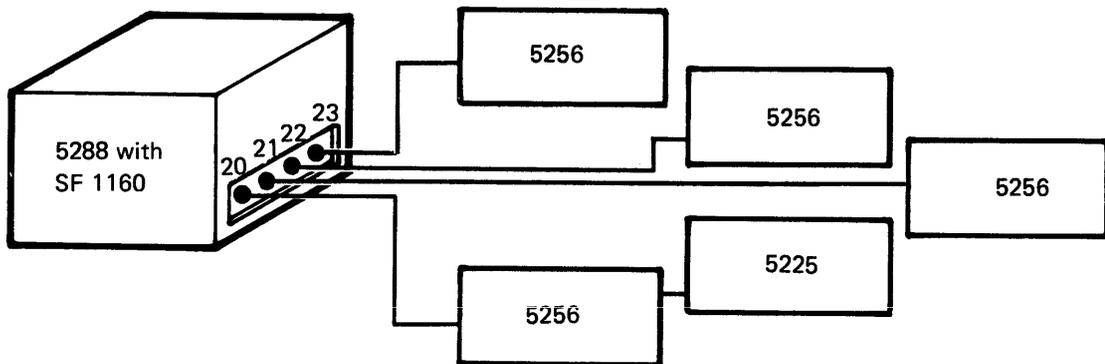
Example B

A single socket provides for the attachment of up to four 5256 printers and one 5225 printer using the Cable Thru feature.
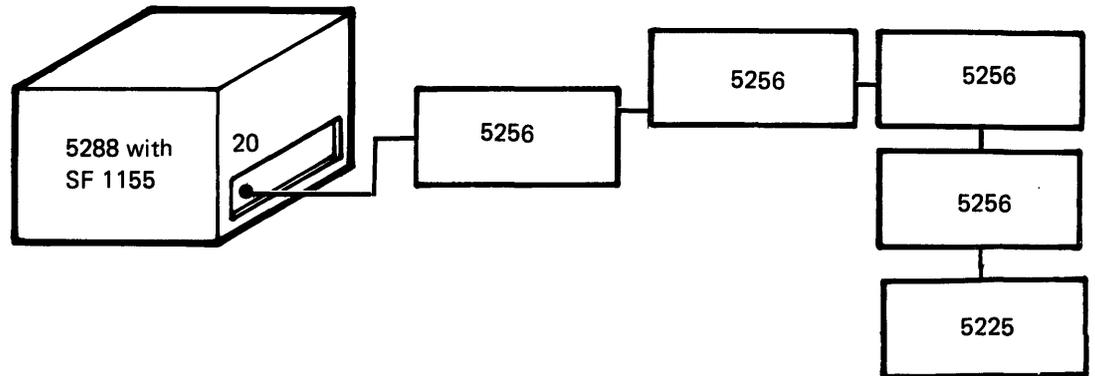
Example C

A single socket provides for the attachment of a single 5222 printer.
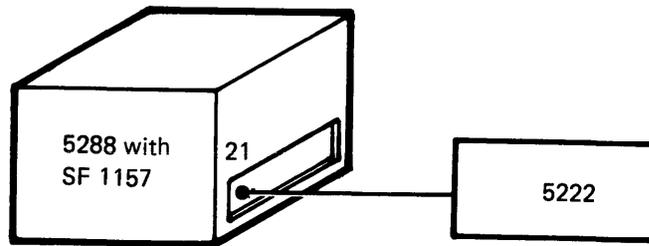
Example D

Five sockets provide for the attachment of any combination of up to four 5222 or 5256 printers and one 5225 printer.
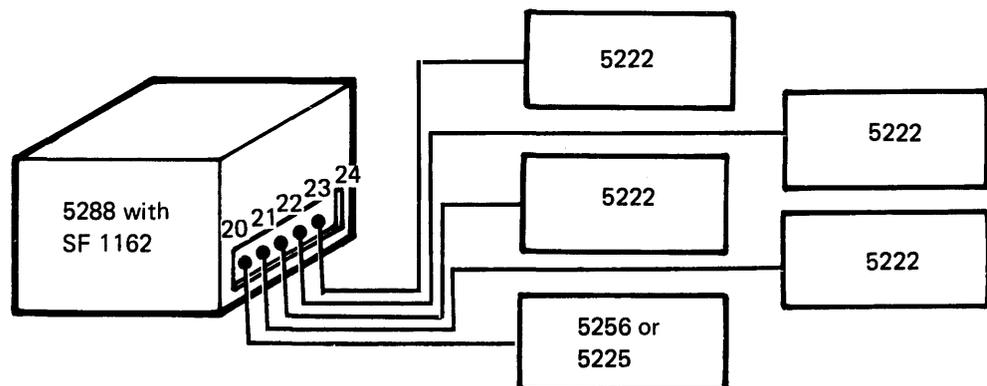
Example E

Another example of up to four 5222 or 5256 printers and one 5225
printer.
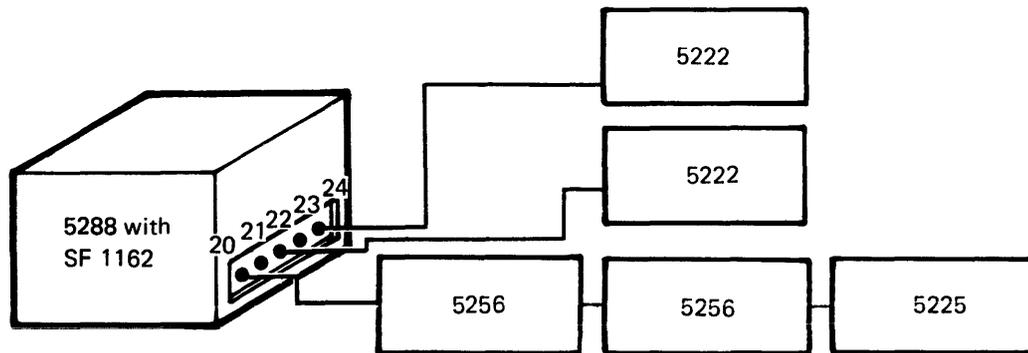
Note: In this example sockets 21 and 23 are unused.

CABLES

For multiconductor and twinaxial cables (used to interconnect 5280
units), you are responsible for determining the proper lengths, ordering
the cables (if the cables are not obtained from IBM), installing, and
maintaining the cables. For twinaxial cables (used to connect 5225 and
5256 printers to controlling units), you are responsible for supplying,
installing, and maintaining cables to attach the units to each other or to
any host system. The 5222 printer is supplied with a 6-meter
(20-foot), four-conductor, double-twisted pair, cable. Extension
cabling can be ordered as an accessory. This section explains which
cables you should order, and how to install them.

It is important that you order your cables early, so that cable labeling
and testing can be completed before the system arrives.

Ordering Procedures for Multiconductor and Twinaxial Cables

After determining which cables you will need, you can order them
through your IBM representative (see *Cabling Considerations* earlier in
this chapter) or obtain them from an outside vendor. You can order
cables in either preassembled or bulk (unassembled) form. Be certain
that the cables you order will be long enough to reach from machine to
machine. Allow an additional 0.6 meters (2 feet) of cable at each end
so that the unit can be moved for servicing.

For ease of installation, it is recommended that you purchase
preassembled cables. If you obtain your cables from a non-IBM
company, see the *IBM 5280 Cable Assembly Manual*, GA21-9341, for
the cable specifications and assembly instructions.

Outdoor Twinaxial Cable Installation

You can use twinaxial cable indoors or outdoors. You will need some type of carrier to provide support every 3 meters (10 feet) for overhead installation. Twinaxial cable is not recommended for direct burial (without conduit).

Outdoor connections are permitted only if the connections are potted in a weatherproof compound. Also, for protection from lightning, you must attach a station protector (see *Station Protectors* in this chapter) at each end of the cable that is run outdoors (for buried and overhead).

Below is a list of suggested outdoor installation methods for twinaxial cable. The methods are listed in the order that provides the greatest protection from lightning (1 provides the most protection, 6 the least protection).

1. Cable buried in grounded metal conduit.

2. Overhead, shielded cable. This shield, which is in addition to the shield in the twinaxial cable, should be grounded at each end and at each pole if possible.

3. Cable buried in metal conduit.

4. Overhead cable under a shield line. The shield line is a metal cable run on the same poles. (Power lines can also have a shielding effect on cables.) The twinaxial cable should hang at least 1 meter (3 feet) below the shield line and at each pole if possible.

5. Cable buried in nonmetallic conduit.

6. Overhead cable on a carrier with the carrier grounded at each end and at each pole.

Note: For overhead cables, avoid having the twinaxial cable as the highest point in the area.

Station Protectors (Twinaxial Cable Only)

Station protectors are required for each outdoor or underground circuit run. You are responsible for supplying, installing, and maintaining station protectors. You can order the Twinaxial Station Protector Kit, part 7361807, from IBM (the Twinaxial Station Protector Kit can also be ordered as Feature Code FC7850). The kits consist of two protectors and are sufficient to install one outdoor cable. You can order single station protectors using IBM part 7362426 for twinaxial cable. A station protector provides for grounding of the cable shield for personnel safety, and contains solid-state components for unit protection. Station protectors should not be installed in areas where unauthorized personnel might come in contact with them. During lightning storms, you should not handle the station protectors or the twinaxial cable that runs from the protector to the terminal. You should install the protectors so that the components in them can be easily inspected and maintained.

Station protectors must be installed indoors where the cable enters or exits the building and as close as possible to a suitable ground. The area where the cables enter or exit the building must not contain combustible material or be a hazardous area as defined in Article 500, National Electric Code (NEC). Also, the station protector must be grounded at the building entrance or exit point (refer to Article 800-31 in NEC).

Grounding Recommendations

It is important to provide good grounding (grounding conductor and grounding electrode) for the station protector. The following is a list of the minimum recommended requirements for station protector grounding. The grounding conductor should be:

- AWG 6-gauge wire or larger

- Less than 3 meters (10 feet) long

- Run in a straight line to a grounding electrode that has a ground resistance of less than 10 ohms

You should also provide common grounding between the station protector, the utility ground, and all extensive metal components in the vicinity of the system. (This prevents side flashes caused by lightning.) The conductor used for interconnecting grounds should be at least AWG 6-gauge wire.

Station Protector Installation Requirements

The station protectors should be installed in line with the cable as it enters or exits a building and should be permanently mounted in the building.

Cabling Schematic

The illustrations that follow are examples of cable connections for 5280 system units. The notes and figures that follow these machine configurations describe the electrical and cabling requirements associated with the connections.
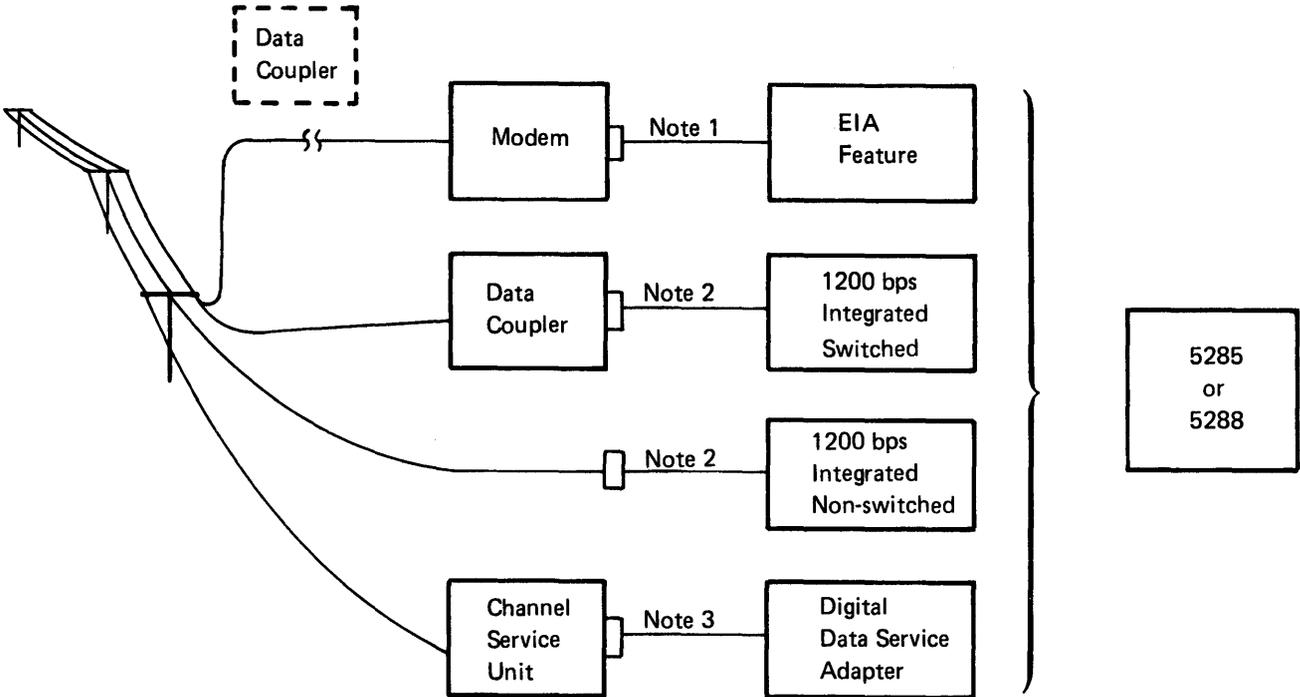
Notes:

1. Either a 6-meter (20-foot) cable (SF9010) or a 12-meter (40-foot) cable (SF9015) can be specified with the EIA/CCITT feature (SF3701). See Figure 1 for termination. An adapter cable is supplied with Datel 600 switched service (SF2835) in U.K., 0.3 meter (12 inch); and non-IBM modem attachment (SF2946) in Japan, 0.3 meter (12 inch).

2. Either a 6-meter (20-foot) cable (SF9010) or a 12-meter (40-foot) cable (SF9015) can be specified with the integrated modem. Terminators at the data coupler or nonswitched communications facilities end of the cable are one of the following:

    a. The cable for the 1200 bps Integrated Modem, nonswitched (SF5500), is terminated with a WE-283 B[1] plug (Figure 2). For countries requiring a different plug connection, an adapter is provided with the correct plug (Figures 3, 4, 5, 6, and 11) to connect to the PTT-provided socket.

    b. The cable for the 1200 bps Integrated Modem, nonswitched with Switched Network Backup (SF5507 and 5508), has a dual termination: a WE-283 B[1] plug (Figure 2) to attach a phone jack and a 15-pin connector (Figure 7). An adapter having two-spade termination (Figure 8) is provided for attachment to the CDT Coupler for SF5507; an adapter having eight-spade termination (Figure 9) is provided for attachment to the CBS Coupler for SF5508.

    c. For U.S. and Canada, the cable for the 1200 bps Integrated Modem, switched (SF5501 and 5502), is terminated with a 15-pin connector (Figure 7). An adapter having eight-spade termination (Figure 9) is provided for attachment to the CBS Coupler (SF5501); an adapter having two-spade termination (Figure 8) is provided for attachment to the CDT Coupler (SF5502).

    d. For World Trade countries, the cable for the 1200 bps Integrated Modem, switched (SF5501 and 5502), is terminated with a WE-283B plug (Figure 2). For countries requiring a different plug connection, an adapter is provided with the correct plug (Figures 6 and 10) for SF5501.

3. Either a 6-meter (20-foot) cable (SF9010) or a 12-meter (40-foot) cable (SF9015) can be specified with the Digital Data Service Adapter (SF5650 or 5651). See Figure 7 for termination.

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[1]Western Electric, a division of American Telephone and Telegraph Co., New York, New York
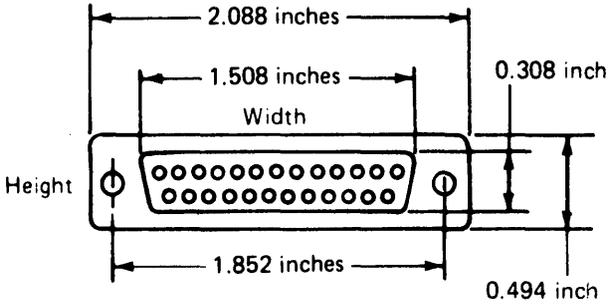
Figure 1. 25-Pin Connector

Figure 2. WE-283 B Plug
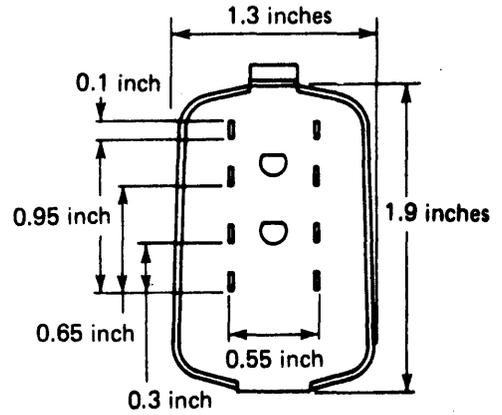
Figure 3. World Trade Communications Plug
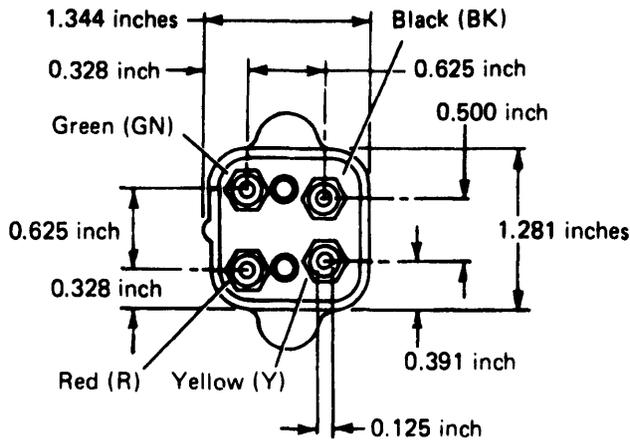
Switched	Nonswitched
Israel	Austria
	Belgium
	Israel
	Netherlands
	Switzerland
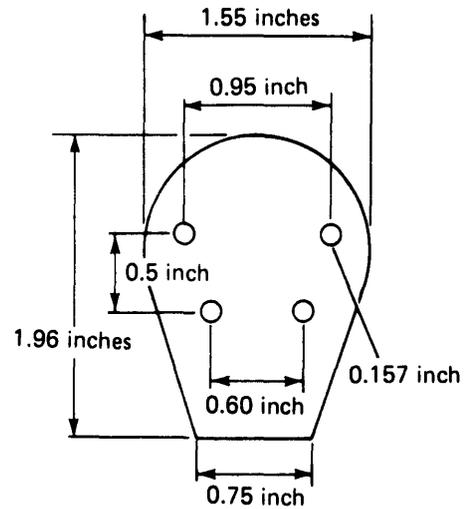
Figure 4. World Trade Communications Plug

Nonswitched
Finland

+RECEIVE
yellow, nsw
telephone set, sw

-TRANSMIT
white, nsw
telephone line, sw

-RECEIVE
black, nsw
telephone set, sw

Mates with WE-283 B Plug

+TRANSMIT
red, nsw
telephone line, sw
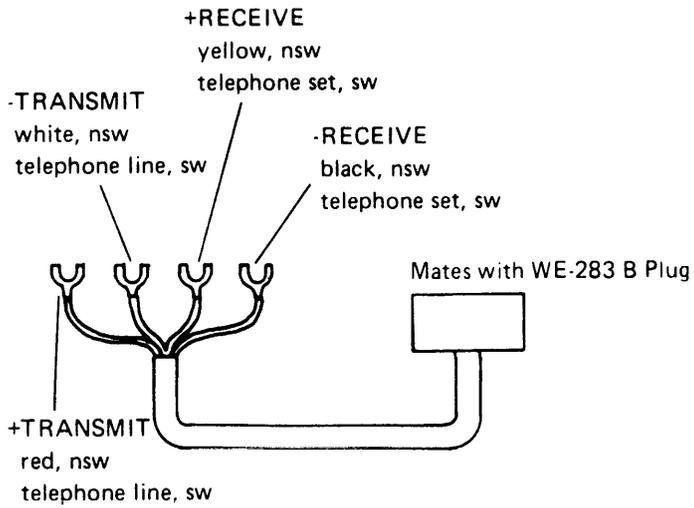
Figure 5. Four-Spade Termination

Nonswitched
New Zealand
United Kingdom

0.78 inch

1.28 inches | 1.92 inches

0.38 inch
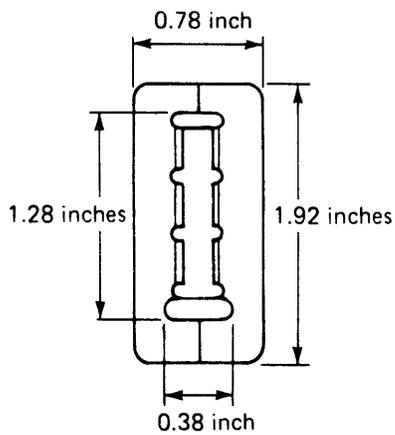
Figure 6. World Trade Communications Plug

Switched   **Nonswitched**
France   France

1.541 inches
0.968 inch
0.312 inch

1.312 inches

0.494 inch
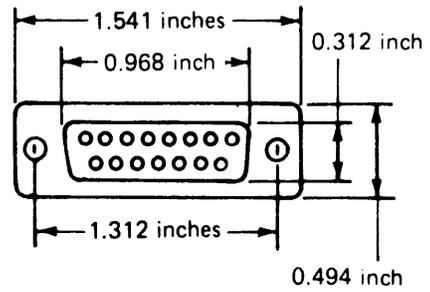
Figure 7. 15-Pin Connector

DT   DR
(white) (black)

Mates with 15-Pin Connector
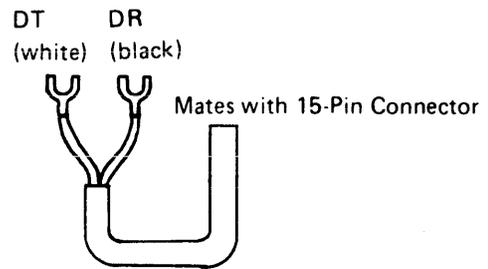
Figure 8. Two-Spade Termination
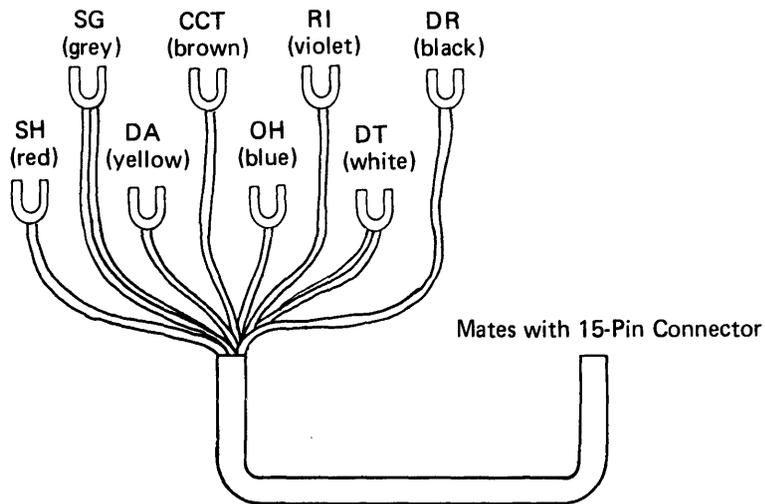
Figure 9. Eight-Spade Termination
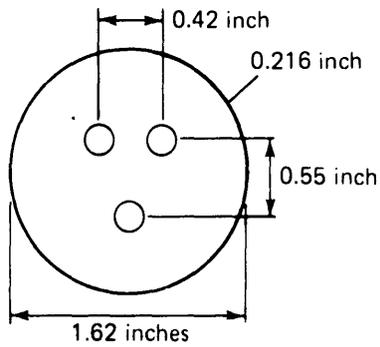
Figure 10. World Trade Communications Plug

Switched
Finland
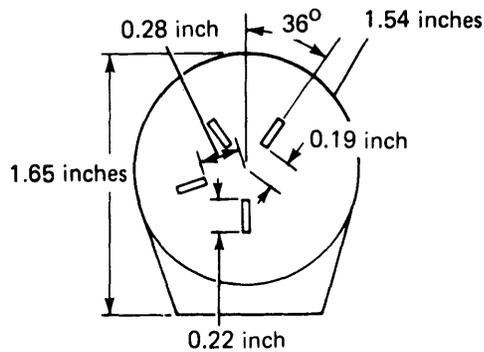
Figure 11. World Trade Communications Plug

Switched
Netherlands

Date	Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		

Activities

Date	Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		

Activities

This is a blank Activities Scheduling Form, a grid with a "Date" and "Week" row across the top numbered 1 through 18, an "Activities" column label along the left side.

Date																		
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Activities

	Date	Week																	
	1																			
	2																			
	3																			
	4																			
	5																			
	6																			
	7																			
	8																			
	9																			
	10																			
	11																			
	12																			
	13																			
	14																			
	15																			
	16																			
	17																			
	18																			

Activities

Appendix B. System Configuration Checklist

When the following checklist is completed, you will have documented the information required to use the system configuration program for creating a user-defined IPL diskette. The required information can be found in the following areas:

- The system summary worksheet in Chapter 1 in this manual

- Appendix E, *Partition Layout*

- Chapter 7, *Preparing for Customer Setup*

- The *System Control Programming Reference/Operation Manual*

Information Required	Valid Responses	Your Response	Reference/Explanation
How many diskette drives will you use during the configuration process? (Prompt 20-01)	1, 2, or 3	_____	*SCP Manual**
What is the total storage capacity of the system being configured? (20-05)	32 to 160 K	_____	System Summary Worksheet or Appendix E
How many foreground partitions (how many keyboards) are in the system being configured? (20-06)	1, 2, 3, or 4	_____	System Summary Worksheet or Appendix E
How many background partitions are in the system being configured? (20-06)	0, 1, 2, 3, 4, 5, or 6	_____	Appendix E
How many application microprocessors are on the system being configured? (20-23)	1 or 2	_____	*SCP Manual*
If two application microprocessors are used, which partitions will be serviced by each? (20-24)			*SCP Manual*

		1	2
Application microprocessor:		1	2
First partition to be serviced:		_____	_____
Last partition to be serviced:		_____	_____

Information Required	Valid Responses	Your Response	Reference/Explanation
Do you want to specify a date at IPL time? (20-07)	Yes or No	_____	*SCP Manual*
What is the name for your user-defined IPL data set? (20-08)	SYSIPLxx	_____	*SCP Manual*
How many diskette drives are in the system being configured? (20-09)	1 to 8	_____	System Summary Worksheet
How many printers are in the system being configured? (20-10)	0 to 5	_____	System Summary Worksheet

System Control Programming Reference/Operation Manual.

Information Required	Valid Responses	Your Response		Reference/ Explanation
What type of printer is in the system being configured? (20-11)	5222, 5225, or 5256	1. _____ 2. _____ 3. _____ 4. _____ 5. _____		System Summary Worksheet
What is each printer's physical device address? (20-11)	80xx	1. _____ 2. _____ 3. _____ 4. _____ 5. _____		Completed system setup form from Chapter 7
Will ASCII diskettes be used? (20-12)	Yes or No	_____		*SCP Manual*
What is the name of the common functions option used? (20-14)	1. SYSDPRT2 2. SYSCFA 3. SYSHELP	_____		*SCP Manual* or Appendix E
What partition entries are to be placed in the resource allocation table? (20-17)	Disk: D1-D8, 4000-5C00 Printer: P1-P5, 8000-80XX	Logical device address _____ _____ _____ _____	Physical device address _____ _____ _____ _____	*SCP Manual*
What system shared entries are to be placed in resource allocation table? (20-18)	Disk: D1-D8, 4000-5C00 Printer: P1-P5, 8000-80XX	Logical device address 0. _____ 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____	Physical device address _____ _____ _____ _____ _____ _____ _____ _____	*SCP Manual*

Information Required	Valid Responses	Your Response	Reference/ Explanation
Beginning with partition 0, what is the size of each partition? (20-19 and/or 20-20)	6 K to 64 K	0. _____ 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____	Appendix E
Beginning with keyboard 0, specify the screen size and whether a single or dual unit. (20-21) **Note**: All the display sizes for a 5280 system must be the same.	480 single, 480 dual, 960 single, 960 dual, or 1920 single	0. _____ 1. _____ 2. _____ 3. _____	System Summary Worksheet

Beginning with keyboard 0, specify the type of keyboard and the native language. (20-25)

Data entry, typewriter, data entry with proof; Italy, Germany, United States, and so on.

	Keyboard/language		Reference/Explanation
0.	_____	_____	System Summary Worksheet and *SCP Manual*
1.	_____	_____	
2.	_____	_____	
3.	_____	_____	

This appendix contains the setup forms required in Chapter 8 of this manual. You must select the appropriate setup form, depending upon the programmable unit in your system.

5285 PROGRAMMABLE DATA STATION SYSTEM SETUP FORM

Printer Type_____
Location_____
Socket On Prog Unit ____20____
Device Address____8000____

Aux. Data Station_____
Location_____
Socket/Prog Unit ____green____

Aux. Data Station_____
Location_____
Socket/Prog Unit ___yellow___
Device Address_____

5286 DUAL PROGRAMMABLE DATA STATION SYSTEM SETUP FORM

Aux. Data Station _____
Location _____
Socket/Prog Unit __green__

Aux. Data Station _____
Location _____
Socket/Prog Unit __yellow__
Device Address _____

5288 PROGRAMMABLE CONTROL UNIT SYSTEM SETUP FORM

*Note: This socket is only available if you
         have the 5222 printer attachment.

Cable Thru Feature Printer Device Addresses

The following chart shows the device addresses for the printers when the Cable Thru feature is used with the 5225 and 5256 printers. The chart also shows the switch settings on the 5256 required to accommodate the appropriate device address.

5288 Printer Socket Number	Device Address				
	First Printer	Second Printer	Third Printer	Fourth Printer	Last Printer
20	8001	8002	8003	8004	8000
21	8009	800A	800B	800C	8008
22	8011	8012	8013	8014	8010
23	8019	801A	801B	801C	8018
Address Switches	1	2	3	4	0
	Address Switch Setting				

The *last printer* always has a switch setting of 0. The appropriate device address for the last printer depends upon which 5288 printer socket the first printer is connected to. For example, if there is only one printer (having the Cable Thru feature) connected to socket 21, the switch setting should be set to 0 with the device address for the printer being 8008.

The 5222 will always be the *only* printer attached to a socket, and the 5225 will always be the *last* printer. Use the *last printer* address switch settings for these machines.

Note: The switch settings *must* be identified for the person that will be setting up the 5280 system.

Appendix D. Floor Plan Drawings and Floor Layout Forms

The floor plan drawings and floor layout forms can be used for preparing your floor plan. The dashed lines around each floor plan drawing represent the recommended service clearance.

Recommended service clearance

This service clearance is required for your service representative to service the unit. The solid lines around a unit represent the recommended table size.
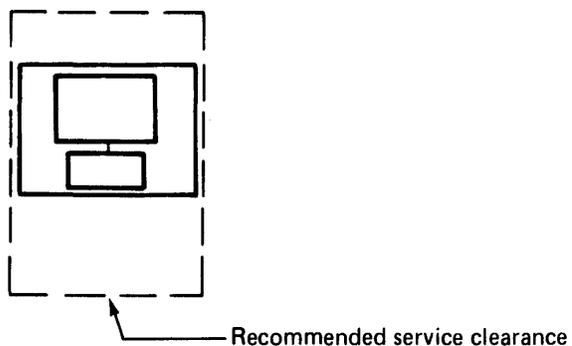
Recommended table size
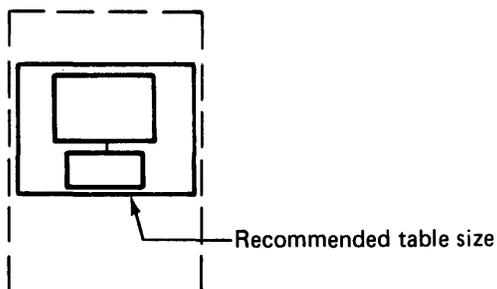
5280 FLOOR PLAN DRAWINGS (DEVICE CUT OUTS)
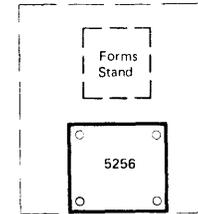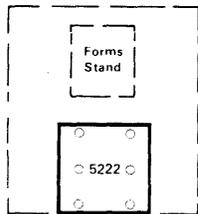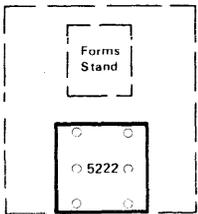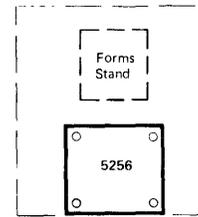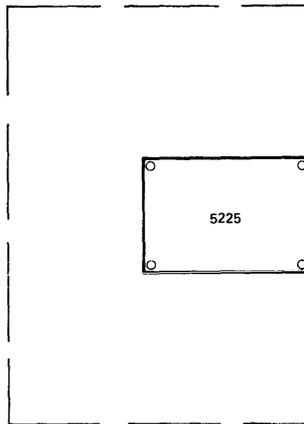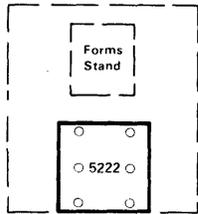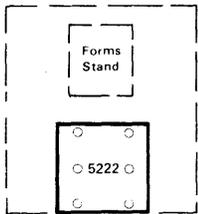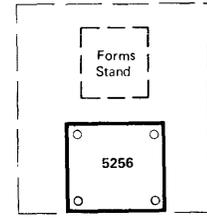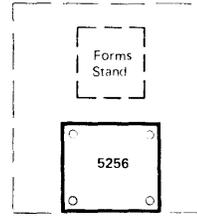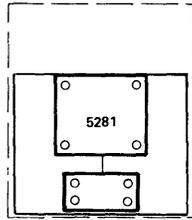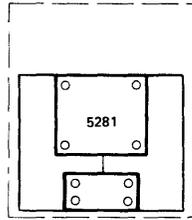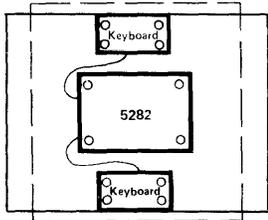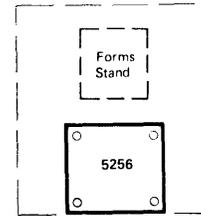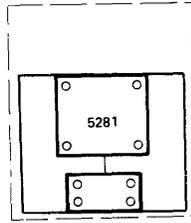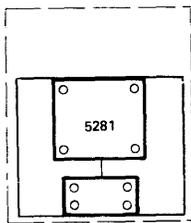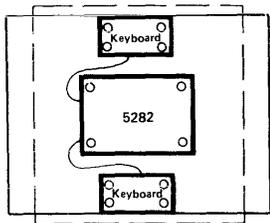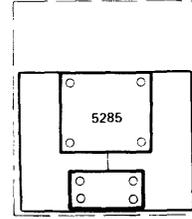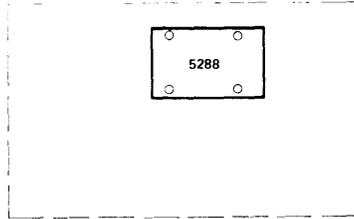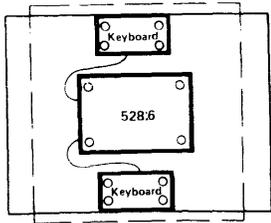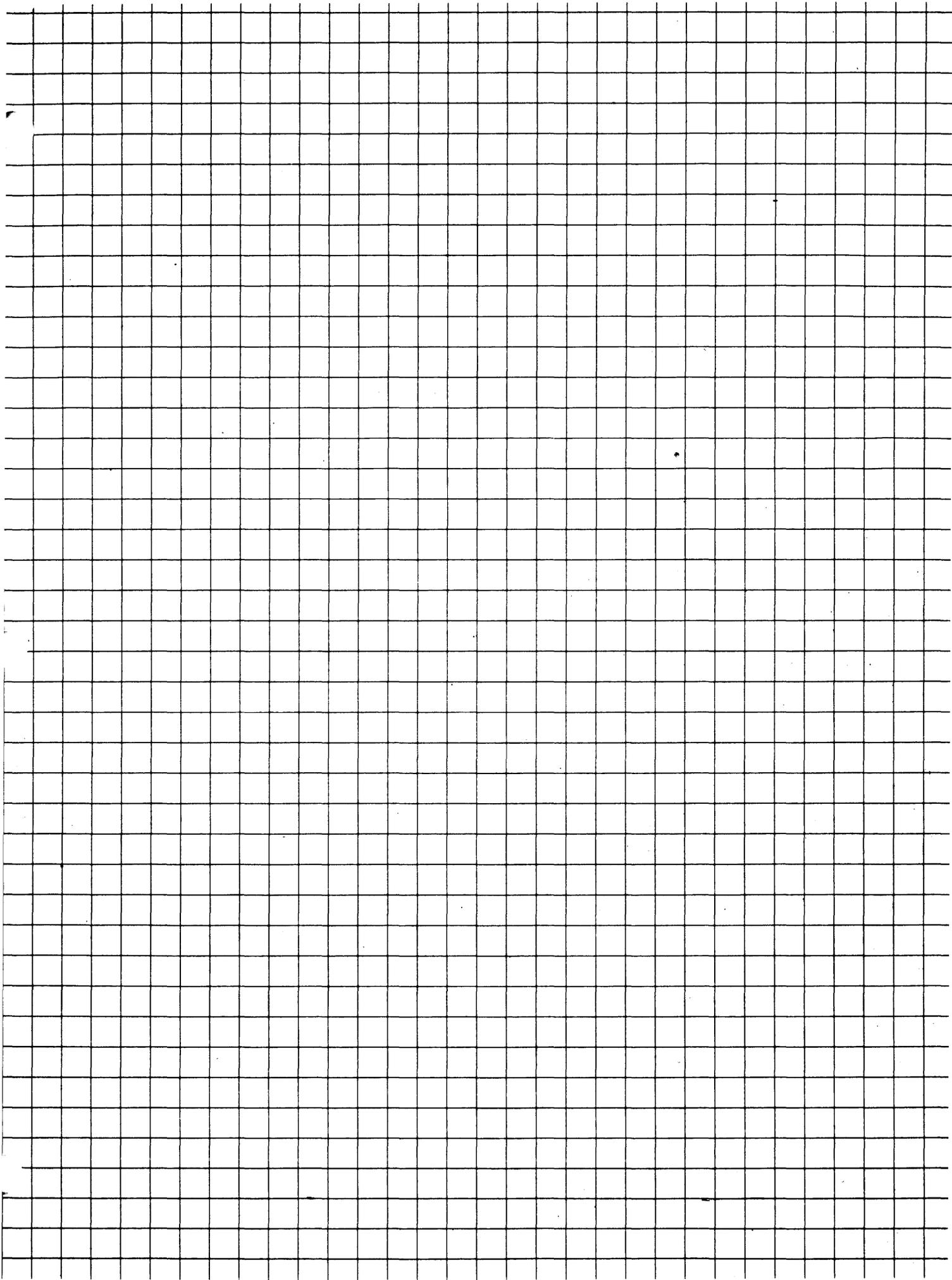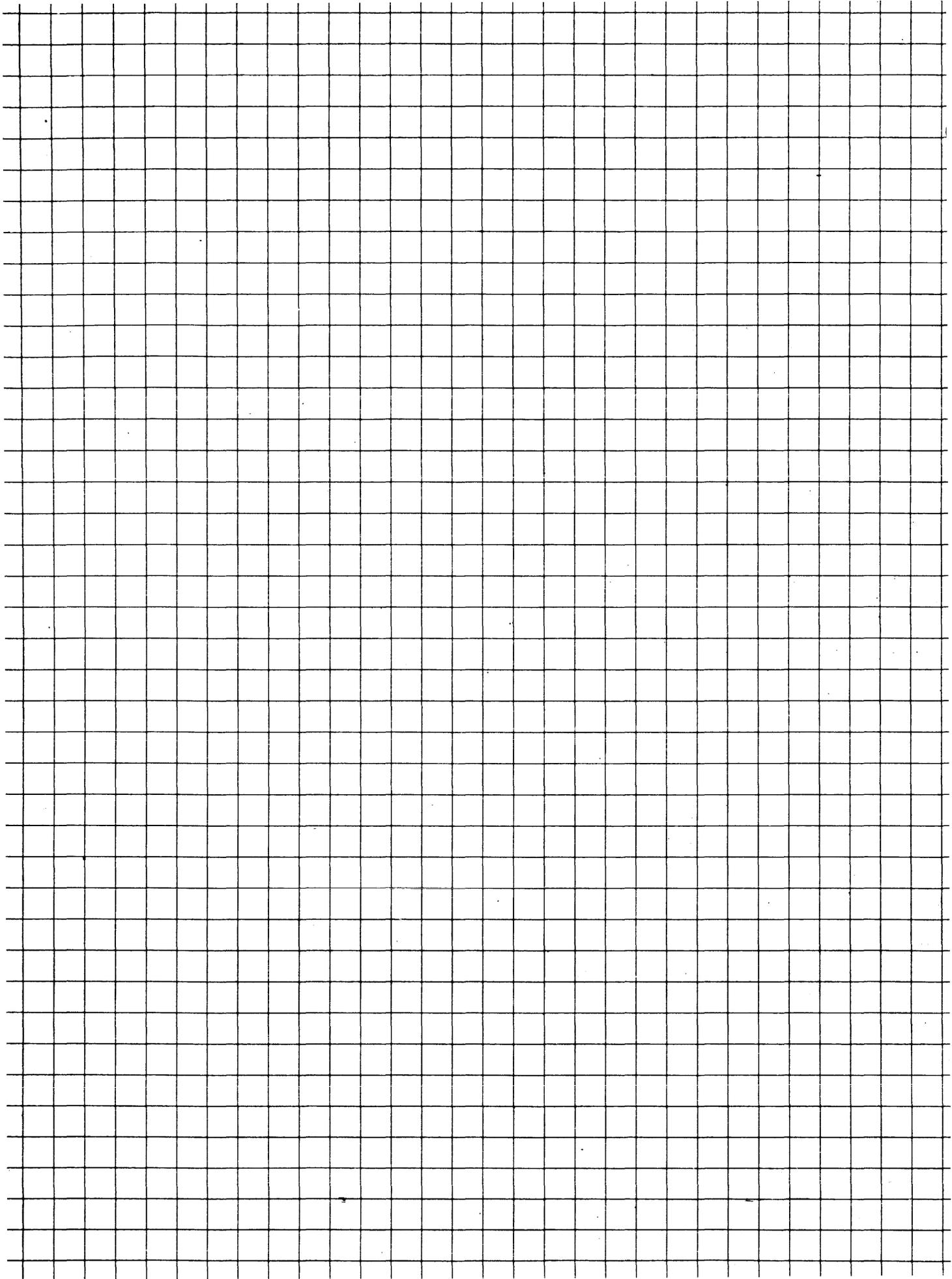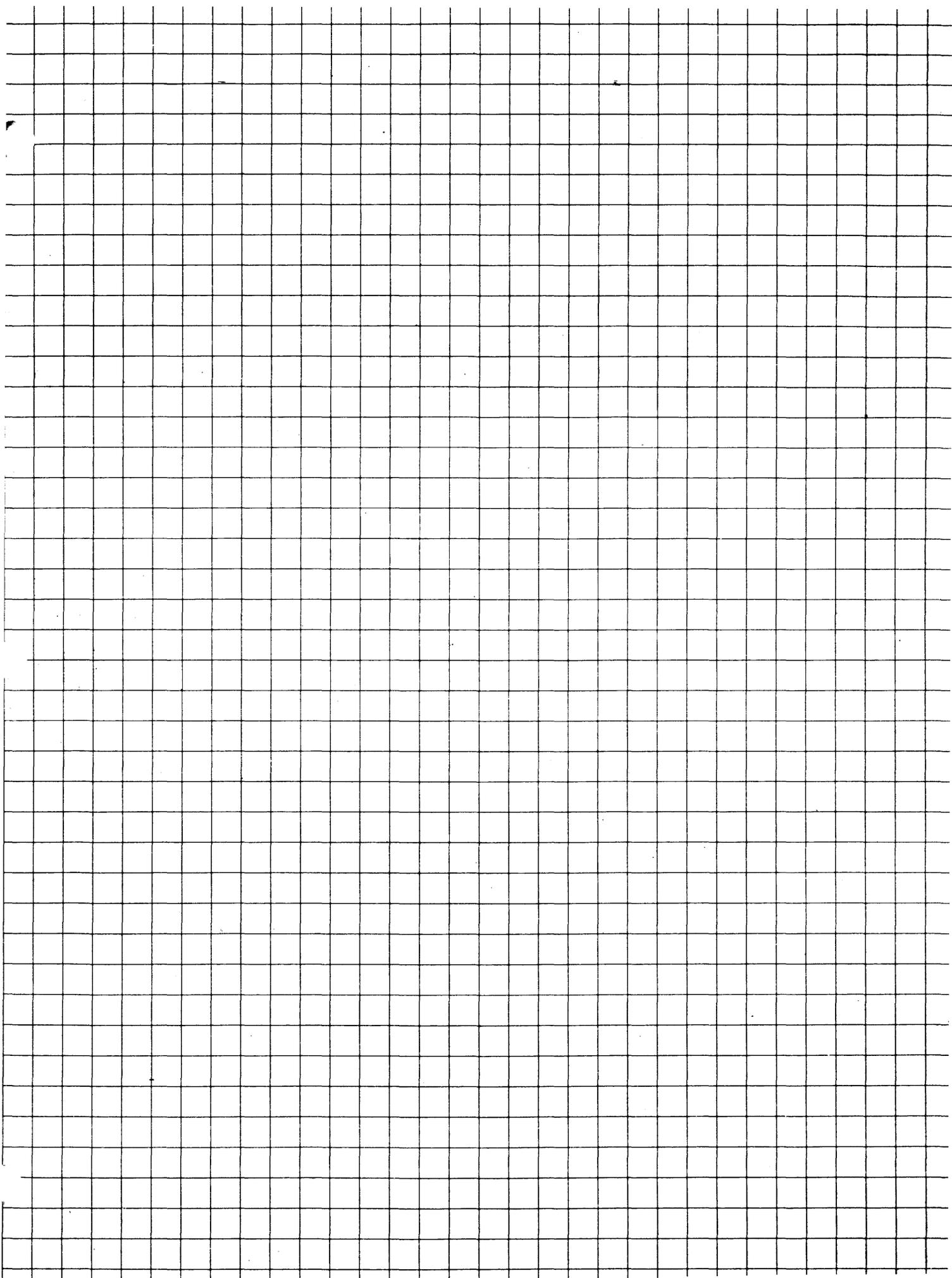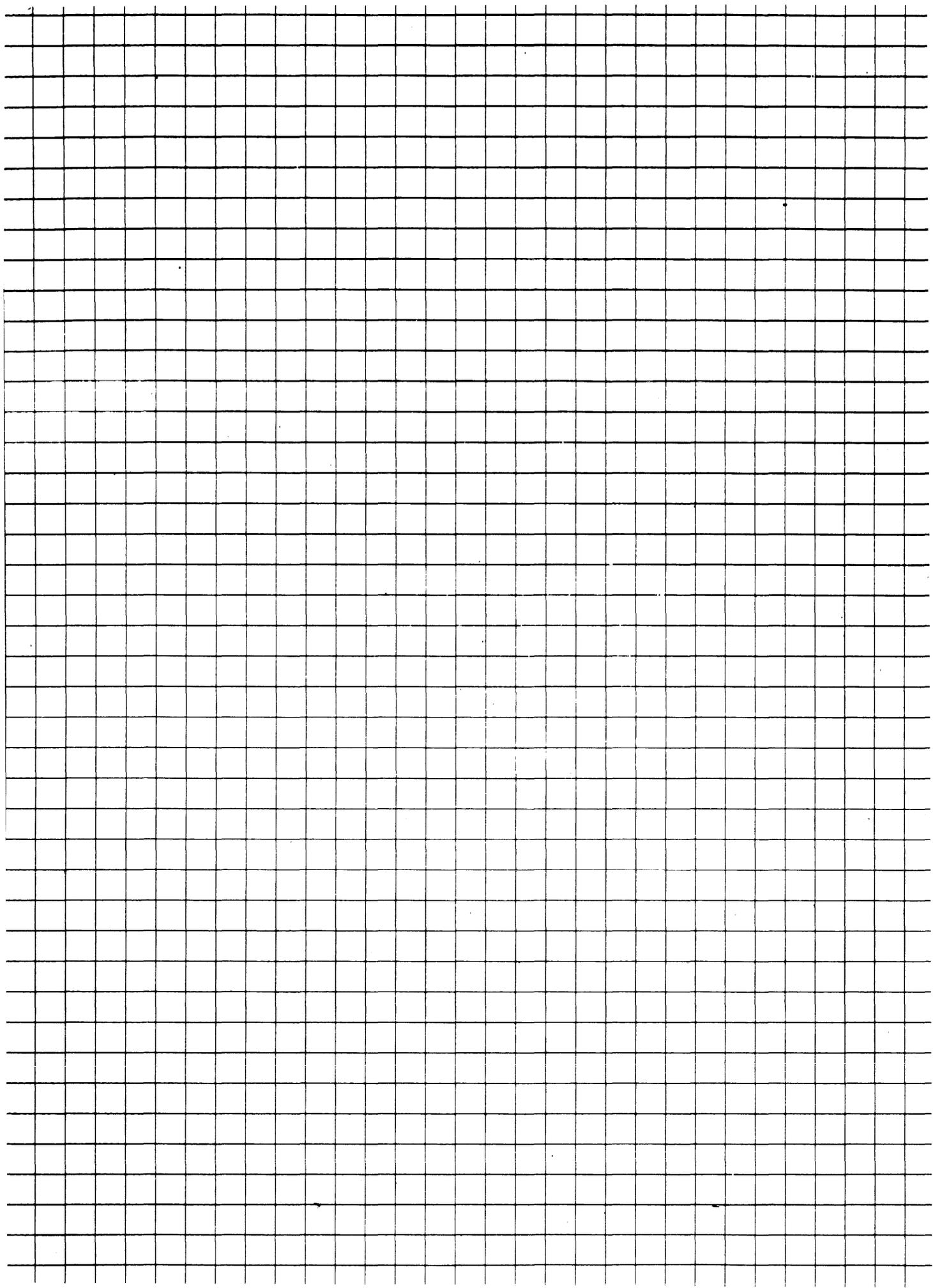
1 mm = 50 mm
¼ inch = 1 foot

The user storage for each 5280 system can be divided into a maximum of eight partitions. There must be one foreground partition for each keyboard on the system. Any remaining partitions are background partitions. When you use the system configuration program to tailor a system for your own requirements, you must specify the size of each foreground and background partition. This appendix gives you some guidelines for determining the number and size of the partitions for your system. Also, this appendix contains a number of sample partition layouts that might assist you in determining how storage should be partitioned for your system. As you review the guidelines and sample partition layouts, you might use the following form to illustrate the way that storage will be partitioned for your system.

Total storage of the 5280 system: _____K
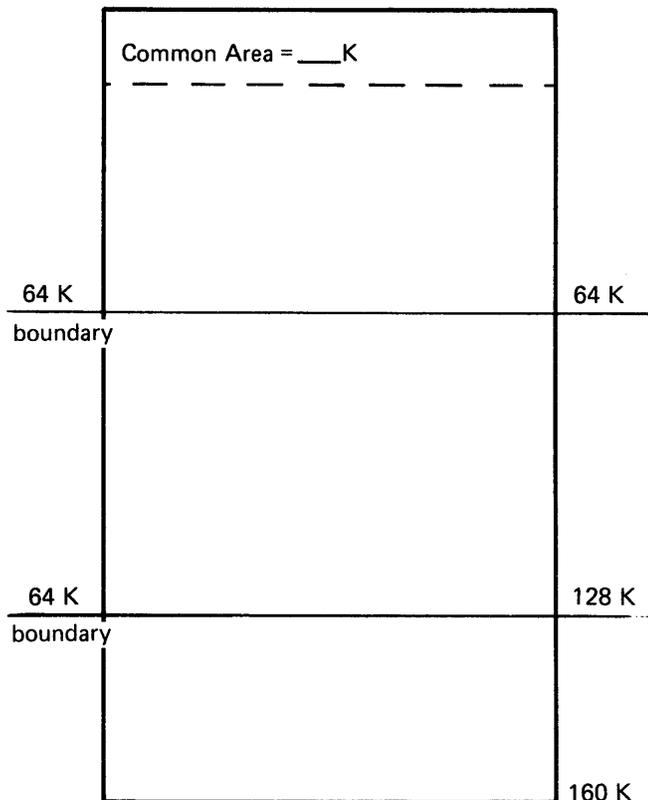
For the common area, select one set of common function options:

(1) SYSDPRT2 = 6 K
(2) SYSCFA = 15 K
(3) SYSHELP = 16 K

Common Area = ___K

64 K
boundary

64 K
boundary

64 K

64 K

128 K

160 K

- Maximum number of partitions is 8 (0-7)

- Allocate foreground partition 0 first

- Partitions must each have at least 6 K and no more than 64 K of storage allocated

- Storage following a 64 K boundary begins with a new partition

Guidelines for determining the number of partitions are as follows:

- There must be one foreground partition for each keyboard on the system.

- Generally, one background partition can be used for executing utility programs from the various keyboards. (Remember, only one job at a time can be executing in a partition.)

- If communications is being used, two background partitions might be required: one for the communications access method (CAM) and one for the utility.

Note: For the 5280 system, the partition numbering starts from 0.

Guidelines for determining partition size are as follows:

- Each partition must be at least 6 K.

- Partitions cannot cross a 64 K boundary. For the 5280, each 64 K portion of user-storage is called a *page*.

- The size of the common area might be larger than 6 K, 15 K, or 16 K (depending upon the common function option being used). See the *System Concepts* manual for more information on determining the size of the common area. If the common area is larger than 6 K, 15 K, or 16 K, one of the partitions in the first page must be made smaller.

Note: 256 bytes of the last 1 K of storage is reserved for diagnostic purposes. Therefore, your last partition will be smaller than allocated. Because the storage remaining is displayed only in 1 K increments, your last partition is displayed as 1 full K smaller.

Following is a description of the storage required for the 5280 program products. Also, sample partition layouts are provided to assist you in determining how storage might be partitioned for your system.

STORAGE REQUIREMENTS/SAMPLE PARTITION LAYOUTS

Storage requirements of the IBM 5280 program products and for the IBM-supplied system control programs are shown below. With the exception of the key entry utility (in the Utilities Program Product), all noncommunications program products shown below can run in either foreground or background partitions.

```
System control programming
  (excluding system configuration program) . . . . . . . . .  9 K each
        System configuration program  . . . . . . . . . . . . . .  16 K

Common area  . . . . . . . . . . . . . . . . .  6 K, 15 K, or 16 K

DE/RPG compiler program  . . . . . . . . . . . . . . . . . . 9 K

Key entry utility program  . . . . . . . . . . . . . . . . . . 8 K

Other utilities programs . . . . . . . . . . . . . . . . . .  9 K each

Sort/Merge Program Product
  (excluding command data set display program)  . . . . . . .  16 K
        Command data set display  . . . . . . . . . . . . . . . . 9 K

Communications Program Product  . . . . . . . . . .  see next page

Assembler Program Product . . . . . . . . . . . . . . . . . . 9 K
```

Note: These are the minimum storage requirements — assuming a physical sector size of 256 bytes, a logical record length less than or equal to 256 bytes, and an I exchange. The amount of storage required may vary for larger physical or logical sector sizes and for different exchanges.

5280 Communications Program Product: Storage Requirements

The utility programs of the Communications Program Product are classified as preparation utilities and execution utilities. All of the preparation utilities run in foreground or background partitions. The execution utilities each require a communications access method, which must run in a separate partition from the utility itself. Execution utilities can run in foreground or background partitions; communications access methods usually run in background partitions.

Preparation Utilities

Communications configuration utility (SYSCCU)	21 K
Remote job entry description utility (SYSRJEDU)	7 K
Data communications description utility (SYSDCDU)	15 K
Communications load utility (SYSCLU)	9 K

Execution Utilities

SNA remote job entry (SYSSRJE)	22 K
Communications access method (SYSSNAR)	24 K
SNA data communications utility (SYSSDCU)	22 K
Communications access method (SYSSNAD)	25 K
BSC data communications utility (SYSBDCU)	22 K
Communications access method (SYSBSCBA or SYSBSCEX)	15-21 K
BSC batch transfer utility (SYSBBTU)	11 K
Communications access method (SYSBSCBA)	15 K
MULTI-LEAVING remote job entry (SYSMRJE)	22 K
Communications access method (SYSBSCR)	11 K
BSC online test utility (SYSBOLT)	6 K
Communications access method (SYSBSCBA or SYSBSCEX)	15-21 K

User Written Program

User written program (minimum partition is 6 K)	
BSC communications access method (SYSBSCEX)	21 K
or	
SNA communications access method (SYSSNAU)	25 K

The following pages show sample sets of operating characteristics, with their corresponding equipment configurations and partition layouts. These samples are provided as guides only; you might wish to modify the partition sizes to meet your applications and equipment configuration. To find the partition layout for your 5280 system:

1. Identify the set of operating characteristics that most closely resembles the way your 5280 system will be used.

2. Find the equipment configuration that matches your own, according to the number of keyboards in the system.

These storage sizes are minimum sizes required for the Communications utilities and CAMs. Additional storage may be required for items such as larger buffers or trace tables. See the *Communications Reference Manual* for information on how to determine the storage size required for your configuration.

Operating Characteristics 1

High-volume production required, with keying done on a batch basis
Centralized data entry department
Emphasis is on speed and accuracy with which data is entered
480 display screen size
Key entry utility used for data entry applications

1 keyboard with total of 32 K

15 K	Common area
8 K	Foreground partition for keyboard 0

9 K	Background partition used for the following:
	Utility Programs
	   List
	   Clear
	   Compress
	   Copy
	   Diskette initialization
	   Label create/maintenance
	   Format conversion
	System Control Programs
	   Patch
	   Close/failure recovery

2 keyboards with total of 32 K

15 K	Common area

9 K	Foreground partition for keyboard 0, used for the following:
	Utility Programs
	   List
	   Clear
	   Compress
	   Copy
	   Diskette initialization
	   Key entry
	   Label create/maintenance
	   Format conversion
	System Control Programs
	   Patch
	   Close/failure recovery

8 K	Foreground partition for keyboard 1

3 keyboards with total of 48 K

15 K	Common area
8 K	Foreground partition for keyboard 0
8 K	Foreground partition for keyboard 1
8 K	Foreground partition for keyboard 2

9 K	Background partition available to all, used for the following:
	Utility Programs
	   List
	   Clear
	   Compress
	   Copy
	   Diskette initialization
	   Label create/maintenance
	   Format conversion
	System Control Programs
	   Patch
	   Close/failure recovery

4 keyboards with total of 48 K

15 K	Common area
8 K	Foreground partition for keyboard 0
8 K	Foreground partition for keyboard 1
8 K	Foreground partition for keyboard 2

9 K	Foreground partition for keyboard 3, used for the following:
	Utility Programs
	   List
	   Clear
	   Compress
	   Copy
	   Diskette initialization
	   Label create/maintenance
	   Format conversion
	System Control Programs
	   Patch
	   Close/failure recovery

Operating Characteristics 2

High-volume production required, with keying done on a batch basis
Centralized data entry department
Emphasis is on speed and accuracy with which data is entered
480 display screen size
DE/RPG compiled programs used for data entry applications

1 keyboard with total of 32 K

15 K	Common area
6 K	Foreground partition for keyboard 0
11 K	Background partition used for the following: DE/RPG compiler Utility Programs List Clear Compress Copy Diskette initialization Label create/maintenance Format conversion System Control Programs Patch Close/failure recovery

2 keyboards with total of 32 K

15 K	Common area
9 K	Foreground partition for keyboard 0, used for the following: User written programs DE/RPG compiler Utility Programs List Clear Compress Copy Diskette initialization Label create/maintenance Format conversion System Control Programs Patch Close/failure recovery
8 K	Foreground partition for keyboard 1

3 keyboards with total of 48 K

15 K	Common area
6 K	Foreground partition for keyboard 0
6 K	Foreground partition for keyboard 1
6 K	Foreground partition for keyboard 2
15 K	Background partition available to all, used for the following: DE/RPG compiler Utility Programs List Clear Compress Copy Diskette initialization Label create/maintenance Format conversion System Control Programs Patch Close/failure recovery

4 keyboards with total of 48 K

15 K	Common area
6 K	Foreground partition for keyboard 0
6 K	Foreground partition for keyboard 1
6 K	Foreground partition for keyboard 2
6 K	Foreground partition for keyboard 3
9 K	Background partition available to all, used for the following: DE/RPG compiler Utility Programs List Clear Compress Copy Diskette initialization Label create/maintenance Format conversion System Control Programs Patch Close/failure recovery

Operating Characteristics 3

High-volume production required, with keying done on a batch basis
Dual mode of operation: Data capture in the foreground partitions with or
    without simultaneous communications or printer operations in background
5280 might be distant from main processing system
5280 might be communicating to a 3741, S/32, or S/34
960 display screen size

1 keyboard with total of 48 K

16 K	Common area
6 K	Foreground partition for keyboard 0
11 K	Background partition used for: BSC batch transfer utility
15 K	Background partition used for the following: Communications access method DE/RPG compiler • Utility Programs List Clear Compress Copy Diskette initialization Label create/maintenance Format conversion System Control Programs Patch Close/failure recovery

2 keyboards with total of 64 K

16 K	Common area
9 K	Foreground partition for keyboard 0
9 K	Foreground partition for keyboard 1
11 K	Background partition used for: BSC batch transfer utility
19 K	Background partition used for the following: Communications access method Various utility programs Sort/Merge Program Product

3 keyboards with total of 64 K

16 K	Common area
7 K	Foreground partition for keyboard 0
7 K	Foreground partition for keyboard 1
7 K	Foreground partition for keyboard 2
11 K	Background partition used for: BSC batch transfer utility
16 K	Background partition used for the following: Communications access method Various utility programs Sort/Merge Program Product

4 keyboards with total of 96 K

16 K	Common area
9 K	Foreground partition for keyboard 0
9 K	Foreground partition for keyboard 1
9 K	Foreground partition for keyboard 2
9 K	Foreground partition for keyboard 3
12 K	Background partition used for the following: BSC batch transfer utility Various utility programs
16 K	Background partition used for the following: Communications access method Various utility programs
16 K	Background partition used for the following: Various utility programs Sort/Merge Program Product

Operating Characteristics 4

High-volume production required, with keying done on a batch basis
Dual mode of operation: Data capture in the foreground partitions with or
    without simultaneous communications or printer operations in background
5280 might be distant from main processing system
5280 might be communicating to a 3741 using the expanded communications
    feature or to a S/370 using CICS or IMS (BSC)
960 display screen size

1 keyboard with total of 64 K

16 K	Common area
5 K	Foreground partition for keyboard 0
22 K	BSC data communications utility
21 K	Background partition used for the following: Communications access method DE/RPG compiler Utility Programs List Clear Compress Copy Diskette initialization Label create/maintenance Format conversion System Control Programs Patch Close/failure recovery Sort/Merge Program Product

2 keyboards with total of 96 K

16 K	Common area
7 K	Foreground partition for keyboard 0
7 K	Foreground partition for keyboard 1
13 K	Background partition used for various utility programs
21 K	Background partition used for the following: Communications access method Various utility programs
22 K	BSC data communication utility
10 K	Background partition

3 keyboards with total of 96 K

16 K	Common area
9 K	Foreground partition for keyboard 0
9 K	Foreground partition for keyboard 1
8 K	Foreground partition for keyboard 2
22 K	BSC data communications utility
21 K	Background partition used for the following: Communications access method Various utility programs Sort/Merge Program Product
11 K	Background partition

4 keyboards with total of 96 K

16 K	Common area
7 K	Foreground partition for keyboard 0
7 K	Foreground partition for keyboard 1
6 K	Foreground partition for keyboard 2
7 K	Foreground partition for keyboard 3
21 K	Background partition used for the following: Communications access method Various utility programs Sort/Merge Program Product
22 K	BSC data communications utility
10 K	Background partition

Operating Characteristics 5

High-volume production required, with keying done on a batch basis
Dual mode of operation: Data capture in the foreground partitions with or
without simultaneous communications or printer operations in background
5280 might be distant from main processing system
5280 will be communicating to a S/370 using CICS or IMS (SNA).
960 display screen size

1 keyboard with total of 96 K

16 K	Common area
8 K	Foreground partition for keyboard 0
16 K	Background partition used for the following: DE/RPG compiler Utility Programs 　List 　Clear 　Compress 　Copy 　Diskette initialization 　Label create/maintenance 　Format conversion System Control Programs 　Patch 　Close/failure recovery Sort/Merge Program Product
22 K	SNA data communications utility
25 K	Communications access method
9 K	Background partition

2 keyboards with total of 96 K

16 K	Common area
8 K	Foreground partition for keyboard 0
7 K	Foreground partition for keyboard 1
9 K	Background partition used for various utility programs
22 K	SNA data communications utility
25 K	Communications access method
9 K	Background partition

3 keyboards with total of 96 K

16 K	Common area
9 K	Foreground partition for keyboard 0
9 K	Foreground partition for keyboard 1
6 K	Foreground partition for keyboard 2
22 K	SNA data communications utility
25 K	Background partition used for the following: Communications access method Various utility programs Sort/Merge Program Product
9 K	Background partition

4 keyboards with total of 96 K

16 K	Common area
9 K	Foreground partition for keyboard 0
9 K	Foreground partition for keyboard 1
6 K	Foreground partition for keyboard 2
25 K	Communications access method
9 K	Foreground partition for keyboard 3
22 K	Background partition used for the following: SNA data communications utility Various utility programs Sort/Merge Program Product

Operating Characteristics 6

One or more printers can be attached
Data might be entered by source departments
Uses *master data sets* on diskette during data capture application
960 or 1920 display screen size

1 keyboard with total of 48 K

15 K	Common area
8 K	Foreground partition for keyboard 0
25 K	Background partition used for the following: Various utility programs Sort/Merge Program Product

2 keyboards with total of 48 K

15 K	Common area
8 K	Foreground partition for keyboard 0
8 K	Foreground partition for keyboard 1
17 K	Background partition used for the following: Various utility programs Sort/Merge Program Product

3 keyboards with total of 64 K

15 K	Common area
8 K	Foreground partition for keyboard 0
8 K	Foreground partition for keyboard 1
8 K	Foreground partition for keyboard 2
16 K	Background partition used for the following: Various utility programs Sort/Merge Program Product
9 K	Background partition used for various utility programs

4 keyboards with total of 64 K

15 K	Common area
8 K	Foreground partition for keyboard 0
8 K	Foreground partition for keyboard 1
8 K	Foreground partition for keyboard 2
8 K	Foreground partition for keyboard 3
17 K	Background partition used for the following: Various utility programs Sort/Merge Program Product

Operating Characteristics 7

One or more printers can be attached
Data might be entered by source departments
Uses *master data sets* on diskette during data capture application
Inquiries are made into main processing systems data base using BSC if data
    is not on local data base
960 or 1920 display screen size

1 keyboard with total of 48 K

16 K	Common area
11 K	Foreground partition for keyboard 0
21 K	Background partition used for the following: Various utility programs Sort/Merge Program Product BSC communications access method

2 keyboards with total of 64 K

16 K	Common area
15 K	Foreground partition for keyboard 0
12 K	Foreground partition for keyboard 1
21 K	Background partition used for the following: Various utility programs Sort/Merge Program Product BSC communications access method

3 keyboards with total of 96 K

16 K	Common area
15 K	Foreground partition for keyboard 0
15 K	Foreground partition for keyboard 1
21 K	Background partition used for the following: Various utility programs BSC communications access method
16 K	Foreground partition for keyboard 2
13 K	Background partition used for various utility programs

4 keyboards with total of 96 K

16 K	Common area
12 K	Foreground partition for keyboard 0
12 K	Foreground partition for keyboard 1
10 K	Foreground partition for keyboard 2
9 K	Foreground partition for keyboard 3
21 K	Background partition used for the following: Various utility programs Sort/Merge Program Product BSC communications access method
16 K	Background partition used for the following: Various utility programs Sort/Merge Program Product

Note: Although only one data station at a time can use the communications facilities under BSC communications access support, in the above sample configurations each data station is capable of running the application.

Operating Characteristics 8

One or more printers can be attached
Data might be entered by source departments
Uses *master data sets* on diskette during data capture application
Inquiries are made into main processing systems data base using SNA if data
   is not on local data base
960 or 1920 display screen size

1 keyboard with total of 64 K

16 K	Common area
16 K	Foreground partition for keyboard 0
25 K	Background partition used for the following: Various utility programs Sort/Merge Program Product SNA communications access method
7 K	Background partition

2 keyboards with total of 96 K

16 K	Common area
16 K	Foreground partition for keyboard 0
13 K	Foreground partition for keyboard 1
10 K	Background partition
25 K	Background partition used for the following: Various utility programs Sort/Merge Program Product SNA communications access method
10 K	Background partition

3 keyboards with total of 96 K

16 K	Common area
16 K	Foreground partition for keyboard 0
16 K	Foreground partition for keyboard 1
13 K	Foreground partition for keyboard 2
25 K	Background partition used for the following: Various utility programs Sort/Merge Program Product SNA communications access method
10 K	Background partition

4 keyboards with total of 96 K

16 K	Common area
12 K	Foreground partition for keyboard 0
12 K	Foreground partition for keyboard 1
12 K	Foreground partition for keyboard 2
9 K	Foreground partition for keyboard 3
25 K	Background partition used for the following: Various utility programs Sort/Merge Program Product SNA communications access method
10 K	Background partition

Note: The SNA communications access method allows each data station the capability to inquire into the main processing system data base.

Operating Characteristics 9

One or more printers can be attached
Data might be entered by source departments
RJE using DOS/VSE POWER at main processing system
960 or 1920 display screen size

1 keyboard with total of 64 K

16 K	Common area
23 K	Foreground partition for keyboard 0 BSC data communications utility
25 K	Background partition used for the following: Various utility programs Sort/Merge Program Product BSC communications access method

2 keyboards with total of 96 K

16 K	Common area
22 K	Foreground partition for keyboard 0 BSC data communications utility
10 K	Background partition
16 K	Background partition
21 K	Background partition used for the following: Various utility programs Sort/Merge Program Product BSC communications access method
11 K	Foreground partition for keyboard 1

3 keyboards with total of 96 K

16 K	Common area
23 K	Foreground partition for keyboard 0 BSC data communications utility
25 K	Background partition used for the following: Various utility programs Sort/Merge Program Product BSC communications access method
16 K	Foreground partition for keyboard 1
16 K	Foreground partition for keyboard 2

4 keyboards with total of 96 K

16 K	Common area
22 K	Foreground partition for keyboard 0 BSC data communications utility
16 K	Foreground partition for keyboard 1
10 K	Foreground partition for keyboard 2
21 K	Background partition used for the following: Various utility programs Sort/Merge Program Product BSC communications access method
11 K	Foreground partition for keyboard 3

Operating Characteristics 10

One or more printers can be attached
Data might be entered by source departments
SRJE using DOS/VSE POWER, RES, or JES2, or JES3 at main processing system
960 or 1920 display screen size

1 keyboard with total of 64 K

6 K	Common area
22 K	Foreground partition for keyboard 0 SNA remote job entry utility
24 K	Background partition used for the following: Various utility programs Sort/Merge Program Product SNA communications access method
12 K	Background partition

2 keyboards with total of 96 K

16 K	Common area
22 K	Foreground partition for keyboard 0 SNA remote job entry utility
9 K	Background partition
16 K	Background partition used for the following: Various utility programs Sort/Merge Program Product
24 K	Background partition used for the following: Various utility programs Sort/Merge Program Product SNA communications access method
9 K	Foreground partition for keyboard 1

3 keyboards with total of 96 K

16 K	Common area
22 K	Foreground partition for keyboard 0 SNA remote job entry utility
26 K	Background partition used for the following: Various utility programs Sort/Merge Program Product SNA communications access method
16 K	Foreground partition for keyboard 1
16 K	Foreground partition for keyboard 2

4 keyboards with total of 96 K

16 K	Common area
22 K	Foreground partition for keyboard 0 SNA remote job entry utility
13 K	Foreground partition for keyboard 1
10 K	Foreground partition for keyboard 2
24 K	Background partition used for the following: Various utility programs Sort/Merge Program Product SNA communications access method
11 K	Foreground partition for keyboard 3

Operating Characteristics 11

One or more printers can be attached
Data might be entered by source departments
MRJE using RES, JES2, or JES3 at main processing system
960 or 1920 display screen size

1 keyboard with total of 48 K

6 K	Common area
22 K	Foreground partition for keyboard 0 MRJE utility
20 K	Background partition used for the following: Various utility programs Sort/Merge Program Product MRJE communications access method

2 keyboards with total of 64 K

16 K	Common area
22 K	Foreground partition for keyboard 0 MRJE utility
10 K	Foreground partition for keyboard 1
16 K	Background partition used for the following: Various utility programs Sort/Merge Program Product MRJE communications access method

3 keyboards with total of 96 K

16 K	Common area
22 K	Foreground partition for keyboard 0 MRJE utility
16 K	Background partition used for the following: Various utility programs Sort/Merge Program Product MRJE communications access method
10 K	Background partition
16 K	Foreground partition for keyboard 1
16 K	Foreground partition for keyboard 2

4 keyboards with total of 96 K

16 K	Common area
22 K	Foreground partition for keyboard 0 MRJE utility
16 K	Background partition used for the following: Various utility programs Sort/Merge Program Product MRJE communications access method
10 K	Foreground partition for keyboard 1
16 K	Foreground partition for keyboard 2
16 K	Foreground partition for keyboard 3

This glossary includes definitions developed by the American National Standards Institute (ANSI) and the International Organization for Standardization (ISO). This material is reproduced from the *American National Dictionary for Information Processing*, copyright 1977 by the Computer and Business Equipment Manufacturers Association, copies of which may be purchased from the American National Standards Institute, 1430 Broadway, New York, New York 10018.

ANSI definitions are identified by an asterisk. An asterisk to the right of the term indicates that the entire entry is reprinted from the *American National Dictionary for Information Processing*. Where definitions from other sources are included in the entry, ANSI definitions are identified by an asterisk to the right of the item number.

access method: A technique for moving data between main storage and input/output devices.

alternative cylinder: A cylinder on a diskette that is assigned in place of a cylinder that is defective.

application program: A program that processes user data to perform a particular data processing task; for example, inventory control or payroll.

ASCII: (ANSI definition) 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), used for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII set consists of control characters and graphic characters.

assembler language: A source language that includes symbolic machine language statements in which there is a one-to-one correspondence with the instruction formats and data formats of the computer.

auto-answer: In data communications, pertains to a machine feature that permits a station to answer a call that it receives over a switched line without operator action.

backup copy: A copy of a data set or diskette that is kept in case the original data set or diskette is destroyed.

basic data exchange: A diskette data exchange that uses 128-byte sectors on a type 1 or 2 diskette. The basic data exchange formats allow you to exchange data between 5280 and other systems that use the basic data exchange format.

basic telecommunications access method (BTAM): An access method that permits read/write communications with a remote device.

batch: An accumulation of data to be processed at one time by the 5280, using the same program.

batch processing: A method of running jobs that does not require continuous operator attention; that is, processing that is not interactive.

block: A collection of contiguous records recorded or communicated as a unit.

blocking: Combining two or more records in one block.

bps: Bits per second.

BSC: Binary synchronous communications.

BTAM: Basic telecommunications access method.

Cable Thru feature: A printer feature that allows multiple printers to be attached to a control unit via a particular line.

calculation specifications sheet: An RPG II coding sheet used to describe calculation processing to be done by the program.

channel service unit: A device provided by the telephone company to connect a 5280 communicating unit to a digital data service network.

clocking: In binary synchronous data communications, the use of clock pulses to control synchronization of data and control characters.

common area: A separate area of main storage that contains routines and data that can be accessed by programs in any of the partitions. These routines must be IBM-supplied programs or user-written assembler programs.

common carrier: In data communications, any government-regulated company that furnishes communications services to the general public.

communications: Telecommunications, or data communications.

communications access method (CAM): A 5280 program that provides the necessary link between a communications program and the communications line. It performs functions such as data formatting and link protocol.

communications adapter: A hardware feature that enables 5280 to become a part of a data communications network.

communications configuration record: A record that describes the communications environment. This record is either supplied by IBM or created when the communications configuration utility is executed.

compiler: 1. A program that translates a series of instructions, written in a programming language, into a program the system can execute. 2. (ANSI definition) A program that translates a source program written in a specific programming language into an object program.

concurrent processing: A method of processing in which two or more programs are executing in the system at the same time. In the 5280, each program must be in a separate partition.

configuration: The group of machines, devices, features, and programs that make up a data processing system.

connector: Terminal unit at the end of a cable which must be inserted into a socket.

Customer Information Control System (CICS): A program product that enables transactions entered at remote terminals to be processed concurrently by user-written programs.

cylinder: The tracks that can be accessed without repositioning the diskette drive access mechanism.

data set: An organized collection of related data records treated as a unit and existing on a diskette.

data set label: A 128-byte area on the diskette index cylinder that describes a diskette data set.

data set name: The name associated with a data set. The first character must be alphabetic, and the remaining characters can be any combination of alphabetic or numeric characters. Blanks cannot appear between characters in a name.

diskette: 1. A thin, flexible magnetic disk permanently sealed in a protective cover.
2. A single removable disk contained in its own envelope.

diskette drive: The mechanism used to read and write data on diskettes.

diskette float: When diskettes are in transit between two points, and unavailable for use.

diskette library: Collection of diskettes; typically requires a set of procedures for control purposes.

display screen: The part of a display station on which data, messages, or other information is displayed.

display station: An input/output device containing a display screen and having an attached keyboard.

EBCDIC (extended binary-coded decimal interchange code): A character set containing 256 eight-bit characters.

edit: To modify the form or format of data; for example, to insert or delete characters such as page numbers or decimal points.

EIA/CCITT: Electronic Industries Association/Consultative Committee on International Telegraphy and Telephony.

error recovery: Automatic or operator-initiated action to correct an error condition.

exclusion key: An optional key on the telephone located under the handset; used to establish data communications.

field: One or more bytes of related information in a record.

float: (See diskette float.)

format: A specific arrangement of information in a record or on a display screen.

format chaining: Defined sequence of formats to be used in entering, verifying, or updating a batch job.

full duplex: Pertaining to simultaneous, independent, two-way transmission. Contrast with half duplex.

H-type data exchange: A diskette data exchange format that uses 256-byte sectors on a type 2D diskette. The H-type exchange allows you to exchange data between 5280 and other systems that use the H-type data exchange format.

half duplex: Pertaining to alternating one-way transmission (transmissions in one direction at a time). Contrast with full duplex.

hertz (Hz): A unit of frequency equal to one cycle per second.

host computer: The primary or controlling computer in a data communications network.

host subsystem: For 5280, software which executes on a host computer and which will accept input from 5280, such as CICS, VS1/RES.

initial program load (IPL): A sequence of events that loads the system programs and prepares the system for execution of jobs.

integrated modem: A device that is built into a 5280 communicating unit to transmit and receive data.

integrity: Preservation of data or programs for their intended use.

interactive job: A job in which the processing actions are performed in response to input provided by an operator. During the job, a dialog exists between the operator and the system.

key entry supervisor: The person with the functional responsibility for program format definitions, extraction of batches, system control and work assignments.

keylock feature: A key operated switch that can be installed on a work station control unit or work station/controller. This switch is used to control the use of the keyboard and/or data communications operations.

leased line: (See nonswitched line.)

LU-LU session: In SNA, a session between two logical units in the network. It provides communication between two end users, each associated with one of the logical units.

magnetic stripe reader feature: A feature that provides the capability of reading numeric encoded information from a magnetic stripe on an identification card.

main storage: 1. General purpose storage of a computer. 2. All storage that can be addressed by programs, from which instructions can be executed, and from which data can be loaded directly into registers.

master data set: A collection of permanent information; for example, a customer address data set, that is often processed along with a transaction data set.

modem (modulator/demodulator): 1. A device that changes machine readable data into a form suitable for transmission over communications lines; a modem also converts transmitted signals into machine readable data. 2. A device that connects a communications adapter to a communication line.

multipoint line: A communications line that interconnects several stations. Data is sent and received under control of a control station; all other stations on the line serve as tributary stations.

multiprogramming: The concurrent execution of two or more programs in which each program appears to be the only program in the system. Programs might have exclusive use of data sets and/or system I/O resources or might share them, depending upon application requirements.

nonswitched line: A communications line between systems or devices that is permanently connected and does not have to be established by dialing. Often the same as leased line. Contrast with switched line.

object program: A set of instructions in machine language. The object program is produced by the compiler from the source program.

operating system: Software controlling the execution of computer programs (OS, OS/VS, DOS, etc.).

output: Data delivered or ready to be delivered from a device or program, usually after some processing.

partition: An area of 5280 storage in which a program can execute.

point-to-point line: A communications connection established between only two communicating stations.

power cord: A cord that plugs into a wall outlet supplying electrical power.

program: 1. A set of sequential instructions that tells the computer where to get input, how to process it, and where to put the results. 2. To design, write, and test computer programs.

program product: An IBM-written, licensed program for which a monthly charge is made. A program product performs functions related to processing user data.

record: A collection of related data, treated as a unit.

relative record number: A number that specifies the location of a record in relation to the beginning of the data set.

remote terminal: A data station that is connected to the system by a data communications line.

resource allocation table: A table in storage that is used to assign a logical device ID (a two-character name) to a physical device.

scratch diskettes: Collection of diskettes that are no longer in the retention cycle and are available for use.

scratch file: (See scratch diskette.)

sector: 1. An area on a diskette track reserved to record a unit of data. 2. The smallest amount of data that can be written to or read from a disk or diskette during a single read or write operation.

socket: The opening on the back panel or side panel of a 5280 unit into which a connector is plugged.

source program: A set of instructions that represents a particular job as defined by the programmer. These instructions are written in a programming language, such as DE/RPG.

spanned record: A record that is stored in more than one block.

station protector: A device used on the system printer cable to offer protection against lightning when printers are set up in separate buildings.

switched line: In data communications, a connection between a communication controller and a remote station, or between two stations, that is established by dialing. The equipment and transmission lines used are the same as those used for telephone (voice) communications. Contrast with nonswitched line.

switched network backup (SNBU): A technique used in data communications to provide an alternative method for connecting two systems over telephone lines when the primary connection (via nonswitched lines) is not operating properly.

synchronous data link control (SDLC): A discipline for managing synchronous, transparent, serial-by-bit information transfer over a communications line.

system configuration: A process that specifies the various components and devices that form a particular operating system. System configuration combines user-specified options and parameters with IBM programs to produce a system having a desired form and capacity.

systems analyst: A person who examines the various operations to be performed by a data processing system and defines the plans and procedures required to maximize the system's effectiveness.

systems network architecture (SNA): A total description of the logical structure, formats, protocols, and operation sequences for transmitting information throughout a communications network.

TCAM: Telecommunications Access Method.

telecommunications access method (TCAM): A method used to transfer data between main storage and remote or local stations. A message control program is used to synchronize the data, thus eliminating delays for terminal input/output operations.

track: A circular path on the diskette surface where data can be recorded and from which data can be read.

transaction data set: A data set that contains records associated with a specific transaction. These records are less permanent information, such as customer orders. Contrast with master data set.

transmit: (ANSI Definition) To send data from one place for reception elsewhere.

verify: To determine whether entering data or another operation has been accomplished accurately.

virtual telecommunications access method (VTAM): A set of programs that control communications between stations and application programs running under DOS/VSE, OS/VS1, or OS/VS2.

VTAM: Virtual Telecommunications Access Method.

wet bulb: Pertains to temperature read from a wet bulb thermometer which measures humidity.

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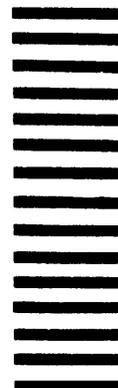
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Technical Newsletter

IBM 5280
Distributed Data
System
Planning and Site Preparation Guide

This technical newsletter provides replacement pages and additional information for the subject manual. Pages to be inserted and/or removed are:

iii, iv	45, 46	83, 84	105, 106	131-134	171, 172
v, vi	61, 62	84.1-84.10	109-112	147-150	172.1, 172.2
1-4	71-76	89, 90	112.1, 112.2	153-156	179-184
11-16	76.1, 76.2	93, 94	113-118	156.1, 156.2	
19, 20	77, 78	94.1, 94.2	123, 124	159, 160	
23, 24	78.1, 78.2	95-100	124.1, 124.2	160.1, 160.2	

A change to the text is indicated by a vertical line to the left of the change. Absence of a vertical line on a page bearing an 'updated' notice means only that previously existing text has been removed or rearranged or that a minor typographical error has been corrected.

Summary of Amendments
- Addition of IBM 3270 Emulation Licensed Program information
- Addition of IBM 5224 printer information

Note: *Please file this cover letter at the back of the manual to provide a record of changes.*

This guide will serve as a workbook for individuals responsible for planning the installation and implementation of IBM 5280 products. The 5280 system is designed so that you, the customer, can do your own planning, site preparation, setup, and system configuration.

Planning and site preparation consists of two main parts: the planning required to convert to the 5280, and the preparation of a physical site. Both parts should be completed before your system arrives.

The amount of planning required to convert to the 5280 will depend upon the number and complexity of your applications. This guide contains information to assist you in this planning so that you can determine the content and sequence of your conversion tasks. A specific sequence is recommended for the activities associated with preparing a physical site.

Use the list of planning activities in Chapter 1 to identify all of the planning activities required for installing your 5280 system. By scheduling these activities carefully, you can set up and begin using your system promptly.

The guide is organized to coincide with the activities that typically make up planning and site preparation:

Chapter 1 outlines the main topics to consider when you are preparing for the system, lists the various planning activities, and suggests an approximate order for their completion.

Chapter 2 provides ordering procedures and IBM part numbers for 5280 supplies.

Chapter 3 describes the education and training opportunities available from IBM for 5280 users.

Chapter 4 presents a broad range of system design considerations, including diskette usage and job scheduling.

Chapter 5 lists some factors that could influence conversions from specific types of devices.

Chapter 6 identifies the 5280 utility programs and equipment used for data communications.

Chapter 7 provides information required to set up your system when it arrives.

Chapter 8 provides information required to select and prepare a physical site.

PREREQUISITE PUBLICATIONS

Before using this guide, the reader should be familiar with the *IBM 5280 General Information*, GA21-9350. A bibliography of the 5280 publications appears in Chapter 2 of this guide.

United States Federal Communications Commission (FCC) rules require IBM to publish the following information, which applies to each unit (including modems and terminals) described in this manual (hereafter called equipment). These rules apply to equipment newly manufactured after 01 January 1981 and for reconditioned equipment considered newly manufactured after that date. All such equipment will contain a FCC compliance label.

WARNING: This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A Computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

List Your Important Phone Numbers:

	Name	Phone Number
• IBM 5280 Marketing Representative	_____	_____
• Supplies Marketing Representative	_____	_____
	_____	_____
	_____	_____
	_____	_____
• IBM System Engineer	_____	_____
• IBM Customer Engineer	_____	_____
• Other contacts		
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Contents

Chapter 1. Introduction to 5280 Planning

The IBM 5280 Distributed Data System offers many features to improve upon the data entry methods currently available, as well as a broad range of data communications facilities. Many of these capabilities, such as the advanced checking and editing functions of DE/RPG, are described in the *IBM 5280 General Information* manual. More detailed information about these capabilities appears in this guide wherever it is related to planning or site preparation.

As a customer setup system, the 5280 enables you to quickly respond to any changes in application requirements. By following a defined sequence of simple instructions, you can first prepare for and later set up your 5280 units at your convenience. The main areas of planning and site preparation are shown in the following illustration; setup instructions accompany all 5280 units when they are shipped to you.

PLANNING AND SITE PREPARATION

System Design Considerations

- Converting programs and procedures

- Defining data sets and job schedules

- Testing programs and procedures

Site Preparation

- Selecting a physical site

- Making a floor plan and ordering cables

- Preparing the site

ALSO: Ordering supplies
Arranging for education and training
Installing data communications facilities
Preparing for system setup

To benefit from your new system without delay, a smooth transition from your existing methods is required. The key to a smooth transition is an effective planning schedule for the necessary preparations.

After you have completed your planning activities, you will be ready for your new system. Detailed setup instructions accompany all 5280 units. It will be necessary for you to receive the machines at your receiving area, transport them to the prepared site, unpack the units, connect the machines with cables, and to then check out the units as directed.

IBM offers a variety of educational opportunities to help you prepare for the 5280. Testing facilities are provided at many IBM locations so that you can test programs before setting up your 5280 system. Consult your IBM representative for more information.

DESCRIBING YOUR IBM 5280 SYSTEM

In order to complete certain planning activities, information about the units that make up your system is required. You will want to know how many diskette drives are available, how many printers will be set up, what each auxiliary data station will be attached to, and similar details about the system. The system summary worksheet that follows is provided so that you can fill in this information. This worksheet will prove useful throughout your planning cycle, especially during any meetings that you hold with IBM representatives or other consultants.

Note: Printer speed may be affected by your programs, application load, forms design, and/or the number of printers attached to the system. For more information concerning the attachment of printers, refer to Chapter 4, System Design Considerations.

IBM 5280 SYSTEM SUMMARY WORKSHEET

Circle or fill in the appropriate information.

Programmable Device	Storage (in K)	No. of Attached Auxiliary Data Stations	No. of Attached Twinaxial Printers*	No. of Attached Start-Stop Printers	No. of Diskette Drives	Type of Diskette Drive	Display Size*	Keyboard Type	Features
IBM 5285 Programmable Data Station		0 or 1	0 or 1	0 or 1	1 or 2	1 or 2D	480, 960, or 1920		
IBM 5286 Dual Programmable Data Station		0 or 1			2	1 or 2D	480		
IBM 5288 Programmable Control Unit		1, 2, 3, or 4	0, 1, 2, 3, 4, 5, 6, 7, or 8	0, 1, 2, 3, or 4	1, 2, 3, or 4	1 or 2D			

Attached Auxiliary Data Stations	Type	No. of Diskette Drives	Type of Diskette Drive	Display Size **	Keyboard Type	Features
No. 1 (see note)	IBM 5281 or 5282	0, 1, or 2	1 or 2D			
No. 2	IBM 5281 or 5282	0, 1, or 2	1 or 2D			
No. 3	IBM 5281 or 5282	0, 1, or 2	1 or 2D			
No. 4	IBM 5281	0, 1, or 2	1 or 2D			

Feature Numbers: Place the number of the appropriate feature(s) in the Features columns above.
1. Elapsed Time Counter
2. Magnetic Stripe Reader
3. Keylock (programmable devices only)
4. Communications Line Attachment
   a. EIA/CCITT
   b. Integrated Modem (1200 bps)
   c. DDSA
5. Second Application Microprocessor
6. Communications Adapter
*7. IBM 3270 Emulation Communications Adapter

Attached Printers

#	Type and Model
1	_____
2	_____
3	_____
4	_____
5	_____
6	_____
7	_____
8	_____

Keyboard Types
1. Typewriter
2. Data Entry
3. Data Entry with Proof Arrangement

*IBM 3270 Emulation
- requires 1920 display size
- only supports up to 5 printers
- feature #7, the IBM Communications Adapter, contains the functions provided by the Communications Adapter (feature #6) plus the IBM 3270 Emulation functions.

**All display sizes for an IBM 5280 system must be the same size.

Note: If your system has an IBM 5288 Programmable Control Unit, when the order was placed you specified whether the first attached data station is an IBM 5281 Data Station or an IBM 5282 Dual Data Station. Make sure that you identify the correct type of data station as number 1.

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Chapter 2. Ordering Supplies for Your 5280 System

This chapter contains specifications and ordering procedures for 5280 supplies. Information is provided to help you determine the types and quantities of publications, diskettes, and printer supplies that you should obtain.

PUBLICATIONS

Various IBM publications exist to directly or indirectly support the 5280 system. The IBM System Library Subscription Service (SLSS) will help you keep your system library up-to-date.

The following diagram illustrates the 5280 publications that support your system. As indicated in the diagram, several publications (indicated by an *) are shipped with the system. It is important that you order the other 5280 publications that you want early in your planning cycle. For new users of communicating devices, the *Data Communications Concepts*, GC21-5169, may be of particular interest.

GUIDE TO IBM 5280 PUBLICATIONS

What is the IBM 5280 System?

IBM 5280 General Information,
GA21-9350

Components, capabilities,
program products, sample
environments

What must be done before the
system arrives?

IBM 5280 Planning and Site Preparation
Guide, GA21-9351
IBM 5280 Cable Assembly Manual,
GA21-9341

System design, ordering
supplies, physical planning,
preparing for setup (The
cable assembly manual is
necessary only when you
are going to build your own
cables)

What are some of the concepts of
the system?

IBM 5280 System Concepts, GA21-9352

Diskette and data set
concepts, partitions,
system capacities

How do I set up IBM 5280 units?

*

User's Setup Procedures:

IBM 5280 System, GA21-9365
IBM 5222 Printer, GA34-0102
IBM 5224 Printer, GA34-0093
IBM 5225 Printer, GA34-0085
IBM 5256 Printer, GA21-9290

Physical setup, checkout,
and problem determination
procedures

How do I start using the IBM 5280
System?

IBM 5280 System Control Programming
Reference/Operation Manual, GC21-7824

System configuration and
other programs fundamental
to the system

How do I operate the IBM 5280
System?

*

IBM 5280 Operator's Guide, GA21-9364

Functions of all keys and
switches, how to compile
and run programs

With a printer?

IBM 5222 Printer Setup Procedure and
Operator's Instructions, GA34-0102
IBM 5224 Printer Operator's Guide,
GA34-0092
IBM 5225 Printer Operator's Guide,
GA34-0054
IBM 5256 Printer Operator's Guide,
GA21-9260

What if I encounter an error
condition?

*

IBM 5280 Message Manual, GA21-9354

Error messages and
recovery procedures

How can I be sure that the system
is set up to operate correctly?

*

IBM 5280 Machine Verification Manual,
GA21-9357

Instructions for running
programs that check out
machine connections

Where can I find information about
IBM 5280 object code?

IBM 5280 Functions Reference Manual,
GA21-9353

Functions of object
program instructions

How can I find information in the
publications?

IBM 5280 Master Index, GA21-9356

Includes index entries for
program product
publications

Publications for IBM 5280 Licensed Programs

IBM 5280 Introduction to DE/RPG, SC21-7803

IBM 5280 DE/RPG User's Guide, SC21-7804

IBM 5280 DE/RPG Reference Manual, SC21-7787

IBM 5280 DE/RPG Debugging Template and Reference Card, GX21-9363

IBM 5280 DE/RPG Problem Determination Procedures for the Programmer, SC21-7852

IBM 5280 COBOL Language Reference Manual, GL23-0031

IBM 5280 COBOL Programmer's Guide, SL23-0032

IBM 5280 COBOL Host Compilers Problem Determination Manual, SL23-0043

IBM 5280 Communications Reference Manual, SC34-0247

IBM 5280 Utilities Reference/Operation Manual, SC21-7788

IBM 5280 Sort/Merge Reference/Operation Manual, SC21-7789

IBM 5280 Assembler Language Reference Manual, SC21-7790

IBM 5280-3270 Emulation Reference Manual, SC34-0384

Supplementary Publications

IBM Forms Design Guide for Printers, GA24-3488

Data Communications Concepts, GC21-5169

IBM 5280 Data Areas and Diagnostic Aids Handbook, SY31-0595

IBM 5280 Cable Assembly Manual, GA21-9341

Using SLSS

The IBM System Library Subscription Service (SLSS) is an automatic publications updating service for technical documentation related to programming, operating, and maintaining IBM data processing systems. SLSS subscriptions are available through your IBM Marketing Representative, without charge or at a fee in accordance with normal publication practices.

The success of a new data entry operation is often dependent upon the speed and accuracy with which programs are developed, debugged, and installed. This, in turn, depends upon ready access to the documentation describing the system and programs. An SLSS subscription should be entered early in the planning cycle so that implementation of the system design can be started early and be based on the latest, most complete documentation.

Two methods of subscribing are provided under SLSS: by order number and by interest profile (or both). The former method requires that the specific eight-character order numbers of the desired documents be listed. Whenever a major revision or an update (technical newsletter) is released pertaining to the documents listed, the subscriber receives copies. The order-number subscription procedure is used (1) when multiple copies of a document are required, or (2) to subscribe to documents not available by profile (for example, program listings and logic manuals).

The profile method of subscribing is useful because it not only provides revisions and updates for the documents ordered, but also provides new publications related to the interests indicated on the SLSS form. The following chart identifies the 5280 publications that can be ordered by profile:

Publication	Subject Code
IBM 5280 Planning and Site Preparation Guide, GA21-9351[1]	15
IBM 5280 Master Index, GA21-9356	00
IBM 5280 System Concepts, GA21-9352	20
IBM 5280 Message Manual, GA21-9354[2]	40
IBM 5280 Machine Verification Manual, GA21-9357[2]	01
IBM 5280 Operator's Guide, GA21-9364[2]	40

Publication	Program Number
IBM 5280 Introduction to DE/RPG, SC21-7803	5708-DE1
IBM 5280 DE/RPG User's Guide, SC21-7804	5708-DE1
IBM 5280 DE/RPG Reference Manual, SC21-7787	5708-DE1
IBM 5280 DE/RPG Problem Determination Procedures for the Programmer, SC21-7852	5708-DE1
IBM 5280 DE/RPG Debugging Template and Reference Card, GX21-9363	5708-DE1
IBM 5280 Utilities Reference/Operation Manual, SC21-7788	5708-UT1
IBM 5280 Communications Reference Manual, SC34-0247	5708-DC1
IBM 5280 Sort/Merge Reference/Operation Manual, SC21-7789	5708-SM1
IBM 5280 System Control Programming Reference/Operation Manual, GC21-7824	5708-SC1
IBM 5280 COBOL Language Reference Manual, GL23-0031	5708-CB1, CB2[3]
IBM 5280 COBOL Programmer's Guide, SL23-0032	5708-CB1, CB2[3]
IBM 5280 COBOL Host Compilers Problem Determination Manual, SL23-0043	
IBM 5280 Assembler Language Reference Manual, SC21-7790	5708-AS1
IBM 5280-3270 Emulation Reference Manual, SC34-0384	5708-EM1

[1]You will not receive a copy of this publication with your SLSS order. However, you will receive any future updates to this publication.

[2]Since these publications are shipped with each 5280 system, you will not receive a copy of these publications with your SLSS order. However, you will receive one copy of any future updates to these publications. For the operator's guide and message manual, you should order one additional copy of the updates for each keyboard on your system.

[3]CB1 for OS/VS, CB2 for DOS/VSE.

Ordering Supplies for Your 5280 System   15

The following example shows how part of the SLSS subscription might be completed for a 5280 system with the following program products:

- DE/RPG

- COBOL

- Utilities

- Sort/Merge

- Communication Utilities

SUBSCRIBER PROFILE

Should Initial Library be shipped? Check One (√) ☑ Yes ☐ No

Section A: Type of Service *(check one)*:
- ☐ (PUB-) No Profile: Order No. subscription only.
- ☐ (PUBG) Profile applicable to use Key G items only.
- ☑ (PUBS) Profile applicable to use Key G and S items. (Invalid for non-IBM non-billable subscriptions)

Section C: Are any of these systems used in a Communications mode? ☑ Yes ☐ No

Section B (#): Systems for which libraries are required. *(Show Processor No., e.g., 3145, 5410)* `A 5 2 8 0` | | | |

Section D (#): Specify subjects of interest: See System Library Bibliographies for subject codes and lists of related publications.

A	00	General Systems Information		21	Assembler	A	32	Utilities
A	01 to 08	Processor, Storage Devices, Channels and I/O		22	APL	A	33	Sort/Merge
				23	BASIC		34	System Planning, Generation, Installation
	09	Communications Devices	A	24	COBOL			
	10	Auxiliary Equipment		25	FORTRAN		35	Simulation, Emulation
	13	Special Features Information		26	ALGOL	A	36	Control Program
	14	Custom Features and Supporting Programs	A	28	RPG, RPGII		37	RAS, Testing, Service Aids, Problem Determination
				29	PL/I			
A	15	Physical Planning Information		30	Access Methods, Data Management, I/O Control Programs		38	Remote Job Entry
A	20	Programming Systems—General Information				A	39	Time Sharing, Interactive Facilities
				31	Support Programs	A	40	Programming System Operation

01-15: Specify type numbers of components in Section F.   20-40: Specify program numbers in Section E2.

Section E1 (#): Specify any Type I programming systems used with major systems:

1130—	1800—	Model 20—	Other System/360—		System 360/370—	
☐ (01) Card/Paper Tape	☐ (03) Card/Paper Tape	☐ (06) Card	☐ (09) BPS	☐ (12) 44 PS	☐ (13) TSS	☐ (17) OS TSO
☐ (02) Disk Monitor	☐ (04) TSX	☐ (07) Tape	☐ (10) BOS		☐ (14) DOS	☐ (18) OS-ASP
	☐ (05) MPX	☐ (08) Disk	☐ (11) TOS		☐ (16) OS	☐ (19) CALL-OS

Section E2 (#): Specify system control programming, selectable unit identifiers, and licensed programs used with major systems:

`A 5 7 0 8 — D E 1`   `A 5 7 0 8 — D C 1`   `A 5 7 0 8 — C B X` | | | | — | | |

`A 5 7 0 8 — S C 1`   `A 5 7 0 8 — U T 1` | | | | — | | | | | | | — | | |

Z

Sequence	Form Type	Name Type	Format ID (1-9, A0-Z9)	Job/Format/ Subroutine Name	Reserved	Repeat (1-9, N)	Mode (E/R)	AND(A)	Position to be Tested (*POSnnnn)	Reserved	Condition	Character to Test (or 'C')	Reserved	Next Format ID (0-9, A0-Z9)	Reserved	Options

Test Conditions

Options

Job Line
CFILE (data set)
DATE (•DMY/•YMD)
EDITC (cupid)
ENTRATR ('attr...)
EXITATR ('attr...)
JOBOPT (('NOPMT)|('NOOPEN))
PRTFILE (data set)
SHARE (names)
SHARER (names)
STATUS (name)
TFILE (data set ['delfreq])
' attr=BL,CS,HI,ND,RI,UL

Entry Lines
CLRL (number)
EOJ (('job' dev) ('PASS))
SLNO (line)
WRITE (name)

0 1	Z								* P O S		E Q	'				
0 2	Z								* P O S		E Q	'				
0 3	Z								* P O S		E Q	'				
0 4	Z								* P O S		E Q	'				
0 5	Z								* P O S		E Q	'				
0 6	Z								* P O S		E Q	'				
0 7	Z								* P O S		E Q	'				
0 8	Z								* P O S		E Q	'				
0 9	Z								* P O S		E Q	'				
1 0	Z								* P O S		E Q	'				
1 1	Z								* P O S		E Q	'				
1 2	Z								* P O S		E Q	'				
1 3	Z								* P O S		E Q	'				
1 4	Z								* P O S		E Q	'				
1 5	Z								* P O S		E Q	'				
	Z								* P O S		E Q	'				
	Z								* P O S		E Q	'				
	Z								* P O S		E Q	'				
	Z								* P O S		E Q	'				

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 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

*Number of sheets per pad may vary slightly.

Other Publications

A label package, GX21-9339, is required as you prepare for customer setup (see Chapter 7). This label package is used for labeling your system cables prior to the 5280 system arriving from IBM. If you do not have this label package, include the label package with your publications order.

There are several other publications that might assist you in generating your job documentation. Job documentation is discussed in Chapter 4, *System Design Considerations*. These publications are the data entry keytop graphic decals, the typewriter keytop graphic decals, and the keyboard template.

The keytop graphic decals are peel-off decals that you can stick in your job documentation to identify which keys should be pressed for a specific operation. For example, an instruction in the job documentation might be:

6. Press the [ENTER/ REC ADV] key to advance to the next record.

You should select the appropriate keytop graphic decals depending upon the type of keyboard(s) on your system:

- *IBM 5280 Data Entry Keytop Graphics*, GX21-9355

- *IBM 5280 Typewriter Keytop Graphics*, GX21-9358

The *IBM 5280 Functions Reference Manual*, GA21-9353 and the *IBM 5280 Assembler Language Reference Manual*, SC21-7790, contain information that might assist you in writing assembler programs. You should order these manuals if you have also ordered the Assembler Licensed Program.

The *IBM 5280 Keyboard Template*, GX21-9360, contains blank squares where you can write in special functions that are given to certain keys by an assembler or COBOL program. This keyboard template can be placed over the template that is permanently attached to the keyboard above the keys. You should order this template only if you are using assembler programs that give some keys a special function.

If you plan to purchase bulk cables and assemble them, or to order cables from a source other than IBM, you should order the *IBM 5280 Cable Assembly Manual*, GA21-9341, for specifications and assembly procedures.

PRINTER PAPER AND RIBBONS

Printer paper and ribbons are the only supplies required if your system has a printer. When ordering paper for printing, consider using standard sizes, thereby minimizing the time required for setup. Paper dimensions should be determined with attention to the print width of the printer, because damage to the print heads can occur when the paper is too narrow.

The format of your printout (forms design) may vary, and specific forms should be tested in the printer to ensure that the print quality is acceptable for your application. For additional information on forms, consult the *IBM Forms Design Guide for Printers*, GA24-3488.

Ordering Paper for the Printers

The IBM 5222 printer can use individual cut or continuous paper forms. The forms can be single-part (without carbon copies) or multipart (with carbon copies). The maximum number of copies for multipart forms is the original plus three copies (four parts).

	Individual Cut	Continuous
Width:		
Maximum	15 inches (381 mm)*	15 inches (381 mm)
Minimum	5.75 inches (146 mm)	3 inches (76.2 mm)
Length:		
Maximum	14 inches (355.6 mm)	14 inches (355.6 mm)
Minimum	3 inches (76.2 mm)	3 inches (76.2 mm)

The maximum print width for either type of form is 13.2 inches (335.28 mm).

*The maximum form width is 12 inches if a Rear Document Insertion Device is installed.

The IBM 5224 printer uses continuous paper forms. The forms can be single-part (without carbon copies) or multipart (the original plus up to three carbon copies).

	Individual Cut	Continuous
Width:		
Maximum		450 mm (17.7 inches)
Minimum		76.2 mm (3 inches)
Length Between Perforations:		
Maximum		318 mm (12.5 inches)
Minimum		76.2 mm (3 inches)

The minimum length between folds is 152.4 mm (6 inches).
The maximum print width is 335.3 mm (13.2 inches).

The IBM 5225 printer uses continuous paper forms. The forms can be single-part (without carbon copies) or multipart (the original plus up to five carbon copies).

Width:	
Maximum	450 mm (17.7 inches)
Minimum	76.2 mm (3 inches)
Length Between Perforations:	
Maximum	318 mm (12.5 inches)
Minimum	76.2 mm (3 inches)

The minimum length between folds is 152.4 mm (6 inches). The maximum print width is 335.3 mm (13.2 inches).

The IBM 5256 printer can use individual cut or continuous paper forms. The forms can be single-part (without carbon copies) or multipart (the original plus up to five carbon copies).

	Individual Cut	Continuous
Width:		
Maximum	367.5 mm (14.5 inches)	381 mm (15 inches)
Minimum	152.4 mm (6 inches)	76.2 mm (3 inches)
Length:		Length Between Perforations:
Maximum	355.6 mm (14 inches)	355.6 mm (14 inches)
Minimum	76.2 mm (3 inches)	76.2 mm (3 inches)

The maximum print width for either type of form is 335.3 mm (13.2 inches).

Ordering Printer Ribbons

The IBM 5222 printer uses a cartridge-type fabric ribbon (IBM part 7034535 or equivalent).

The IBM 5224 printer uses a cartridge-type fabric ribbon (IBM part 6845100 or equivalent).

The IBM 5225 printer uses fabric ribbons wound on disposable spools (IBM part 4412372 or equivalent).

The IBM 5256 printer uses fabric ribbons wound on disposable spools (IBM part 1136653 or equivalent) or a cartridge-type ribbon (IBM part 7034535 or equivalent) depending on your machine.

Utility Programs

In addition to the Key Entry utility, the following utility programs are available for use with the 5280 system. Detailed descriptions and operating instructions are provided in the *Utilities Reference/Operation Manual*.

Diskette/data set clear: To clear the data portion of a data set, to drop or free data set labels, or to drop or free an entire diskette of data

Diskette compress: To consolidate unused portions of diskettes or data sets

Diskette copy: To duplicate or replace data sets, parts of data sets, or the entire diskette contents

Diskette initialization: To reinitialize diskettes; often to a different sector size or sequence

Format conversion aid: To convert IBM 3740 formats to DE/RPG-like source programs

Diskette label maintenance: To allocate data sets, delete data sets, or modify data set labels

Diskette label list: To print or display data set labels or related information

Diskette print: To print the contents of data sets or of entire diskettes

Resource allocation table: To establish or modify logical device addresses

System status: To determine the status of each partition in the system or to determine the configuration for a user-defined IPL diskette

Sort/Merge Program

Sort/merge: To rearrange in sequence and/or combine data into a new data set, leaving the original data set unchanged

Data Communications Utility Programs

The IBM 5280 Communications Utility Programs include:

- Eight Communications Access Methods (CAM) to provide a link between the communications program executing in the IBM 5280 and the communications network, for either BSC or SNA

- Three utility programs to transfer data over a Binary Synchronous Communications network

- Two utility programs to transfer data over a Systems Network Architecture/Synchronous Data Link Control network

- Five preparation utility programs to support either of the above

- Three IBM 3270 emulation utility programs to communicate over a Binary Synchronous Communications network

- Two IBM 3270 emulation utility programs to communicate over a Systems Network Architecture/Synchronous Data Link Control network

- One IBM 3270 configuration utility program to support either of the above

- The Communications Load Utility to load CAM

Chapter 6 describes the communications utilities more completely. Detailed information and operating instructions for communications utility programs appear in the *Communications Reference Manual* (SC34-0247) and the *IBM 3270 Emulation Reference Manual,* (SC34-0384).

Other general scheduling considerations you might account for in your
plans include:

- Application deadlines

- Lead time for data to be transferred from source departments to the
  IBM 5280 system

- Output schedules and output mode, whether dedicated or concurrent
  (coffee breaks and lunch times might be considered here)

- Shift changes

Printer Operations

The use of input/output devices such as printers may require an exit
from a program, and the number and characteristics of program exits
can influence job schedules. For example, some applications require
extensive printing; it may be desirable (though not always necessary) to
schedule printing for a time when other demands on the system are
low.

The IBM 5222, 5224, 5225, or 5256 printer can be attached to an IBM
5280 system. The operator guide for these printers provides detailed
instructions on their use. Information on formatted and unformatted
printing also appears in the *DE/RPG User's Guide,* the *DE/RPG
Reference Manual,* and the *Assembler Language Reference Manual.*

Rated printing speed with the IBM 5222 printer is 80 characters per
second (cps).

Rated printing speeds with the IBM 5224 printer are:

Model 1	140 lines per minute (lpm)
Model 2	240 lpm

Rated printing speeds with the IBM 5225 printer are:

	10 Characters Per Inch	15 Characters Per Inch
Model 1	280 lpm	195 lpm
Model 2	400 lpm	290 lpm
Model 3	490 lpm	355 lpm
Model 4	560 lpm	420 lpm

Rated printing speeds with the IBM 5256 printer are:

Model 1	40 characters per second (cps)
Model 2	80 cps
Model 3	·120 cps

Note: Printer speed may be affected by your programs, application load,
forms design, and/or the number of printers attached to the system.

Production Statistics

Production statistics can be kept for all jobs, and procedures for reading or recording these statistics must be accounted for in job schedules. Statistics can be maintained for either an individual job or for work done at the station overall. Job statistics are normally maintained for only the duration of the job; when the job ends, the statistics from the job can be written to a data set. They will also be added to those for the data station as a whole.

The following counters are kept for all DE/RPG programs:

- Keystrokes

- Records

- Elapsed time in minutes (if Interval Timer is installed)

- Marked records

- Verify correction keystrokes (verify mode only)

Counters kept on a station basis provide a similar summary of system activity; the number of jobs is also recorded. Consult the *DE/RPG Reference Manual* for further information on production statistics.

Networks

Communications lines, modems, and other communications equipment can be arranged in several ways, depending on the intended use. The different arrangements of this equipment are called networks. The basic types of networks are:

- Point-to-point, nonswitched

- Point-to-point, switched

- Multipoint (nonswitched)

Following are illustrations of these basic types of networks:

Point-to-Point Network, Nonswitched

- 5280 communicating device connected to another system

- Nonswitched, permanent connection

| Other system |——| Modem |—z—| Modem |——| 5280 communicating device |

Point-to-Point Network, Switched

- Any or all remote devices can be a 5280 communicating device

- Switched, temporary connection to one device at a time

- Connection only occurs during actual communication

Other system	——	Modem	—z— or	Modem	——	Remote device
Modem	——	Remote device
Modem	——	Remote device

Multipoint Network (Nonswitched)

- Any or all remote devices can be a 5280 communicating device

- Nonswitched, permanent connection

- Other system calls (polls) remote devices by their unique address

- Only the called device answers

- Other remote devices wait their turn for a call

For a more complete introduction to the basic principles and components of data communications, see the general information manual, *Data Communications Concepts*.

WHAT TO DO WITH THIS CHAPTER

Now with a basic understanding of data communications, you are ready to arrange for the necessary communications equipment. The main steps you should complete are:

- Meet with your IBM representative or someone in your company who is responsible for communications networks.

- Get an exact list of the 5280 communications features that have been ordered.

- Determine the type of network to be established (refer to the following pages on system design for communications).

- Identify the type of communications connection and programs to be used.

- Meet with someone from a communications company and place an order for equipment, services, or both.

- Fill in your responses to the questions listed at the end of this chapter.

System Design for Data Communications

The first step in defining a communications network involves documenting the application parameters. This information should be gathered through consultations with the system analyst, system programmer, and/or any host system personnel:

- Number and locations of communicating machines

- Information flow patterns between programmable data stations, programmable control units, and/or main processors

- Types of transactions

- Volume of each type of transaction

- Urgency of the information to be transmitted

- Number of stations that will simultaneously require access

- Reservations for increases in transaction volumes, types

- Reliability and availability requirements

- Security and addressing procedures

- Financial resources available

Host Considerations

Host system planning must begin early in the planning cycle. By notifying the affected personnel early, time can be allotted for programming or other changes required to support the IBM 5280. The following items should be defined:

- Access method (for example, BTAM, VTAM, or TCAM)

- Security procedures

- Error-detection procedures

- File-sharing arrangements

- Program storage requirements

- Network addresses and identification procedures

- Host user program applications

Compatibility

Experience has proven that compatibility among components is a major consideration for new installations. To reduce delays caused by incompatibility, we recommend that you consult your IBM representative and, if necessary, a representative of a communications common carrier company. These representatives can aid you in identifying any trade-offs among alternatives, and can review your selection of facilities. The following factors must be identical at both ends of a communications connection.

Transmission protocol:	SDLC or BSC
Transmission code:	EBCDIC or ASCII
Network type:	Point-to-point or multipoint
Line connection:	Switched or nonswitched
Line type:	Full- or half-duplex
Line speed:	600, 1200, 2400, or 4800 bits per second
Modem characteristics:	Integrated or external auto or manual answer internal (machine) or external (modem) clocking
Functions:	Batch, inquiry, RJE, or 3270 Emulation

Your planning schedule should reflect the dates of any meetings with IBM representatives or communications company personnel.

THE IBM 5280 COMMUNICATIONS LICENSED PROGRAMS

The Communications Utilities consist of communications access
method (CAM) support, a set of communications utility programs,
and the support for user-written communications programs. The
Communications Reference Manual, (SC34-0247) provides informa-
tion about IBM 5280 data communications.

The CAM provides a necessary link between a communications
program, either IBM-supplied or your own, and the communications
network. With the CAM, the utility programs can perform the following
data transfer functions in either a BSC or SNA/SDLC network:

• Send data to a terminal or host computer

• Receive data from a terminal or host computer

• Inquire into host subsystem files and receive replies

• Submit, execute, and obtain results of jobs from a host subsystem

The IBM 5280-3270 Emulation Licensed Program allows the
IBM 5280 to appear as selected IBM 3270 control units and devices.
The IBM 3270 Emulation licensed program consists of the following
five basic parts:

• IBM 3270 Device Emulation Program: to emulate the functions
  of the IBM 3270. Supports both BSC and SNA/SDLC line
  protocols.

• IBM 3270 Program Interface: to transmit data to and receive data
  from a remote system using the IBM 3270 BSC data stream
  protocols. (This feature only applies to 5280 DE/RPG and 5280
  COBOL user-supplied programs. A user-supplied host program is
  required.)

• IBM 3270 Batch Transfer: to perform file copy functions to a
  remote system using the IBM 3270 BSC line protocol. (A user-
  supplied host program is required.)

• Communications Access Method, BSC: to provide the necessary
  link between any of the above three parts and a BSC Communications
  Network.

• Communications Access Method, SNA/SDLC: to provide the
  necessary link between the IBM 3270 Device Emulation Program
  and an SNA/SDLC Communications Network.

Detailed information and operating instructions for the IBM 3270
Emulation Licensed Program are provided in the IBM 5280-3270
Emulation Reference Manual (SC34-0384).

The utility programs for communications and for 3270 Emulation
can be divided into two groups: those that are used to prepare for
communications (called preparation utilities), and those that actually
transfer data over a communications line (called execution utilities).
Storage requirements for the utility programs appear in Appendix E.

Preparation Utilities

The preparation utilities consist of interactive programs in which you
specify the characteristics of your execution utilities and
communications configuration. Your responses to the prompts are
saved on diskette for convenient reuse. The preparation utilities and
their purposes are as follows:

• The communications configuration utility is used to describe the
communications environment.

• The data communications description utility is used to describe
transmit, receive, and inquiry functions for the following execution
utilities: BSC batch transfer, BSC data communications, IBM
3270 BSC emulation communications, and SNA data communications.

• The RJE description utility is used to describe jobs for the
MULTI-LEAVING remote job entry and SNA remote job entry
utilities.

• The communications load utility is used to load a CAM into storage
for the communication execution utilities or communications
programs that you have written.

• The communications monitor preparation utility prepares the IBM
5280 system to monitor a BSC multipoint line after IPL, whenever
CAM is not loaded in storage.

• The forms control utility is used to describe forms control informa-
tion.

Execution Utilities

Each execution utility is specifically designed for and can be used in only one type of network, either BSC or SNA/SDLC. The utility programs can also communicate with certain IBM systems and host subsystems.

- The BSC batch transfer utility enables the IBM 5280 to send and receive batch data to and from diskette over communications lines.

- The BSC data communications utility enables the IBM 5280 to send and receive batch data, and to send inquiries and receive replies from a host subsystem.

- The MULTI-LEAVING remote job entry utility enables the IBM 5280 to submit, execute, and obtain results of jobs from a host RJE subsystem using BSC link protocol.

- The BSC 3270 batch transfer utility enables the IBM 5280 to transmit and receive data to and from a diskette over communication lines without having to reconfigure the IBM 3270 network. A user-written host program is required. The IBM 5280 appears as an IBM 3277 display on a 3271 control unit.

- The BSC 3270 display emulation utility enables the IBM 5280 to interactively communicate with IBM 3270 BSC host applications as an IBM 3270 display. The IBM 5280 appears as an equivalent IBM 3277 display (1920 character) on a 3271 control unit.

- The BSC 3270 printer emulation utility enables the IBM 5280 to communicate with IBM 3270 BSC host applications as an IBM 3270 printer. The IBM 5280 appears as an equivalent IBM 3284, 3286, or 3288 printer on a 3271 control unit.

- The SNA data communications utility transmits and receives batch data and sends inquiries and receives replies from a host subsystem. Up to four LU-LU sessions can operate concurrently using the same CAM.

- The SNA remote job entry utility enables the IBM 5280 to submit, execute, and obtain results of jobs from a host RJE subsystem using SDLC link protocol.

- The SNA 3270 display emulation utility enables the IBM 5280 to communicate interactively with an SNA 3270 host application as an IBM 3270 display (LU-2). The IBM 5280 appears as an IBM 3277 display (1920 character) on a 3274-1C control unit.

- The SNA 3270 printer emulation utility enables the IBM 5280 to communicate with an SNA 3270 host application as an IBM 3270 printer (LU-1 or LU-3). The IBM 5280 appears as an IBM 3287 printer on a 3274-1C control unit.

The accompanying chart shows which utility programs of the communications and IBM 3270 Emulation licensed programs can be used to communicate with IBM systems and host subsystems.

With Binary Synchronous Communications, the IBM 5280:

Can appear to be an:	When it uses	To communicate with the following IBM systems and machines:
IBM 3270 Display System	BSC Data 3270 Emulation Licensed Program	System/3 Model 15D under CCP System/370: CICS/VS with ACF/VTAM under OS/VS1 and OS/VS2 (MVS) CICS/VS with BTAM under OS/VS1 and OS/VS2 (MVS) CICS/VS with ACF/TCAM under OS/VS1 and OS/VS2 (MVS) CICS/VS with BTAM under DOS/VSE IMS/VS with BTAM under OS/VS1 and OS/VS2 (MVS) IMS/VS with ACF/VTAM under OS/VS1 or OS/VS2 (MVS) TSO with ACF/VTAM Note: All of the above systems (except System/3) are also supported when under control of VM/370.
IBM 3741 Work Station	BSC Data Communications Utility or BSC Batch Transfer Utility	System/3 with CCP or RPG II System/32 with RPG II System/34 with RPG II or SSP-ICF 3741 Models 2 and 4 3747 5265 Other 5280 units System/370, 3031, 3032, 3033, 4331, and 4341 processors OS/VS CICS DOS/VSE CICS OS/VS IMS

| IBM 3780 Data Communications Terminal | BSC Data Communications Utility | System/370 (RJE): DOS/VSE POWER |
| System/3 MRJE Work Station | MULTI-LEAVING Remote Job Entry Utility | System/370 (RJE): OS/VS1 RES OS/VS2 JES2 OS/VS2 JES3 |

With Systems Network Architecture/Synchronous Data Link Control, the IBM 5280 can act as a secondary station for IBM System/370, 3031, 3032, 3033, 4331, and 4341 processors:

By using	With IBM System/370 subsystem
SNA Data Communications Utility	CICS: OS/VS and DOS/VSE IMS: OS/VS
SNA Remote Job Entry Utility	RJE: DOS/VSE POWER OS/VS1 RES OS/VS2 JES2 OS/VS2 JES3
IBM SNA 3270 Emulation Licensed Program (IBM 4331 and 4341 processors are not supported.)	IMS/VS: ACF/VTAM under OS/VS1 and OS/VS2 (MVS) CICS/VS: ACF/VTAM under OS/VS1 and OS/VS2 (MVS) CICS/VS: ACF/TCAM under OS/VS1 and OS/VS2 (MVS) CICS/VS: ACF/VTAM under DOS/VSE TSO: ACF/VTAM

Acronyms

BSC: Binary synchronous communications

SNA/SDLC: Systems Network Architecture/Synchronous Data Link Control

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5280 DATA COMMUNICATIONS EQUIPMENT

The BSC/SDLC adapter is required for communications; it must be connected to one of the following:

- External modem

- Internal modem

- Adapter for digital data service

External Modem

When ordering modems to be used with an EIA/CCITT feature, use the following specifications:

Interface: EIA RS232C (CCITT V. 24/28 outside of the United States)
Transmission speed: 600 to 4800 bits per second (bps)

The 5280 can provide the internal clocking for your external modem, if the external modem does not supply the clocking. The internal clocking provided by the 5280 enables transmission speeds of 600 or 1200 bits per second (bps).

Communications Line Connection (Nonswitched Line Connector)

You attach the 5280 system with integrated or external IBM modems to a nonswitched line connector by a cable with a four-prong plug. The plug attaches to a connector (404B, 549A, 493A, or a compatible type), which should be requested from your local telephone company.

PREPARING FOR THE COMMUNICATIONS CONFIGURATION UTILITY

The communications configuration utility enables you to define your communications environment by selecting parameters to:

- Control the operation of communications hardware

- Control the execution of the communications access method

- Describe certain characteristics of the system or terminal with which your device will be communicating

This utility program requires that you respond to a series of prompts which appear on a display. Your responses are stored on diskette as configuration records in a data set; this data set is used when beginning a communications job. Multiple configuration records can be created for different environments.

Prompts for the communications configuration utility are listed in Figure 0.1. These prompts are interdependent. By following the parameter prompting sequence chart in Figure 0.2, you can determine which subset of prompts is applicable to your configuration. Your modem supplier, host system programmer, common carrier representative, and IBM representative will be able to supply information necessary to complete answers to the prompts in Figure 0.1 which are pertinent to their equipment.

Additional information, along with explanations of alternatives, can be found in the IBM 5280 Communications Reference Manual (SC34-0247) in the chapter "Preparation Utilities" and appendix "Host Considerations." For IBM 3270 emulation, additional information can be found in the IBM 5280-3270 Emulation Reference Manual (SC34-0384) in appendices "Host Considerations" and "Installation Procedures". By selecting the parameters in Figure 0.1 which pertain to your configuration, you are now prepared to execute the communications configuration utility (SYSCCU).

Question ID	Parameter Description	Communications Configuration Record Name							
M1	1. IBM 3270 emulation mode 2. Non-3270 emulation								
C1	1. Nonswitched point-to-point line 2. Switched point-to-point line 3. Multipoint line								
C2	1. Integrated modem 2. EIA - external modem 3. DDSA 4. Integrated modem without exclusion key								
C3	Integrated modem attenuation level								
C4	1. Use switched network backup 2. Do not use switched network backup								
C5	1. Manual call/answer 2. Auto answer								
C6	1. Connect data-set-to-line 2. Data-terminal-ready								
C7	1. Modem answer tone 2. Business machine answer tone								
C8	Timer value for answer tone send (in seconds)								
C9	1. 1300 Hertz answer tone frequency 2. 2100 Hertz answer tone frequency								
C10	1. IBM external modem with wrap capability 2. Non-IBM external modem								
C11	1. Internal clocking 2. Modem clocking								
C12	1. Full speed modem rate 2. Half speed modem rate								
C13	1. Constant request to send 2. No constant request to send								
C14	Data set ready timeout (in seconds)								
C15	Line speed (in bps)								

Figure 0.1 (Part 1 of 4) - Planning Chart for Configuration Records

Question ID	Parameter Description	Communications Configuration Record Name							
C16	Clear to send delay (in seconds)								
C17	CAM name								
C18	1. EBCDIC line code 2. ASCII line code								
C19	Number of entries in trace table								
C20	Number of device partitions								

C21	Partition number - 00
	                     - 01
	                     - 02
	                     - 03
	                     - 04
	                     - 05
	                     - 06
	                     - 07								

B1	1. 3741 look-alike 2. 3780 look-alike 3. MRJE								
B2	1. 5280 sends initial line bid 2. Host sends initial line bid								
B3	1. 5280 is primary station 2. 5280 is not primary station								
B4	Terminal ID								
B5	Host ID								
B6	Polling address (in hex)								
B7	Selection address (in hex)								
B8	1. Unblocked record format 2. Blocked record format								
B9	ITB blocking factor								
B10	1. Use IRS characters 2. Do not use IRS characters								
B11	Block size								

Figure 0.1 (Part 2 of 4) - Planning Chart for Configuration Records

Question ID	Parameter Description	Communications Configuration Record Name							
B12	1. Transmit in transparent mode 2. Do not transmit in transparent mode								
B13	1. Expand blanks in data received 2. Do not decompress blanks								
B14	1. Use blank truncation 2. Do not use blank truncation								
B15	1. Enable reverse interrupt 2. Do not enable reverse interrupt								
B16	TTD receive limit								
B17	CAM I/O buffer size								
B18	Maximum number of line bid retries								
B19	Number of EOTs to send to EOT								
B20	Number of leading PAD characters								
B21	Number of trailing PAD characters								
B22	Receive timeout (in seconds)								
B23	Receive timeout retry count								
B24	Transmit timeout (in seconds)								
B25	Continue timeout (in seconds)								
B26	WACK receive limit								
B27	Record retransmit limit								
B28	Control number unit								
B29	Immediate disconnect								
S1	Primary LU name								
S2	Secondary PU name								
S3	Specific ID for XID (in hex)								
S4	SDLC station address (in hex)								
S5	Receive pacing count								

Figure 0.1 (Part 3 of 4) - Planning Chart for Configuration Records

Question ID	Parameter Description	Communications Configuration Record Name							
S6	Send pacing count								
S7	1. SYSSRJE 2. SYSSDCU 3. User program								
S8	Maximum number of users								
S9	1. Program issues logon 2. Program does not issue logon								
S10	1. Use NRZI 2. Do not use NRZI								
S11	Communications program timeout (in minutes)								
S12	Inactivity timeout (in seconds)								
S13	Block size								

S14	RU size - 00
	      - 01
	      - 02
	      - 03
	      - 04
	      - 05
	      - 06
	      - 07								

S15	Receive pacing count - 00
	      - 01
	      - 02
	      - 03
	      - 04
	      - 05
	      - 06
	      - 07								

S16	Send pacing count - 00
	      - 01
	      - 02
	      - 03
	      - 04
	      - 05
	      - 06
	      - 07								

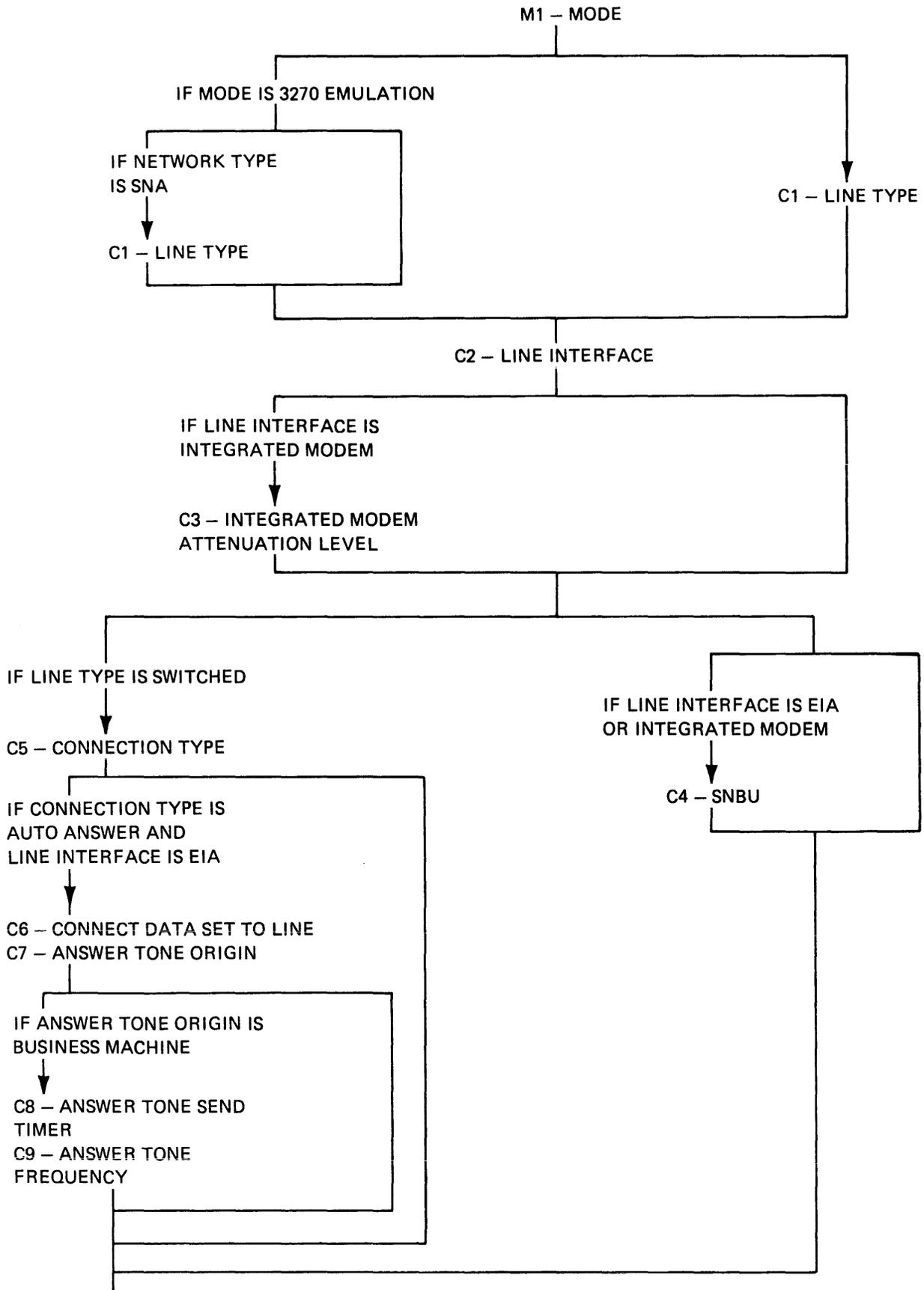Figure 0.1 (Part 4 of 4) - Planning Chart for Configuration Records

M1 — MODE

IF MODE IS 3270 EMULATION

IF NETWORK TYPE
IS SNA

C1 — LINE TYPE

C1 — LINE TYPE

C2 — LINE INTERFACE

IF LINE INTERFACE IS
INTEGRATED MODEM

C3 — INTEGRATED MODEM
ATTENUATION LEVEL

IF LINE TYPE IS SWITCHED

C5 — CONNECTION TYPE

IF CONNECTION TYPE IS
AUTO ANSWER AND
LINE INTERFACE IS EIA

C6 — CONNECT DATA SET TO LINE
C7 — ANSWER TONE ORIGIN

IF ANSWER TONE ORIGIN IS
BUSINESS MACHINE

C8 — ANSWER TONE SEND
TIMER
C9 — ANSWER TONE
FREQUENCY

IF LINE INTERFACE IS EIA
OR INTEGRATED MODEM

C4 — SNBU

Figure 0.2 (Part 1 of 6) - Parameter Prompting Sequence Chart

84.4

IF LINE INTERFACE IS EIA

C10 – WRAP CAPABILITY MODEM
C11 – CLOCKING

C12 – MODEM RATE

IF LINE TYPE IS NON-SWITCHED POINT TO POINT

C13 – CONSTANT REQUEST TO SEND

C14 – DATA SET READY TIMEOUT
C15 – LINE SPEED
C16 – FIRST CLEAR TO SEND DELAY
C17 – CAM NAME

IF MODE IS NOT 3270 EMULATION

C18 – LINE CODE

C19 – TRACE OPTION

IF MODE IS 3270 EMULATION

C20 – NO. OF PARTITIONS TO BE DEFINED
C21 – PARTITION DEFINITION

IF NETWORK TYPE
IS BSC

S1 – PRIMARY
LU NAME   1

IF MODE IS 3270
EMULATION

IF LINE TYPE IS MULTIPOINT

B16 – TTD RECEIVE
LIMIT   2

B6 – POLLING ADDRESS   3

B1 – DEVICE TYPE   4

Figure 0.2 (Part 2 of 6) - Parameter Prompting Sequence Chart

1

S1 – PLU NAME
S2 – SPU NAME
S3 – XID
S4 – SDLC STATION ADDRESS

IF MODE IS NOT 3270
EMULATION

S5 – RECEIVE PACING COUNT
S6 – SEND PACING COUNT
S7 – HOST SUBSYSTEM TYPE

IF 5280 APPLICATION PROGRAM IS SYSSDCU

S8 – MAXIMUM USERS

S9 – LOGON

IF LINE INTERFACE IS INTEGRATED
MODEM OR EIA

S10 – NRZI

S11 – COMMUNICATION PROGRAM TIMEOUT
S12 – INACTIVITY TIMEOUT

IF MODE IS NOT
3270 EMULATION

IF 5280 APPLICATION PROGRAM
IS USER PROGRAM

S13 – BLOCKSIZE

S14 – BIU SIZE
S15 – RECEIVE PACING CT
S16 – SEND PACING CT

SPECIFY WHERE TO SAVE
COMMUNICATIONS INFORMATION

Figure 0.2 (Part 3 of 6) - Parameter Prompting Sequence Chart

Figure 0.2 (Part 4 of 6) - Parameter Prompting Sequence Chart

IF IRS IS NO AND
LINE CODE IS EBCDIC

B12 — TRANSPARENCY

IF TRANSPARENCY IS YES

B14 — BLANK TRUNCATION

B13 — BLANK EXPANSION

IF BLANK EXPANSION IS NO

B14 — BLANK TRUNCATION

2

B15 — ENABLE REVERSE INTERRUPT
B16 — TTD RECEIVE LIMIT

IF MODE IS NOT
3270 EMULATION

B17 — CAM I/O BUFFER
SIZE

B18 — ENQ MAX
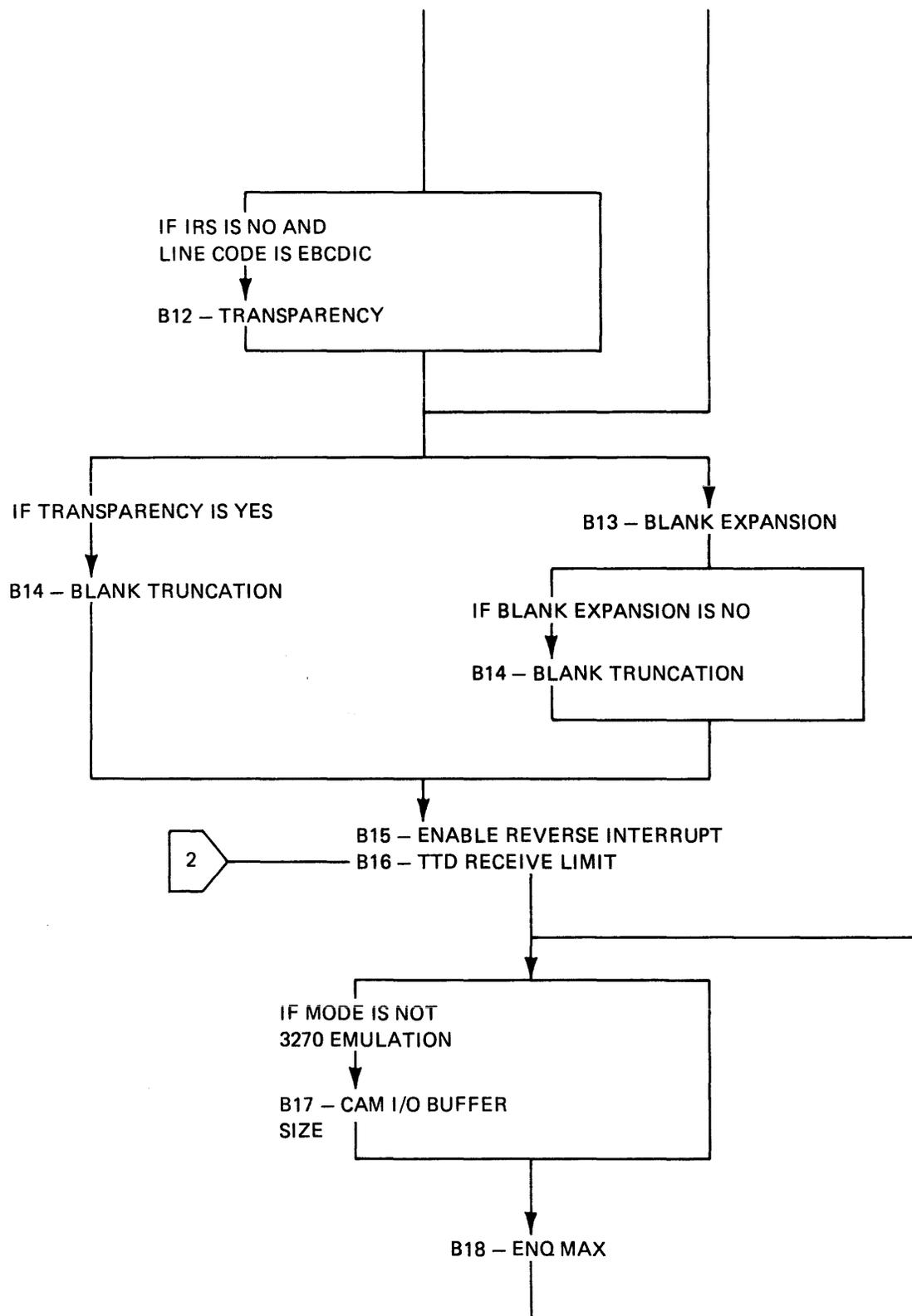
Figure 0.2 (Part 5 of 6) - Parameter Prompting Sequence Chart

84.8

IF MODE IS NOT
3270 EMULATION

B19 – EOT TO EOT

B20 – # OF LEADING PAD CHARS
B21 – # OF TRAILING PAD CHARS
B22 – RECEIVE TIMEOUT
B23 – RECEIVE TIMEOUT RETRY COUNT
B24 – TRANSMIT TIMEOUT
B25 – CONTINUE TIMEOUT

IF MODE IS 3270 EMULATION
OR IF DEVICE TYPE IS 3741 OR 3780

B26 – WACK RECEIVE LIMIT

B27 – RECORD RETRANSMIT LIMIT

IF MODE IS
3270 EMULATION

IF LINE TYPE IS SWITCHED
AND DEVICE TYPE IS 3741 OR
3780 (NOT MRJE)

B28 – CONTROL UNIT NUMBER

B29 – IMMEDIATE DISCONNECT

SPECIFY WHERE TO SAVE COMMUNICATIONS INFORMATION

Figure 0.2 (Part 6 of 6) - Parameter Prompting Sequence Chart

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The Diskette Drive Cable

7. If your auxiliary data stations have one or two diskette drives, fill in the blanks with the information required for the diskette drive cable. For example:

Aux Data Station __5282__
Location __Unit ½ on floor plan__
Socket On Prog Unit __Yellow Square__
Device Address __4800 / 4C00__
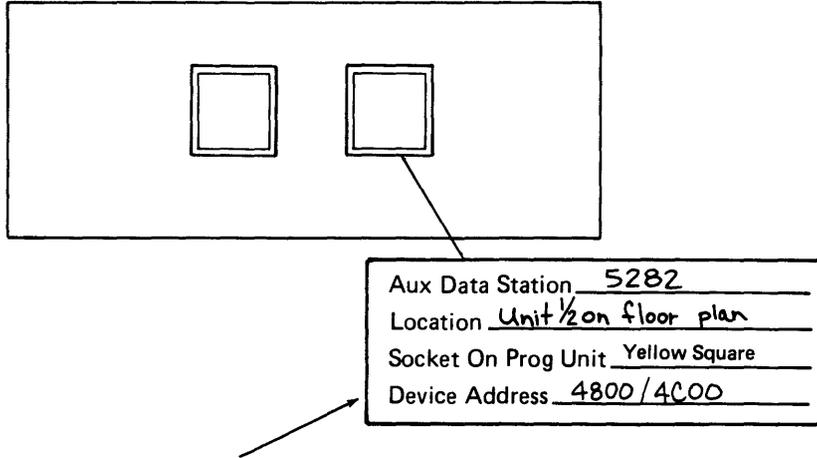
If your auxiliary data station has one diskette drive, the device address is 4800. If your auxiliary data station has two diskette drives, the device address is 4800/4C00 as shown in this example.

The Printer Cables (For an IBM 5285 Only)

8. If you have a printer attached to your system, fill in the
information required for your printer cable. For example:

For an IBM 5224, 5225, or 5256 printer
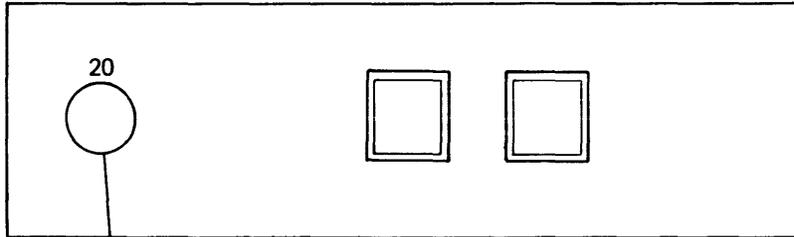
```
┌─────────────────────────────────────────────────┐
│   20                                             │
│   ◯                    ┌──┐      ┌──┐            │
│                        │  │      │  │            │
│                        └──┘      └──┘            │
│                                                  │
└─────────────────────────────────────────────────┘
```

┌─────────────────────────────────────┐
│ Printer Type __5256_____   │
│ Location _Unit 2 on the floor plan_   │
│ Socket On Prog Unit __20_____   │
│ Device Address__8000_____   │
└─────────────────────────────────────┘

For an IBM 5222 printer
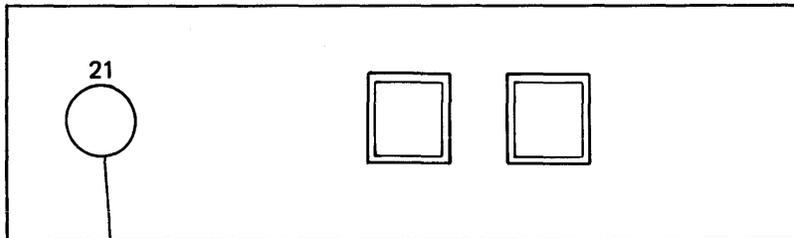
```
┌─────────────────────────────────────────────────┐
│   21                                             │
│   ◯                    ┌──┐      ┌──┐            │
│                        │  │      │  │            │
│                        └──┘      └──┘            │
│                                                  │
└─────────────────────────────────────────────────┘
```

┌─────────────────────────────────────┐
│ Printer Type __5222_____   │
│ Location _Unit 3 on floor PlAN_   │
│ Socket On Prog Unit __21_____   │
│ Device Address__8008_____   │
└─────────────────────────────────────┘

9. Go to *Labeling the Cables* later in this chapter.

d. If the auxiliary data station has one diskette drive, you must assign an available socket with one device address to that data station. For example:

```
5000
5400        5000      5400
 ⊠           9         10
 8
```

e. As you assign the 5280 diskette drive sockets to the auxiliary data stations, fill in the blanks with the information required for each diskette cable. For example:

```
   ○        ○        ○        ○        ○
```

```
4C00/                    5000/                    5800/
4800     4800     4C00    5400     5000    5400    5C00    5800    5C00
 ⊠        ⊠        ⊠        8       ⊠       ⊠       11       12      13
 6        6        7                9       10
```

Aux Data Station_____
Location_____
Socket On Prog Unit_____
Device Address_____

Aux Data Station_____
Location_____
Socket On Prog Unit_____
Device Address_____

Aux Data Station___5282____
Location Unit O/l on floor plan
Socket On Prog Unit____8____
Device Address 5000/5400

Note: For this example, the 5288 has four diskette drives. Therefore, the first three diskette drive sockets are crossed out. Also, the first auxiliary data station has two diskette drives.

Draw in the dashed line as you complete the appropriate block of information.
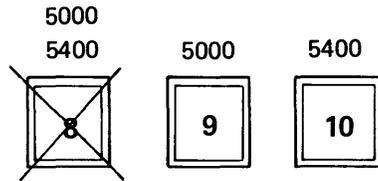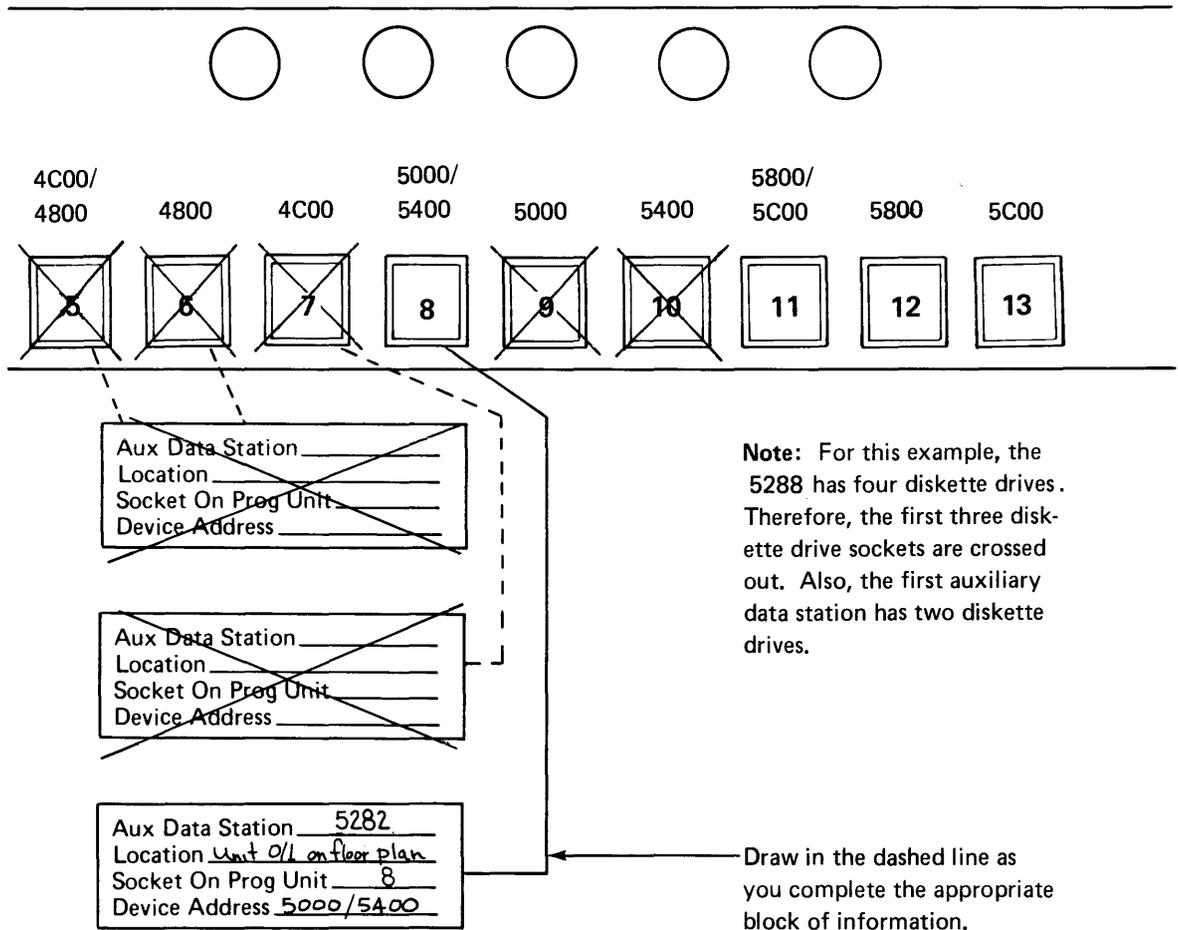
13. If you have any diskette sockets that are unused after all auxiliary work stations have been assigned, cross out these sockets on the system setup form.

| *The Printer Cables*

14. Using the floor plan, determine how many printers will be attached directly to the IBM 5280. Printers that are cabled through another printer are not directly attached to the IBM 5280. Then . assign the printer to an IBM 5280 printer socket and fill in the blanks for the information required for each printer cable. See the following examples.

One Socket Twinaxial
For IBM 5224, 5225, and 5256 printers:

```
                          20
                          ◯

        5000              5800/
  4800  4C00  5400  5000  5400  5C00  5800  5C00
  [6]   [7]   [8]   [9]   [10]  [11]  [12]  [13]
```

Printer Type _____
Location _____
Socket On Prog Unit ___20___
Device Address ___8000___
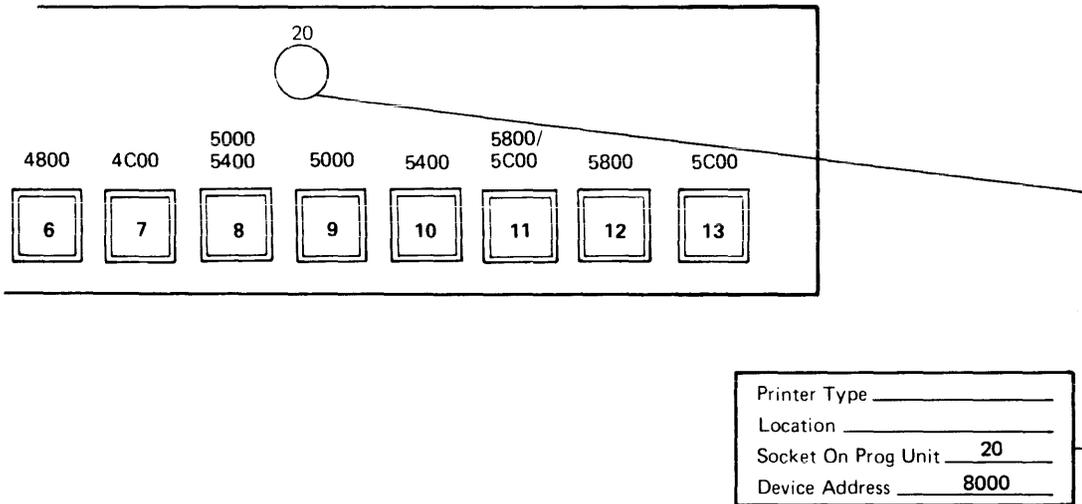
One Socket Start-Stop
For IBM 5222 printer only:
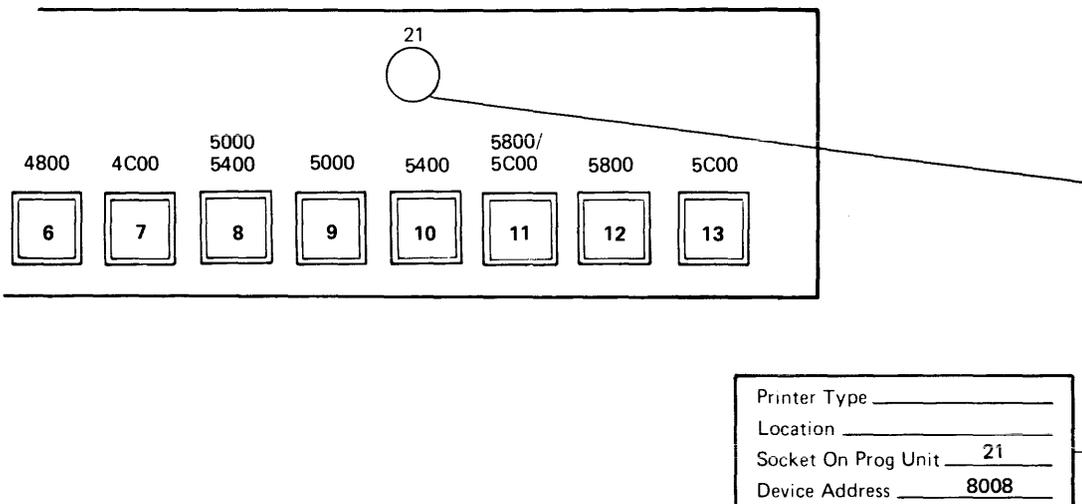
```
                          21
                          ◯

        5000              5800/
  4800  4C00  5400  5000  5400  5C00  5800  5C00
  [6]   [7]   [8]   [9]   [10]  [11]  [12]  [13]
```

Printer Type _____
Location _____
Socket On Prog Unit ___21___
Device Address ___8008___

Four Socket Twinaxial
For IBM 5224, 5225, and 5256 printer only

| Printer Type _____ |
| Location _____ |
| Socket On Prog Unit ___20___ |
| Device Address ___8000___ |

| Printer Type _____ |
| Location _____ |
| Socket On Prog Unit ___21___ |
| Device Address ___8008___ |

| Printer Type _____ |
| Location _____ |
| Socket On Prog Unit ___22___ |
| Device Address ___8010___ |

| Printer Type _____ |
| Location _____ |
| Socket On Prog Unit ___23___ |
| Device Address ___8018___ |
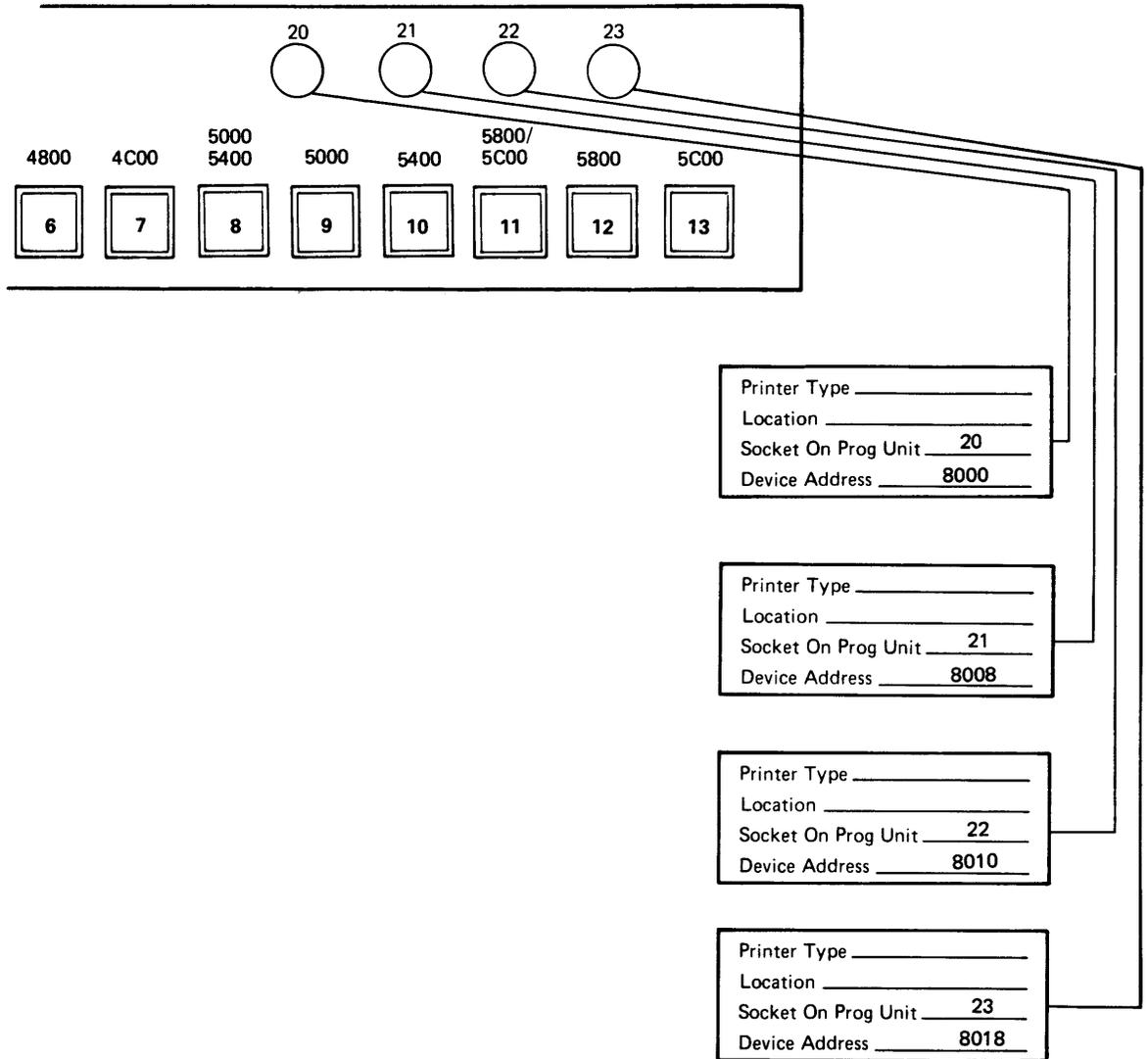
This page is intentionally left blank.

Five Socket Twinaxial/Start-Stop
For IBM 5222, 5224, 5225 and 5256 printers:

| | 20 | 21 | 22 | 23 | 24 |

| 4800 | 4C00 | 5000 5400 | 5000 | 5400 | 5800/ 5C00 | 5800 | 5C00 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
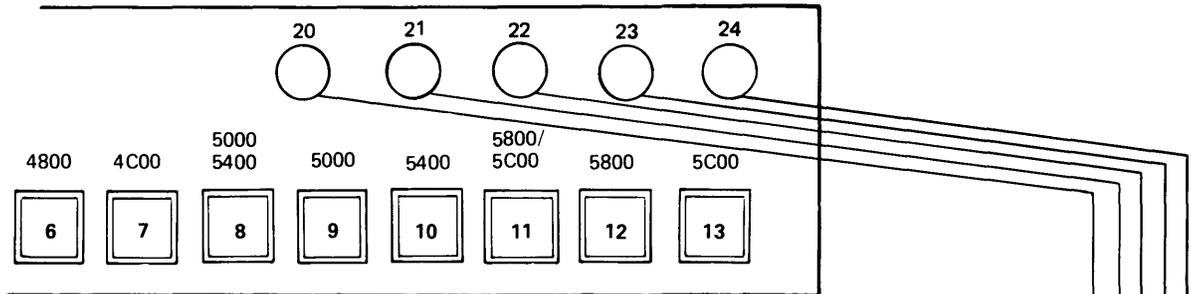
This socket is for twinaxial cable (IBM 5224, 5225, and 5256 printers) only.

Printer Type _____
Location _____
Socket On Prog Unit ___20___
Device Address ___8000___

Printer Type _____
Location _____
Socket On Prog Unit ___21___
Device Address ___8008___

Printer Type _____
Location _____
Socket On Prog Unit ___22___
Device Address ___8010___

These sockets are for IBM 5222 printers only.

Printer Type _____
Location _____
Socket On Prog Unit ___23___
Device Address ___8018___

Printer Type _____
Location _____
Socket On Prog Unit ___24___
Device Address ___8020___

LABELING THE CABLES

Once the system setup sheet has been completed and your ordered cables have arrived, you can use the system setup sheet to assist you in labeling the cables. Cables that are installed under a raised floor, through walls, and so on, should be labeled before they are installed. Once the cables are labeled with the proper information, the system can easily be set up. The package of labels (GX21-9339) required for labeling the cables can be ordered from your IBM marketing representative.

Aux Data Station_____
Location_____
Socket On Prog Unit _____
Device Address_____

You will need two labels for each data station cable, diskette cable, and printer cable on your system.

Labeling the Data Station Cables

If you ordered your display
cables from IBM, there will
be a green square on the
cable connector.

First, transfer the information from the system setup form to the labels
for the data station cables. For example:

Aux Data Station___5282___	Aux Data Station___5282___
Location Unit ½ on floor plan	Location __Unit ½ on floor plan__
Socket On Prog Unit__x__	Socket On Prog Unit__x__
Device Address_____~_____	Device Address_____~_____

Information from the Setup Form   Data Station Cable Label

Remember, you need to complete two labels for each cable. Now you
must use the floor plan to determine which data station cable goes
between the programmable unit and the appropriate auxiliary data
station. Then tie the appropriate labels to each end of the cable(s).

Labeling the Diskette Cables
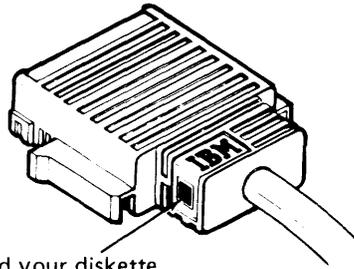
If you ordered your diskette
drive cables from IBM, there
will be a yellow square on
the cable connector.

As with the data station cables, transfer the information from the
system setup form to the labels. Then use the floor plan to determine
which diskette cable goes between the programmable unit and the
appropriate auxiliary data station.

Labeling the Printer Cables

IBM 5224, 5225, and 5256 Printer Cable   IBM 5222 Printer Cable (See note)
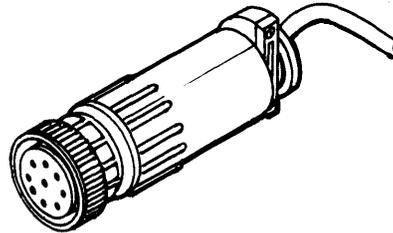
As with the data station and diskette cables, transfer the information
from the system setup form to the labels. Then use the floor plan to
determine which cable goes between the programmable unit and the
printer. Now, tie the appropriate label to the ends of each printer
cable(s).

Note: The IBM 5222 printer cable is attached to the printer and,
therefore, is not available until the machine arrives.

PREPARING THE SYSTEM CONFIGURATION CHECKLIST

Appendix B contains the system configuration checklist. Use this checklist when executing the system configuration program to generate user-defined IPL (initial program loader) diskettes. An IPL diskette contains the initial program and data areas that must be loaded into the system before you can use the system. IBM supplies you with a starter IPL diskette so that you can run your first program. Generally, the first program you run is the system configuration program. This program uses your responses to prompting messages to generate a user-defined IPL diskette. A user-defined IPL diskette allows you to load an IPL program and data areas that are tailored to your specific system. Some of the information you need when responding to the system configuration prompting messages is contained in this publication. The system configuration checklist in Appendix B identifies where the required information can be found. Fill in the blanks for the information that can be found in this manual. The system configuration checklist can then be completed by the person who will be running the system configuration program.

PREPARING FOR YOUR 5280 SYSTEM OPERATION

Your planning for the 5280 system should include plans for operating the system once it has been set up. Unless an efficient plan for conducting operations is developed beforehand, the initial period of operation is likely to be extremely disorganized. To aid in this effort, the following checklists and suggestions are offered:

Summary Checklist

To ensure that all the preinstallation activities have been addressed, complete the following checklist:

Cables Ordered

☐   Data station cables

☐   Diskette drive cables

☐   Printer cables

☐   Communication cable length specified

|

Licensed Programs Ordered

- ☐ System control programming

- ☐ DE/RPG

- ☐ Utilities

- ☐ Communications utilities

- ☐ Sort/Merge

- ☐ Assembler

- ☐ IBM 5280-3270 Emulation Licensed Program

Publications Ordered

- ☐ *System Concepts*, GA21-9352

- ☐ *Introduction to DE/RPG*, SC21-7803

- ☐ *DE/RPG User's Guide*, SC21-7804

- ☐ *DE/RPG Reference Manual*, SC21-7787

- ☐ *Utilities Reference/Operation Manual*, SC21-7788

- ☐ *System Control Programming Reference/Operation Manual*, GC21-7824

- ☐ *Sort/Merge Reference/Operation Manual*, SC21-7789

- ☐ *Assembler Language Reference Manual*, SC21-7790

- ☐ *Communications Reference Manual*, SC34-0247

- ☐ *Master Index*, GA21-9356

- ☐ *Functions Reference Manual*, GA21-9353

- ☐ *DE/RPG Problem Determination Procedures for the Programmer*, SC21-7852

- ☐ *COBOL Language Reference Manual*, GL23-0031

- ☐ *COBOL Programmer's Guide*, SL23-0032

- ☐ *IBM 5280 COBOL Host Compilers Problem Determination Manual*, SL23-0043

- ☐ *IBM 3270 Emulation Reference Manual*, SC34-0384

The information in this chapter is provided to help you identify and prepare an installation site. Use the first section of this chapter when making a floor plan. The second section provides unit specifications; the third section contains information for anyone installing the cables.

Experience has shown the importance of having a working environment and operator furniture that promotes optimum operator performance, safety, and comfort. Consider the following factors and physical requirements when selecting and preparing an installation site.

FURNITURE CONSIDERATIONS

The table you set your data station(s) on should allow for adequate operator comfort. The recommended table size for optimum operator performance is:

- Table height: 660 to 690 millimeters (26 to 27 inches).

- Knee clearance: 635 millimeters (25 inches) from the underside of the table to the floor.

- Depth: For single data stations, a minimum of 760 millimeters (30 inches); for dual data stations, a minimum of 1.12 meters (44 inches) to a maximum of 1.22 meters (48 inches).

- Width: For single data stations, 1.14 meters (45 inches); for dual data stations, a minimum of 1.68 meters (66 inches).

- Tables should be strong enough to support the weight of the data stations. (See the specifications later in this chapter for the weight of each data station.)

Note: Standard tables with a height of 660 to 690 millimeters (26 to 27 inches) might not be available. If you have to special order the tables, make sure you allow six to eight weeks for delivery.

The following is one example of a table arrangement suitable for the
IBM 5282 and 5286 dual data stations. Notice that placing a cabinet
on either side of the table not only provides storage close at hand, but
work space to place your working documents when you have a dual
data station. Placed lengthwise, this table can be used for the IBM 5281
and 5285 data stations.
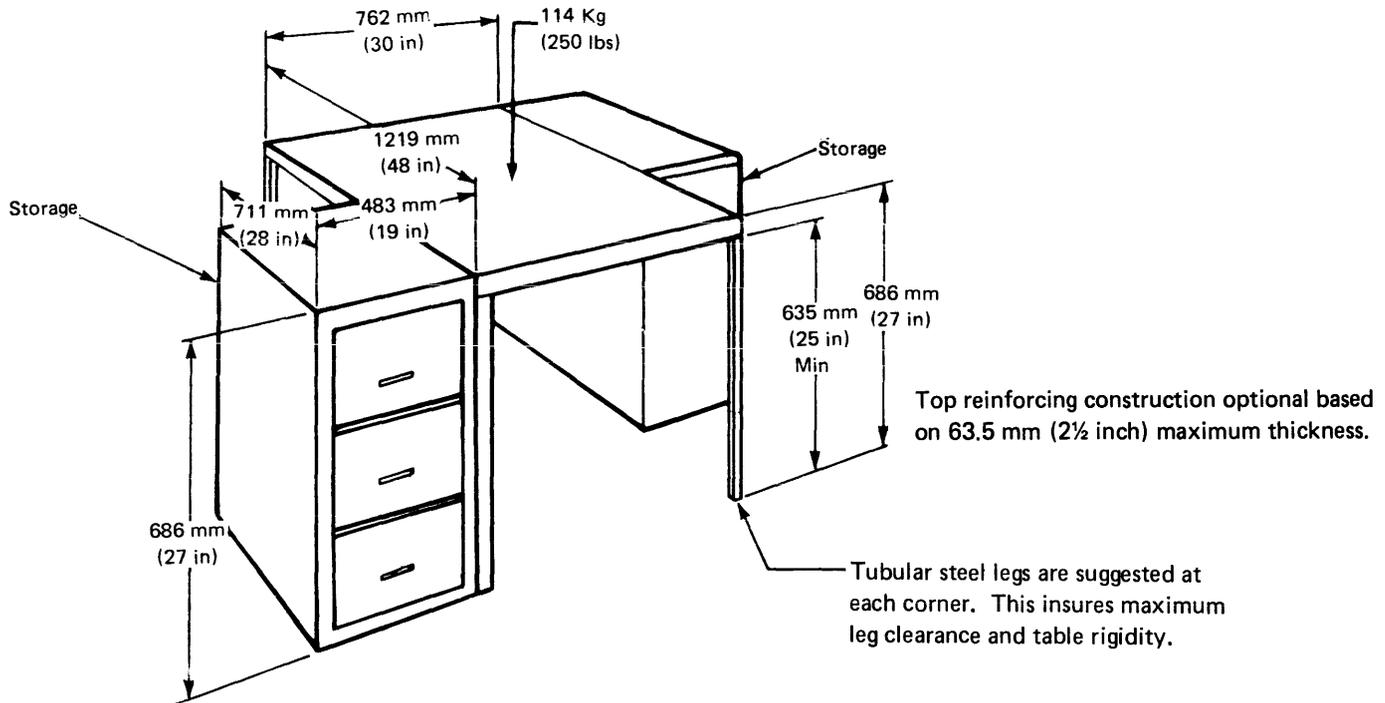
Top reinforcing construction optional based
on 63.5 mm (2½ inch) maximum thickness.

Tubular steel legs are suggested at
each corner. This insures maximum
leg clearance and table rigidity.

Following are considerations for the previously described table:

• Plastic laminate top with a matte or satin finish.

• Must be able to sit at ends or sides of table. Cross braces between
  table legs cannot be lower than the 635 mm (25-inch) minimum
  specified dimension.

The table you set your IBM 5222, 5224, or 5256 printer on should
allow for knob clearance, paper movement, and the storage of any
printer-related materials. The recommended table size is:

• Height: 675 to 750 millimeters (27 to 30 inches)

• Depth: 500 to 900 millimeters (20 to 36 inches)

• Width: 600 to 750 millimeters (24 to 30 inches)

MAKING A FLOOR PLAN

The arrangement of your 5280 units should provide for efficient workflow and should make economical use of existing facilities. To aid you in preparing a floor plan, Appendix D contains floor-plan drawings of the 5280 machines, scaled at 1 millimeter = 50 millimeters (1/4 inch = 1 foot). Sheets of grid paper are also provided. When floor-plan drawings are cut out and placed on a grid-paper drawing of the work area, the devices can be moved about to help define the best room arrangement.

Draw the dimensions of the room
or area to scale on the grid paper.
Be sure to include doors and windows.

In addition to those factors previously listed under *Furniture Considerations*, the following space requirements and considerations must be reviewed when a floor plan is made:

☐ The IBM 5222, 5224, or 5256 printer should be placed on a table for convenient operation. The printer must not be placed on top of a 5288 Programmable Control Unit. The IBM 5288 is not designed to support other machines.

☐ The IBM 5225 printer must be positioned to allow access to the front and the back.

☐ To ensure proper servicing, set up the first auxiliary data station (see the system summary worksheet in Chapter 1) that is connected to an IBM 5288 Programmable Control Unit within easy viewing distance of the programmable control unit. It is recommended that the first auxiliary unit be within 6 meters (20 feet) of the programmable control unit.

☐ Reserve adequate storage space by each IBM 5280 unit for storing documentation. A storage device large enough to hold the maintenance and operator information is shipped with each unit.

☐ Subject to local requirements, each IBM 5280 unit has a power cord that is 2.4 meters (8 feet) long. Consider allocating one grounded electrical outlet for each device, with an extra outlet reserved for service and miscellaneous needs.

☐ If you have ordered a printer, consider installing the printer within sight of a data station. This arrangement will facilitate program testing and will make it easier to check on proper printer operations.

☐ Miscellaneous equipment: consider other items that will be or should be in the same area as your system, such as office equipment and furniture.

☐ Consider the possible future expansion of your system workload and facilities.

ELECTRICAL REQUIREMENTS

Voltage and Frequency

The IBM 5280 machines operate at the following voltages:

Nominal Voltage	60 Hertz		50 Hertz	
	Minimum	Maximum	Minimum	Maximum
100	90	110	90	110
110			99	121
115/120	104	127		
123.5			111	136
200	180	220	180	220
208	187	229		
220	198	242	198	242
230	207	253		
235			212	258

The allowable voltage variation is plus or minus 10%.

Power Cords and Receptacles

Each machine has a three-wire power cord that includes an equipment ground wire. See the *System Specifications* section in this chapter for detailed information on power cord lengths, plug styles, and cord styles.

Branch Circuits and Grounding

The power cords have either a green, or yellow and green equipment ground wire. For safety, each branch circuit must have an insulated wire conductor, equal to the size of the phase conductor, for grounding the equipment. All branch-circuit ground wires should run from the distribution panel, and a single ground wire should run from the distribution panel to a service ground or a suitable building ground. Figure 0.3 illustrates proper grounding for IBM 5280 systems.

Safety Precaution: The conduit must not serve as the only means of grounding because it might not be continuous. The system neutral must be electrically isolated from the ground conductor except at the building ground station.

AC Power Distribution in a Typical Commercial Building

Main Distribution Panel

120V 120V

208V

Transformer

Neutral
Bus

Center
Tap

Ground
Bus

Note: This diagram is
intended as a conceptual
overview only. A qualified
electrician should be con-
sulted for your specific
situation.

Power
Panel

A

These buses must be tied to an
approved ground source. They
can be tied through wire (A)
but, if possible, a ground source
should be supplied through wire
(B) also.

These buses
must not be
tied together
in the power
panel.

Neutral
Bus

Ground
Bus

B

Earth
Ground

Ground

Hot

Neutral

120 Vac Receptacle
Front View

To Other 120 Vac
Circuits

Figure 0.3. Proper Grounding

AC Power Terms

Current Carrying Ground: This is the neutral line that is connected to the neutral bus.

Neutral Bus: This bus bar is inside the power panel. The neutral line should be tied to this bus. The neutral bus should be tied to the ground bus only at the main distribution panel.

Main Distribution Panel: This is the first power panel inside of the customer's building. This panel is fed directly from the power company lines. The ground bus in this panel is serviced by the service entrance ground.

Ground Bus: This bus bar is in the power panel. The ground wire for the power source of the IBM 5280 should connect to this bar, along with a wire into the panel from an approved earth ground source.

Earth Ground: The definition depends upon local electrical building codes. Usually, an earth ground is supplied in two forms:

1. A metal pipe running into the earth and containing running water. Stagnant water or sump lines are not good earth ground sources. Lines broken by nonmetal connnections do not supply a good earth ground.

2. A metal stake driven into the ground. The length of the stake and the depth to which it must be driven into the ground depends on local codes.

Noncurrent Carrying Ground: This is the line from the ground in the receptacle to the ground bus.

ENVIRONMENTAL CONSIDERATIONS AND REQUIREMENTS

Temperature, Relative Humidity, and Wet Bulb

The following chart shows the temperature and humidity limits for the 5280 system.

Operating Environment (System is turned on)	
Temperature	16° to 32°C (60° to 90°F)
Relative Humidity	8% to 80%
Maximum Wet Bulb	23°C (73°F)
Nonoperating Environment (System is turned off)	
Temperature	10° to 43°C (50° to 110°F)
Relative Humidity	8% to 80%
Maximum Wet Bulb	27°C (80°F)
Storage Environment	
Temperature	0° to 60°C (33° to 140°F)
Relative Humidity	5% to 80%
Maximum Wet Bulb	0° to 30°C (33° to 85°F)
Shipping Environment	
Temperature	-40° to 60°C (-40° to 140°F)
Relative Humidity	5% to 100% (including condensation, excluding rain)
Maximum Wet Bulb	0° to 30°C (33° to 86°F)

If your site environment is outside the specified temperature or humidity ranges, you should consult an air-conditioning or humidity-control expert.

You should also make note of the humidity limits of your supplies. These limits might vary for different materials, such as printer forms, carbonized printer forms, printer ribbons, and diskettes. If operating and storage areas cannot be maintained at similar temperature and humidity levels, allow enough time for the supplies to adapt to operating room conditions before using them.

Diskette Environment

Temperature:	10° to 51° C (50° to 125° F)
Relative humidity:	8% to 80%
Maximum wet bulb temperature:	29° C (85° F)

Electrostatic Discharge

With low humidity levels, static charges generated by the movements of people, carts, furniture, and paper are more readily stored in certain types of floor construction, floor coverings, and furniture. These charges might create an annoying static shock when discharged upon contact with another person or object. If discharged to or near data processing or other electronic equipment, these charges can cause intermittent interference. To minimize electrostatic discharge, maintain suitable humidity levels and avoid the use of the following materials:

- High-resistance floor surface material

- Carpeting that lacks antistatic properties

- Plastic seat covers

Lotions and sprays are commercially available for carpeting that tends to store static charges. If low humidity levels and the static charges that result are a recurrent problem, you might consider installing a humidifier.

Electromagnetic Compatibility

Do not install the machines in areas where high electromagnetic interference can be radiated or conducted. Such areas might exist near some radio-frequency sources, such as:

- Radio-transmitting antennas (AM, FM, TV, or two-way radio)

- Radar (FAA or military)

- Certain industrial machines (rf induction heaters, rf arc welders, or insulation testers)

- Time clocks

- Certain electrical heating systems

- High-energy power lines

If your proposed installation site is near any of the above, determine what special installation or product considerations are necessary to ensure normal operation. Your IBM representative can help you determine what, if any, adjustments are appropriate.

Atmospheric Contaminants

Particulate, liquid, and gaseous atmospheric contaminants in some industrial environments, especially those in the process industries, can corrode copper and other metals used in the IBM 5280 units. Extensive corrosion in any computer equipment can produce electrical short circuits or contact failures. These conditions can in turn cause system malfunctions.

If you are in doubt about the atmospheric conditions of your installation site, consult your IBM representative.

CABLING CONSIDERATIONS

Four types of cables are used to connect the devices together within an IBM 5280 system:

- Data station cable

- Diskette drive cable

- Printer cable

- Modem cable

The *data station cable* is always required when auxiliary data stations (IBM 5281 or 5282) are attached to a programmable unit (IBM 5285, 5286, or 5288).

The *diskette drive cable* is required if the auxiliary data station has one or two diskette drives. This cable is required in addition to the data station cable.

The *printer cable* is required to connect an IBM 5224, 5225, or 5256 printer to an IBM 5285, 5288, or each other. An attachment cable connects the IBM 5222 printer to an IBM 5285 or 5288 and is supplied with the printer.

The *modem cable* is used to connect an IBM 5280 programmable unit to a communications facility and is supplied with the communications feature.

Data station, diskette drive, and printer cables can be obtained from IBM or from other sources. Communications cables are a part of the communications feature and come from IBM.

Order your cables early. Length restrictions are noted in the following
chart. Normally the data station and diskette drive cables will be the
same length for any one particular data station. Consult your floor
plan as well as the following considerations when determining cable
lengths.

Type of Cable	Between Programmable Unit And:*	Length
Data station multiconductor	Auxiliary keyboard/display	1.5 to 61 meters (5 to 200 feet)
Diskette drive multiconductor	Auxiliary diskette drive(s)	1.5 to 61 meters (5 to 200 feet)
Twinaxial	Printers (IBM 5224, 5225, and 5256)	Up to 1525 meters (5000 feet)
Four-conductor, double-twisted pair	Printer (IBM 5222)	6 meters (20 feet). Up to 55 meters (180 feet) of extension cabling can be ordered as an accessory
Communications multiconductor	Communications facility (modem, etc.)	6.1 or 12.2 meters (20 or 40 feet)
*The IBM 5280 programmable units are the 5288 Programmable Control Unit, the 5285 Programmable Data Station, and the 5286 Dual Programmable Data Station		

Use your floor plan when determining cable lengths.

☐ Allow enough cable to move the machines for servicing. A minimum of 0.6 meters (2 feet) at both ends is recommended beyond the required length to connect the units.

☐ Consider how the cables will be routed in the building. Care should be taken to ensure that the cables do not present obstacles to easy movement and are not exposed to possible damage.

☐ If ordering preassembled cables, remember that each end of the cable will have a connector of the following dimensions:

21 mm (28/32 in)

273 mm (2 7/8 in)

IBM 5222 Printer Cable

23 mm (29/32 in)

Data Station and Diskette Drive Cable   IBM 5224, 5225, and 5256 Printer Cable

Do not remove any connectors. If the cable must pass through a wall, be sure that a large enough opening can be provided.

☐ If cables will be installed in the ceiling, consider the distance from the ceiling to each machine. Similarly, consider the distance from the floor to each machine if the cable route will be on or beneath the floor.

☐ Only twinaxial (printer) cables can be installed outside. Station protectors should be obtained for such outside installations. See the *Cables* section of this chapter.

☐ Cable runs, both horizontal and vertical, must be supported every 3 meters (10 feet).

☐ Cables can be run in the same conduit as telephone lines, provided adequate openings are made for cable connectors.

Note: When installing cables label each cable at both ends. This very important step is explained in Chapter 7, *Preparing for Customer Setup.*

Once you have identified the types of cables needed and their lengths, you should order the cables. Plan to have all cables and connectors in your possession no later than four weeks before the IBM 5280 units arrive.

Ordering Data Station, Diskette Drive, and Printer (Twinaxial) Cables

Preassembled cables can be ordered through your IBM representative by specifying the part number and the desired length.

- Data station cable, part 7364212

- Diskette drive cable, part 7364208

- IBM 5224, 5225, and 5256 printer cable, part 7362267

- Extension cabling for the IBM 5222 printer, up to 55 meters (180 feet), IBM part 6846671

If you plan to purchase bulk cables and assemble them, or to order cables from another source, refer to the *IBM 5280 Cable Assembly Manual*, GA21-9341, for specifications and assembly procedures. A package of labels (GX21-9339) for labeling your cables can be ordered from your IBM marketing representative.

Ordering Communications Cable

A communications cable is provided by IBM when the communications feature is ordered, but you must specify the length desired, either 6 meters (20 feet) or 12 meters (40 feet).

Signal Separation Guide for Multiconductor/Twinaxial Cable

The following distances are a guide for voltages up to 440 volts. Signal cables should not be installed near power lines transmitting or electrical equipment using more than 440 volts.

The minimum distance between signal cable and fluorescent, neon, or incandescent lighting fixtures is 127 millimeters (5 inches).

The minimum distance between signal cable and unshielded power lines or electrical equipment depends upon the power consumption of the equipment:

- 2 kVA or below: 127 millimeters (5 inches)

- 2-5 kVA: 305 millimeters (12 inches)

- Over 5 kVA: 610 millimeters (24 inches)

The minimum distance between signal cable and unshielded power lines or electrical equipment with the signal cable enclosed in a grounded metallic conduit is:

- 2 kVA or below: 63.5 millimeters (2.5 inches)

- 2-5 kVA: 152 millimeters (6 inches)

- Over 5 kVA: 305 millimeters (12 inches)

The minimum distance between signal cable and power lines in a grounded metallic conduit is:

- 2 kVA or below: 63.5 millimeters (2.5 inches)

- 2-5 kVA: 152 millimeters (6 inches)

- Over 5 kVA: 305 millimeters (12 inches)

The minimum distance between signal cable enclosed in a grounded metallic conduit and power lines enclosed in a grounded metallic conduit is:

- 2 kVA or below: 30.5 millimeters (1.2 inches)

- 2–5 kVA: 76 millimeters (3 inches)

- Over 5 kVA: 152 millimeters (6 inches)

IBM 5222 PRINTER

Plan View
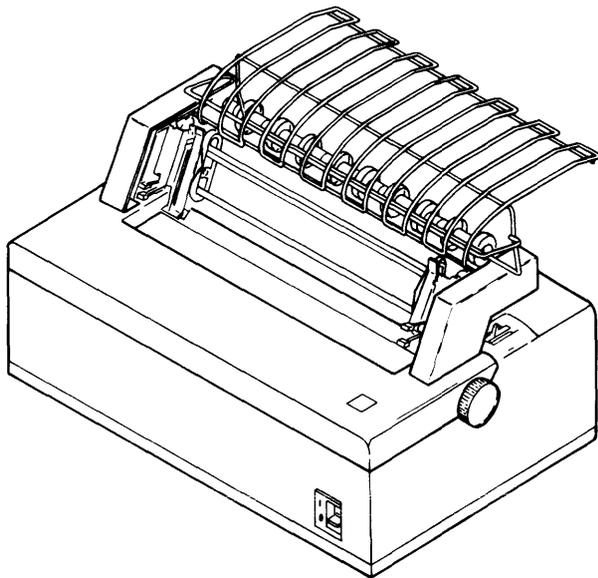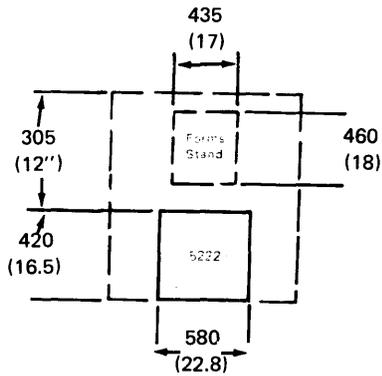
Specifications

Dimensions:[1]

	Width	Depth	Height
Millimeters	580	420	360
Inches	22.8	16.5	14.1

Service Clearances:*

	Front[1]	Rear	Right	Left
Millimeters	37	305	100	100
Inches	1.5	12	4	4

Weight: 31.7 kg (70 lb)

Heat Output: 125 watts (427 Btu/hr)

Airflow: 0 m³/min (0 CFM). The IBM 5222 printer can operate in a static airflow environment.

Power Requirements:

Voltage	120
kVA	0.1
Phase	1
Plug type[1]	H
Power cord style[1]	**

Operating and Nonoperating Environment: See *Environmental Considerations and Requirements* in this chapter.

[1]The power cord is 1.8 meters (6 feet) long and is pluggable at both ends. For more information, see *Power Plugs and Receptacles* in this section.

*Provide for operator access and forms carrier.

**The power cord is 6 meters (20 feet) long. For more information, see *Power Plugs and Receptacles* in this section.

IBM 5224 Printer

Plan View
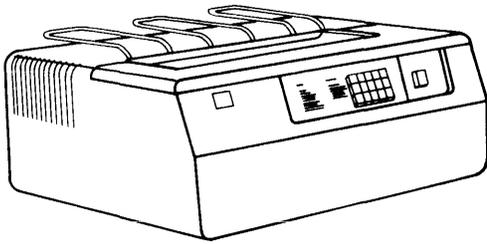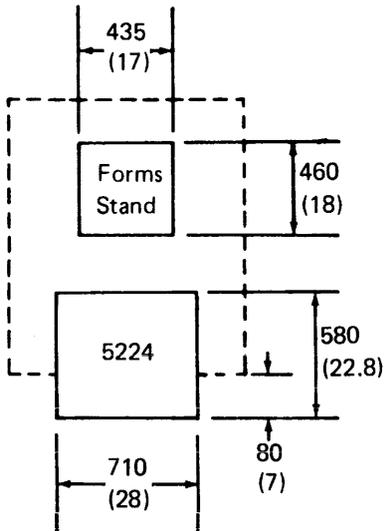
Specifications

Dimensions:	Width	Depth	Height	
Millimeters	710	580	280	
Inches	28	22.8	11	

Service Clearances:*	Front	Rear	Right	Left
Millimeters	N/A	400	150	150
Inches	N/A	16	6	6

Weight: 61 Kg (135 lb)

Heat Output:	Model 1	Model 2
BTU/hr	1850	2050
Watts	550	600

Airflow: 2.3 m^3/min (100 cfm)

Power Requirements:	Model 1	Model 2
Voltage	100-240	100-240
kVA	0.55	0.60
Phase	1	1
Plug type	H,J,K, or L	H,J,K, or L
Power cord style	**	**

Operating and Nonoperating Environment: See *Environmental Considerations and Requirements* in this chapter.

* Provide for operator access and forms carrier.

**The power card is 2.45 m (8 ft) long. For more information, see *Power Plugs and Receptacles* in this section.

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5225 PRINTER

Plan View

Specifications

Dimensions:

	Width	**Depth**	**Height**
Millimeters	1100	750	1000
Inches	43-3/4	29-1/2	39-1/2

Service Clearances:

	Front[1]	**Rear**	**Right**	**Left**
Millimeters	1000	1000	0	900
Inches	39-1/2	39-1/2	0	35-1/2

Weight: 250 kg (550 lb)

Heat Output:

	Model 1	**Models 2, 3, and 4**
Btu/hr	1880	2900
Watts	550	850

Airflow: 4.5 m^3/min (150 cfm)

Power Requirements:

	Model 1	**Models 2, 3, and 4**
Voltage	120, 208, 240	120, 208, 240
kVA	.75	1.0
Phase	1	1
Plug type[1]	H, J, K or L	H, J, K, or L
Power cord style[1]	A8	A8

Operating and Nonoperating Environment: See *Environmental Considerations and Requirements* in this chapter.

[1]The power cord is 2.4 meters (8 feet) long. For more information, see *Power Plugs and Receptacles* in this chapter.

CABLING FOR AN AUXILIARY DATA STATION

Note 1

```
┌──────────────┐          ┌──────────────┐
│              │    /     │              │
│  5285, 5286, ├────/─────┤  5281 or     │
│  or 5288     ├──────────┤  5282        │
│              │    \     │              │
└──────────────┘    \     └──────────────┘
```

Note 2

One 5281 or 5282 can be attached to a 5285 (w/o SF2500 communications adapter) or 5286. 5281 or 5282, for a total of no more than four keyboards, can be attached to the 5288.

Notes:
1. The multiconductor data station cable (IBM part 7364212) is always required when auxiliary data stations (5281 or 5282) are attached to a programmable unit (5285, 5286, or 5288).
2. The multiconductor diskette drive cable (IBM part 7364208) is required if the auxiliary data station has one or two diskette drives. This cable is required in addition to the data station cable.

CABLING FOR PRINTERS

The twinaxial printer cable (IBM part 7362267) is required to connect an IBM 5224, 5225, or 5256 printer to an IBM 5285, 5288, or to each other. Each IBM 5222 printer is attached individually to an IBM 5285 or 5288 by a 6-meter (20-foot), four-conductor, double-twisted pair cable. Up to 55 meters (180 feet) of additional 5222 cable can be ordered as an accessory (IBM part 6846671).

The following examples illustrate how the printers may be connected to the IBM 5280 system using the various printer attachments available:

One printer can be attached to the IBM 5285.
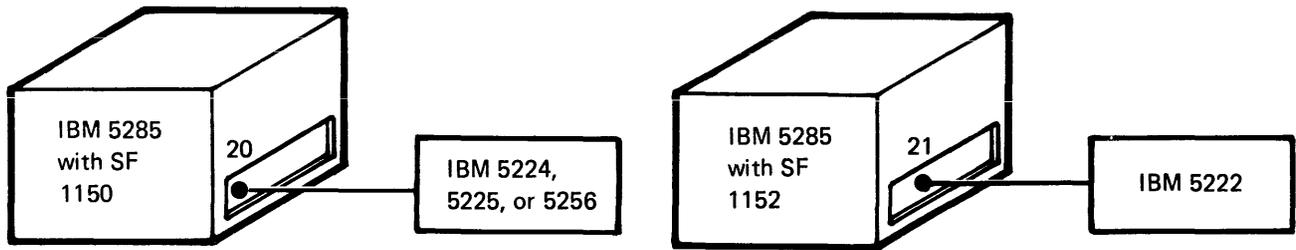
PRINTER LIMITATIONS ON THE IBM 5288

A maximum of 8 printers can be attached to the IBM 5288. The IBM 5222 is always attached individually to an IBM 5285 or 5288. Printer speed may be affected by programs, application load, forms design, and/or the number of printers attached to the system. IBM 3270 Emulation only supports up to 5 printers.

Example A

Four sockets provide for the attachment of up to eight IBM 5224, 5225, or 5256 printers.
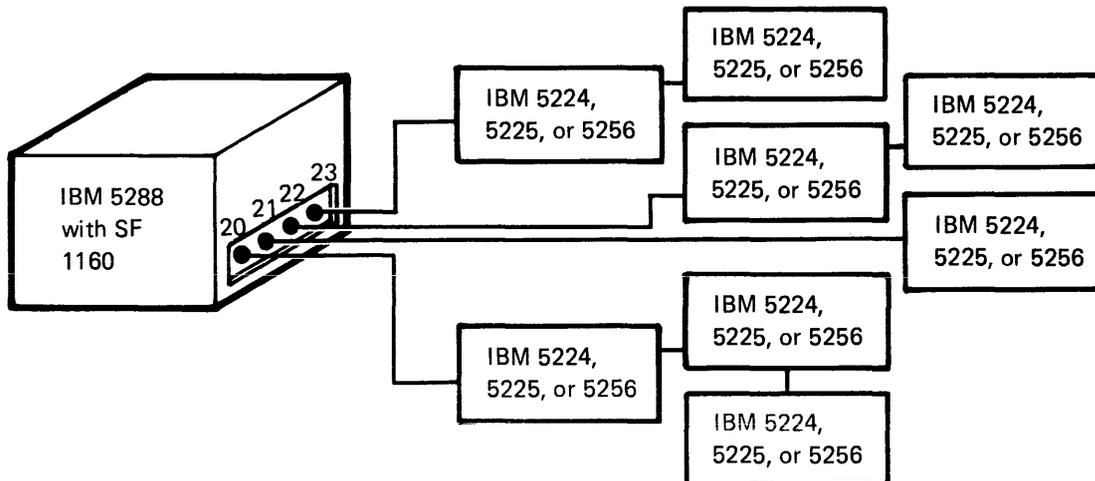
Example B

A single socket provides for the attachment of up to seven IBM 5224, 5225, or 5256 printers using the Cable Thru feature.

```
┌─────────────┐        ┌──────────┐    ┌──────────┐   ┌──────────┐
│ IBM 5288    │ 20     │ IBM 5224,│────│ IBM 5224,│───│ IBM 5224,│
│ with SF     │        │ 5225, or │    │ 5225, or │   │ 5225, or │
│ 1155        │        │ 5256     │    │ 5256     │   │ 5256     │
└─────────────┘        └──────────┘    └──────────┘   └──────────┘
                                                            │
                                                      ┌──────────┐
                                                      │ IBM 5224,│
                                                      │ 5225, or │
                                                      │ 5256     │
                                                      └──────────┘
                                                            │
                       ┌──────────┐    ┌──────────┐   ┌──────────┐
                       │ IBM 5224,│────│ IBM 5224,│───│ IBM 5224,│
                       │ 5225, or │    │ 5225, or │   │ 5225, or │
                       │ 5256     │    │ 5256     │   │ 5256     │
                       └──────────┘    └──────────┘   └──────────┘
```
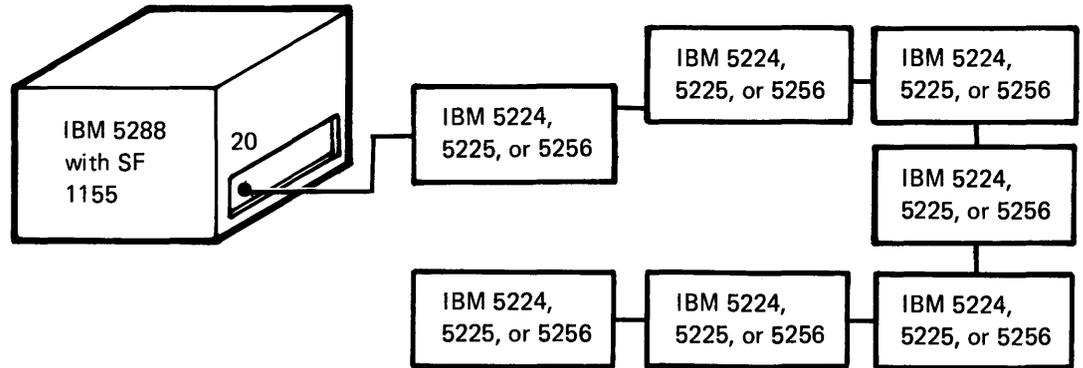
Example C

A single socket provides for the attachment of a single IBM 5222 printer.

```
┌─────────────┐
│ IBM 5288    │ 21     ┌──────────┐
│ with SF     │────────│ IBM 5222 │
│ 1157        │        └──────────┘
└─────────────┘
```
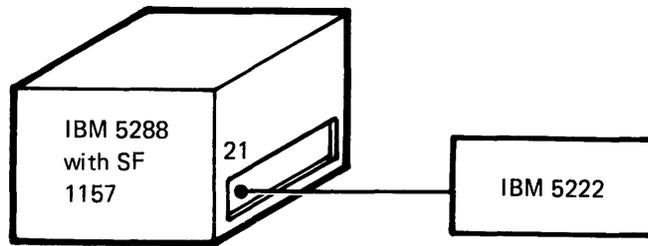
Example D

Five sockets provide for the attachment of any combination of up to four IBM 5222 printers and up to seven 5224, 5225, or 5256 printers. The total number of printers cannot exceed eight.

```
                                          ┌──────────┐
                                          │ IBM 5222 │
                                          └──────────┘
                                                      ┌──────────┐
                                                      │ IBM 5222 │
┌─────────────┐                                       └──────────┘
│ IBM 5288    │                           ┌──────────┐
│ with SF     │ 20 21 22 23 24            │ IBM 5222 │
│ 1162        │                           └──────────┘
└─────────────┘                                       ┌──────────┐
                                                      │ IBM 5222 │
                                                      └──────────┘
                                          ┌──────────┐
                                          │ IBM 5224,│ ┌──────────┐
                                          │ 5225, or │ │ IBM 5224,│
                                          │ 5256     │ │ 5225, or │
                                          └──────────┘ │ 5256     │
                                                       └──────────┘
                       ┌──────────┐    ┌──────────┐
                       │ IBM 5224,│────│ IBM 5224,│
                       │ 5225, or │    │ 5225, or │
                       │ 5256     │    │ 5256     │
                       └──────────┘    └──────────┘
```
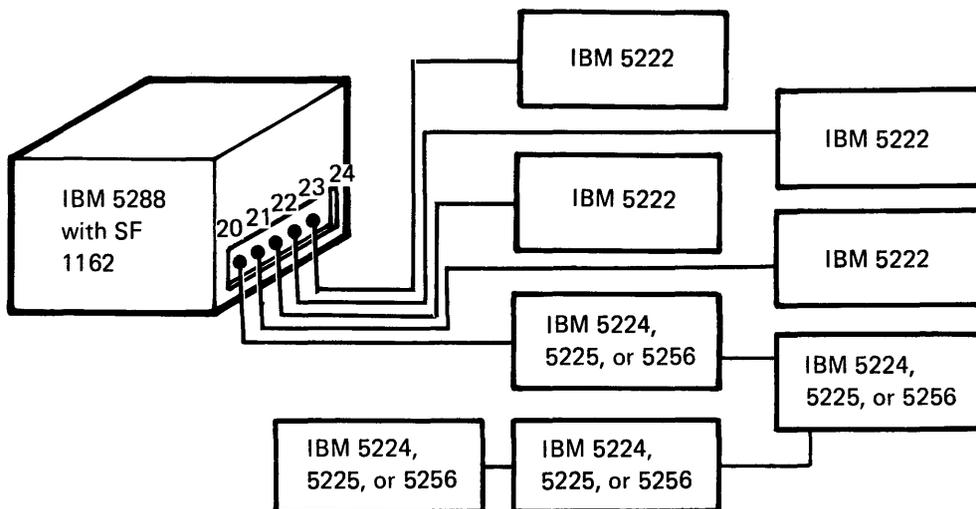
Example E

Another example of up to eight printers attached.
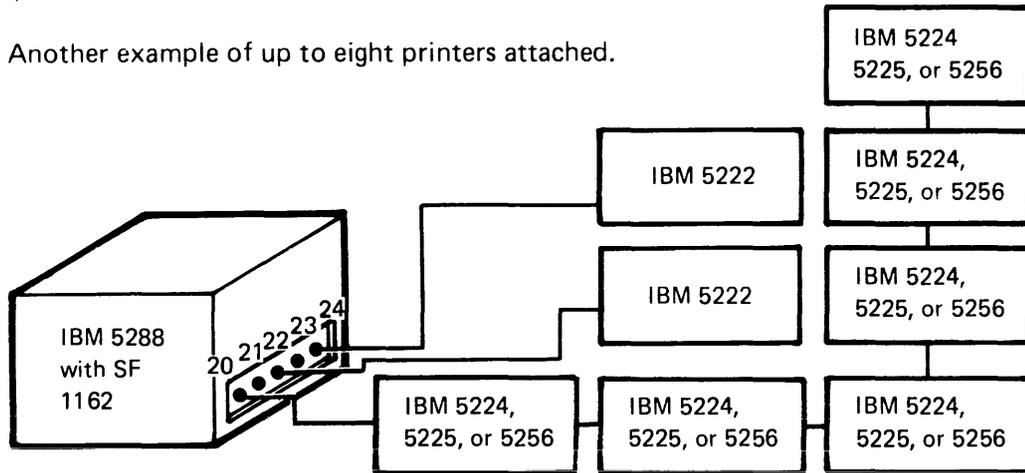
Note: In this example sockets 21 and 23 are unused.

CABLES

For multiconductor and twinaxial cables (used to interconnect IBM
5280 units), you are responsible for determining the proper lengths,
ordering the cables (if the cables are not obtained from IBM), install-
ing, and maintaining the cables. For twinaxial cables (used to connect
IBM 5224, 5225, and 5256 printers to controlling units), you are
responsible for supplying, installing, and maintaining cables to attach
the units to each other or to any host system. The IBM 5222 printer
is supplied with a 6-meter (20-foot), four-conductor, double-twisted
pair, cable. Extension cabling can be ordered as an accessory. This
section explains which cables you should order, and how to install
them.

It is important that you order your cables early, so that cable labeling
and testing can be completed before the system arrives.

Ordering Procedures for Multiconductor and Twinaxial Cables

After determining which cables you will need, you can order them
through your IBM representative (see *Cabling Considerations* earlier in
this chapter) or obtain them from an outside vendor. You can order
cables in either preassembled or bulk (unassembled) form. Be certain
that the cables you order will be long enough to reach from machine to
machine. Allow an additional 0.6 meters (2 feet) of cable at each end
so that the unit can be moved for servicing.

For ease of installation, it is recommended that you purchase
preassembled cables. If you obtain your cables from a non-IBM
company, see the *IBM 5280 Cable Assembly Manual*, GA21-9341, for
the cable specifications and assembly instructions.

Appendix B. System Configuration Checklist

When the following checklist is completed, you will have documented the information required to use the system configuration program for creating a user-defined IPL diskette. The required information can be found in the following areas:

- The system summary worksheet in Chapter 1 in this manual

- Appendix E, *Partition Layout*

- Chapter 7, *Preparing for Customer Setup*

- The *System Control Programming Reference/Operation Manual*

Information Required	Valid Responses	Your Response	Notes	Reference/ Explanation
How many diskette drives will you use during the configuration process? (Prompt 20-01)	1, 2, or 3	_____		*SCP Manual**
What is the total storage capacity of the system being configured? (20-05)	32 to 288 K	_____		System Summary Worksheet or Appendix E
How many foreground partitions (how many keyboards) are in the system being configured? (20-06)	1, 2, 3, or 4	_____	The total number of partitions that can be on the system is eight.	System Summary Worksheet or Appendix E
How many background partitions are in the system being configured? (20-06)	0, 1, 2, 3, 4, 5, 6, or 7	_____		Appendix E
How many application microprocessors are on the system being configured? (20-23)	1 or 2	_____	There are two application microprocessors on the system only if the optional Second Application Microprocessor Feature is installed.	*SCP Manual**
If two application microprocessors are used, which partitions will be serviced by each? (20-24)				*SCP Manual**

	Application microprocessor:	1	2
	First partition to be serviced:	_____	_____
	Last partition to be serviced:	_____	_____

Information Required	Valid Responses	Your Response	Notes	Reference/ Explanation
Do you want to specify a date at IPL time? (20-07)	Yes or No	_____		*SCP Manual**
What is the name for your user-defined IPL data set? (20-08)	SYSIPLxx	_____		*SCP Manual**
How many diskette drives are in the system being configured? (20-09)	1 to 8	_____		System Summary Worksheet
How many printers are in the system being configured? (20-10)	0 to 8	_____		System Summary Worksheet

*System Control Programming Reference/Operation Manual.

Information Required	Valid Responses	Your Response	Notes	Reference/ Explanation
What type(s) of printer(s) is in the system being configured? (20-11)	IBM 5222, 5224, 5225, or 5256	1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____		System Summary Worksheet
What is each printer's physical device address? (20-11)	80xx	1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____		Completed system setup form from Chapter 7
Will ASCII diskettes be used? (20-12)	Yes or No	_____		*SCP Manual* *
Do you want to install the BSC multipoint monitor on the IPL diskette? (20-28)	Yes or No	_____		*SCP Manual* *
What is the name of the common functions option used? (20-14)	1. SYSDPRT2 2. SYSCFA 3. SYSHELP	_____		*SCP Manual* * or Appendix E
Beginning with partition 0, specify the programs to load in each partition at the completion of the IPL process. (20-30)		0. _____ 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____	All programs must reside on the IPL diskette.	*SCP Manual* *
Beginning with keyboard/display 0, specify the default device address that is to appear in promp 05-00. (20-32)		0. _____ 1. _____ 2. _____ 3. _____		*SCP Manual* *

*System Control Programming Reference/Operation Manual.

Information Required	Valid Responses	Your Response		Notes	Reference/ Explanation
What partition entries are to be placed in the resource allocation table? (20-17)	Disk: D1-D8, 4000-5C00 Printer: P1-P5, 8000-80XX	Logical device address _____ _____ _____ _____	Physical device address _____ _____ _____ _____	Additional entries might be required	*SCP Manual* *
What system-shared entries are to be placed in resource allocation table? (20-18)	Disk: D1-D8, 4000-5C00 Printer: P1-P5, 8000-80XX	Logical device address 0. _____ 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____	Physical device address _____ _____ _____ _____ _____ _____ _____ _____	for your system.	*SCP Manual* *
Beginning with partition 0, what is the size of each partition? (20-19 and/or 20-20)	6 K to 64 K	0. _____ 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____			Appendix E
Beginning with keyboard 0, specify the screen size and whether a single or dual unit. (20-21)	480 single, 480 dual, 960 single, 960 dual, or 1920 single	0. _____ 1. _____ 2. _____ 3. _____		All display sizes for your IBM 5280 system must be the same.	System Summary Worksheet
Beginning with keyboard 0, specify the type of keyboard and the native language. (20-25)	Data entry, typewriter, data entry with proof; Italy, Germany, United States, and so on.	Keyboard/language 0. _____ 1. _____ 2. _____ 3. _____	_____ _____ _____ _____	See the *Table of Language/ Keyboard Types* in Chapter 3 of the SCP Manual.	System Summary Worksheet and *SCP Manual* *

*System Control Programming Reference/Operation Manual.

IBM 5288 PROGRAMMABLE CONTROL UNIT SYSTEM SETUP FORM

Data Station Sockets

20 21 22 23 24

4800
4C00   4800   4C00   5000
5400   5000   5400   5800/
5C00   5800   5C00

5 6 7 8 9 10 11 12 13

Aux Data Station _____
Location _____
Socket On Prog Unit _____

Aux Data Station _____
Location _____
Socket On Prog Unit _____

Aux Data Station _____
Location _____
Socket On Prog Unit _____

Aux Data Station _____
Location _____
Socket On Prog Unit _____

Aux Data Station _____
Location _____
Socket On Prog Unit _____
Device Address _____

Aux Data Station _____
Location _____
Socket On Prog Unit _____
Device Address _____

Aux Data Station _____
Location _____
Socket On Prog Unit _____
Device Address _____

Aux Data Station _____
Location _____
Socket On Prog Unit _____
Device Address _____

Aux Data Station _____
Location _____
Socket On Prog Unit _____
Device Address _____

Aux Data Station _____
Location _____
Socket On Prog Unit _____
Device Address _____

Printer Type _____
Location _____
Socket On Prog Unit __20__
Device Address __8000__

Printer Type _____
Location _____
Socket On Prog Unit __21__
Device Address __8008__

Printer Type _____
Location _____
Socket On Prog Unit __22__
Device Address __8010__

Printer Type _____
Location _____
Socket On Prog Unit __23__
Device Address __8018__

**
Printer Type _____
Location _____
Socket On Prog Unit _____
Device Address _____

**
Printer Type _____
Location _____
Socket On Prog Unit _____
Device Address _____

**
Printer Type _____
Location _____
Socket On Prog Unit _____
Device Address _____

*
Printer Type _____
Location _____
Socket On Prog Unit __24__
Device Address __8020__

*Note: This socket is only available if you
have the IBM 5222 printer attachment.

**These printers connect to a printer that
is attached to socket 20, 21, 22, or 23.
There can be a maximum of seven printers
on one socket and a maximum of eight
printers on the IBM 5288.

Cable Thru Feature Printer Device Addresses

The following chart shows the device addresses for the printers when the Cable Thru feature is used with the IBM 5224, 5225, and 5256 printers. The chart also shows the switch settings on the printers required to accommodate the appropriate device address.

TWINAXIAL

5288 Printer Socket Number	Device Address						
	First Printer	Second Printer	Third Printer	Fourth Printer	Fifth Printer	Sixth Printer	Last Printer
20	8001	8002	8003	8004	8005	8006	8000
21	8009	800A	800B	800C	800D	800E	8008
22	8011	8012	8013	8014	8015	8016	8010
23	8019	801A	801B	801C	801D	801E	8018
Address Switches	1	2	3	4	5	6	0
	Address Switch Setting						

The *last printer* always has a switch setting of 0. The appropriate device address for the last printer depends upon which IBM 5288 printer socket the first printer is connected to. For example, if there is only one printer (having the Cable Thru feature) connected to socket 21, the switch setting should be set to 0 with the device address for the printer being 8008.

Note: The switch settings must be identified for the person that will be setting up the IBM 5280 system.

The IBM 5222 will always be the *only* printer attached to a socket. The following chart shows the addresses for the IBM 5222 printer.

START-STOP

Socket	Address
21	8008
22	8010
23	8018
24	8020

Appendix D. Floor Plan Drawings and Floor Layout Forms

The floor plan drawings and floor layout forms can be used for preparing your floor plan. The dashed lines around each floor plan drawing represent the recommended service clearance.

Recommended service clearance

This service clearance is required for your service representative to service the unit. The solid lines around a unit represent the recommended table size.

Recommended table size

5280 FLOOR PLAN DRAWINGS (DEVICE CUT OUTS)

Keyboard

528:6

Keyboard

5288

5285

Keyboard

5282

Keyboard

5281

5281

Forms
Stand

5256

Keyboard

5282

Keyboard

5281

5281

Forms
Stand

5256

Forms
Stand

5256

Forms
Stand

5222

Forms
Stand

5222

5225

Forms
Stand

5256

Forms
Stand

5222

Forms
Stand

5222

Forms
Stand

5256

1 mm = 50 mm
¼ inch = 1 foot

156

5280 FLOOR PLAN DRAWINGS (DEVICE CUT OUTS)
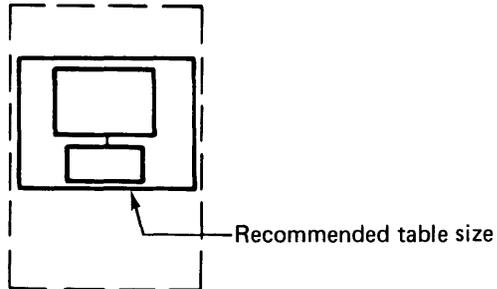
Programmable Units and Auxiliary Data Stations
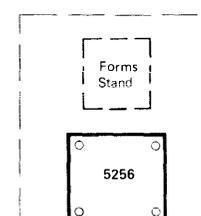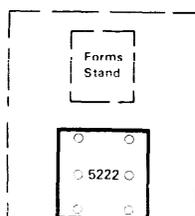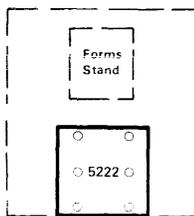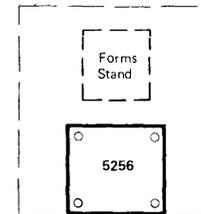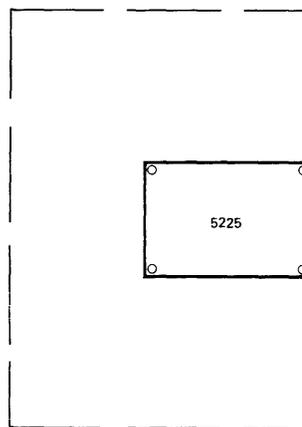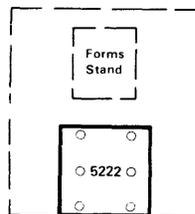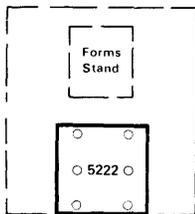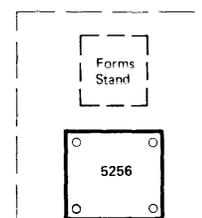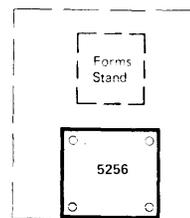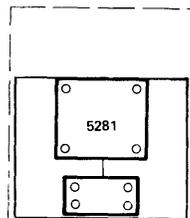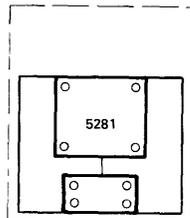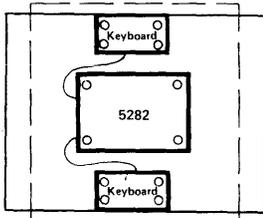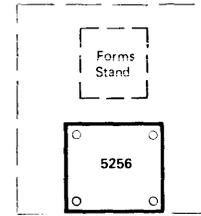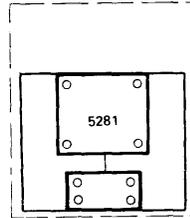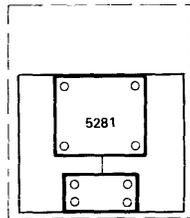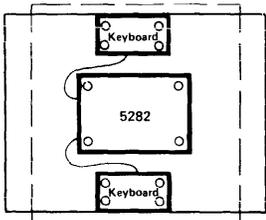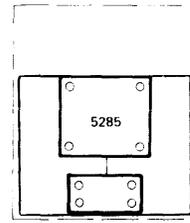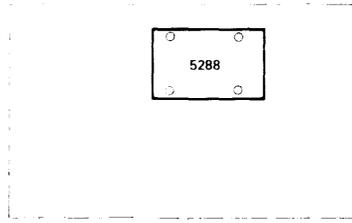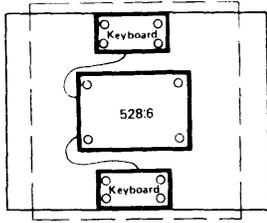
1 mm = 50 mm
¼ inch = 1 foot
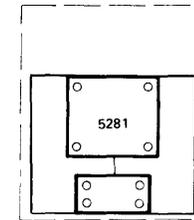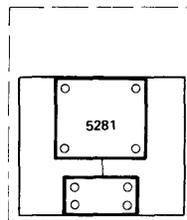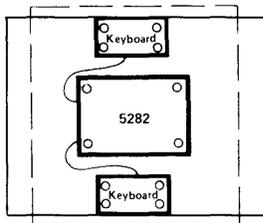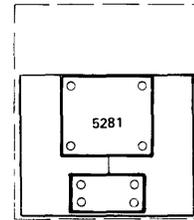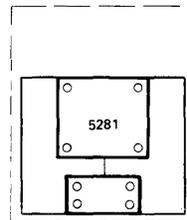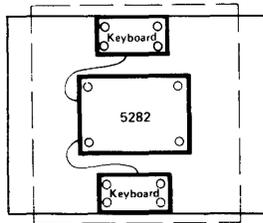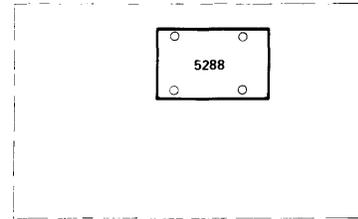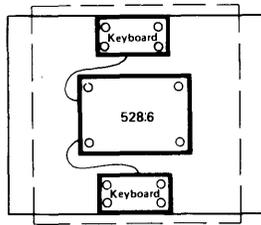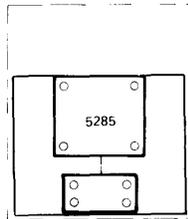
5280 FLOOR PLAN DRAWINGS (DEVICE CUT OUTS)

Printers

1 mm = 50 mm
¼ inch = 1 foot

| Forms Stand | Forms Stand | Forms Stand | Forms Stand | Forms Stand | Forms Stand |
| 5222 | 5222 | 5222 | 5222 | 5224 | 5224 |

| Forms Stand | Forms Stand | Forms Stand | Forms Stand | Forms Stand | Forms Stand |
| 5224 | 5224 | 5224 | 5224 | 5224 | 5224 |

| Forms Stand | Forms Stand | Forms Stand | Forms Stand | |
| 5256 | 5256 | 5256 | 5256 | 5225 |

| Forms Stand | Forms Stand | Forms Stand | Forms Stand | |
| 5256 | 5256 | 5256 | 5256 | |

| 5225 | 5225 | 5225 | 5225 |
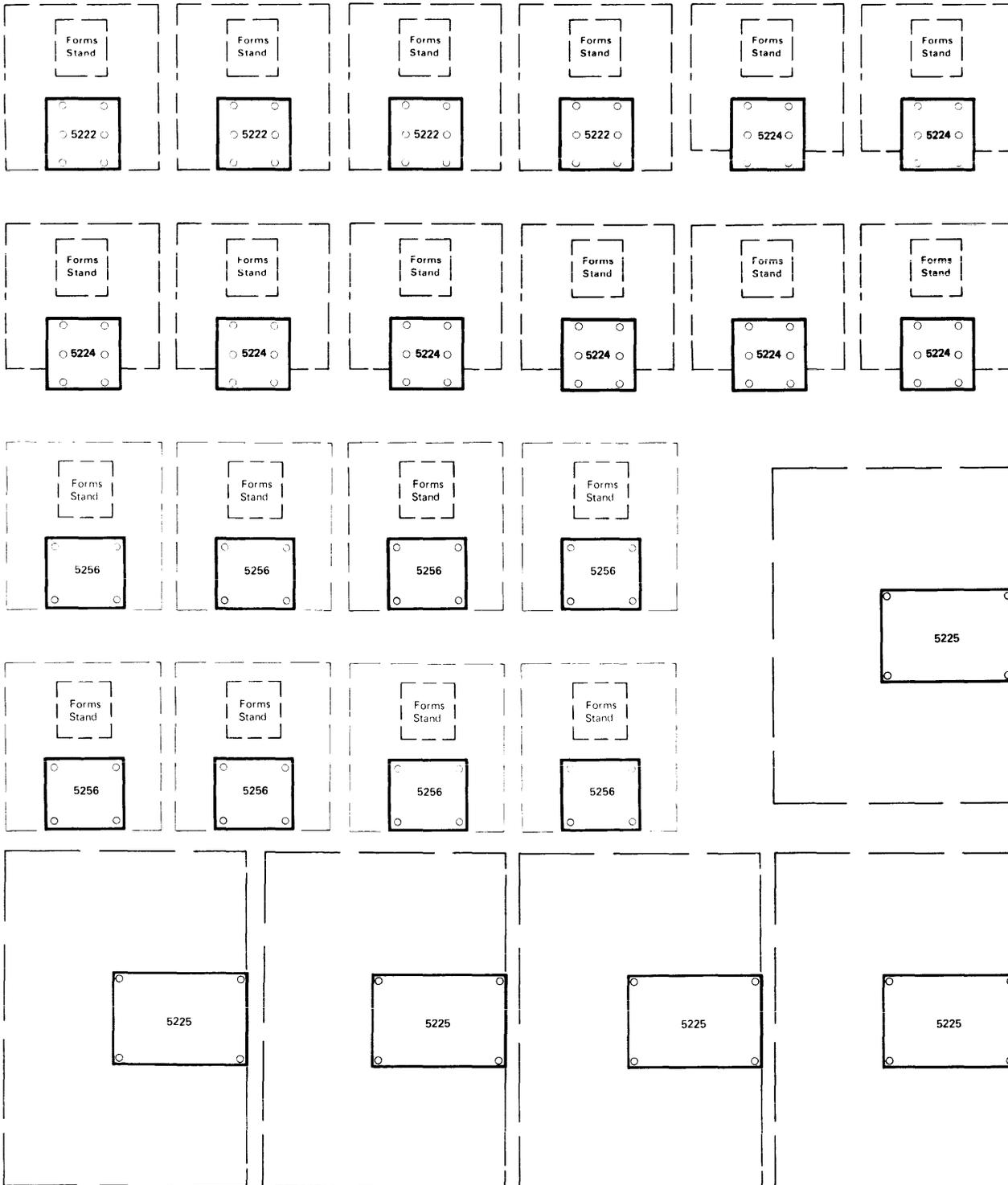
Following is a description of the storage required for the IBM 5280
licensed programs. Also, sample partition layouts are provided to
assist you in determining how storage might be partitioned for your
system.

STORAGE REQUIREMENTS/SAMPLE PARTITION LAYOUTS

Storage requirements of the IBM 5280 licensed programs and for the
IBM-supplied system control programs are shown below. These storage
requirements are subject to change for future releases of the programs.
With the exception of the key entry utility (in the Utilities Licensed
Program) all noncommunications licensed programs shown below can
run in either foreground or background partitions.

System control programming
  (excluding system configuration program) . . . . 9 K each
            System configuration program . . . . 16 K

Common area . . . . 6 K, 15 K, or 16 K

DE/RPG compiler program . . . . 9 K

Key entry utility program . . . . 8 K

Other utilities programs . . . . 9 K each

Sort/Merge Licensed Program
  (excluding command data set display program) . . . . 16 K
            Command data set display . . . . 9 K

Communications Licensed Program . . . . see next page

IBM 3270 Emulation Licensed Programs . . . . see page 160.1

Assembler Licensed Program . . . . 9 K

Note: These are the minimum storage requirements — assuming a
physical sector size of 256 bytes, a logical record length less than or
equal to 256 bytes, and an I exchange. The amount of storage
required may vary for larger physical or logical sector sizes and for
different exchanges.

IBM 5280 Communications Licensed Program: Storage Requirements

The utility programs of the Communications Licensed Program are classified as preparation utilities and execution utilities. All of the preparation utilities run in foreground or background partitions. The execution utilities each require a communications access method, which must run in a separate partition from the utility itself. Execution utilities can run in foreground or background partitions; communications access method usually run in background partitions.

Preparation Utilities

Communications configuration utility (SYSCCU)	25 K
Remote job entry description utility (SYSRJEDU)	7 K
Data communications description utility (SYSDCDU)	16 K
Communication load utility (SYSCLU)	12 K
Communications Monitor preparation utility (SYSCMPU)	8 K
Forms Control utility (SYSFORMS)	7 K

Execution Utilities

SNA remote job entry (SYSSRJE)	22 K
Communications access method (SYSSNAR)	24 K
SNA data communications utility (SYSSDCU)	22 K
Communications access method (SYSSNAD)	25 K
BSC data communications utility (SYSBDCU)	22 K
Communications access method (SYSBSCBA or SYSBSCEX)	15-21 K
BSC batch transfer utility (SYSBBTU)	11 K
Communications access method (SYSBSCBA)	15 K
MULTI-LEAVING remote job entry (SYSMRJE)	25 K
Communications access method (SYSBSCR)	11 K
BSC online test utility (SYSBOLT)	6 K
Communications access method (SYSBSCBA or SYSBSCEX)	15-21 K

User Written Program

User written program (minimum partition is 6 K)	
BSC communications access method (SYSBSCEX)	19 K
or	
SNA communications access method (SYSSNAU)	25 K

IBM 5280-3270 Emulation Licensed Program: Storage Requirements

Preparation Utilities

Device emulation configuration utility (SYSDECU)   16 K

Execution Utilities

SNA 3270 display emulator (SYSSDEU)	25 K
SNA 3270 Communications access method (SYSSNAE)	29 K*
SNA 3270 printer emulator (SYSSPEU)	30 K
SNA 3270 Communications access method (SYSSNAE)	29 K*
BSC 3270 display emulator (SYSBDEU)	24 K
BSC 3270 Communications access method (SYSBSCE)	14 K
BSC 3270 printer emulator (SYSBPEU)	26 K
BSC 3270 Communications access method (SYSBSCE)	14 K
BSC 3270 batch transfer utility (SYSBTEU)	42 K
BSC 3270 Communications access method (SYSBSCE)	14 K

3270 User Written Program

User written program, DE/RPG or COBOL (minimum partition
is 6 K)
    BSC 3270 Communications access method (SYSBSCE)   14K

*Note: The size varies depending on the number of sessions, the Request
Unit (RU) size and pacing counts. Refer to the Installation Appendix
of the IBM 5280 - 3270 Emulation Reference Manual for the exact size
formula.

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Operating Characteristics 10

One or more printers can be attached
Data might be entered by source departments
SRJE using DOS/VSE POWER, RES, or JES2, or JES3 at main processing system
960 or 1920 display screen size

1 keyboard with total of 64 K

6 K	Common area
22 K	Foreground partition for keyboard 0 SNA remote job entry utility
24 K	Background partition used for the following: Various utility programs Sort/Merge Program Product SNA communications access method
12 K	Background partition

2 keyboards with total of 96 K

16 K	Common area
22 K	Foreground partition for keyboard 0 SNA remote job entry utility
9 K	Background partition
16 K	Background partition used for the following: Various utility programs Sort/Merge Program Product
24 K	Background partition used for the following: Various utility programs Sort/Merge Program Product SNA communications access method
9 K	Foreground partition for keyboard 1

3 keyboards with total of 96 K

16 K	Common area
22 K	Foreground partition for keyboard 0 SNA remote job entry utility
26 K	Background partition used for the following: Various utility programs Sort/Merge Program Product SNA communications access method
16 K	Foreground partition for keyboard 1
16 K	Foreground partition for keyboard 2

4 keyboards with total of 96 K

16 K	Common area
22 K	Foreground partition for keyboard 0 SNA remote job entry utility
13 K	Foreground partition for keyboard 1
10 K	Foreground partition for keyboard 2
24 K	Background partition used for the following: Various utility programs Sort/Merge Program Product SNA communications access method
11 K	Foreground partition for keyboard 3

Operating Characteristics 11

One or more printers can be attached
Data might be entered by source departments
MRJE using RES, JES2, or JES3 at main processing system
960 or 1920 display screen size

1 keyboard with total of 48 K

6 K	Common area
22 K	Foreground partition for keyboard 0 MRJE utility
20 K	Background partition used for the following: Various utility programs Sort/Merge Program Product MRJE communications access method

2 keyboards with total of 64 K

16 K	Common area
22 K	Foreground partition for keyboard 0 MRJE utility
10 K	Foreground partition for keyboard 1
16 K	Background partition used for the following: Various utility programs Sort/Merge Program Product MRJE communications access method

3 keyboards with total of 96 K

16 K	Common area
22 K	Foreground partition for keyboard 0 MRJE utility
16 K	Background partition used for the following: Various utility programs Sort/Merge Program Product MRJE communications access method
10 K	Background partition
16 K	Foreground partition for keyboard 1
16 K	Foreground partition for keyboard 2

4 keyboards with total of 96 K

16 K	Common area
22 K	Foreground partition for keyboard 0 MRJE utility
16 K	Background partition used for the following: Various utility programs Sort/Merge Program Product MRJE communications access method
10 K	Foreground partition for keyboard 1
16 K	Foreground partition for keyboard 2
16 K	Foreground partition for keyboard 3

Operating Characteristics 12

One or more printers can be attached
Local data entry and host communications (BSC)
IBM 3270 Emulation using IMS/VS, CICS/VS, TSO,
CCP, or user written program at the main processing
system
1920 display screen size

1 keyboard with total of 96 K

6 K	Common area
26 K	Foreground partition for keyboard 0 Display Emulation
26 K	Background partition Printer Emulation
18 K	Background partition used for the following: Various utility programs Sort/Merge Licensed Program
14 K	Background partition BSC CAM

2 keyboards with total of 96 K

16 K	Common area
26 K	Foreground partition for keyboard 0 Display Emulation
22 K	Foreground partition for keyboard 1 other jobs
18 K	Background partition used for the following: Other jobs Various utility programs Sort/Merge Licensed Program
14 K	Background partition BSC CAM

3 keyboards with total of 96 K

6 K	Common area
42 K	Foreground partition for keyboard 0 Batch Transfer
16 K	Foreground partition for keyboard 1 Program Interface Job (User Written)
18 K	Foreground partition for keyboard 2 Other jobs Various utility programs Sort/Merge Licensed Program
14 K	Background partition BSC CAM

4 keyboards with total of 128 K

6 K	Common area
26 K	Foreground partition for keyboard 0 Display Emulation
26 K	Foreground partition for keyboard 1 Display Emulation
24 K	Foreground partition for keyboard 2 Display Emulation
24 K	Foreground partition for keyboard 3 Display Emulation
14 K	Background partition BSC CAM

Operating Characteristics 13

One or more printers can be attached
Local data entry and host communications (SNA/SDLC)
IBM 3270 Emulation using IMS/VS, CICS/VS, or TSO
1920 display screen size

1 keyboard with total of 96 K

6 K	Common area
25 K	Foreground partition for keyboard 0 Display Emulation
30 K	Background partition Printer Emulation
29 K	Background partition SNA CAM*

2 keyboards with total of 128 K

16 K	Common area
25 K	Foreground partition for keyboard 0 Display Emulation
30 K	Background partition Printer Emulation
22 K	Foreground partition for keyboard 1 Other jobs
32 K	Background partition SNA CAM*

*29K is a practical minimum for the
SNA CAM size. However, the CAM
size will be larger depending on the
number of emulations and the buffers
required. See the IBM 5280-3270
Emulation Reference Manual
(SC34-0384), Appendix C, for the
formula to calculate the CAM size.

3 keyboards with total of 192 K

16 K	Common area
25 K	Foreground partition for keyboard 0 Display Emulation
22 K	Foreground partition for keyboard 1 Other jobs
30 K	Background partition Printer Emulation
30 K	Background partition Printer Emulation
25 K	Foreground partition for keyboard 2 Display Emulation
38 K	Background partition SNA CAM*

4 keyboards with total of 288 K

16 K	Common area
25 K	Foreground partition for keyboard 0 Display Emulation
22 K	Foreground partition for keyboard 1 Other jobs
25 K	Foreground partition for keyboard 2 Display Emulation
25 K	Foreground partition for keyboard 3 Display Emulation
30 K	Background partition Printer Emulation
30 K	Background partition Printer Emulation
50 K	Background partition SNA CAM*
30 K	Background partition Printer Emulation

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