

5280



GA21-9350-3

IBM 5280 Distributed Data System

General Information



GA21-9350-3

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General Information

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 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.

Fourth Edition (June 1981)

This is a major revision of, and obsoletes, GA21-9350-2. Changes or additions to the text and illustrations are indicated by a vertical line to the left of the change or addition.

Changes are periodically made to the information herein; these changes will be reported in technical newsletters or in new editions to this publication.

This publication is for planning purposes only. The information herein is subject to change before the products described become available. Also, this publication contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

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This manual is intended for customer executives and data processing managers. The primary objective of this general information manual is to provide you with enough information to demonstrate how the IBM 5280 Distributed Data System can meet your data processing needs.

The IBM 5280 is a diskette-based system designed for data entry, communications, and processing. IBM diskette 1, diskette 2, and diskette 2D diskette types are supported by the IBM 5280 system.

Descriptions of the data stations, control unit, printers, and program products that make up the IBM 5280 system are provided in this manual. In addition, the characteristics, capacities, and features of the IBM 5280 system, as well as the program support and data communications that are available, are also described.

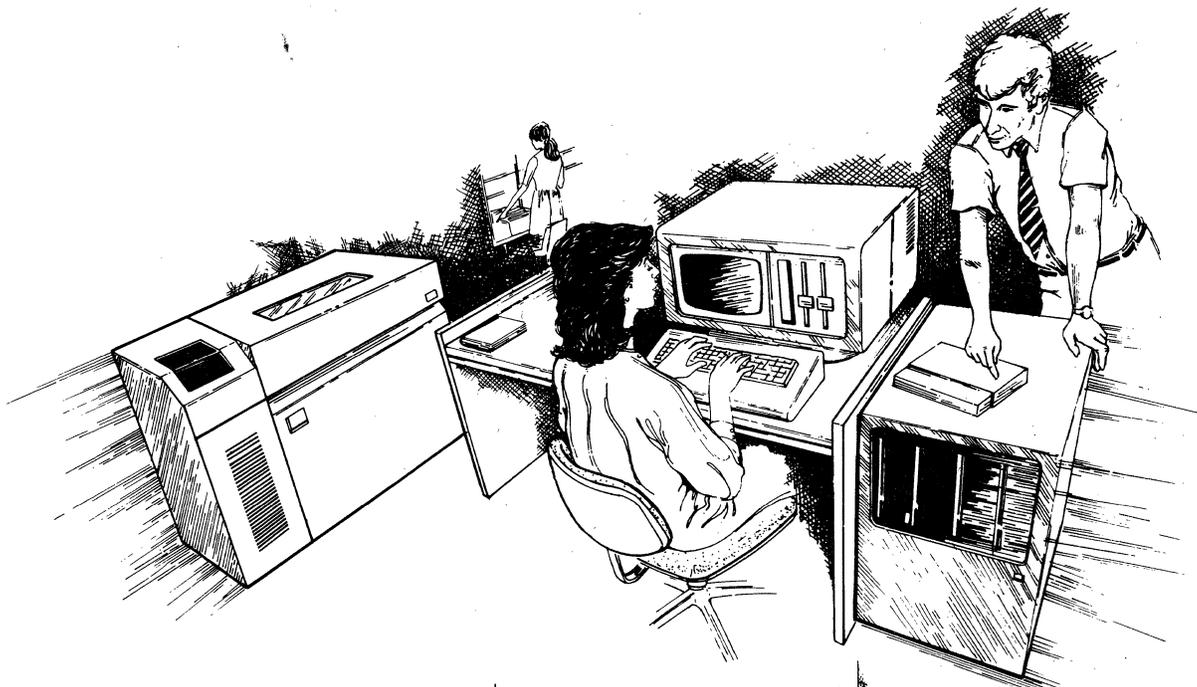
The *IBM 5280 Planning and Site Preparation Guide*, GA21-9351, contains specific considerations involved in preparing for the IBM 5280 system.

Typical applications are depicted to demonstrate the variety of ways the IBM 5280 products can be used; these applications are: (1) data entry, (2) remote batch, inquiry, distributed printing, and remote job entry, and (3) processing. Examples of the environments in which these applications might be used are provided to help you understand the combination of IBM 5280 products that fits the applications. A glossary is provided to define unfamiliar terms.

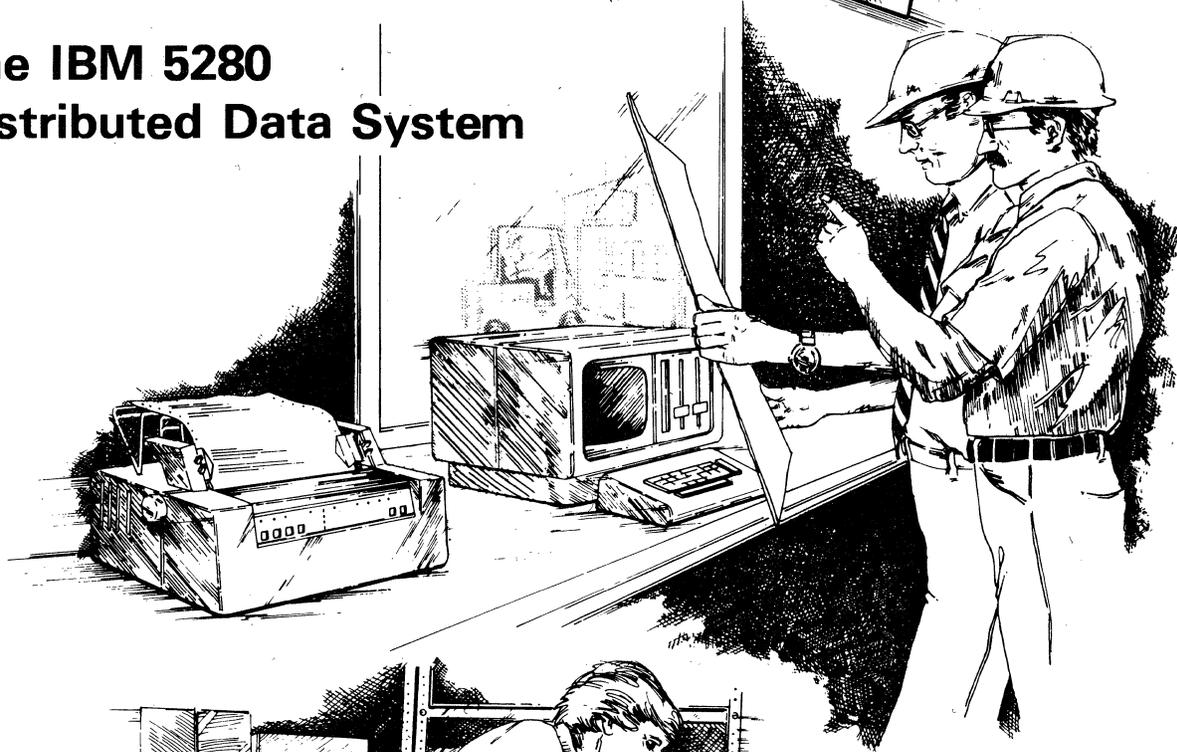
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The IBM 5280 Distributed Data System



Today's businesses have a wide range of data processing needs. A business with limited space may require the capabilities of multiple systems. A data-entry system may be needed in a high-volume data-entry department where employees enter data from handwritten documents. A remote inquiry system may be needed near a sales counter for the clerk to use in locating pertinent information about the item being sold. This information may be in a host processing system on the other side of town or in another city. Finally, a programmable application processing system may be needed by other departments.

To meet these application requirements, businesses typically use different systems, each with its own design and own operating procedures. The IBM 5280 Distributed Data System meets the complex requirements of business today—the requirements for a versatile system that can be used in multiple environments, for a system that is small in size but flexible enough to perform the functions you need, and for a system that provides a standard appearance and standard operating procedures no matter how it is used.

The 5280 is a diskette-based system that can be used for a variety of data processing solutions. The 5280 system can be used to (1) perform data entry (high-volume capture of data), (2) send data to and receive data from a host processing system using communications lines, and (3) develop and execute user-written programs.

The 5280 does not require extensive space or a special computer room. The data stations and one of the printers are tabletop size and can be easily placed in the area where they are needed. The 5280 system consists of tabletop programmable data stations, tabletop auxiliary data stations, a floor-standing programmable control unit, and printers. The program support offered with the 5280 consists of System Control Programming and the following program products: Data Entry with RPG subroutines (DE/RPG), Utilities, Sort/Merge, Communications Utilities, a COBOL host compiler for DOS/VSE and a COBOL host compiler for OS/VS, and Assembler Language.

Multiple programs can be operating concurrently in each programmable data station or control unit. There is no operating system or system console station; therefore, each operator has independent use of the resources available.

Figure 1 illustrates the components within the 5280 system.

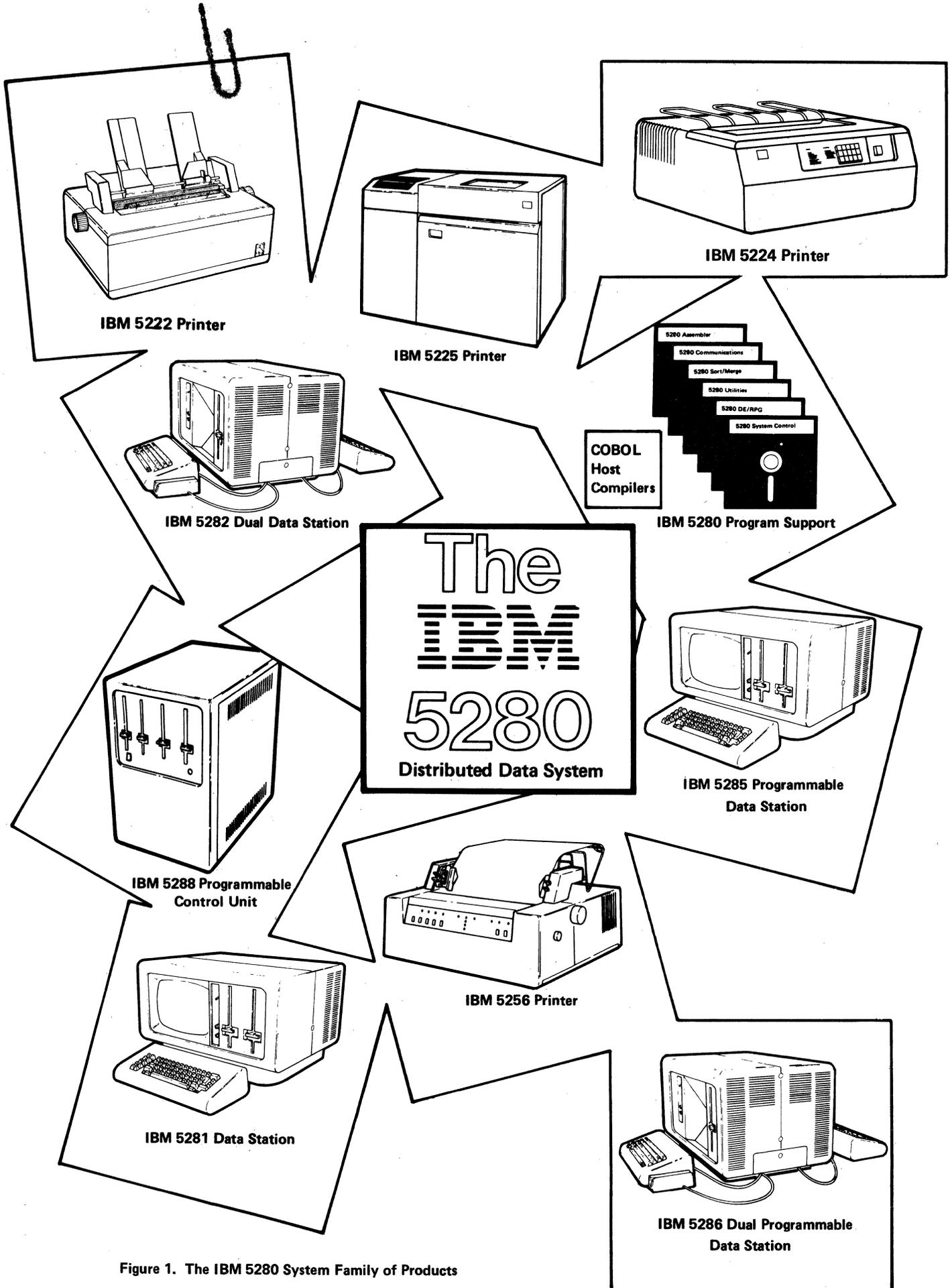


Figure 1. The IBM 5280 System Family of Products

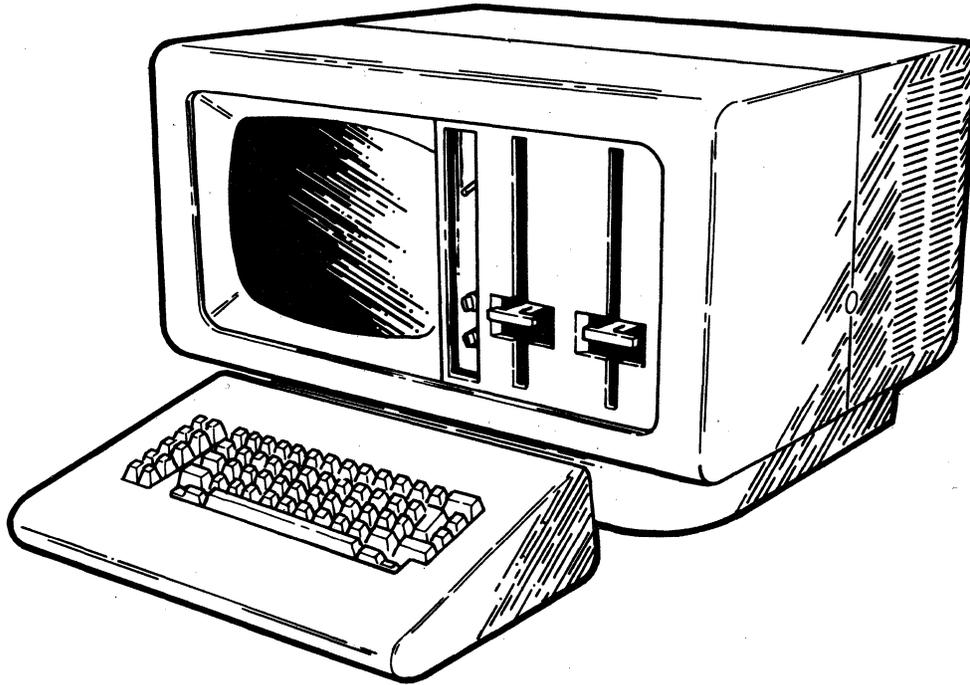
Some of the attributes of the IBM 5280 system are:

- A variety of programmable and auxiliary data stations
- Display size variety (480, 960, and 1920 characters)
- Three keyboard types (typewriter, data entry, and data entry with a proof arrangement)
- Uppercase and lowercase keyboards, displays, and printers
- Movable keyboards
- User programmability (with DE/RPG, COBOL, and the Assembler Language)
- Communications support for SNA/SDLC and BSC
- A wide range of printer speeds (from 40 characters per second to 560 lines per minute)
- Two types of compact diskette drives supporting either IBM diskette 1 only or IBM diskette 1, diskette 2, and diskette 2D diskette types
- System storage size flexibility (from 32 K to 288 K)
- Program size flexibility (6 K to 64 K partitions)
- Independent data station operation
- Powerful editing for data entry in support of a host processing system
- Multiprogramming for concurrent program operation
- Data security through the Keylock feature and use of the Magnetic Stripe Reader in addition to the logon communications security function that is available

THE IBM 5280 DISTRIBUTED DATA SYSTEM DATA STATIONS, CONTROL UNIT, AND PRINTERS

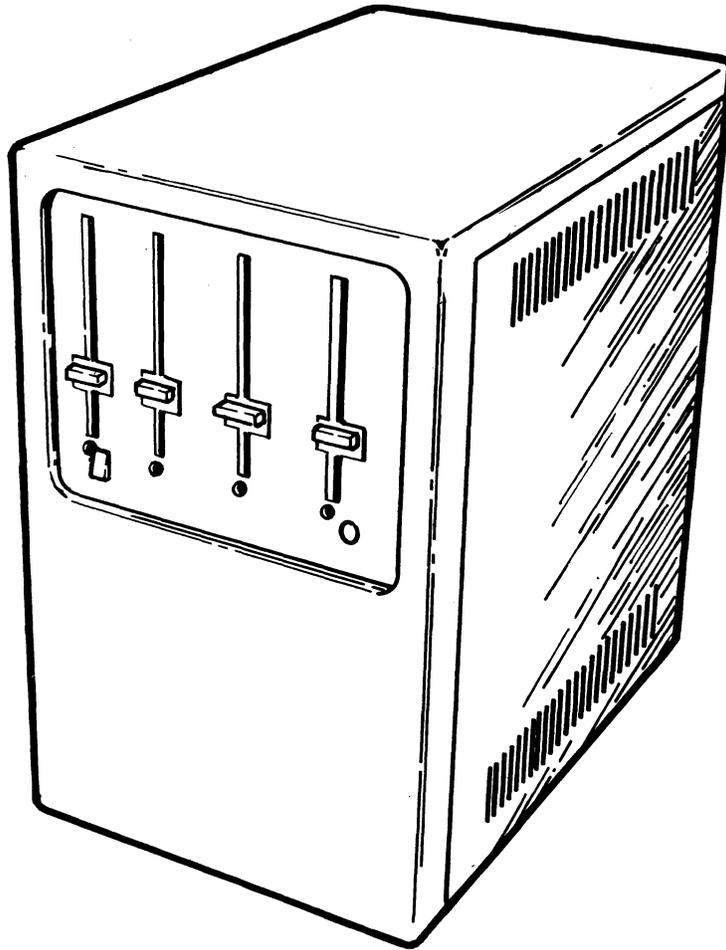
The following is an overview of the IBM 5280 data stations, control unit, and printers. For more detail about these, see Chapter 3

IBM 5285 Programmable Data Station



The IBM 5285 is a tabletop programmable data station with a single keyboard and display. This data station can support a printer and either an IBM 5281 or 5282 auxiliary data station or communications; it also supports all licensed programs offered for the system. The IBM 5285 has one diskette drive; it can support a maximum of four diskette drives (counting two drives in the 5285 and two in the auxiliary data stations). The available display sizes are 480, 960, and 1920 characters. The maximum storage size is 96 K.

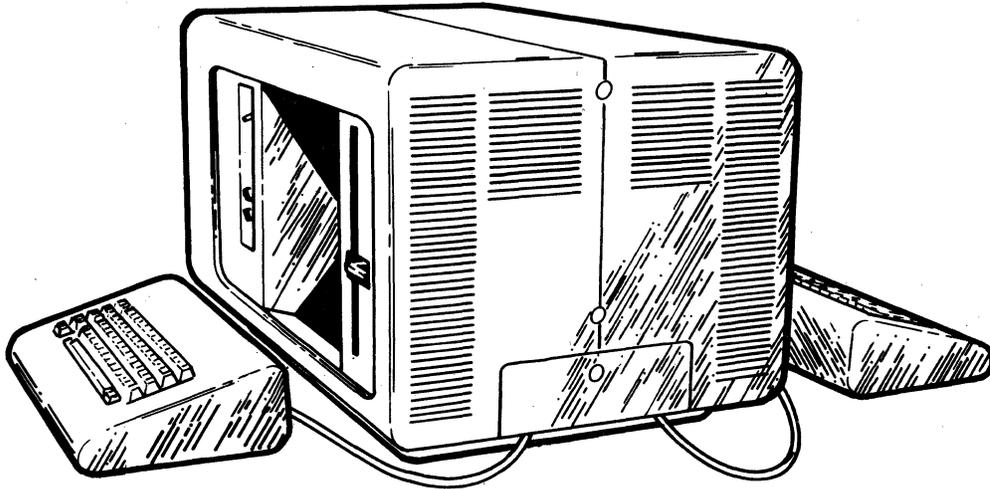
IBM 5288 Programmable Control Unit



The IBM 5288 is a floor-standing programmable control unit. The IBM 5288 must have at least one diskette drive and at least one attached IBM 5281 or 5282 auxiliary data station. The maximum storage size is 160 K. The IBM 5288 supports a maximum of eight diskette drives (in combinations that include up to six drives in the attached auxiliary data stations or up to four drives in the control unit). The IBM 5288 also supports a maximum of eight printers (in combinations that include up to four IBM 5222 printers and up to eight IBM 5224, 5225, or 5256 printers).

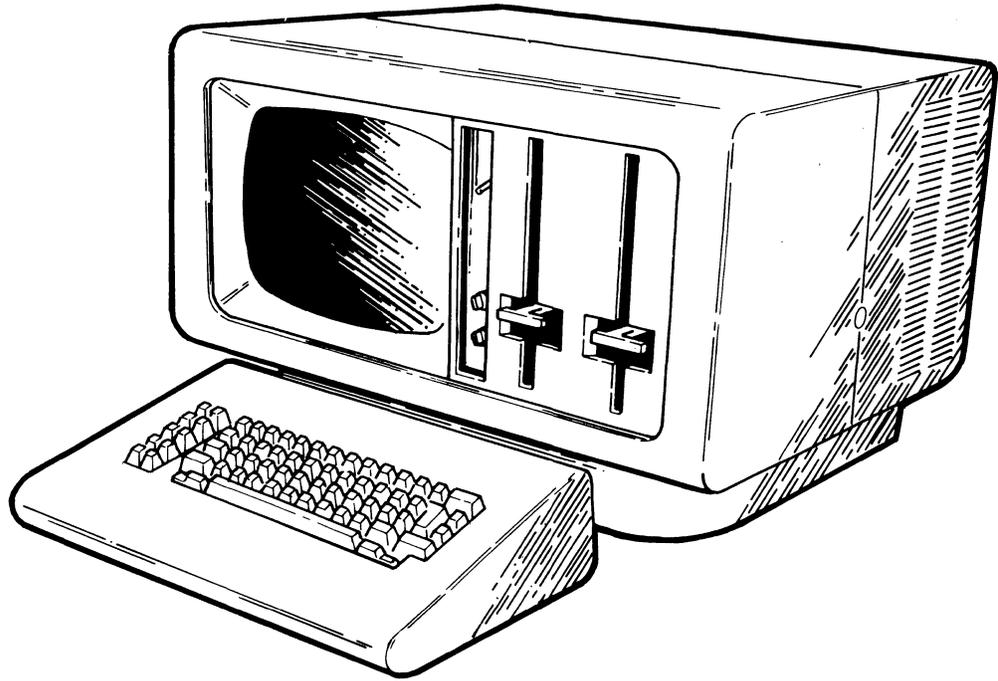
Note: Printer speed may be affected by the customer's programs, application load, forms design, and/or the number of printers attached to the system.

IBM 5286 Dual Programmable Data Station



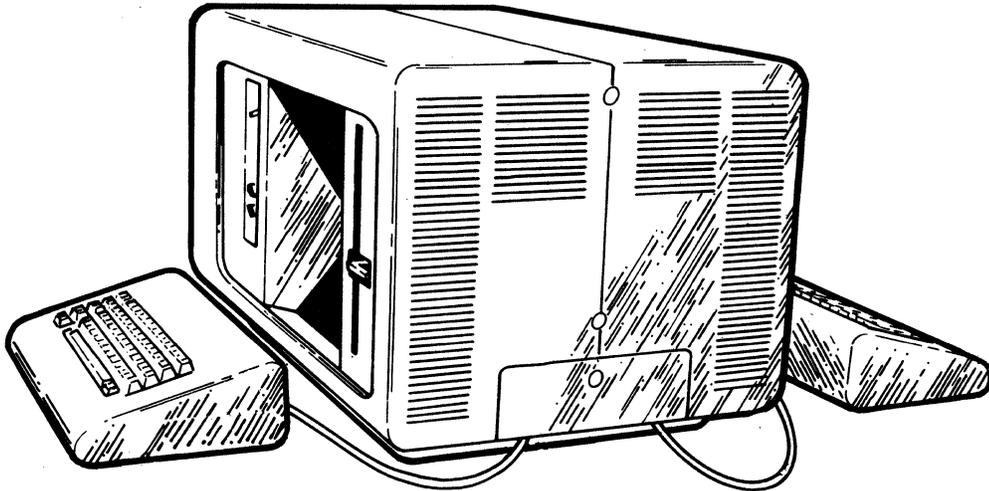
The IBM 5286 is a tabletop programmable data station with a split screen and two keyboards. The IBM 5286 allows two operators seated at the same data station to simultaneously share the system. Each operator has a 480-character display, a keyboard, and a diskette drive. The keyboards must be of the same type. The IBM 5286 can support either an IBM 5281 or IBM 5282 auxiliary data station and all licensed programs except the Communications Utilities (5708-DC1) and the IBM 5280-3270 Emulation Licensed Program (5708-EM1). The IBM 5286 has a minimum of two diskette drives (both of these must be the same type); it can support an additional two drives in the auxiliary data stations (there are no restrictions on these drives). The maximum storage size is 96 K.

IBM 5281 Data Station



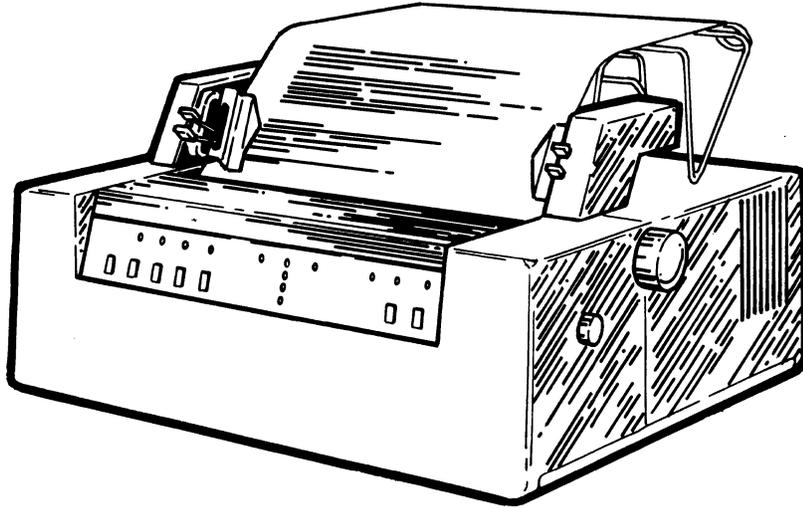
The 5281 is a single keyboard and display, tabletop auxiliary data station. The 5281 must be attached to one of the programmable data stations or to the programmable control unit. The 5281 shares the functions of the programmable device to which it is attached. This auxiliary data station can be up to 61 meters (200 feet) away from the programmable data station or control unit to which it is attached. The 5281 does not require a diskette drive although it can have a maximum of two diskette drives.

IBM 5282 Dual Data Station



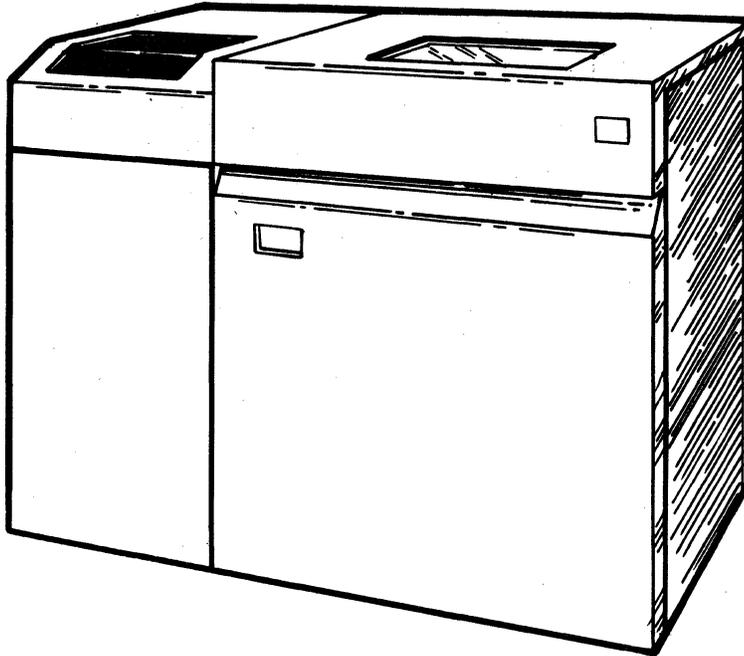
The 5282 is a tabletop auxiliary data station that has a split screen and two keyboards. The 5282 must be attached to one of the programmable data stations or to the programmable control unit. The 5282 shares the functions of the programmable device to which it is attached. This auxiliary data station can be up to 61 meters (200 feet) away from the programmable data station or control unit to which it is attached. The 5282 does not require a diskette drive although it can have a maximum of two diskette drives.

IBM 5256 Printer



The IBM 5256 Printer is a bidirectional (prints in two directions) matrix character printer. It is tabletop in size. One can be attached to a 5285 Programmable Data Station and up to four can be attached to a 5288 Programmable Control Unit. The 5256 can be up to 1525 meters (5000 feet) away from the 5285 or 5288 to which it is attached. Speeds range from 40 to 120 characters per second. The average printing rate depends on the format of the printed data on the page. When printing at 10 characters per inch, it is possible that the IBM 5222 printer is not as fast as the IBM 5256 Model 2 printer. Vertical spacing is either 6 or 8 lines per inch. The 5256 prints up to 132 characters per line (10 characters per inch). Either a 95-graphic character set or a multinational 184-graphic character set is available; both sets provide upper and lowercase printing. Continuous forms or individual, precut forms can be used. The continuous forms can be from 3 inches to 15 inches wide and from 3 inches to 14 inches long. The individual cut forms can be from 6 inches to 14.5 inches wide and from 3 inches to 14 inches long. Both single and multipart (up to one original and five carbon copies) forms can be used. For more details see the *IBM 5256 Printer Operator's Guide*, GA21-9260.

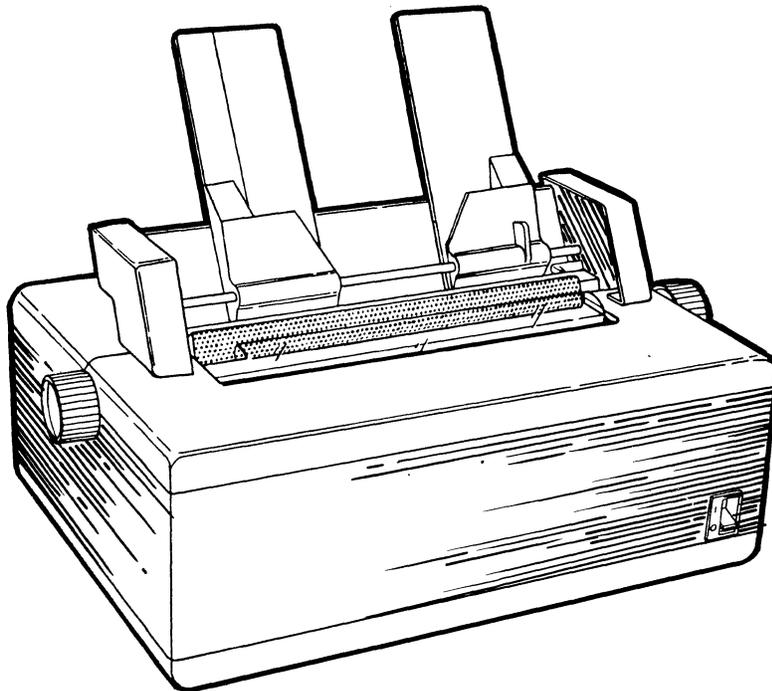
IBM 5225 Printer



The 5225 is the line printer offered with the 5280 system. It is a floor-standing impact matrix printer. One 5225 can be attached to a 5285 Programmable Data Station and one to a 5288 Programmable Control Unit. The 5225 can be up to 1525 meters (5000 feet) away from the 5285 or 5288 to which it is attached. Line speeds range from 280 to 560 lines per minute (at 10 characters per inch). The printing rate depends on the format of the printed data on the page and the character density (10 or 15 characters per inch). Vertical spacing is either 6 or 8 lines per inch. The 5225 prints up to 132 characters per line at 10 characters per inch or up to 198 characters per line at 15 characters per inch. Either a 95-graphic character set or a multinational 184-graphic character set is available; both sets provide uppercase and lowercase printing.

The 5225 printer is designed for continuous forms only. The forms can be from 3 inches to 12.5 inches long (6 inches fold to fold) and from 3 inches to 17.7 inches wide. Single and multipart (up to one original and five carbon copies) forms can be used. For more details, see the *IBM 5225 Printer Models 1, 2, 3, and 4 Operator's Guide*, GA34-0054.

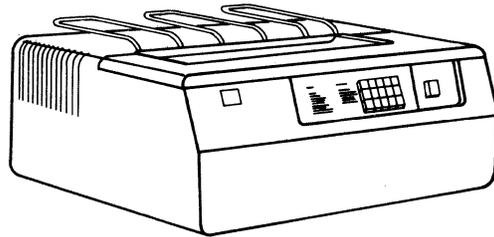
IBM 5222 Printer



The IBM 5222 Printer is a bidirectional (prints in two directions) matrix character printer. It is tabletop size. One printer can be attached to an IBM 5285 Programmable Data Station and up to four can be attached to an IBM 5288 Programmable Control Unit. The IBM 5222 can be placed up to 200 feet away from the IBM 5285 or 5288 to which it is attached. Speeds range from 52 to 80 characters per second. The average printing rate depends on the format of the printed data on the page. When printing at 10 characters per inch, it is possible that the IBM 5222 Printer is not as fast as the IBM 5256 Model 2 Printer. Vertical spacing is either 6 or 8 lines per inch. The IBM 5222 prints up to 132 characters per line (10 characters per inch) or up to 198 characters per line (15 characters per inch). Either a standard 95-graphic character set or a multinational 184-graphic character set is available; both sets provide uppercase and lowercase printing.

The IBM 5222 Printer is designed for both continuous forms or individual, precut forms. The forms can be from 3 inches to 14 inches long and from 3 inches (continuous) or 5.75 inches (precut) to 15 inches wide. Single and multipart (up to one original and three carbon copies) forms can be used. For more details, see the IBM 5222 Customer Setup Instructions and Operator's Guide (GA34-0102), and Form Design Reference Guide for Printers (GA24-3488).

IBM 5224 Printer



The IBM 5224 Printer is a bidirectional (prints in two directions) line printer. It is tabletop in size. One IBM 5224 can be attached to an IBM 5285 Programmable Data Station and up to eight can be attached to an IBM 5288 Programmable Control Unit. The IBM 5224 Printer can be up to 1524 meters (5000 feet) away from the IBM 5285 or IBM 5288 to which it is attached. Available speeds are 140 or 240 lines per minute. Vertical spacing is either 6 or 8 lines per inch. The vertical spacing is selectable by the operator. The IBM 5224 printer prints either 10 characters per inch or 15 characters per inch selectable by the operator. At 10 characters per inch, there is a maximum of 132 characters per line. At 15 characters per inch, there is a maximum of 198 characters per line. Either the standard 95-graphic character set or the multi-national 184-graphic character set is available. Both sets provide uppercase and lowercase printing. The forms used by the IBM 5224 printer must be continuous and can be from 3 inches to 17.7 inches wide. Forms of up to four parts can be used. For more details, see the *IBM 5224 Printer Operator's Guide*, GA34-0092, to be available at a later date.

THE PROGRAM SUPPORT FOR THE IBM 5280 DISTRIBUTED DATA SYSTEM

All programs offered with the IBM 5280 system operate in partitions in the main storage area of the programmable data stations and control unit. The main storage area in the IBM 5280 system is available from 32 K to 288 K, depending on machine type. Part of this storage area is occupied by routines used by programs in the partitions. This area is called the common area. The common area can be approximately 6 K, 15 K, or 17 K.

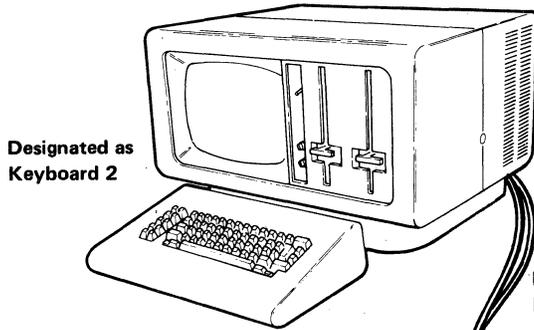
The partitions occupy the remainder of the main storage area. The partitions are designated areas of storage that are exclusively available for your programs and utilities. The system is tailored by describing the size and kind of partitions you want to use.

Two kinds of partitions exist: foreground and background. Every foreground partition is linked to a keyboard in the system. There can be a maximum of four foreground partitions. For example, if four IBM 5281 Data Stations were attached to an IBM 5288 Programmable Control Unit, each of the four foreground partitions in the IBM 5288 storage area would be linked to each attached IBM 5281 keyboard (one partition per one keyboard). The operator or programmer would then be able to use the keyboards on the IBM 5281 Data Stations to operate programs in the foreground partitions of the IBM 5288.

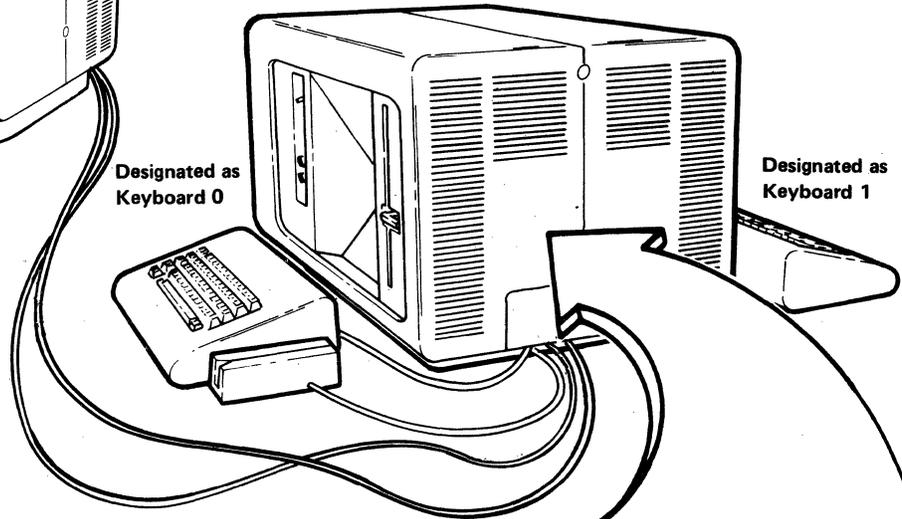
The background partitions are not linked with a keyboard although they can access a keyboard when necessary. Programs that operate in a background partition are normally independent of keyboard interaction and require only limited operator interaction. For example, the DE/RPG compiler can be used in a background partition because it does not require continuous keyboard entry; on the other hand, a DE/RPG data-entry program that creates a data set from the operator's entries typically uses a foreground partition.

Figure 2 illustrates a partition division for the IBM 5286. In this example, the IBM 5286 Dual Programmable Data Station and the attached IBM 5281 auxiliary data station are being used for a data-entry application.

The IBM 5281 Data Station



The IBM 5286 Dual Programmable Data Station



Partitioned Main Storage for the IBM 5286

Foreground Partitions

Common Area (15 K)
First partition linked to Keyboard 0 (10 K) <i>A data-entry program requiring operator entries is in this partition.</i>
Second partition linked to Keyboard 1 (11 K) <i>A data-entry program requiring operator entries is in this partition.</i>
Third partition linked to Keyboard 2 (12 K) <i>A data-entry program requiring operator entries is in this partition.</i>
Background partition (16 K) <i>A utility (for example, the copy utility) is in this partition. It requires only limited operator interaction.</i>

Figure 2. A Sample Partition Division of Main Storage

A foreground partition has been assigned to each keyboard in the system. There is one 16 K background partition which will accommodate the Utilities and the Sort/Merge Licensed Programs. This background partition can be accessed by any operator using the IBM 5281 or 5286 keyboards.

The use of partitions allows the IBM 5280 system to support multiprogramming. *Multiprogramming* is the concurrent execution of two or more programs (up to a total of 8 partitions—a maximum of 4 in foreground partitions; a maximum of 7 in background partitions). Multiprogramming provides a tool that allows the operators to increase productivity. For example, multiprogramming allows operators to use the keyboards for entry at the same time that utilities or user programs are operating in the background partition.

System Control Programming

A diskette containing the System Control Programming is available upon request from IBM. The System Control Programming contains the programs necessary to support and maintain the system.

IBM 5280 Licensed Programs

The licensed programs are available from IBM for a monthly charge. The licensed programs that are offered for the IBM 5280 system are:

- IBM 5280 DE/RPG
- IBM 5280 COBOL (a host compiler for OS/VS and a host compiler for DOS/VSE)
- IBM 5280 Utilities
- IBM 5280 Sort/Merge
- IBM 5280 Communications Utilities
- IBM 5280 Assembler Language
- IBM 5280-3270 Emulation

IBM 5280 DE/RPG

DE/RPG is for the operator's use in data entry and for the programmer's use in applications. When DE/RPG is used for data entry, keyboard functions such as automatic duplication and automatic skip are available. Also available are operations that provide verification of entered data and automatic control of the input/output devices for the operator.

When DE/RPG is used for application programming, functions such as input/output processing, conditioning operations, and arithmetic operations are available. Many of the functions normally provided in a high-level language for application programming are provided by DE/RPG. DE/RPG (in conjunction with the communications feature and the communications utilities licensed program) can be used to perform read and write operations from a remote IBM 5280 system to a host processing system.

IBM 5280 COBOL

The OS/VS and DOS/VSE COBOL host compilers allow customers who already have programmers trained in the COBOL language to write IBM 5280 applications and compile them on their OS/VS or DOS/VSE system. These applications can then be executed on an IBM 5280 system.

The IBM 5280 COBOL is designed in accordance with the following specifications:

- The 1974 ANS standard COBOL as defined in ANSI Standard X3.23—1974 (with the exception that the RERUN clause is confined to checking for syntax validity)
- The low Intermediate Level COBOL as defined in FIPS (Federal Information Processing Standard) PUB 21-1 (with the exception that the RERUN clause is confined to checking for syntax validity)

Programs compiled using the IBM 5280 COBOL can use the IBM 5280 diskettes, printers, and data stations; they can also perform communications tasks such as remote batch transfer and remote inquiry.

IBM 5280 Utilities

The utilities consist of commonly requested programs that enhance the use of the system. They provide functions such as copying diskettes and converting IBM 3740 programs.

IBM 5280 Sort/Merge

The sort/merge programs provide the arranging in sequence and combining of data for the IBM 5280 system.

IBM 5280 Communications Utilities

The communications utilities allow the user to use the communications feature offered on the IBM 5285 Programmable Data Station and the IBM 5288 Programmable Control Unit. The communications utilities allow the operator to perform batch transfer, inquiry, and remote job entry operations with little operator effort or experience. Both BSC and SNA/SDLC support are provided with the Communications Utilities Licensed Program.

IBM 5280 Assembler Language

The assembler language is provided by the IBM 5280 system to allow assembler programs to be written.

The chapters titled *Program Support (Noncommunications)* and *Communications Support* contain detailed information about these licensed programs.

IBM 5280-3270 Emulation

The IBM 3270 Emulation licensed program is available for the IBM 5285 and the IBM 5288. This licensed program allows an IBM 5280 system to emulate functions of the IBM 3270 Display System. IBM 5280-3270 Emulation supports both BSC and SDLC line protocols.

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Chapter 2. How the 5280 Distributed Data System Fulfills Your Data Processing Needs

There are many ways to combine the 5280 products to match a variety of data processing needs. The previous chapter briefly introduced the products available in the 5280 system. This chapter presents three typical applications that demonstrate the flexibility of the 5280 system: (1) data entry, (2) remote batch, inquiry, distributed printing, and remote job entry, and (3) data processing.

Each of these applications is an extension of another. Remote processing often follows data entry. The 5280 system accommodates many different application tasks by providing a single multipurpose system.

The data stations, control unit, and printers used in this chapter illustrate one part of each environment in which the application could be used. Configurations consisting of different products from the 5280 system are possible and may fit your needs more closely. For example, the processing environment in the following text consists of a configuration with the 5288 Programmable Control Unit. A small department might actually use the 5285 Programmable Data Station.

An advantage of using the 5280 system is that it performs a variety of functions while maintaining the same appearance, programming, and operating characteristics. The selection of the data stations and program support that is offered allows you to install a system that *looks* and *operates* the same when it is installed in different departments, but that *performs* the unique tasks of each department.



USING THE 5280 SYSTEM FOR DATA-ENTRY APPLICATIONS

Data entry is the high-volume capture of information. Data-entry environments range from areas that include professional data-entry operators to areas that only occasionally use a data-entry system.

DE/RPG provides extensive editing and verification checks against entered data to ensure the integrity of the data before giving it to the host processing system. It also provides automatic functions that enhance the data-entry process and make it more efficient; for example, it provides automatic format selection. Automatic format selection means that the program (rather than the operator) determines the next format to be used. DE/RPG allows the operators (and programmers) to design display formats in this type of application; the operators can use these formats to provide an entry pattern that matches the arrangement of information on the source document. DE/RPG also allows the operator or programmer to change the arrangement of entered data to an entirely different sequence for the diskette so it will satisfy the requirements of the host processing system.

The DE/RPG programs can be written to include subroutines which, in addition to the normal editing functions, validate the accuracy of entered information or extract information from other diskette data sets. These subroutines can perform standard procedural arithmetic, conditioning, and input/output master data set handling. Extensive prompting can also be included in the programs used by less experienced or casual-use operators.

The 5285 and 5286 Programmable Data Stations and the 5288 Programmable Control Unit support DE/RPG, which provides the operating characteristics required in this environment. The IBM Communications Utilities Program Product provides the functions necessary for a remotely located system that must transfer its work to a host processing system using a communications line.

The 5286 Dual Programmable Data Station is primarily for the user who has requirements for data entry only. The 5285 Programmable Data Station is primarily for the user who requires data entry, communications support, or a printer. The 5288 Programmable Control Unit is for the user who has extensive requirements such as communications, multiple data stations, and printers.

Figure 3 and Figure 4 show two configurations that reflect the type of environments in which this application might be used.

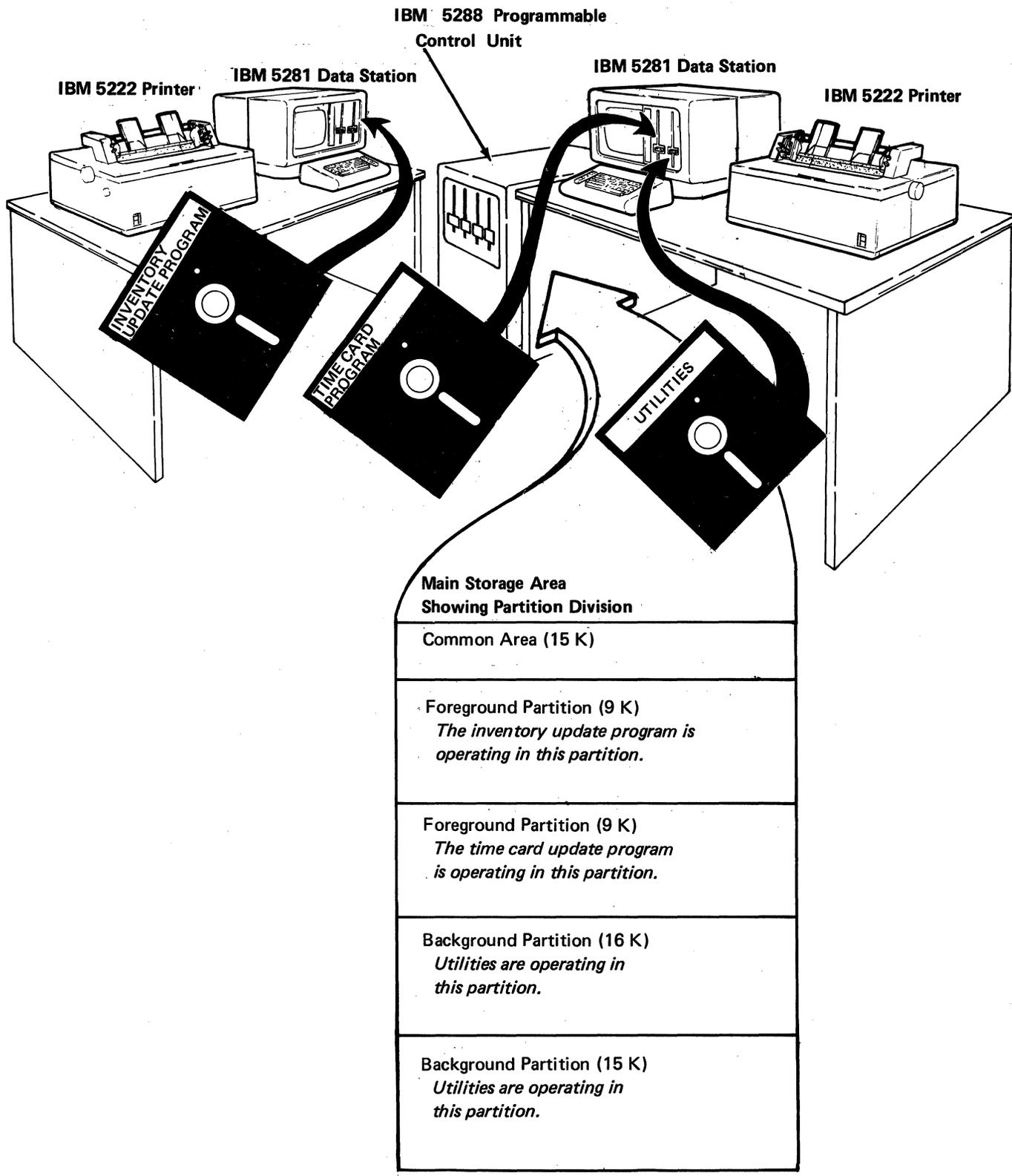


Figure 3. Possible Configuration for a Data Entry (Noncommunicating) Application

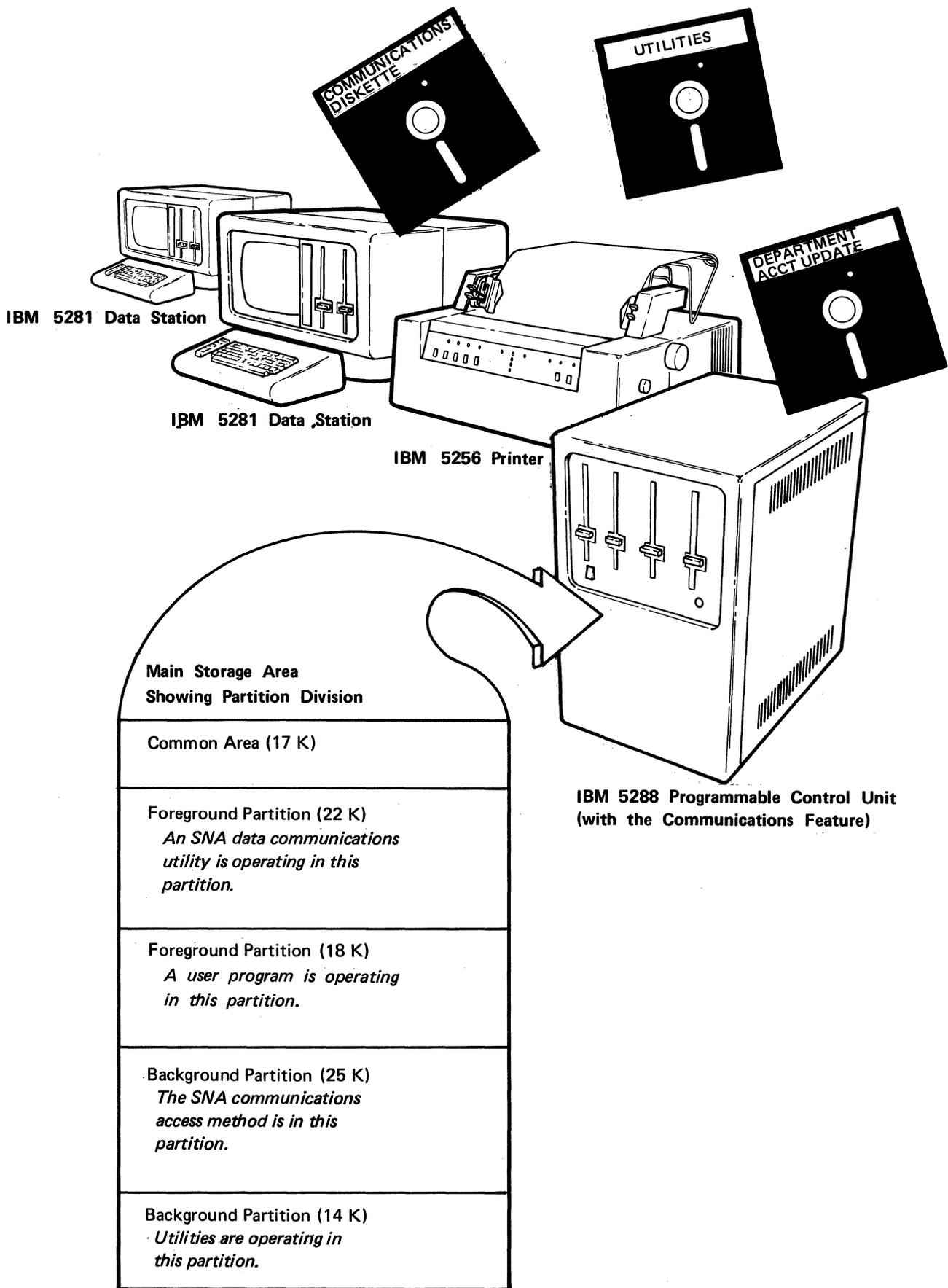


Figure 4. Possible Configuration for Data Entry (Communicating) Application

The advantages of using 5280 products for data-entry applications are that the 5280 system:

- Allows the user to program his own applications and customize them to accommodate the operators performing data-entry tasks
- Provides communications capability to a variety of host processing systems
- Allows multiple data set access
- Uses DE/RPG for designing display formats that match the source document and diskette formats that are compatible with those used by the host processing system
- Allows each operator to have a diskette drive for reading and writing information
- Promotes system efficiency through the use of concurrent program operation

- Provides powerful immediate edit checks against entered data to prevent the passing of erroneous information to the host processing system
- Provides expanded prompting facilities to allow the user to customize the prompts to the needs of the individual entering the data
- Offers expanded diskette storage and a variety of diskette types to allow easy transition from existing systems
- Provides independent data station operation
- Provides easy-to-read displays and easy-to-use keyboards

In addition, the 5280 system has been designed to allow conversion from the 3740 Data Entry System. The chapter entitled *Changing to the 5280 System from the IBM 3740 System* in this manual gives detailed information about this process.

Appendix A gives an example of using the 5280 for a data-entry application.



USING THE 5280 SYSTEM FOR REMOTE BATCH, INQUIRY, DISTRIBUTED PRINTING, OR REMOTE JOB ENTRY (RJE) APPLICATIONS

Both the 5285 Programmable Data Station and the 5288 Programmable Control Unit fulfill the requirement for a remotely located system that can send data to and receive data from a host processing system.

The IBM Communications Utilities Program Product provides remote batch, inquiry, and remote job entry support. The Communications Utilities Program Product is divided into two groups of utilities: those that are used to prepare for communications and those that actually transfer data over the communications line. These utilities allow the operator to transfer data over the communications line with little operator involvement. The transfer can be performed at the same time that the system is being used for another application.

Because printers can be attached to the 5285 and 5288, data can be sent from the host processing system over the communications lines directly to a printer attached to the 5280 system. Data can also be written to a diskette. The 5285, with its single keyboard and display, provides the facilities needed by a single user or small departments. The 5288, with multiple auxiliary data stations and printers, provides the facilities needed in larger installations.

Figure 5 shows the data station and storage arrangements that reflect the environment in which this application might be used.

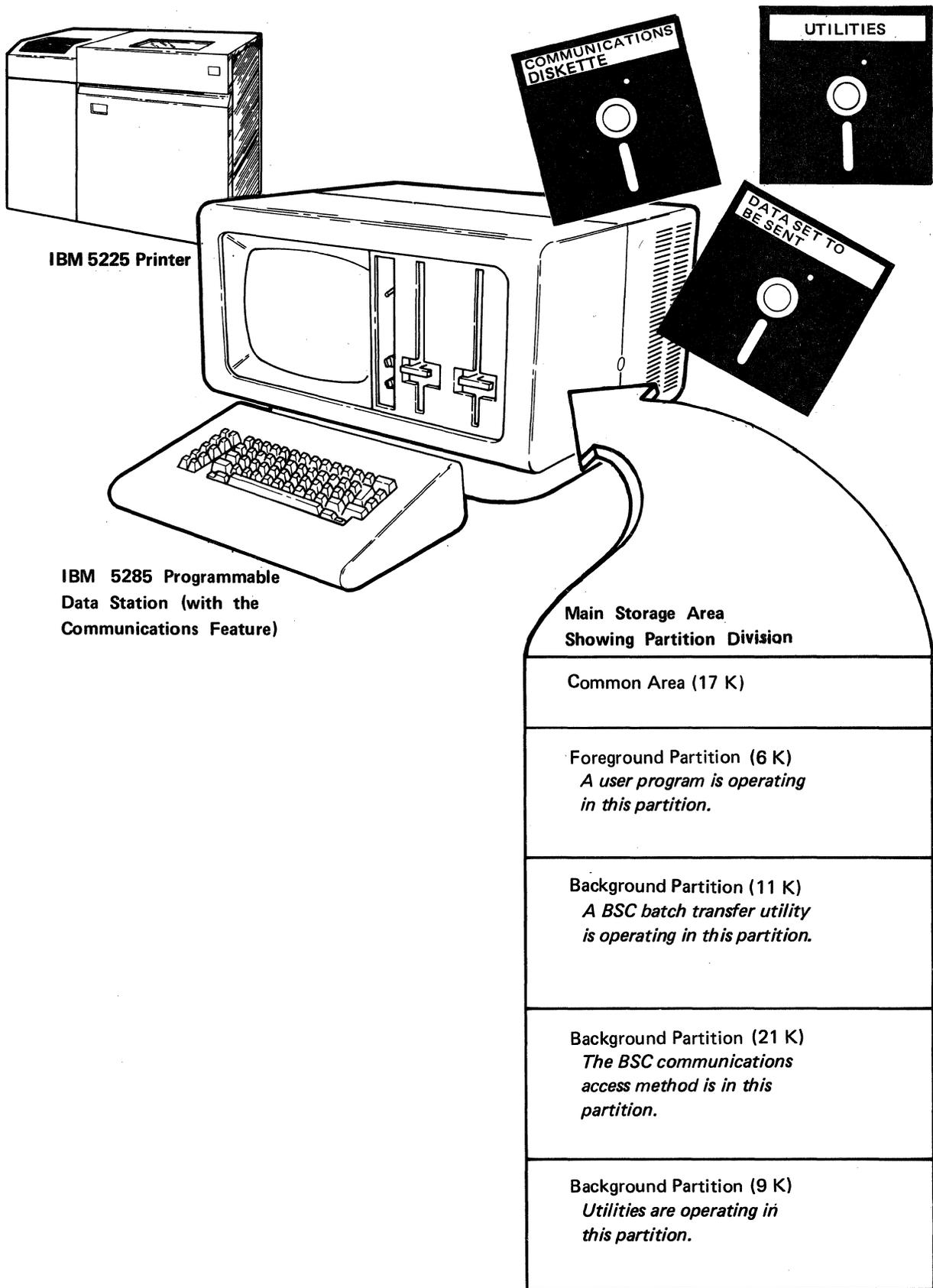
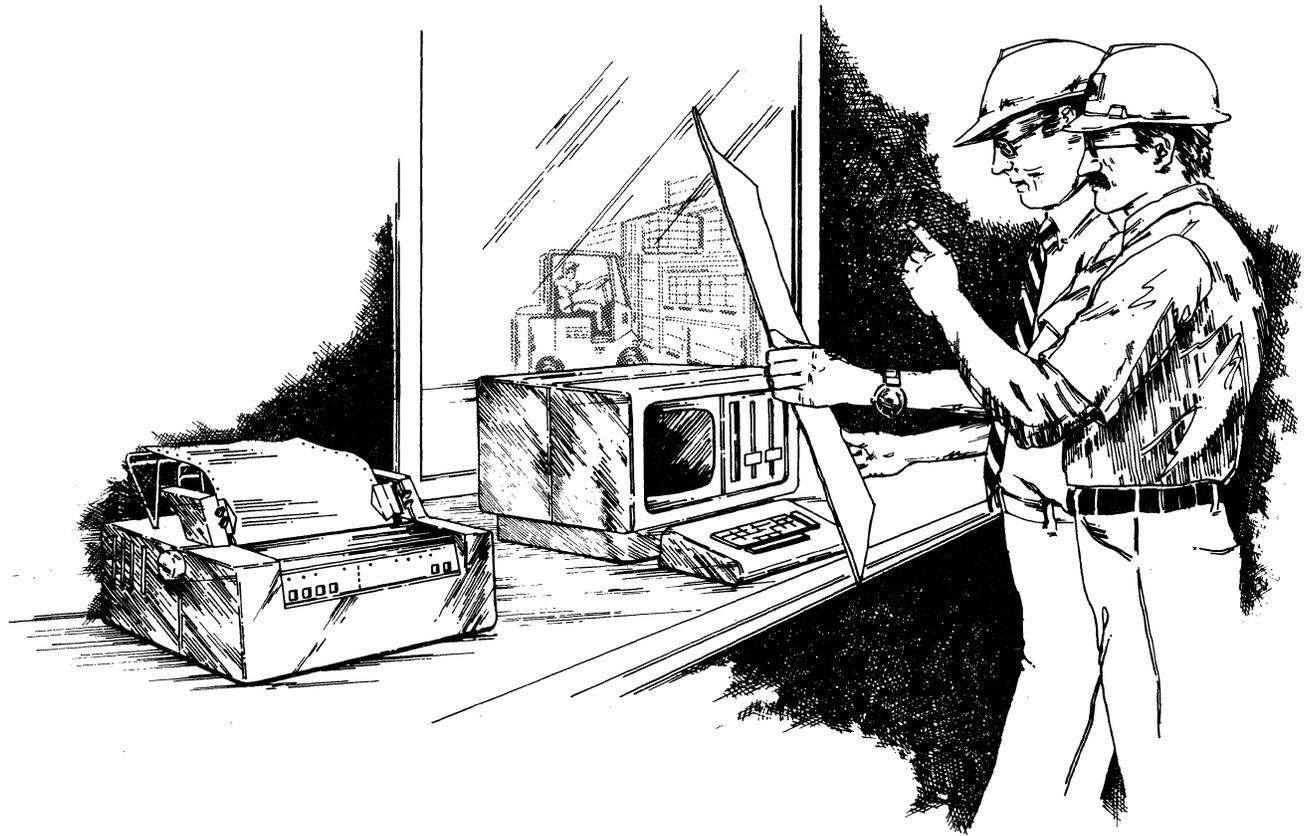


Figure 5. Possible Configurations for a Remote Batch, Inquiry, Distributed Printing, or Remote Job Entry Application

The advantages of using the 5280 system for remote applications are that it:

- Provides easy-to-use utilities that allow less experienced operators to transmit data to a host processing system
- Allows the user to write his own communications programs
- Provides editing either before transmitting or after receiving data using programs written in either the DE/RPG or the COBOL language
- Allows the user to transmit data during times that the work load is the lightest in the host processing system
- Allows the operator at the remote 5280 data station to submit and execute jobs on the host processing system
- Uses a single data station to provide a remote system for a single user
- Allows the user to inquire into the host processing system about the job status or about data in the master data base
- Allows distributed printing from the host processing system to the remote 5280 system
- Prints job output from a host processing system at a remote location at printer speeds tailored to the requirements of volume and schedules (40 characters per second to 560 lines per minute)
- Allows the user to access data sets in the host processing system
- Writes data from a host processing system to a diskette drive in the 5280 system
- Operates concurrently with other programs thereby allowing an operator to make multiple use of the system

Appendix A gives an example of using the 5280 system for a remote batch application.



USING THE IBM 5280 SYSTEM FOR PROCESSING APPLICATIONS

The processing capabilities are used to support the host processing system. For example, the IBM 5280 system can be used in a remote location to perform order/entry, invoice control, or even local payroll jobs without requiring interaction with the host processing system. The ability to process data at the remote location allows the user to immediately access data and obtain results necessary for his normal job function; the IBM 5280 can also perform transaction-related jobs and transmit data that updates the master data set in the host processing system.

This environment normally includes communications support and the use of programs written in either DE/RPG or COBOL language. Operators can either use the IBM 5280 in a batch transfer mode (offline from the host processing system) or in an interactive mode (online with the host processing system). Entries provided by operators can be used as input for a DE/RPG or COBOL program. The program can then process the entered data before sending it to the host processing system. For example, the processing performed by a DE/RPG or COBOL program might consist of determining batch totals and printing orders or reformatting sequentially entered transaction data into master keyed data sets for master data set update by the host processing system.

The IBM 5285 Programmable Data Station (with a communications adapter feature), the IBM 5288 Programmable Control Unit (with a communications adapter feature) and the IBM 5286 Dual Programmable Data Station (noncommunicating) are available for use in this environment. Figure 6 illustrates a typical data station and storage arrangement.

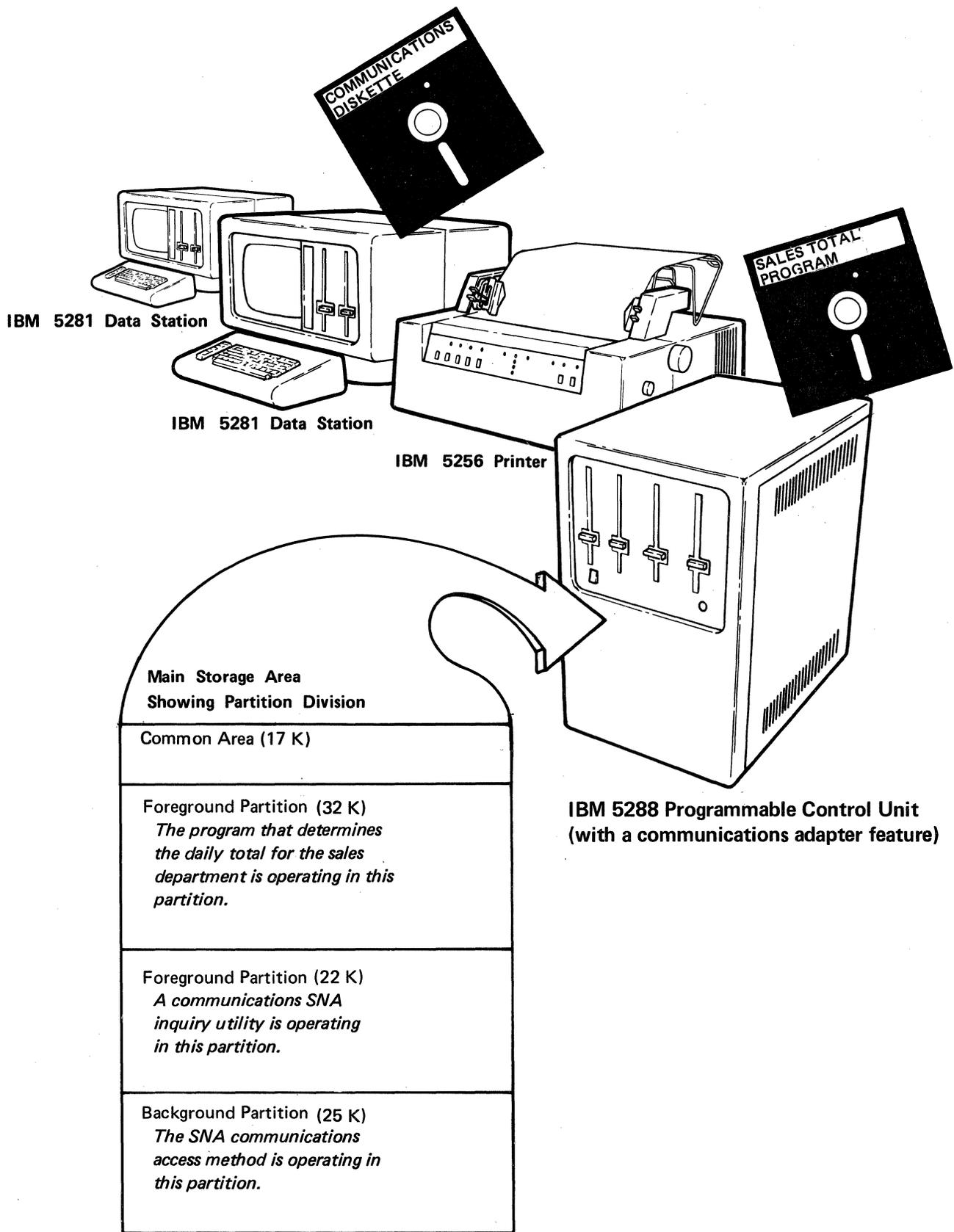


Figure 6. Possible Configuration for a Processing Application (with Communications)

The advantages of using the 5280 system for processing applications are that:

- Some of the functions normally performed at the host processing system can be performed at the remote location.
- Data sets sent to the host processing system can be presented in a more usable form to relieve the host processing system of the necessity of reformatting the data.
- Transaction processing can be performed at the remote location where it is required and where it can be easily validated and corrected.

Appendix A gives an example of using the 5280 system for a data processing application.

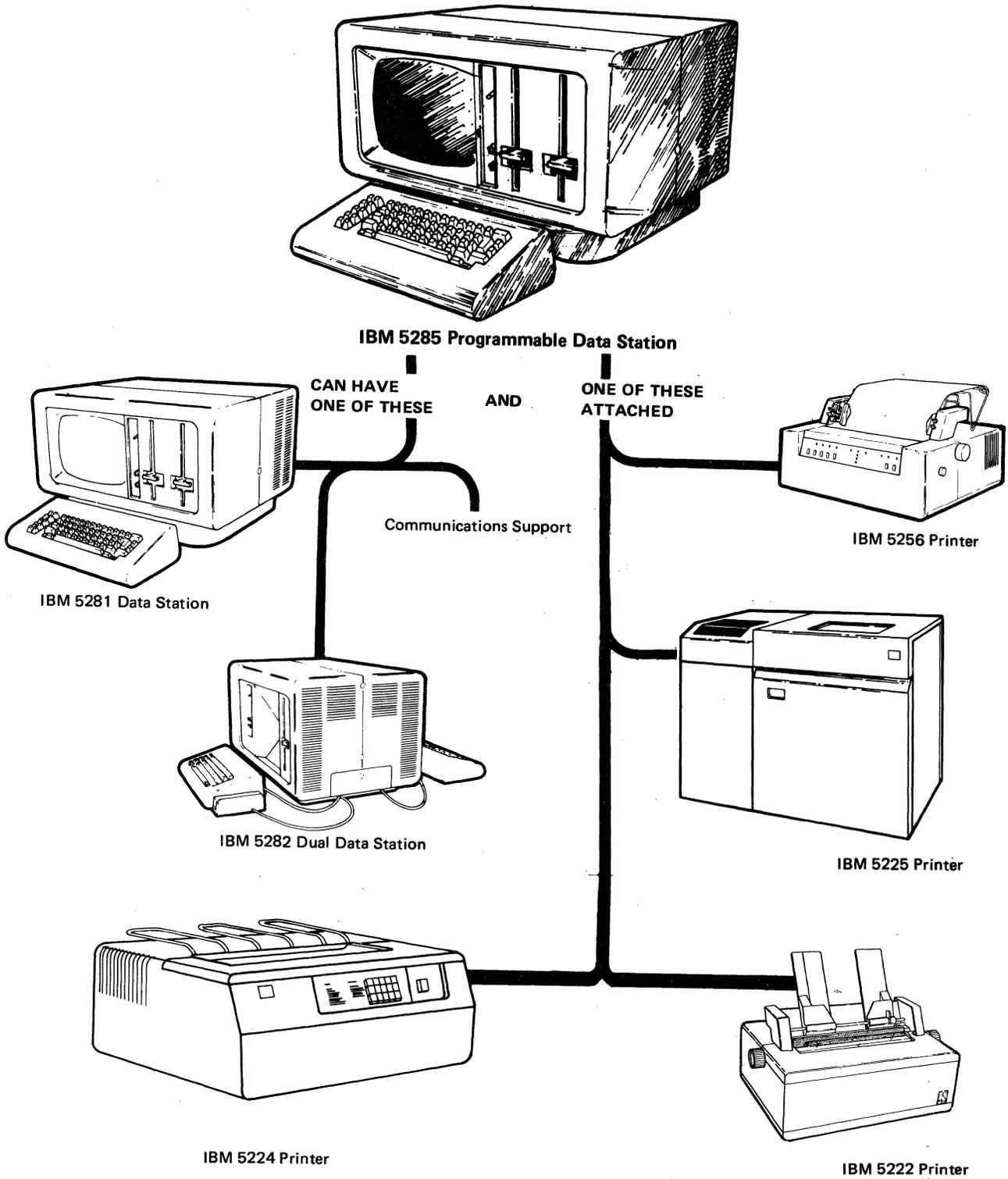
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Chapter 3. Specific Information About the 5280 Data Stations, Control Unit, and Printers

This chapter describes in detail the data stations, printers, and control unit in the 5280 system. It also describes the possible combinations of 5280 products.

A highlighted drawing of the product being described is linked with line drawings of the data stations and printers that can be attached to it. A list on the opposing page provides detailed information about the product being described.

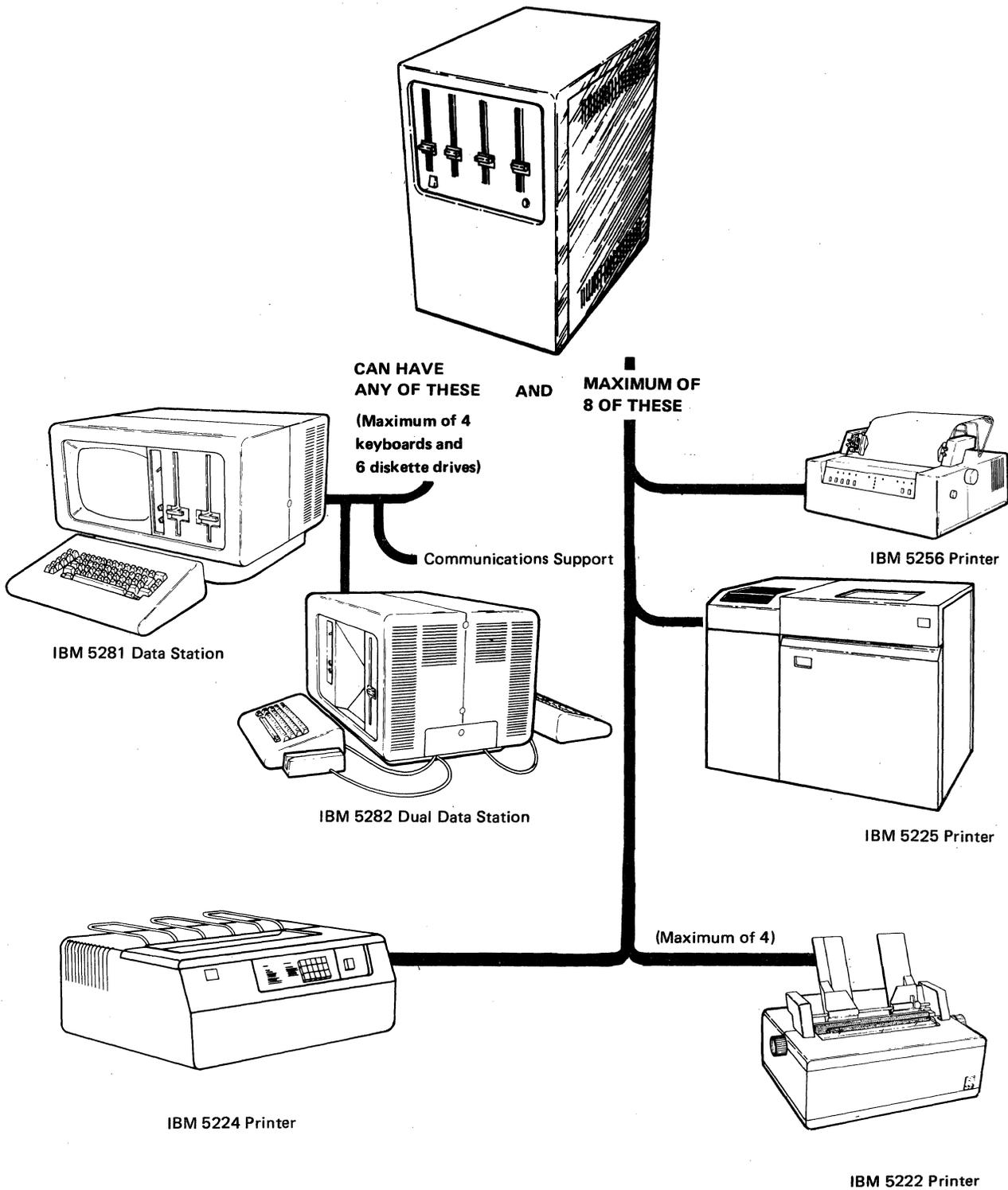
IBM 5285 Programmable Data Station Configuration



IBM 5285 Programmable Data Station

- A single, tabletop, programmable keyboard/display station.
- Storage sizes available are 32 K, 48 K, 64 K, and 96 K.
- Keyboards available are data entry, data entry with the proof arrangement, and typewriter.
- The unit can contain either one diskette drive or two diskette drives, and a maximum of two drives can be in the auxiliary data station, with a total of four drives in the system. These drives support either diskette 1 only or diskette 1, 2 and 2D. The drives do not have to be the same type.
- Programming available includes:
 - IBM 5280 System Control Programming
 - IBM 5280 Sort/Merge Licensed Program
 - IBM 5280 Utilities Licensed Program
 - IBM 5280 Communications Utilities Licensed Program
 - IBM 5280 DE/RPG Licensed Program
 - IBM 5280 COBOL Licensed Programs (a host compiler for OS/VS and a host compiler for DOS/VSE)
 - IBM 5280 Assembler Language Licensed Program
 - IBM 5280-3270 Emulation Licensed Program
- Display sizes are 480, 960, and 1920 characters. Attached auxiliary data stations must have the same display size as the 5285. Display size must be 1920 characters if the IBM 5280-3270 Emulation Licensed Program is installed.
- Features available include:
 - Keylock
 - Magnetic Stripe Reader
 - Communications hardware adapters
 - Elapsed time counter
 - Second application microprocessor

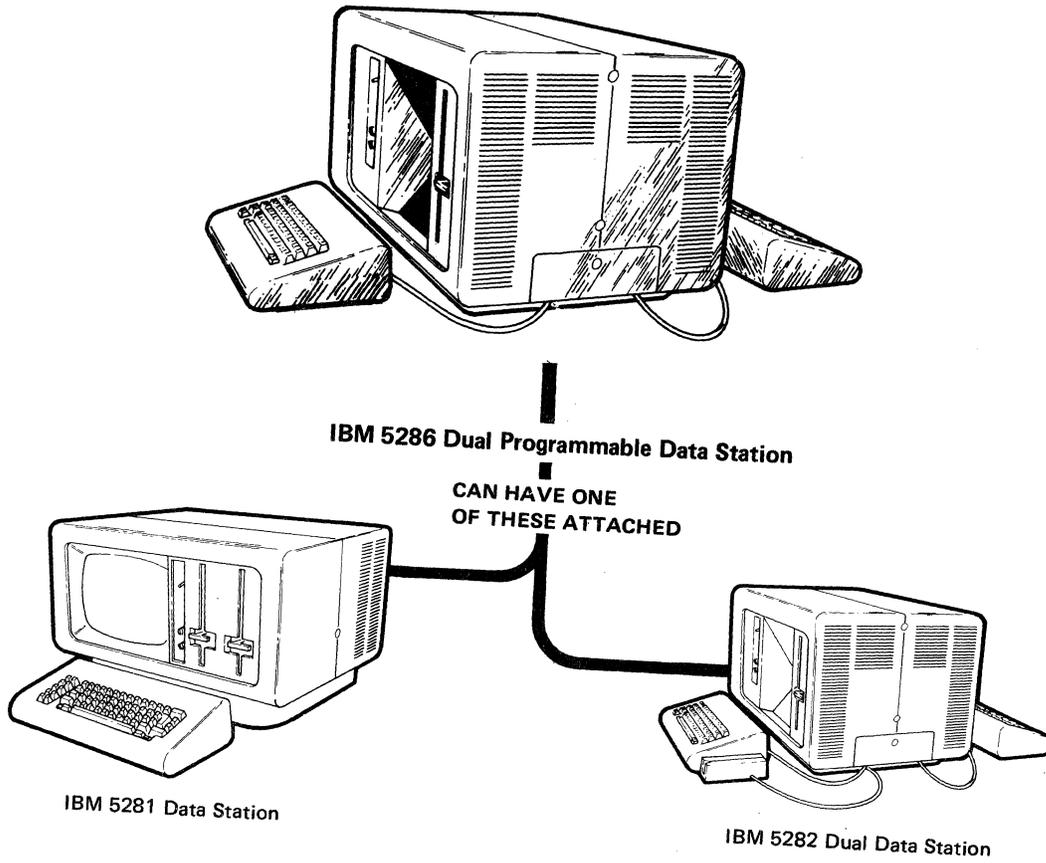
IBM 5288 Programmable Control Unit Configuration



IBM 5288 Programmable Control Unit

- A floor-standing programmable unit.
- Storage sizes available are 32 K, 64 K, 96 K, 128 K, 160 K, 224 K, and 288 K.
- One diskette drive is included. A maximum of four diskette drives can be in the unit and a maximum of six drives can be in the auxiliary data stations. However, there can only be a total of eight drives in the IBM 5288 system. These drives support either diskette 1 only or diskette 1, 2, and 2D. The drives do not have to be the same type.
- Programming available includes:
 - IBM 5280 System Control Programming
 - IBM 5280 Sort/Merge Licensed Program
 - IBM 5280 Utilities Licensed Program
 - IBM 5280 Communications Utilities Licensed Program
 - IBM 5280 DE/RPG Licensed Program
 - IBM 5280 COBOL Licensed Program (a host compiler for OS/VS or a host compiler for DOS/VSE)
 - IBM 5280 Assembler Language Licensed Program
 - IBM 5280-3270 Emulation Licensed Program
- Display sizes are 480, 960, and 1920 characters. All displays must be the same size. Display size must be 1920 characters if the IBM 5280-3270 Emulation Licensed Program is installed.
- Features available include:
 - Keylock
 - Elapsed time counter
 - Communications hardware adapter
 - Second application microprocessor

IBM 5286 Dual Programmable Data Station Configuration



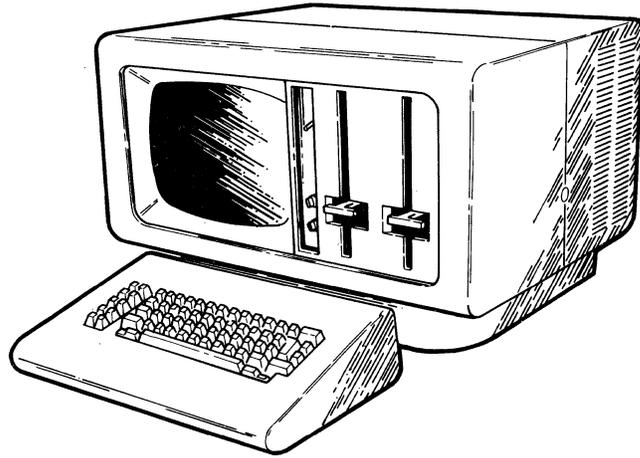
IBM 5286 Dual Programmable Data Station

- A dual, tabletop, programmable keyboard/display station.
- Storage sizes available are 32 K, 48 K, 64 K, and 96 K.

Keyboards available are data entry, data entry with the proof arrangement, and typewriter. Both keyboards must be the same type.

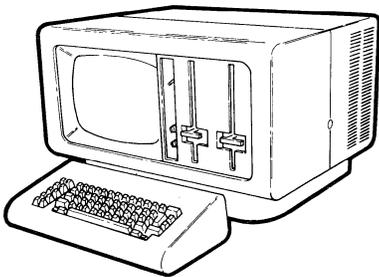
- Two diskette drives are included. A maximum of two diskette drives is allowed in the unit and a maximum of two drives can be in the auxiliary data stations with a total of four drives in the system. These drives support either diskette 1 only or diskette 1, 2, and 2D. The drives in the auxiliary data stations do not have to be the same type as the IBM 5286.
- Programming available includes:
 - IBM 5280 System Control Programming
 - IBM 5280 Sort/Merge Licensed Program
 - IBM 5280 Utilities Licensed Program
 - IBM 5280 Assembler Language Licensed Program
 - IBM 5280 DE/RPG Licensed Program
 - IBM 5280 COBOL Licensed Programs (a host compiler for OS/VS or a host compiler for DOS/VSE)
- Display size is 480 characters.
- Features available include:
 - Keylock
 - Magnetic Stripe Reader
 - Elapsed time counter
 - Second application microprocessor

IBM 5281 Data Station Configuration

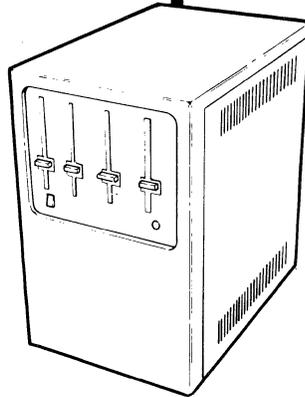


IBM 5281 Data Station

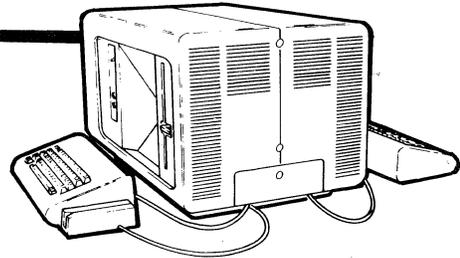
MUST BE ATTACHED TO ONE
OF THESE



IBM 5285 Programmable Data Station



IBM 5288 Programmable Control Unit

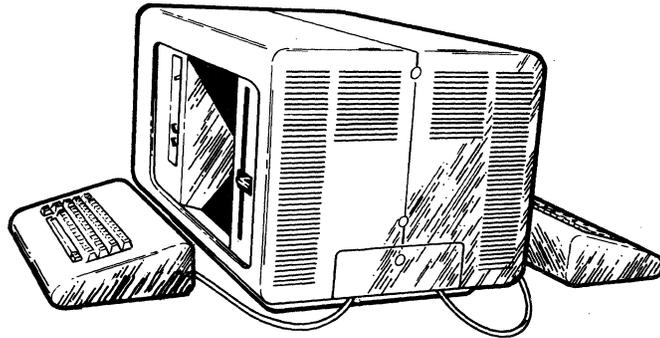


IBM 5286 Dual Programmable Data Station

IBM 5281 Data Station

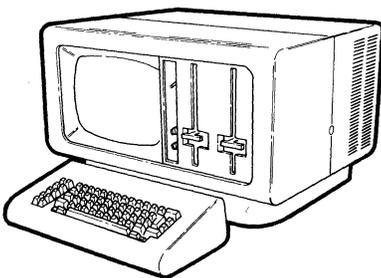
- A single, tabletop, auxiliary keyboard display.
- No diskette drives are required, however, a maximum of two drives are allowed; these support either diskette 1 only or diskette 1, 2, and 2D. The drives do not have to be the same type.
- Keyboards available are data entry, data entry with a proof arrangement, and typewriter.
- Display sizes are 480, 960, and 1920 characters. The size is determined by the programmable device to which the station is attached.
- Feature available:
 - Magnetic Stripe Reader
 - Display Screen Filter

IBM 5282 Dual Data Station Configuration

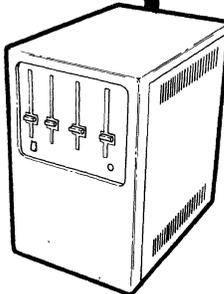


IBM 5282 Dual Data Station

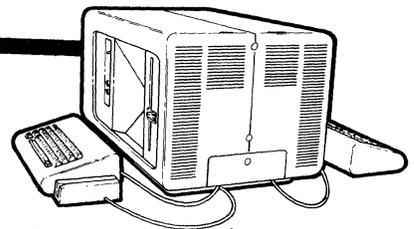
MUST BE ATTACHED
TO ONE OF THESE



IBM 5285 Programmable Data Station



IBM 5288 Programmable Control Unit

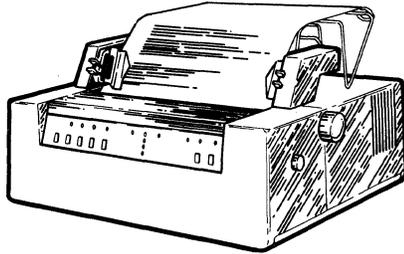


IBM 5286 Dual Programmable Data Station

IBM 5282 Dual Data Station

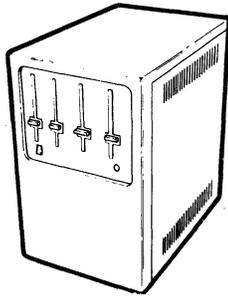
- A dual, tabletop, auxiliary keyboard/display station.
- No diskette drives are required, however, a maximum of two drives are allowed; these support either diskette 1 only or diskette 1, 2, and 2D. The drives do not have to be the same type.
- Keyboards available are data entry, data entry with a proof arrangement, and typewriter. Both keyboards must be the same type.
- Display sizes are 480 and 960 characters. The size is determined by the programmable device to which the station is attached.
- Feature available:
 - Magnetic Stripe Reader

IBM 5256 Printer Configuration

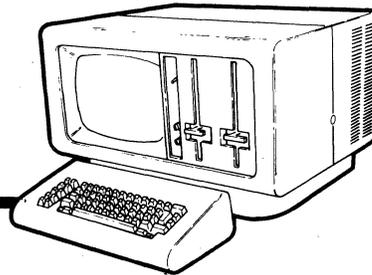


IBM 5256 Printer

MUST BE ATTACHED TO ONE
OF THESE



IBM 5288 Programmable Control Unit
(with an Auxiliary Data Station)



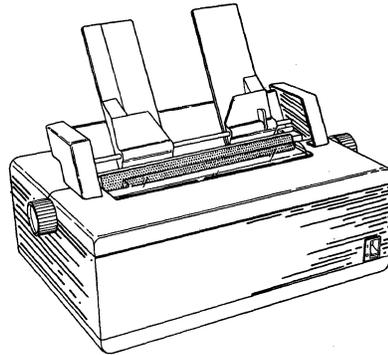
IBM 5285 Programmable Data Station

IBM 5256 Printer

- Bidirectional serial character matrix printer.
- A 95-graphic, upper-lowercase character set is offered as well as a 184-graphic multinational character set.
- Maximum print speeds (by model) are:
 - Model 1 40 characters per second
 - Model 2 80 characters per second
 - Model 3 120 characters per second
- Print line is 132 characters.
- Variable width forms tractor.
- Up to 6-part forms can be used.
- Vertical line spacing is either 6 or 8 lines per inch.
- Features include:
 - Audible Alarm
 - Cable Thru

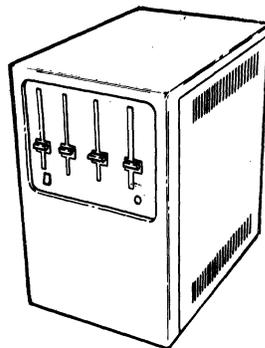
See the *Forms Design Reference Guide for Printers*, GA24-3488, for additional information on forms design considerations.

IBM 5222 Printer Configuration

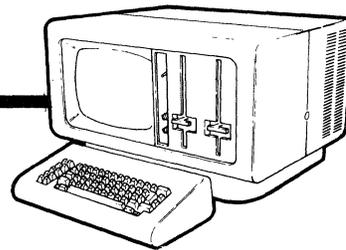


IBM 5222 Printer

MUST BE ATTACHED TO ONE
OF THESE



IBM 5288 Programmable Control Unit
(with an Auxiliary Data Station)



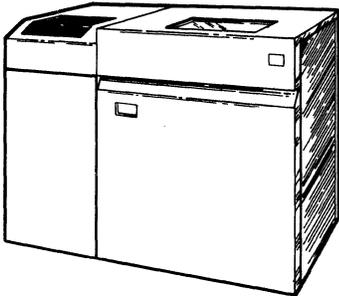
IBM 5285 Programmable Data Station

IBM 5222 Printer

- Bidirectional serial character matrix printer
- A 95-graphic, upper-lowercase character set is offered as well as a 184-graphic multinational character set
- Maximum print speed is 80 characters per second
- Print line length is 132 characters at 10 characters per inch and 198 characters at 15 characters per inch
- Variable width forms tractor
- Up to 4-part forms can be used
- Vertical line spacing is either 6 or 8 lines per inch

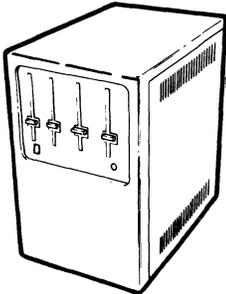
See the *Forms Design Reference Guide for Printers*, GA24-3488, for additional information on forms design considerations.

IBM 5225 Printer Configuration

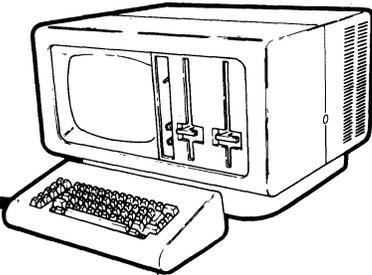


IBM 5225 Printer

MUST BE ATTACHED TO ONE OF THESE



IBM 5288 Programmable Control Unit



IBM 5285 Programmable Data Station

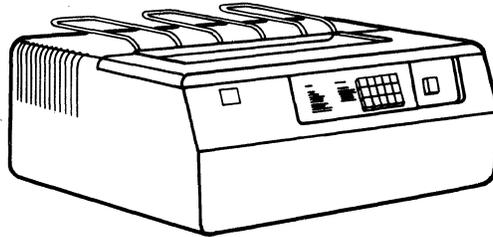
IBM 5225 Printer

- Impact matrix line printer.
- A 95-graphic, upper-lowercase character set is offered as well as a 184-graphic multinational character set.
- Maximum print speeds (by model and at 10 characters per inch) are:
 - Model 1, 280 lines per minute with a maximum line length of 7.4 inches
 - Model 2, 400 lines per minute with a maximum line length of 9.8 inches
 - Model 3, 490 lines per minute with a maximum line length of 11.8 inches
 - Model 4, 560 lines per minute with a maximum line length of 13.0 inches
- Print density of 10 or 15 characters per inch.
- Maximum print line length is 132 characters at 10 characters per inch and 198 characters at 15 characters per inch.
- Variable width forms tractor.
- Up to 6-part forms can be used.
- Vertical line spacing is either 6 or 8 lines per inch.
- Features include:
 - Audible Alarm
 - Cable Thru

Note: The number of lines per minute depends on the model of the printer, the line length, and the print density.

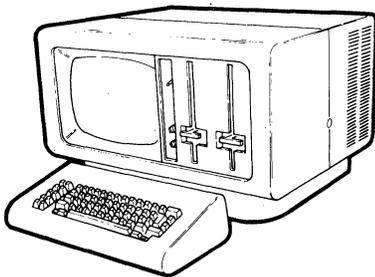
See the *Forms Design Reference Guide for Printers*, GA24-3488, for additional information on forms design considerations.

IBM 5224 Printer Configuration

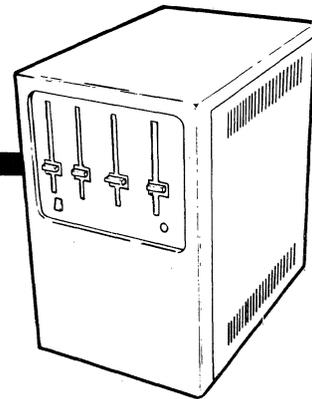


IBM 5224 Printer

Must be attached to one of these



IBM 5285 Programmable Data Station



IBM 5288 Programmable Control Unit

IBM 5224 Printer

- Tabletop, impact matrix line printer
- Maximum print speeds at 10 characters per inch on 7.4 inch lines are:
 - Model 1 – 140 lines per minute
 - Model 2 – 240 lines per minute
- Maximum characters per line are:
 - At 10 characters per inch – 132
 - At 15 characters per inch – 198
- Variable width forms tractor
- Up to four part forms can be used
- Vertical spacing is either 6 or 8 lines per inch, selectable by the operator.

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Chapter 4. General Characteristics of the 5280 Common Components

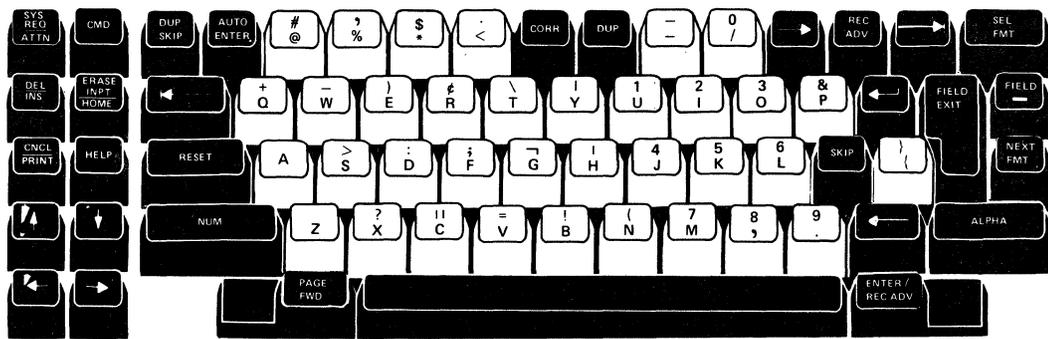
This chapter describes the general characteristics of the keyboards, displays, and diskette drives that are included in the 5280 system. Specific information about each data station, control unit, and printer is in the preceding chapter and specific information about the program support is in the following chapter.

The 5286 Dual Programmable Data Station, the 5285 Programmable Data Station, the 5281 Data Station, and the 5282 Dual Data Station provide common keyboard and display functions and have common characteristics. All of these 5280 products use the same types of diskette drives.

KEYBOARDS

Three basic types of keyboards are offered: the typewriter keyboard, data entry keyboard, and data entry keyboard with a proof arrangement. Both keyboards of a dual data station (the 5286 and 5282) must be the same type. Operator ease of use is enhanced by a movable keyboard and palm rest on each keyboard.

Figure 7 illustrates the keyboards.



Data Entry



Data Entry with the Proof Arrangement

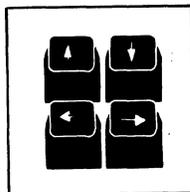


Typewriter

Figure 7. Types of Keyboards

Each keyboard has cursor movement keys, special function keys, field exit keys, and data keys (alphabetic and numeric). All data keys, the Cursor Right and Cursor Left keys, and some of the function keys are typamatic. Typamatic means that the key operation continues as long as the key is held down.

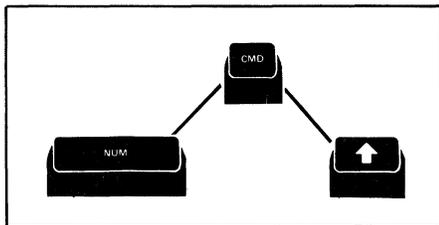
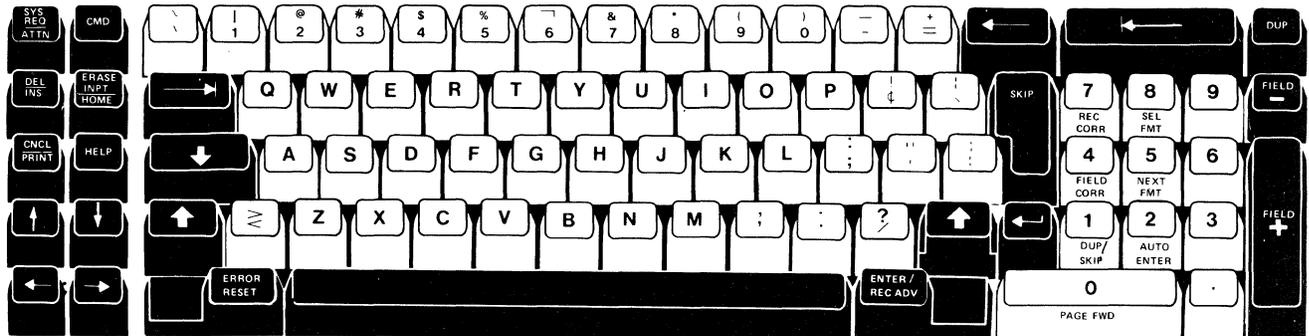
Cursor Movement Keys



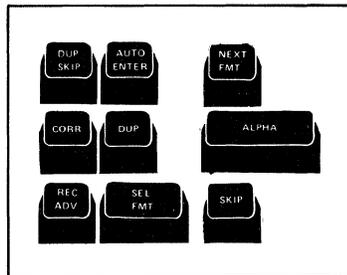
The cursor movement keys allow the operator to position the cursor in any position on the display when format 0 is used. For user formats, the Field Advance and Field Backspace keys are used to position the cursor between fields and the cursor movement keys position the cursor within the fields.

Special Function Keys

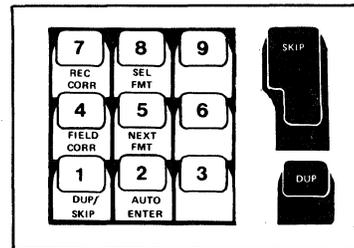
	Communications Only			Key Entry Utility Only									
	Comm Attention	End Input	Comm Status	Search End of Data	Load Format	Change Format	Display Format	Display Data		Dump/Trace File Open	Auto Mark		Clear Screen
Hex	Review Second Dataset	Transfer Record	Return to Transaction Dataset	Search Content	Search Seq Content	Search Record Number	End of Job	Edit Release	Mark Field	Delete Record	Insert Record	Display Verify Record	



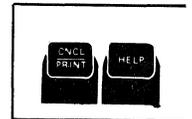
CMD-Key Sequence
CMD-Shift-Key Sequence



Data Entry Keyboard



Typewriter Keyboard

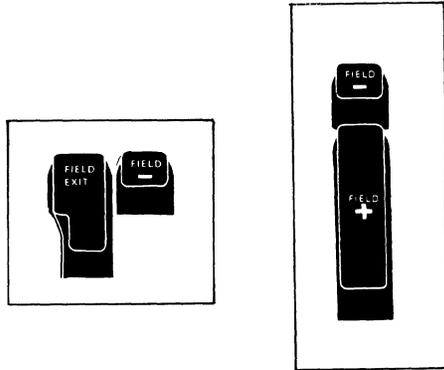


Typewriter and Data Entry Keyboard

The special function keys work with the programs. These keys control operations such as copying, searching records, advancing records, selecting formats, duplicating fields, skipping or bypassing fields, and certain communications functions. The templates across the top of the keyboard name the functions that the keys perform. To use the command keys on the bottom half of the template, press the CMD key and the appropriate key across the top of the keyboard. To use command keys on the top half of the template, press CMD, shift, and then the appropriate key.

Several templates are available. One template is for systems without communications and the others are for systems with communications. The example shows a template for systems with communications. Some of the command keys shown on the template are for use only with the key entry utility.

Field Exit Keys



The field exit keys (in addition to the Dup, Skip, Character Advance, and Field Advance keys) may cause an edit to be performed against the contents of the field before the field is exited. Some edits are performed on a field basis and some are performed on a character basis. Examples of these types of edits are:

- *Mandatory entry.* The operator must enter information into the field. The entry can be blank.
- *Mandatory fill.* The operator must completely fill the field.
- *Data required.* The operator must enter data (at least one nonblank character) into the field before it can be exited.
- *Blank check.* The entire entry must contain no blanks or consist of all blanks.
- *Field exit required.* One of the field exit keys (and Dup, Skip, Character Advance, or Field Advance keys) must be used to leave the field.
- *Right adjust.* Data that is entered is shifted to the rightmost position of the field and the unused portion of the field is filled with either blanks or zeros when a field exit key is used.

All 5280 keyboards allow the entry of diacritic characters (such as the German umlaut, ä) and hexadecimal values (such as A9, which is equivalent to the decimal value 169).

DISPLAYS

All 5280 displays use a cathode-ray tube, which forms green characters on a dark background. Highlighting techniques are available to emphasize information on the displays. These techniques highlight the current field or designated fields. Because highlighting can be accomplished on a field basis, the combination of various highlighting techniques on the same display is possible. For example, one field may use column separators while the next field may be underlined. This control is accomplished through your user program.

When current field highlighting is specified, the field is highlighted only while the cursor is in the field. When the cursor exits to the next field, the exited field resumes its normal display characteristics.

The types of highlighting available on a field basis are:

Selectable	Default (if none selected)
Reverse image	Normal image
High intensity	Normal intensity
Nondisplay	Display character
Blink	No blink
Column separators	No column separators
Underscore	No underscore

Figure 8 illustrates these attributes.

IBM 5280 Distributed Data Station
Highlighting Characters

normal intensity abcdefghijklmnopqrstuvwxyz

HIGH INTENSITY ABCDEFGHIJKLMNOPQRSTUVWXYZ

NORMAL INTENSITY

HIGH INTENSITY

REVERSE IMAGE

HI REVERSE IMAGE

SEPARATORS

HI SEPARATORS

REVERSE SEPARATORS

HI REVERSE SEPARATORS

BLINK

HIGH BLINK

REVERSE BLINK

HI REVERSE BLINK

UNDERSCORE

HIGH UNDERSCORE

REVERSE UNDERSCORE

Figure 8. Display Attributes

The number of displayable characters varies according to the data station type. Figure 9 illustrates the relationship of the data station types and display size.

Programmable Data Station or Control Unit	Characters Per Display	Attached Auxiliary Data Station	Characters Per Display¹
IBM 5286	480	5281	480
		5282	480
IBM 5285 (Noncommunicating)	480	5281	480
		5282	960
	960	5281	960
		5282	960
1920	5281	1920	
	None		
IBM 5285 (Communicating)	960 or 1920	None	
IBM 5288 (First display is a 5281 or 5282 with a 480-character display)		5281	480
		5282	480
(First display is a 5281 or 5282 with a 960-character display)		5281	960
		5282	960
(First display is a 5281 with a 1920 character display)		5281	1920

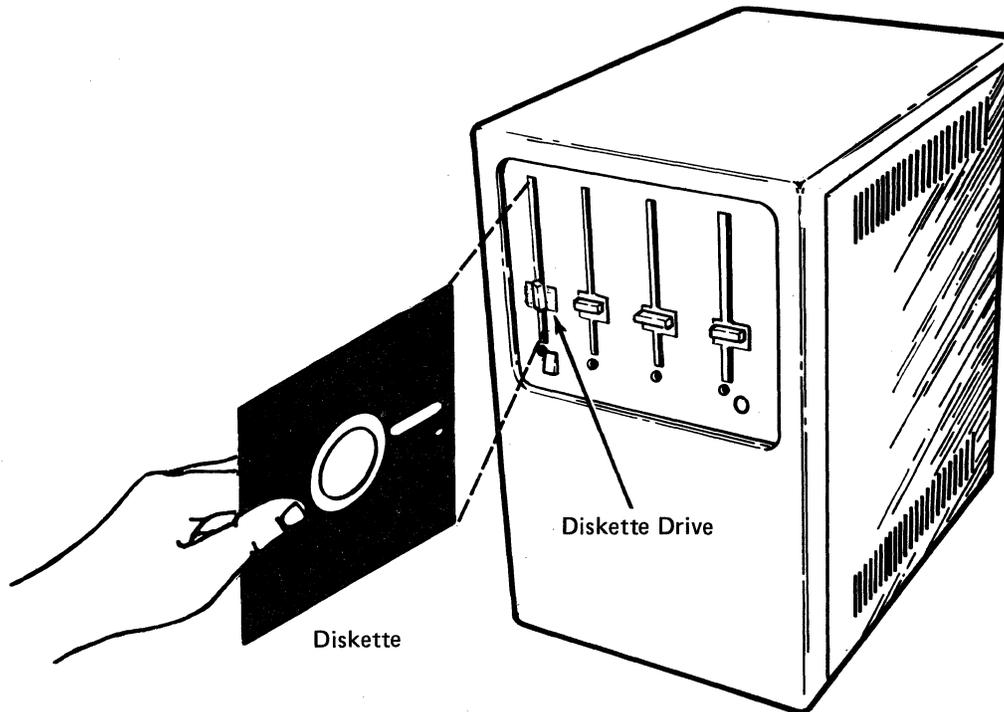
¹All data stations on a system must have the same display size.

Figure 9. Display Sizes Available in the 5280 System

Either the standard 94-character set or the multinational 185-character set is available. Diacritics can be displayed.

A display screen filter is optional. This attaches to the screen of the single data station to reduce glare and possibly enhance character contrast.

DISKETTE DRIVES AND DISKETTE TYPES AVAILABLE FOR THE 5280 SYSTEM



IBM 5288
Programmable Control Unit

A diskette is a thin, flexible, magnetic media used to store data. The diskette provides quick-access magnetic storage for programs and data sets. Diskettes used by any IBM system with the same diskette type at the same bytes per sector and the same data type as the 5280 system are compatible with the diskettes recorded on the 5280 system.

There are two types of compact diskette drives in the 5280 system. One drive uses only the IBM diskette 1. The other drive uses IBM diskette 1, diskette 2, or diskette 2D. Drives that support only IBM diskette 1 can read and write only on the IBM diskette 1 type. Drives that support IBM diskette 1, 2, and 2D can read from and write on all three diskette types.

IBM diskette 2D can store twice the data of IBM diskette 2 and four times the data of IBM diskette 1. IBM diskette 1 is only recorded on one side of the media while IBM diskette 2 and IBM diskette 2D are recorded on both sides of the media.

The following chart shows the capacities of the diskette types that can be used by the 5280:

Diskette Type	Physical Record Length (Bytes per Sector)	Total Storage (in Bytes)	Format Number
Diskette 1	128	246 272	1
Diskette 1	256	284 160	2
Diskette 1	512	303 104	3
Diskette 2	128	492 544	4
Diskette 2	256	568 320	5
Diskette 2	512	606 208	6
Diskette 2D	256	985 088	7
Diskette 2D	512	1 136 640	8
Diskette 2D	1024	1 212 416	9

For diskette data exchange with other systems, the following exchange types are supported:

BASIC Exchange (formats 1 and 4 in chart)

H Exchange (format 7 in chart)

I Exchange (all formats in chart)

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Chapter 5. Program Support (Noncommunications)

This chapter contains specific information about the programs, other than those for communications, available with the IBM 5280 system. Communications programming is described in the following chapter.

The IBM 5280 program support consists of:

- IBM 5280 System Control Programming
- IBM 5280 DE/RPG Licensed Program
- IBM 5280 COBOL Licensed Program (host compilers for OS/VS and DOS/VSE)
- IBM 5280 Utilities Licensed Program
- IBM 5280 Sort/Merge Licensed Program
- IBM 5280 Assembler Language Licensed Program

All program support is on diskettes; when needed, programs on diskettes can be loaded into the main storage area of the IBM 5285 Programmable Data Station, IBM 5288 Programmable Control Unit, or IBM 5286 Dual Programmable Data Station. All user programs and IBM licensed programs are executed in partitions.

You determine the partition sizes and types you want to use. There must be at least one foreground partition assigned. A foreground partition should be assigned to each keyboard. You can define the background partitions as you wish. One large background partition that can be shared by all operators on the system (in a contention mode) or multiple smaller background partitions (one for each operator) are available; it is your decision. The *IBM 5280 System Control Programming Reference/Operation Manual*, GC21-7824, provides detailed instructions for defining partition sizes and types.

Each of the licensed programs supplied by IBM has a minimum predefined partition size in which it must be executed. The *IBM 5280 Planning and Site Preparation Guide*, GA21-9351, provides this information. For example, the noncommunications licensed programs (except the sort/merge programs, COBOL, and diskette copy utility) are designed to execute in a 9 K minimum partition; therefore, each background partition should be at least 9 K if you intend to use most of the IBM Utilities licensed program, 11 K for the diskette copy utility and at least 16 K if you intend to use the sort/merge or COBOL programs.

IBM 5280 SYSTEM CONTROL PROGRAMMING

These programs are available from IBM without additional charge. They provide basic functions necessary for the use of your IBM 5280 products. Prompted displays guide you through the process of using these programs.

The following text describes each of these programs.

- *IPL (Initial Program Load)*: This program contains the system configuration required to complete the power-on sequence. You can define a customized configuration by using the system configuration program.
- *System Configuration*: This program allows you to create a personalized IPL configuration by specifying your individual system requirements for use in the IPL process. Your customized configuration is saved on a diskette that is available for use at the time IPL is performed.
- *PTF/Patch*: This program allows you to apply IBM-released changes or corrections to the IBM-supplied programs or changes or corrections to your user programs.
- *Close Failure Recovery*: This program allows you to access data that would normally be lost as the result of not properly closing the data set.

The *IBM 5280 System Control Programming Reference/Operation Manual*, GC21-7824, contains details about each of these programs.

IBM 5280 DE/RPG LICENSED PROGRAM

DE/RPG is an optional IBM-supplied program that is available for a fee. DE/RPG allows you to perform a range of program functions from writing simple data-entry programs to writing complex application programs. The diskette containing the DE/RPG licensed program consists of the compiler and the source entry program.

Your DE/RPG programs can be entered into the system using the source entry program, key entry utility, or a user-defined entry program. Once a program has been entered, it must be compiled. When a program is compiled, it is changed into a form that the machine can use. Upon completion of the compilation, it is ready to be used for data entry or processing. The source entry program is used to create DE/RPG source statements which become input to the DE/RPG compiler. It prompts the operator for information about the program. The prompts enhance the ease-of-use aspect of entering your DE/RPG programs into the IBM 5280 system.

Using DE/RPG for Data-Entry Programs

DE/RPG provides a broad range of data-entry program capability from simple transcriptive key entry to high-function data entry with extensive editing and data set access. Ease-of-use design allows nonprogrammer-oriented users to write simple data-entry DE/RPG programs.

Powerful data-entry functions are available through the use of DE/RPG. Some of these are described in the following text.

High-Function Editing—provides the capability of checking on the accuracy of data as it is entered and automatically supplying data as needed. Edits are performed on a character, field, or record basis. The editing provided by DE/RPG includes:

- Checking characters for acceptable shifts (such as alphabetic and alphabetic only, numeric and numeric only, digits only, and hexadecimal)
- Checking fields against a specified self-check modulus
- Checking fields against a specified character pattern
- Automatically duplicating fields from previous records or from another source
- Conditionally bypassing fields
- Validating field contents based on sequence, range of values, tables entries, or arithmetic expressions
- Shifting field contents right with blank or zero fill (right adjust)
- Performing arithmetic calculations
- Automatic data insertion of a constant, a specifically named field, or the results of an arithmetic expression
- Substituting table data for keyed data
- Resequencing fields for the output record

Display Manipulation—provides the control for the appearance of data and the appearance and content of messages on the display. This includes:

- Emphasizing prompts or data fields by using the highlight, blink, reverse image, underline, nondisplay, or column separator attributes
- Specifying the positions of prompts and data on the display
- Displaying multiple formats concurrently

Production Statistics—provide statistics for keystrokes, records, elapsed time, marked records, verify correction keystrokes, and the number of jobs. All DE/RPG programs maintain production statistics on a job and station basis.

User-Written Subroutines—provide user-specified operations through the RPG Calculation Specifications. The operations that are available are a subset of RPG III. The subroutines provide functions such as complex editing, extensive arithmetic calculations, master data set access, and formatted printing. The subroutines can be used in conjunction with the Communications Utilities Program Product to perform read and write operations to a host system from a remote location.

Modes of Operation—provide operating characteristics for the different phases of data entry. There are four basic modes for data-entry operations.

- Enter mode which is used for initial data entry. The record that is created is automatically written to the diskette data set.
- Update mode which is used to review or modify user-selected records in the data set.
- Verify mode which is used to check the integrity of the data in the existing data set.
- Rerun mode which is used to sequentially process the field edits and checks against the existing data set without operator intervention.

Using DE/RPG for Application Programs

DE/RPG provides full program flexibility. The operations that are available are a subset of RPG III and include:

- Arithmetic calculations
- Move and compare data
- Branching
- Indicator and bit testing
- Subroutine operation
- I/O operations for the diskette, printer, keyboard/display, and communications

The sequence of operations is user-defined. The RPG *cycle* does not apply.

Using this capability, the user can write a noninteractive standalone program that can execute in a background partition. The result is a program that provides total processing functions.

Three manuals are available for helping you learn how to use DE/RPG to write programs. These manuals are the *IBM 5280 Introduction to DE/RPG*, SC21-7803, the *IBM 5280 DE/RPG User's Guide*, SC21-7804, and the *IBM 5280 DE/RPG Reference Manual*, SC21-7787. See your IBM service representative for a description of the education that is available.

IBM 5280 COBOL LICENSED PROGRAMS

IBM offers two optional COBOL compilers (the compilers are available for a fee). The following COBOL compilers are available:

- IBM 5280 COBOL – OS/VS Host Compiler and Library
- IBM 5280 COBOL – DOS/VSE Host Compiler and Library

The compilers execute on an IBM System/370, 303X, or 4300 under either OS/VS1 or OS/VS2 (MVS), or DOS/VSE.

The compilers generate IBM 5280 machine language object programs that will execute on an IBM 5285, 5286, and 5288.

IBM 5280 COBOL provides these modules as defined for 1974 ANS Standard COBOL, ANSI Standard X3.23-1974, understood and interpreted by IBM as of January 1980:

- *Nucleus* which includes all of level 1 and provides these parts of level 2: punctuation characters, arithmetic operators and expressions, qualifier connectives (OF and IN), plurals of figurative constants, CORRESPONDING clause, comparison of nonnumeric operands, complex conditions, nested redefinitions, and levels 01-49. This module also provides the PERFORM verb and higher-level forms of:

ACCEPT ADD COMPUTE DISPLAY DIVIDE
IF MOVE MULTIPLY SUBTRACT

- *Language Features* allow a programmer to define and process fixed-length tables of up to three dimensions; to divide the COBOL program into segments that can overlay one another; to copy text into a program from a library; and to transfer control from one COBOL program to another within a partition and share data among such programs. These language features include all of level 1 for table handling, segmentation, library and inter-program communications.

- *I/O Features* permit COBOL programs to work with data files organized in three ways: sequential, relative, and indexed. Within a COBOL program, the programmer can read, write, rewrite, and delete records. These features include all of level 1 for sequential I/O, relative I/O, and indexed I/O except for the RERUN clause.
- *Debug* (which includes all of level 1) assists the programmer in debugging COBOL programs. These include compile-time storage maps and execution-time snapshots of data areas; flow trace, which identifies the last statement executed before an abnormal termination; extensive error checking and error messages at five severity levels; and several programmer options for controlling the form of the output listing.

In addition, the following language independent features are available with IBM 5280 COBOL:

- *Work Station Support* is an IBM extension to the language that provides a set of verbs and syntax for controlling a keyboard and display. A programmer can write interactive programs that allow an operator to perform functions such as entering data, performing inquiries, and updating files.
- With the display screen design capabilities, COBOL programs can cause data to be edited after the operator enters it; the programs can also position prompts and data fields anywhere on the screen except on the status line. The display attributes for prompts and data fields include highlight, blink, reverse image, underline, nondisplay, and column separators.
- *Data Communications*, using a CALL interface to the IBM 5280 Communications Utilities licensed program, allows data interchange with remote stations using BSC or SNA/SDLC.
- *Debugging Features* assist the programmer further in a faster and easier debugging of COBOL programs. Included are formatted dumps using COBOL source data-names, dynamic dumps at user specified points in the Procedure Division, and the number of the COBOL statement and the verb within the statement that caused an abnormal termination.

The *IBM 5280 COBOL Language Reference*, GL23-0031, defines the level of the IBM 5280 language and the *IBM 5280 COBOL Programmer's Guide*, SL23-0032, defines the IBM extensions to the language and how to compile the source programs.

IBM 5280 UTILITIES LICENSED PROGRAM

The utilities are optional IBM-supplied programs that are available for a fee. These programs provide you with a comprehensive set of commonly used program functions. The *IBM 5280 Utilities Reference/Operation Manual*, SC21-7788, provides detailed information about each noncommunications utility. The communications utilities are a separate licensed program and are described in detail in Chapter 6.

The following lists the utilities and gives a brief description of their functions:

- ***Diskette Compress Utility***: This utility rewrites the existing data sets on the diskette to recover unused space between the data sets. It places all unallocated space on a diskette into one contiguous area that can then be used for a new data set.
- ***Diskette Copy***: This utility copies data from one area of a diskette to another area or from one diskette to another diskette. There are six different kinds of diskette copies available:
 - **Image Copy**. The contents of the entire diskette are copied to another diskette. The diskette must be the same type and with the same initialization parameters.
 - **Volume Copy**. The data sets on the diskette are copied to another diskette. Deleted data sets are not copied. The diskettes do not have to be the same diskette type or format.
 - **Data Set Copy**. One to four data sets can be combined to form a new data set, copied over data in an existing data set, or added to existing data in an existing data set.
 - **Specify Record Copy**. Data beginning with the first relative record number and ending with the last relative record number that the user specifies is copied into another data set.
 - **Specify Key Copy**. Records containing the key(s) that the user specifies are copied.
 - **Single Drive Data Set Copy**. A data set can be copied from one diskette to another using only one diskette drive.
- ***Diskette Data Set Clear Utility***: This utility releases the space occupied by a data set to allow recording of new data or to allow it to be used by another data set. For security, the data can be optionally cleared so that it cannot be recovered.
- ***Diskette Initialization Utility***: This utility performs surface analysis and formats the diskette according to user requirements.
- ***Diskette Label List Utility***: This utility prints or displays the contents of a diskette label.

- ***Diskette Label Maintenance Utility:*** This utility allocates new data set space, deletes old data sets, and modifies the volume and data set labels.
- ***Diskette Print Utility:*** This utility prints data that is on the diskette. These are the types of diskette prints available.
 - Diskette Print. Prints all records from every data set on the diskette.
 - Data Set Print. Prints only a single specified data set.
 - Specify Record Print. Prints data beginning with the first relative record number through the ending relative record number of the data set specified by the user.
 - Select Key Print. Prints records containing key(s) in the data set that the user specifies.
- ***Key Entry Utility:*** This utility provides a way to write and use simple data-entry programs using the IBM 3740 Key Entry String Language.
- ***3740 Format Conversion Utility:*** This utility converts existing 3740 formats (A...N----) into DE/RPG source programs. The types of functions that can be converted include right adjust, bypass, skip, duplicate, and self check.
- ***Resource Allocation Utility:*** This utility changes or deletes the logical identifiers assigned to the physical device addresses in your system.
- ***System Status Utility:*** This utility provides a way to:
 - View the activity of the system, such as which programs are operating in which partitions.
 - Display or print the system configuration as defined on an IPL diskette.

IBM 5280 SORT/MERGE LICENSED PROGRAM

The sort/merge programs are optional IBM-supplied programs that are available for a fee. The sort program rearranges records in a data set into a specified sequence and then puts the rearranged records into another data set leaving the original data set unchanged.

Data can be sorted in ascending or descending sequence.

In addition, the operator can specify an alternate collating sequence and/or select the fields that determine the way the records will be sorted. The types of sorts that are supported are:

- *Full Record Sort*: Places the entire sorted data set into a new data set
- *Address Out*: Writes the sorted relative record numbers for the specified data set (in order) into a new data set
- *Record Subset*: Writes records containing selected fields from records in the original data set in sorted order into a new data set
- *Index/Key*: Writes records containing a key field in sorted order along with the relative record numbers of the original data set into an index/key data set

The merge program combines records from two diskette data sets (each of which are in a sorted sequence) and places them into another diskette data set without altering either of the input data sets. The merge program can be used for multivolume data sets.

The command data set display program prints or displays the contents of the Sort/Merge command data set. (The command data set contains the parameters for the sort or merge.)

IBM 5280 ASSEMBLER LANGUAGE LICENSED PROGRAM

The assembler program is an optional IBM-supplied program that is available for a fee. The assembler that is available with the IBM 5280 system consists of control statements and instructions. The instructions describe arithmetic and logical operations, branching, input/output operations, and internal partition data movement. The control statements describe such things as storage allocation, data areas, and prompts.

The licensed program includes an ACL to assembler conversion aid program.

The *IBM 5280 Assembler Language Reference Manual*, SC21-7790, gives detailed information about the assembler language control statements and instructions.

DATA SET ORGANIZATION AND ACCESS METHODS

The 5280 supports sequential data set organization. This includes data sets that are sequential as entered, sequential by key value, and sequential by an indexed data set. The types of access methods available for retrieving data are:

- Sequential
- Direct by relative record number
- Key indexed

The data set organization and access methods are defined by the user program.

Because diskette data sets can be shared, copying records or data sets is relatively easy. Data sets can be labeled as shared read or shared read/write (update) to allow multiple programs to access the same data set on a single diskette. The no shared function (which is the default) is also available to protect the data set.

Chapter 6. Communications Support

Communications support for the IBM 5280 consists of two parts; the base communications feature and the communications feature with IBM 3270 emulation.

This chapter describes the hardware that is required for communications support, the host processing systems with which the IBM 5280 can communicate, the characteristics of the communications access methods, and the communications utilities that provide application solutions for remote batch, inquiry, distributed printing, and remote job entry operations.

The communications support consists of hardware features which provide the necessary data links for the IBM 5280. The Communications Utilities licensed program and the 3270 Emulation licensed program provide the communications access methods, communications utilities, and user programming interface.

The minimum IBM 5280 configurations required to support communications are as follows:

- Base Communications

The minimum system which supports BSC must consist of an IBM 5285 programmable data station or IBM 5288 programmable control unit, a 960-character display, 32 K bytes of main storage, and a diskette drive. The minimum system which supports MRJE must have at least 48 K bytes of main storage. The minimum system which supports SNA/SDLC must have at least 64 K bytes of main storage.

- Communications with IBM 3270 Emulation

The minimum system which supports IBM 3270 emulation with BSC must consist of an IBM 5285 programmable data station or an IBM 5288 programmable control unit, a 1920-character display, 64 K bytes of main storage*, the IBM 3270 emulation communications adapter (# 3270) and a diskette drive. The minimum system which supports IBM 3270 emulation with SNA/SDLC must consist of all of the above, plus the elapsed time counter feature.

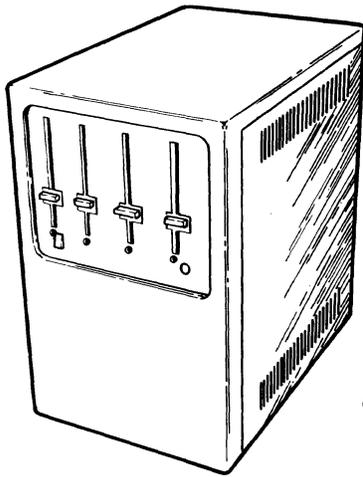
***Note:** 96 K if a printer is used with the keyboard/display.

The communications support for the IBM 5280 includes remote batch, inquiry, and remote job entry capabilities. A variety of processing systems are supported. Both BSC (binary synchronous communications) and SNA/SDLC (systems network architecture/synchronous data link control) support are available.

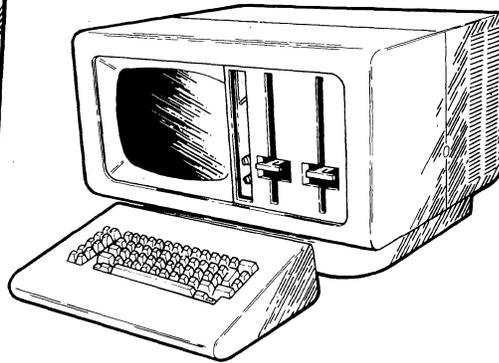
The IBM 5280 operates in a point-to-point switched, point-to-point nonswitched, or multipoint network. In a multipoint network, it serves as a tributary station.

Line speeds can be from 600 bps to 4800 bps. Both ASCII and EBCDIC transmission codes can be used. The IBM 5280 operates only in half duplex mode; however, a full duplex line can be used to decrease line turnaround time.

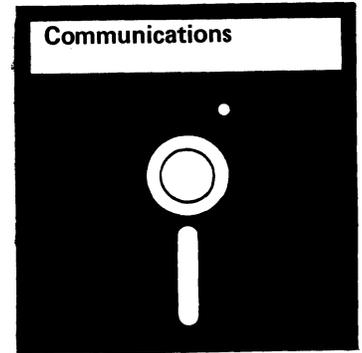
Figures 11 and 12 show the hardware and programs included in the communications support.



**IBM 5288
Programmable
Control Unit**



**IBM 5285
Programmable
Data Station**



**IBM 5280
Communications Utilities Licensed
Program**

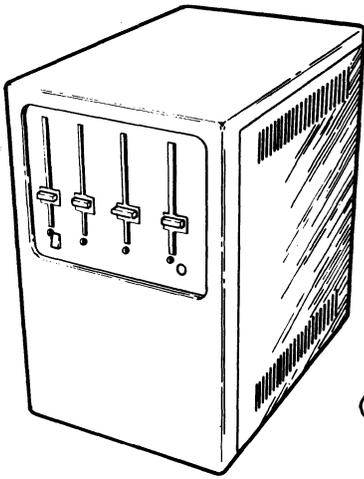
Minimum Hardware Configuration

- One diskette drive
- One 960-character display and one keyboard
- BSC - 32 K main storage (48 K MRJE)
- SNA - 64 K main storage
- Communications adapter feature plus one of the following:
 - EIA/CCITT
 - Integrated modem
 - DDS Adapter
- Also available:
 - SNBU (integrated modem)
 - Magnetic Stripe Reader
 - Autoanswer (integrated modem)

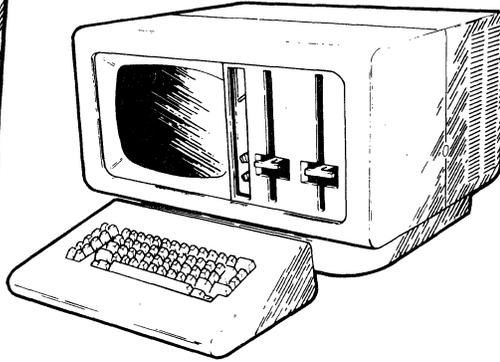
Program Support

- Communications access methods
- Communications configuration utility
- Communications load utility
- Communications monitor preparation utility
- RJE description utility
- Data communications description utility
- MULTI-LEAVING remote job entry utility
- SNA remote job entry utility
- SNA data communications utility
- BSC data communications utility
- BSC batch transfer utility
- BSC online test utility (for customer engineering diagnostics)
- Forms control utility

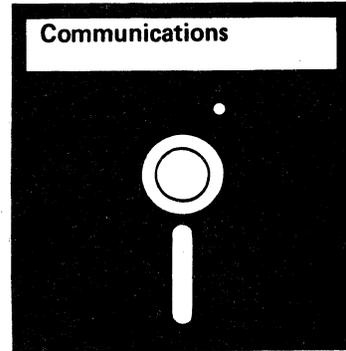
Figure 11. Hardware and Programs Included in the Base Communications Support



**IBM 5288
Programmable
Control Unit**



**IBM 5285
Programmable
Data Station**



**IBM 5280
3270 Device Emulation
Licensed Program**

Hardware Support

One diskette drive
 One 1920-character display and one keyboard
 64 K main storage*
 Communications adapter feature plus
 one of the following:
 EIA/CCITT
 Integrated modem
 DDS Adapter

Also available:
 SNBU

Program Support

3270 BSC communications access method
 3270 BSC program interface for use with
 DE/RPG and COBOL
 3270 SNA communications access method
 3270 BSC batch transfer emulation utility
 3270 Device emulation configuration utility
 3270 BSC display emulation utility
 3270 SNA display emulation utility
 3270 BSC print emulation utility
 3270 SNA print emulation utility
 Data Communications description utility

***Note:** 96 K if a printer is used with the keyboard/display

Figure 12. Hardware and Programs included in the IBM 3270 Device Emulation Communications Support

THE HARDWARE SUPPORT FOR IBM 5280 COMMUNICATIONS

The hardware support consists of modems and adapters. These are described in detail in this chapter. The base communications and IBM 3270 device emulation communication on the IBM 5280 provide support for one BSC or SDLC communications line. The hardware interface between the IBM 5280 communications adapter features and the communications line can be provided by the Electronic Industry Association/Consultative Committee International Telegraph and Telephone (EIA/CCITT) interface feature, an integrated modem, or the Digital Data Service (DDS) Adapter feature. These features are described in the chapter entitled *Features* in this manual.

The EIA/CCITT feature is required to connect the IBM 5280 to common carrier or customer-supplied data communications equipment or to IBM standalone modems. It conforms to the EIA Standard RS232C and CCITT Recommendation V.24/V.28 for line speeds of 600 to 4800 bps.

An integrated modem eliminates the need for the EIA/CCITT interface on the IBM 5280. Several versions of a 1200 bps integrated modem are available. These are described in the chapter entitled *Features*.

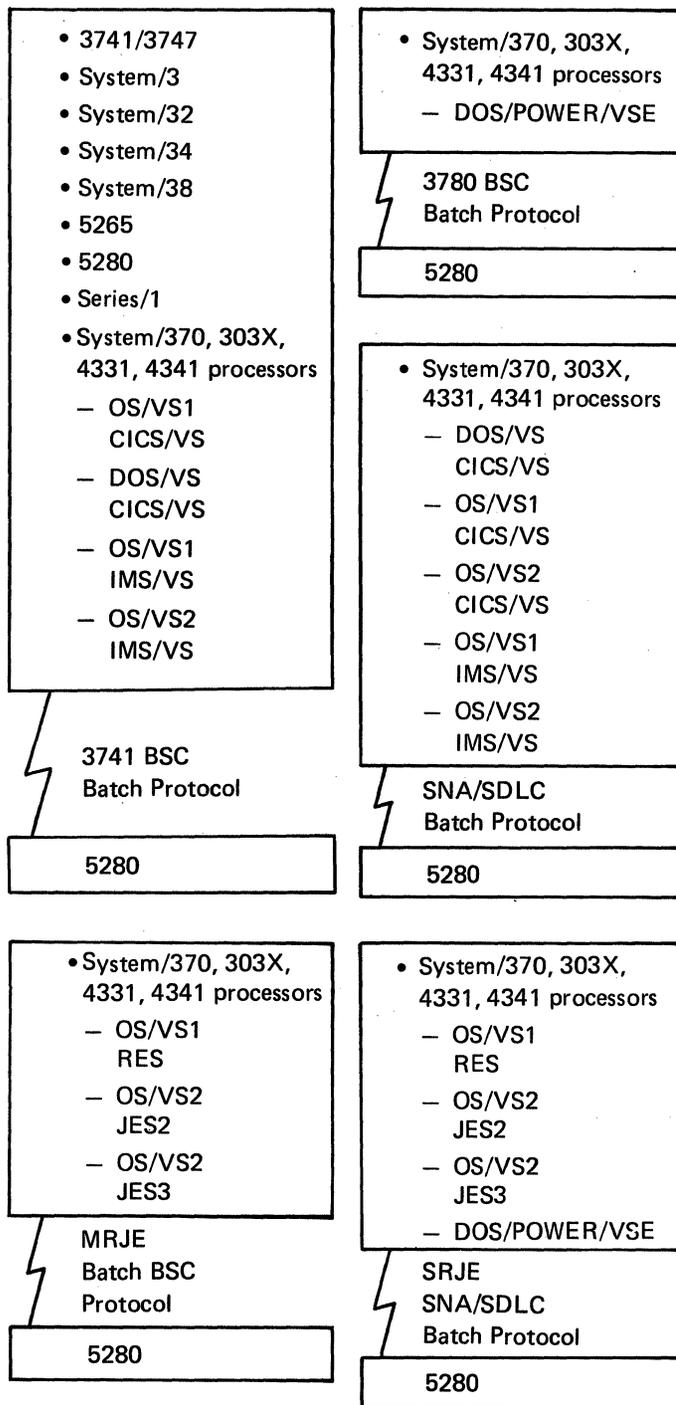
The DDS Adapter feature is an integrated adapter designed to allow the IBM 5280 system to access nonswitched Digital Data Service network. The IBM 5280 supports speeds of 2400 and 4800 bps using the DDS Adapter. The DDS Adapter accesses the communications line via a channel service unit (CSU) provided by the common carrier. This is described in the chapter entitled *Features*. The DDS Adapter may also be used for local connections between the IBM 5280 system and any other devices which use a DDS Adapter and which support the IBM 5280 Communications Utilities.

Other communications capabilities available on the IBM 5280 include business machine clocking, autoanswer, and switched network backup (SNBU). Business machine clocking (which is included as part of the communications adapter support) provides an internal synchronous clock which enables the IBM 5280 to operate with modems that have no clocking signals. It supports communications at 1200 bps and 600 bps (half speed). Autoanswer capability enables the IBM 5280 to respond automatically in unattended mode to receive a call from another system or work station in a switched network environment. This capability establishes the switched line connection on the IBM 5280. SNBU provides backup using a switched line if the nonswitched line being used becomes inoperative or degraded. If SNA/SDLC is being used, the Elapsed Time Counter feature must be installed.

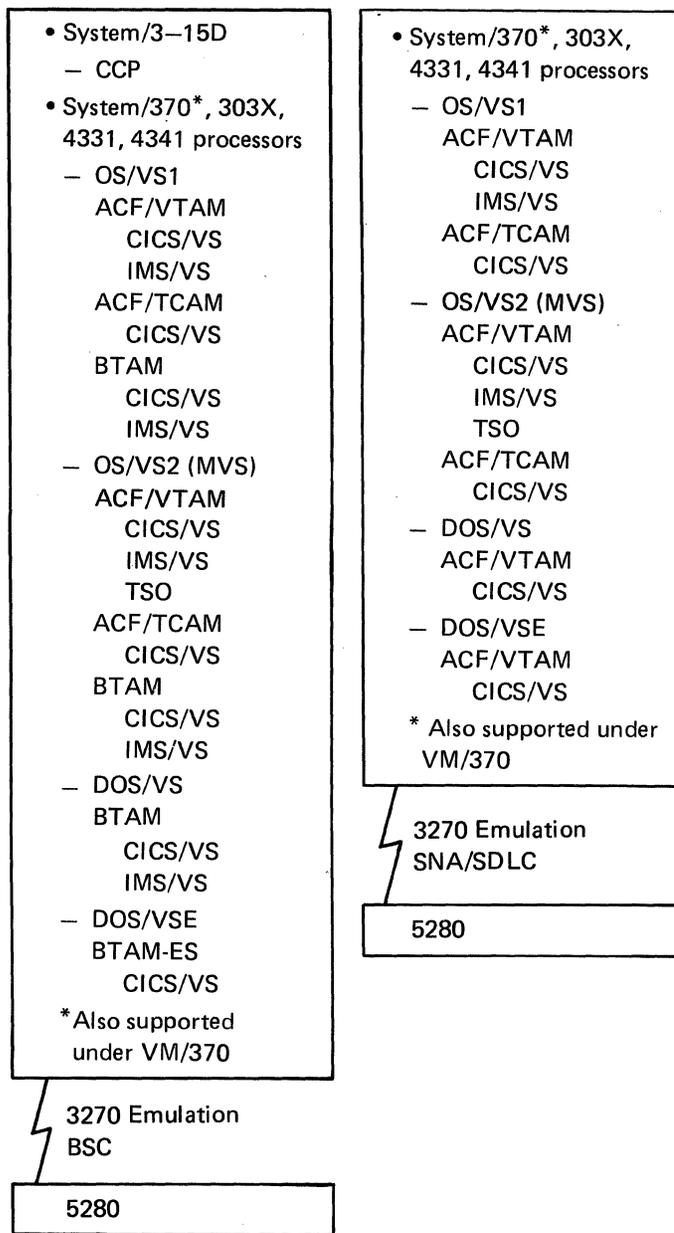
REMOTE PROCESSING SYSTEMS WITH WHICH THE IBM 5280 CAN COMMUNICATE

Figure 13 lists the host processing systems with which the BSC and SNA support on the IBM 5280 system can communicate. It also indicates how the IBM 5280 appears to the host processing system with which it is communicating.

BASE COMMUNICATIONS



IBM 3270 EMULATION



The SNA support shown in figure 13 uses:

- Logical Unit Type 1 (LU1) for base communications
- Logical Unit Types 1, 2, 3 (LU1, 2, 3) for IBM 3270 Device Emulation
- Physical Unit Type 2 (PU2)
- Function Management Profile 3 (FMP3)
- Transmission Subsystem Profile 3 (TSP3)

It offers multiple logical-unit-to-logical-unit (LU-LU) sessions via one physical unit for IMS/VS or CICS/VS subsystems and a single LU-LU session for the RJE (remote job entry) subsystems.

IBM 5280 COMMUNICATIONS UTILITIES LICENSED PROGRAM

The IBM 5280 Communications Utilities Licensed Program is an optional IBM-supplied program that is available for a fee. It contains communications utilities and access methods that execute in the IBM 5280 storage (see Figure 14-1). The operator's interaction with the utility is through the use of the keyboard in response to prompts that appear on the display. Some of the utility programs are used to prepare for running a communications job, and others transfer data over a communications line using the communications access method.

1 Characteristics of the Communications Access Methods

The communications access method provides a link between the communications program executing in the IBM 5280 and the communications network. It provides functions such as blocking/deblocking, data formatting, and link protocol to free the communications programs of these responsibilities.

Figure 14-1 illustrates the parts and relationship of components within the Communications Licensed Program.

Separate communications access methods are provided to match the configuration of the remote environment. Communications execution utilities that allow you to perform remote batch, inquiry, and remote job entry applications have been provided for use with the communications access methods.

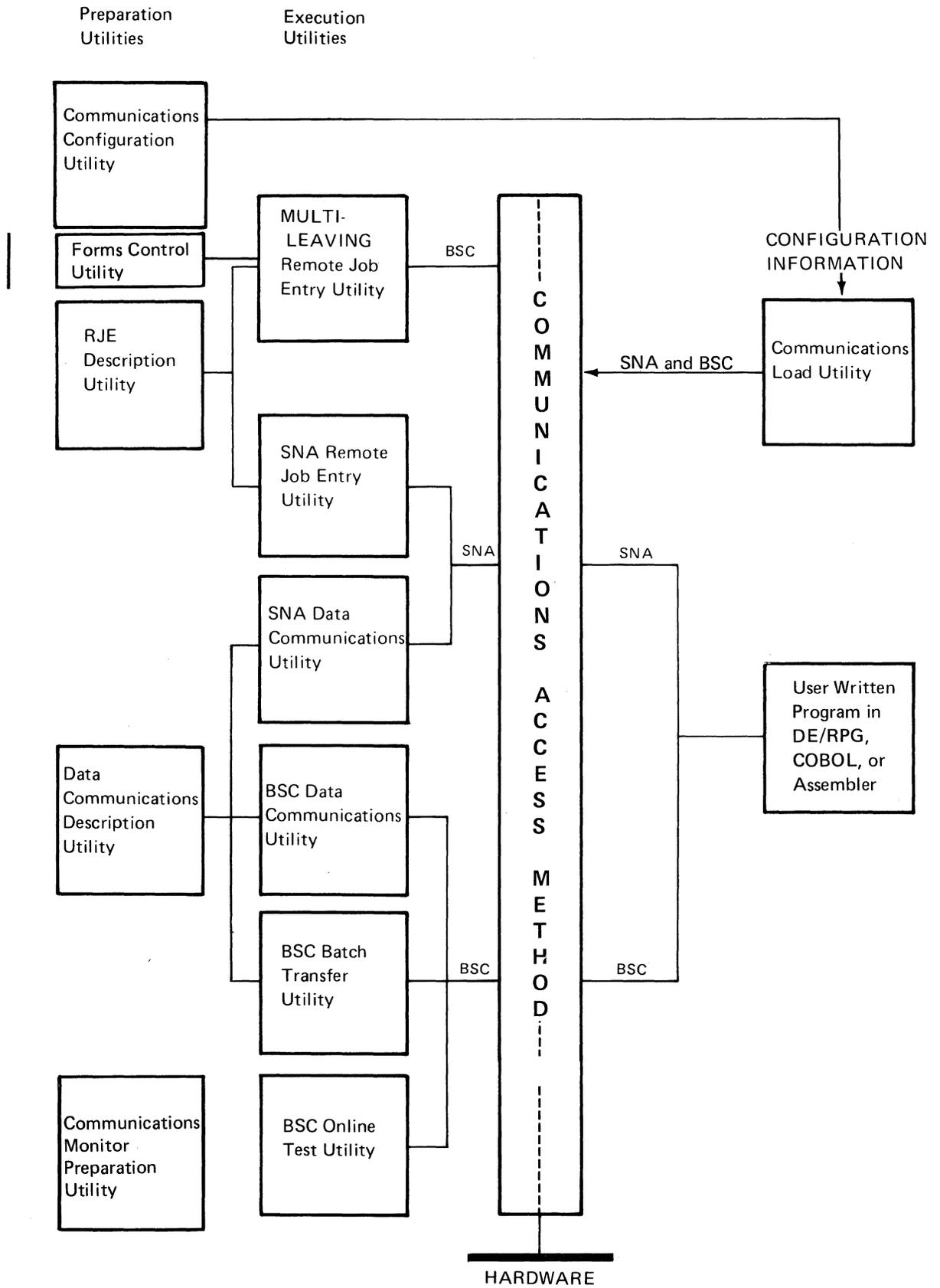


Figure 14-1. Relationship of Components within the Base Communications Licensed Programs

Preparing for Communications

The communications configuration utility allows you to describe the IBM 5280 communications environment. By responding to a series of prompts, you describe how the IBM 5280 will connect to the communications line, how it will identify itself to a host processing system, and link protocol operating characteristics. Your responses are saved on diskette and used to control the access method when a communications program is executing.

The Communications Utilities Licensed Program diskette contains the following communications configuration records:

- BSC3741 for the BSC batch transfer utility, BSC data communications utility, BSC Online Test Utility, and BSC user programs
- BSC3780 for the BSC data communications utility (DOS/VSE POWER only)
- BSCMRJE for the MULTI-LEAVING remote job entry utility
- SNADBDC for the SNA data communications utility (IMS/VS and CICS/VS only)
- SNASRJE for the SNA remote job entry utility
- SNAUSER for SNA user programs
- BSC3270 for IBM 3270 emulation using BSC
- SNA3270 for IBM 3270 emulation using SNA/SDLC

Two job preparation utilities describe how the execution utilities will operate (for example, they describe the devices that will be used and the type of operation to be performed and save the information on diskette). These job preparation utilities are the data communications description utility and the remote job entry description utility. The remote job entry description utility is used to describe jobs to be executed by the MRJE and SRJE execution utilities. The data communications description utility is used to describe jobs to be executed by the other execution utilities.

The Communications Monitor Preparation Utility allows you to build a communications control block for the monitor mode of communications. Activation of the monitor mode enables the communications hardware to respond to any polls or selections that the host sends across the line, without a communications access method being loaded.

The Forms Control Utility creates a table data set with forms control information.

The following topics describe the execution utilities that are available.

Communications Execution Utilities that Can Be Used for Remote Batch Applications

The utilities that can be used for sending or receiving batch data from a remote location to a processing system are:

- BSC batch transfer utility
- BSC data communications utility
- SNA data communications utility

BSC Batch Transfer Utility

The BSC batch transfer utility provides batch communications capability for the 5280 system. Using this utility, the 5280 can receive data into and transmit data from a diskette data set; the diskette drive is the only input/output device supported. Multiple receive and transmit operations can be executed as a single job. When using the BSC batch transfer utility, the 5280 appears as a 3741 in the communications network.

BSC Data Communications Utility

The BSC data communications utility allows the 5280 to transmit batch data and receive batch data; it can also be used for inquiry applications (3741 only). This utility accepts input from the 5280 diskette, keyboard, and Magnetic Stripe Reader to be sent to the remote processing system. Data sent to the remote 5280 by the subsystem in the remote processing system can be received on the 5280's diskette, printer, and display. Multiple transmit, receive, and inquiry functions can be executed as a single job. When using this utility, the 5280 appears to the network as a 3741 or a 3780 (to DOS/VSE POWER only).

SNA Data Communications Utility

The SNA data communications utility allows the 5280 to send and receive batch data; it can also be used for inquiry functions. Because of multiple LU-LU sessions capability, users can concurrently execute up to four SNA data communications utilities all communicating with the same SNA DB/DC subsystem (either IMS or CICS).

The SNA data communications utility accepts input from the 5280 diskette and keyboard to be sent to the host processing system. Data sent to the remote 5280 by the subsystem in the host processing system can be received on the 5280's diskette, printer, and display.

The SNA data communications utility can execute multiple transmit, receive and inquiry functions as a single job.

Communications Execution Utilities that Can Be Used for Inquiry Applications

Execution utilities for inquiry applications are:

- BSC data communications utility
- SNA data communications utility

BSC Data Communications Utility

The BSC data communications utility allows the 5280 to send inquiries to and receive replies from a processing system. It can also be used for batch applications. This utility accepts input from the 5280 data station's keyboard for this application. Data sent to the remote 5280 by the subsystem in the processing system can be received on the 5280's diskette, printer, and display. Multiple inquiries can be executed as a single job. When using this utility, the 5280 system appears to the network as a 3741.

SNA Data Communications Utility

The SNA data communications utility in inquiry mode allows the 5280 to send inquiries and receive replies. It can also be used for batch functions. Because of the multiple LU-LU sessions capability, users can concurrently execute up to four SNA data communications utilities all communicating with the same SNA DB/DC subsystem (either IMS or CICS).

The SNA data communications utility accepts input only from the keyboard. Data sent to the 5280 by the subsystem in the host processing system can be received on the diskette, printer, and display. The SNA data communications utility can execute multiple inquiry functions as a single job.

Communications Execution Utilities that Can Be Used for Remote Job Entry Applications

The utilities that can be used for this application are:

- MULTI-LEAVING remote job entry utility
- SNA remote job entry utility
- BSC data communications utility (only when used as a 3780 for DOS/VSE POWER)

MULTI-LEAVING Remote Job Entry (MRJE) Utility

The MRJE utility enables the 5280 system to serve as a remote job entry work station to the supported RJE subsystems on the S/370. These subsystems provide MULTI-LEAVING support which is fully synchronized two-directional transmission of a variable number of data streams between two computers. When using MRJE, the 5280 is always the remote station and must initiate communications with the subsystem in the remote processing system. When MRJE is executing in the 5280, no other communications program can be running.

MRJE accepts input from the 5280 diskette and keyboard to be sent to the processing system. Utility control statements are used as input to control the MRJE session. Output from the processing system can be sent to the remote 5280's diskette, display, and printer, sent to another data station in the network, or directed to output devices at the processing system.

SNA Remote Job Entry (SRJE) Utility

The SRJE utility enables the 5280 system to serve as a remote job entry work station in an SNA/SDLC network. It can interface to the supported RJE subsystems in the processing system. When SRJE is executing in the 5280, no other communications program can be running.

The SRJE utility accepts input from the diskette and keyboard to be sent to the host processing system. Utility control statements are used as input to control the SRJE session. Output from the processing system can be sent to the remote 5280's diskette, display, and printer, sent to another data station in the network, or directed to output devices at the host processing system.

BSC Data Communications Utility

The BSC data communications utility provides batch communications capability for a 5280 system which is communicating with DOS/VSE POWER. Using this utility, the 5280 can receive data into and transmit data from a diskette data set; data sets can also be received by a printer in the 5280 system. Multiple receive and transmit operations can be executed as a single job. When using the BSC data communications utility, the 5280 appears as a 3780 in the communications network.

User-Written Communications Applications Programs

The DE/RPG, COBOL, and assembler languages can be used to write communications application programs. When DE/RPG or COBOL is used, you may issue write and read operations to and from the host processing system. This allows you to perform inquiry and batch operations with your own programs.

The communications load utility is used when you use DE/RPG, COBOL, or the assembler language for communications; it loads the communications access method that allows you to transmit and receive from the host processing system.

IBM 5280-3270 Emulation Licensed Program

The IBM 5280-3270 Emulation Licensed Program emulates IBM 3270 Information Display System control units for Binary Synchronous Communications (BSC) and System Network Architecture communications (SNA). Different control units are emulated for BSC and SNA as follows:

BSC 3271 Model 2 control unit on multipoint nonswitched or multipoint nonswitched with switched network backup.

SNA 3274 Model 1C control unit on point to point or multipoint nonswitched, or point to point switched. (Point to point switched is not supported by 3274).

For both BSC and SNA, 3270 emulation is performed for the same keyboard/displays and printer as follows:

- 3277 Model 2 Keyboard/Display (1920 characters)
- 5280 Data entry keyboard (0 to 24 program function keys)
- 5280 Typewriter keyboard (0 to 24 program function keys)
- 5280 Proof keyboard (0 to 24 program function keys)
- 3284 and 3286 BSC character printers and 3288 BSC line printer
- 3287 character printer for SNA Logical Unit 1 (LU1) and Logical Unit 3 (LU3)

The IBM 5280-3270 Emulation Licensed Program consists of the following:

- 3270 BSC communications access method (CAM)
- 3270 BSC program interface for use with user-written DE/RPG and COBOL programs
- 3270 SNA communications access method (CAM)
- 3270 BSC batch transfer emulation utility
- 3270 device emulation configuration utility
- 3270 BSC display emulation utility
- 3270 SNA display emulation utility
- 3270 BSC print emulation utility
- 3270 SNA print emulation utility
- Data Communications description utility

IBM 3270 Emulation Licensed Program Utilities

Preparation Utilities

- IBM 3270 Device Emulation Configuration Utility provides the user with a step-by-step method of creating a device configuration record (DCR). The DCR provides the utilities with device characteristics such as keyboard features, printer features, and printer character set information. The DCR also provides the information necessary to load the communications access method (CAM).
- Data Communications Description Utility is used to establish the information used by the execution utilities to transmit, receive, and do inquiry functions.

Execution Utilities

- IBM 3270 Batch Transfer Emulation Utility allows the user to interactively transmit records to or receive records from a host system using IBM 3270 protocols in a BSC network. A user written program must be provided on the host system.
- IBM 3270 BSC Display Emulation Utility allows the IBM 5280 to appear to the host system as an IBM 3277 Model 2 Display Station. Typewriter, data entry, and data entry with proof arrangement keyboards are supported. IBM 3270 program function keys are supported. The local print key function is supported.
- IBM 3270 SNA Display Emulation Utility allows the IBM 5280 to appear to the host system as an IBM 3277 Model 2 Display Station. Typewriter, data entry, and data entry with proof arrangement keyboards are supported. IBM 3270 program function keys are supported. The local print key function is supported.
- IBM 3270 BSC Print Emulation Utility allows the IBM 5222, 5224, 5225, and 5256 printers to appear to the host system as the IBM 3284 Model 2 printer, the IBM 3286 Model 2 printer, or the IBM 3288 Model 2 printer.
- IBM 3270 SNA Print Emulation Utility allows the IBM 5222, 5224, 5225, and 5256 printers to appear to the host system as the IBM 3287 Model 1 or 2 printer.
- Figure 14-2 illustrates the parts and relationships of components within the IBM 3270 Emulation Licensed Program.

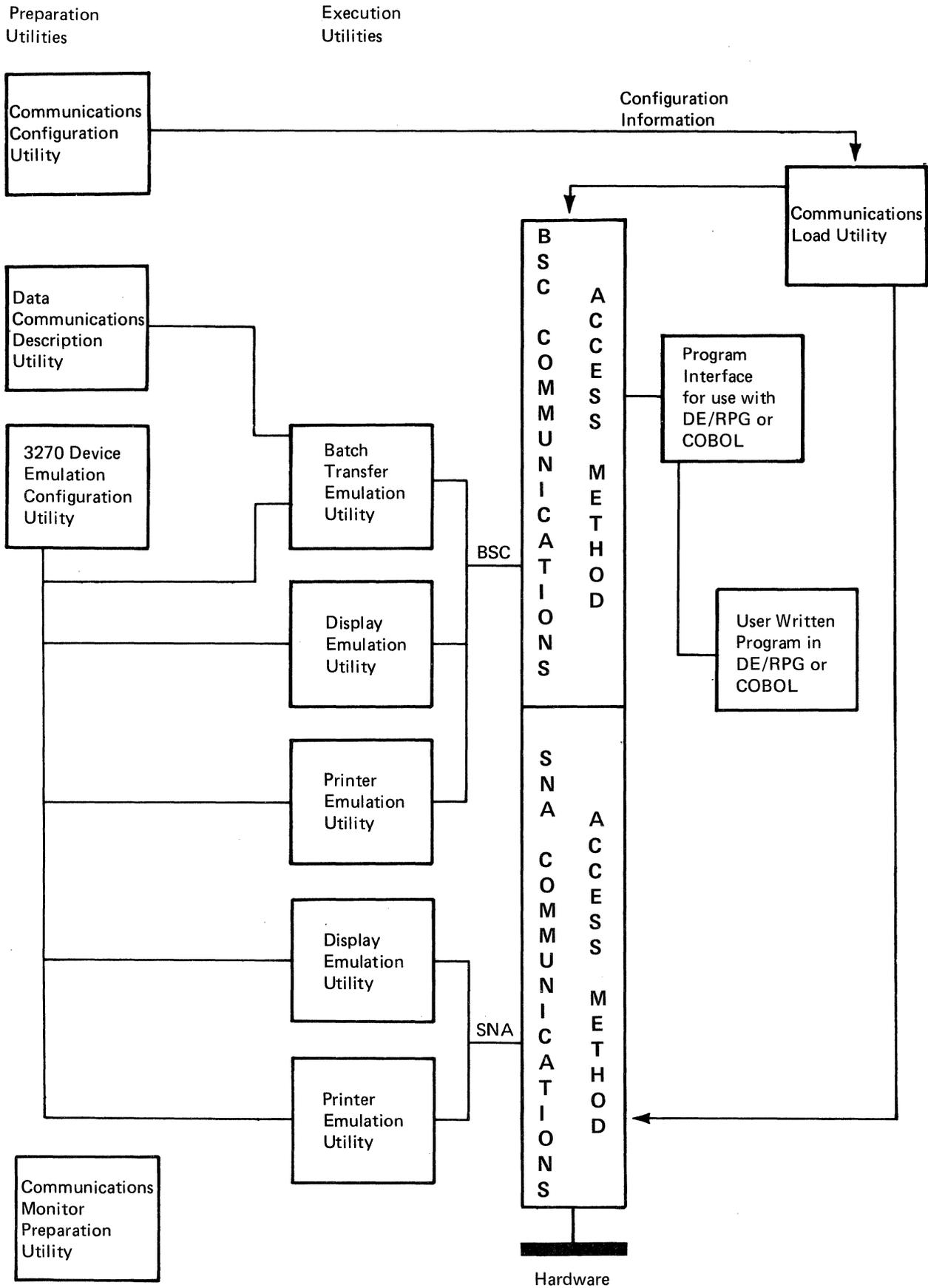


Figure 14-2. Relationship of Components within the IBM 3270 Emulation Licensed Program

Features are available for purchase or lease but are not a standard part of the IBM 5280 system. An overview of the communications adapter features is in Chapter 6 and an overview of the keyboard feature is described in Chapter 4.

Feature	IBM 5288	IBM 5285	IBM 5286	IBM 5281	IBM 5282	IBM 5256	IBM 5225	IBM 5222	IBM 5224
Communications Adapter	X	X							
IBM 3270 Emulation Communications Adapter	X	X							
EIA/CCITT	X	X							
Digital Data Service Adapter	X	X							
1200 bps Integrated Modem	X	X							
Elapsed Time Counter	X	X	X						
Keylock	X	X	X						
Magnetic Stripe Reader		X	X	X	X				
Audible Alarm						X	X		X**
Cable Thru						X	X		X**
Display Screen Filter		X		X					
Rear Document Insertion Device								X	
Forms Stand						X		X	
Second Application Microprocessor*	X	X	X						

***Note:** The Second Application Microprocessor feature can not be installed on an IBM 5285 when the communications adapter feature is installed.

****Note:** These are standard features, available without additional charge on the IBM 5224 printer.

The following headings list the features that are available and give brief information about each.

COMMUNICATIONS ADAPTER

This feature is required to attach a communications line to an IBM 5280 via an appropriate interface or modem. It allows the IBM 5280 to function on a switched or nonswitched line. This adapter provides for both BSC and SDLC.

IBM 3270 EMULATION COMMUNICATIONS ADAPTER

This feature provides the same function as the Communications Adapter (above) and, in addition, provides support for the IBM 5280-3270 emulation licensed program.

**ELECTRONIC INDUSTRY ASSOCIATION/CONSULTATIVE
COMMITTEE INTERNATIONAL TELEGRAPH AND TELEPHONE
(EIA/CCITT)**

This feature is required for attachment of the IBM 5280 system to common-carrier, customer-supplied data communications equipment, and/or external IBM modems operating on a switched or nonswitched communications facility. It provides conversion of signals and voltage levels specified as EIA RS232C in CCITT V.24/V.28 for 600 to 4800 bps.

DIGITAL DATA SERVICE (DDS) ADAPTER

This feature allows the IBM 5280 system to attach to a nonswitched Digital Data Service network by a channel service unit (CSU). The DDS Adapter has its own clock with speeds of 2400 and 4800 bps. The speed must match the customer's order for the common-carrier service. It is a full duplex adapter.

This feature may be used to locally connect another support device that also uses a DDS Adapter.

1200 BPS INTEGRATED MODEMS

These modems eliminate the need for the EIA/CCITT interface. The connection to the Public Switched Telephone Network is through an FCC Registered Protective Device that is equivalent to the CDT (manual answer) or CBS (autoanswer) Data Access Arrangements.

The 1200 bps modems are available in the United States, Canada, and World Trade countries. They provide voice-grade communications in either switched or nonswitched environments.

The following are the 1200 bps integrated modems that are available for BSC or SDLC at speeds of 600 or 1200 bps:

United States and Canada

- U.S. switched network modem with autoanswer
- U.S. switched network modem with manual answer
- U.S. nonswitched network modem
- U.S. nonswitched network modem with SNBU autoanswer
- U.S. nonswitched network modem with SNBU manual answer

World Trade Countries

- International switched network modem with autoanswer
- International nonswitched line modem public switched network with manual answer

ELAPSED TIME COUNTER

This feature provides the system with the capability of timing program/production functions. This feature is required for SNA/SDLC communications and for DE/RPG if you want to maintain elapsed time production statistics.

KEYLOCK

This feature is a key-operated switch that can be installed on the IBM 5286 Dual Programmable Data Station, IBM 5285 Programmable Data Station, and IBM 5288 Programmable Control Unit. Only one Keylock feature can be on each programmable data station or control unit.

The switch uses two keys. One key allows the operator to perform local operations and the other allows the operator to perform local/remote operations.

Figure 15 shows the Keylock feature.

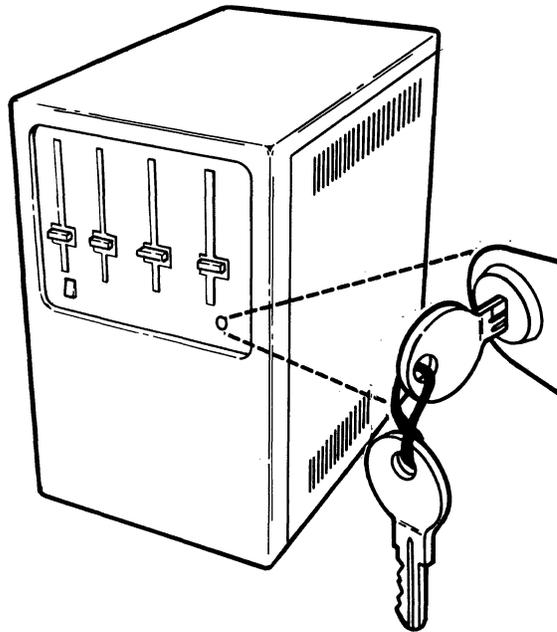


Figure 15. Keylock Feature

MAGNETIC STRIPE READER

This feature allows the IBM 5280 system to read numeric encoded information from a magnetic stripe card or other documentation. When this feature is installed and operating under program control, it can act as a security measure to ensure that only authorized persons can use the system. Using BSC data communications, magnetic stripe card data can be transmitted to a host system. There can only be one reader per keyboard.

Figure 16 shows the Magnetic Stripe Reader.

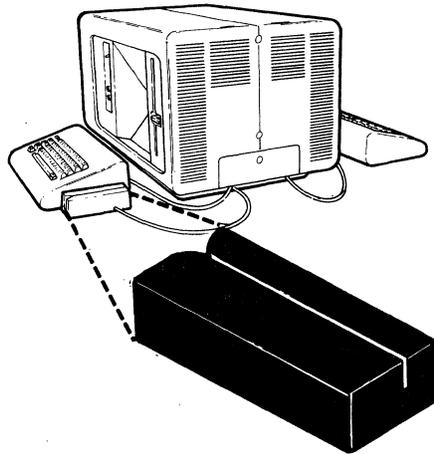


Figure 16. Magnetic Stripe Reader

AUDIBLE ALARM (ON THE PRINTERS)

This alarm is normally used to alert the operator to a condition requiring attention on the printer.

SECOND APPLICATION MICROPROCESSOR

The Second Application Microprocessor provides more processing power to be used as an aid to performance improvement when operating in a multiprogramming mode. This feature can be installed on the IBM 5285 Programmable Data Station (without communications), the IBM 5286 Dual Programmable Data Station, and the IBM 5288 Programmable Control Unit.

CABLE THRU FEATURE (ON THE IBM 5224, 5225, AND 5256 PRINTERS)

This feature allows you to attach multiple IBM 5224, 5225, and 5256 printers to the IBM 5288 Programmable Control Unit through a single socket. It provides increased flexibility for designing system configurations.

The Cable Thru feature is not available on the IBM 5222 printer.

Figure 17 illustrates the use of the Cable Thru feature.

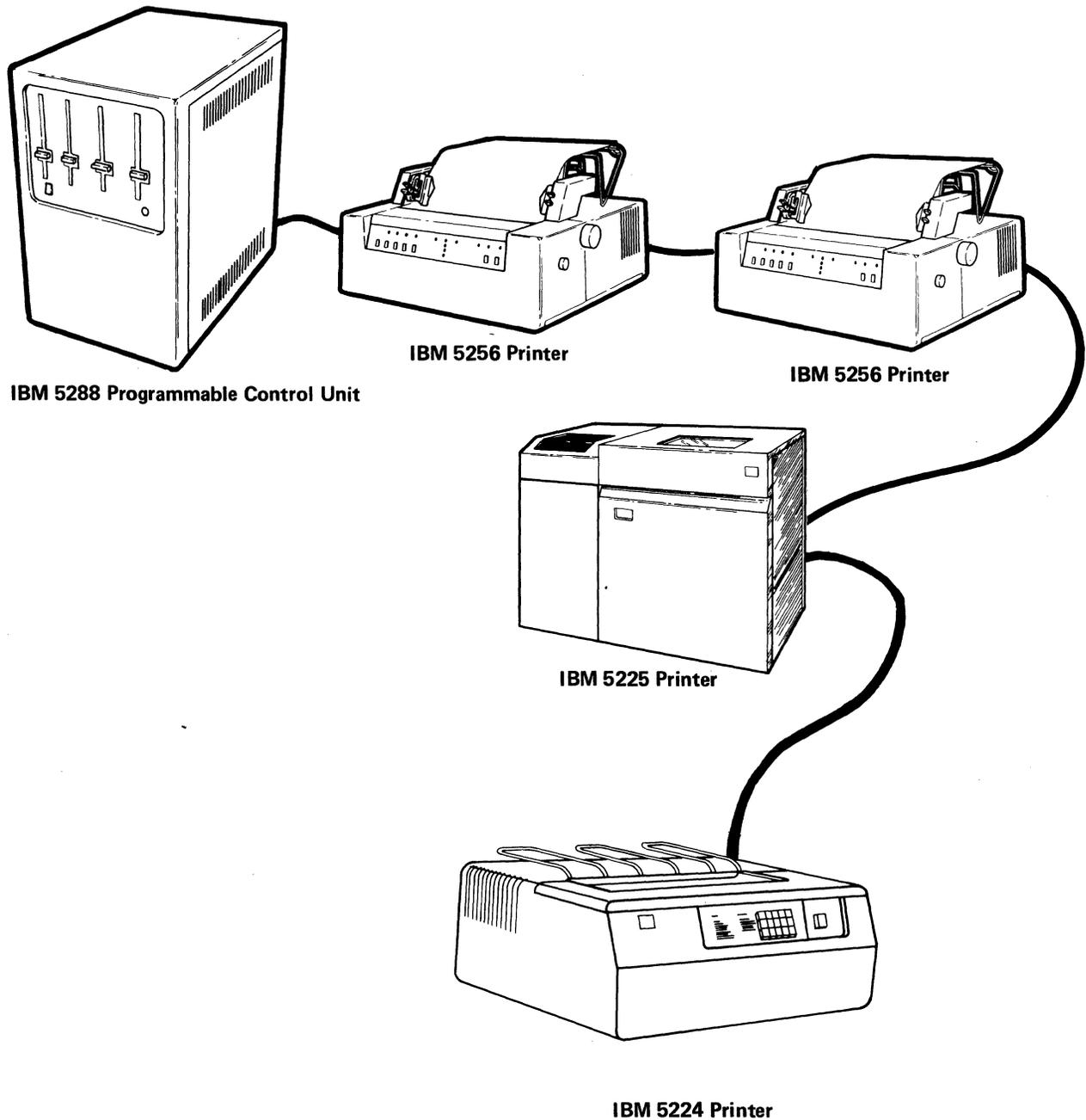


Figure 17. Cable Thru Feature

DISPLAY SCREEN FILTER ACCESSORY

This feature provides a contrast enhancement anti-glare filter for the single displays. The filter aids the operator's comfort by reducing glare and providing improved display readability. The filter can be used on the IBM 5281 Data Station and the IBM 5285 Programmable Data Station.

REAR DOCUMENT INSERTION DEVICE FEATURE (ON THE IBM 5222 PRINTER)

This feature provides a forms guide for using individual, precut forms. The feature consists of two vertical guides (one fixed and one adjustable) and a stationary back plate. The fixed vertical guide has registration lines to aid in positioning the forms.

The forms can be from 5.75 inches to 12 inches wide and from 3 inches to 14 inches long. If multipoint forms are used, the leading edge must be glued and the maximum number of copies is the original plus three copies (four parts).

The Rear Document Insertion Device is readily interchangeable (by the operator) with the standard forms tractor. The device attaches to the same mounting points as the forms tractor.

FORMS STAND ACCESSORY (FOR THE IBM 5222, 5224 AND 5256 PRINTERS)

The forms stand permits feeding continuous forms from a carton and provides for form stacking on a single shelf after printing.

Chapter 8. Changing to the 5280 System from the IBM 3740 System

Compatibility with an existing system is an important consideration. The 5280 system is compatible with the 3740 system. The subjects to consider when changing from a 3740 system to a 5280 system are using your 3740 programs on the 5280, changing your ACL programs to 5280 assembler language programs, and exchanging diskettes.

The following headings give detailed information about these subjects.

USING YOUR 3740 PROGRAMS ON THE 5280 SYSTEM

The key entry utility (which is part of the IBM 5280 Utilities Program Product) allows you to write and use simple data-entry programs in the familiar 3740-like formats (A...N----).

It can be used with IBM diskette 1, 2, or 2D. This utility supports production statistics, verify mode, and record insert which are supported features of the 3741. The programs that are created by this utility allow you to specify the starting field position, type and length of fields, and the ending field position. All programs can be saved on a diskette for repeated use. All records that are used by the utility can be a maximum of 128 characters long.

Each program consists of field definition characters, field continuation characters, and the end of format character. A 3740 program can be from 1 to 128 characters long. This is the appearance of a typical 3740 program:

```
A...N---N....J----S----E
```

CHANGING YOUR 3740 PROGRAMS TO DE/RPG PROGRAMS

The 3740 format conversion utility allows you to convert your existing 3740 programs into DE/RPG programs. Once you have accomplished this, you can take advantage of new functions by enhancing your programs using DE/RPG.

Not all field definitions can be converted; the following table shows which fields cannot be converted by this utility:

Not Convertible to DE/RPG Source Programs

- Online field totals
- Offline field totals
- Field selection
- Record selection
- Constant insertion
- Printer formatting
- Printer control
- Edit control

The programmer can provide the functions that are not convertible by adding the appropriate DE/RPG statements.

Figure 18 shows a comparison of 3741 and 5280 editing functions.

Function	Support by 3741	Supported by 5280 via DE/RPG	Supported by 5280 via Key Entry Utility
Keyboard shift	X	X	X
Duplication	X	X	X
Skip	X	X	X
Right adjust	X	X	X
Auxiliary duplication	X	X	
Self check with modulus 10/11	X	X	
Self check generate		X	
Verify	X	X	X
Prompt messages	X	X	X
Picture check	X	X	X
Verify bypass	X	X	X
Numeric only	X	X	
Search	X	X	X
Format chaining	X	X	X
Alphabetic only		X	
Signed numeric		X	
Arithmetic		X	
Blank check		X	
Field exit required		X	X
Mandatory enter		X	
Mandatory fill		X	
Range check		X	
Sequence check		X	
Table lookup		X	
User exit		X	
Sort/Merge		X	
Conditional verify		X	
File inquiry		X	
Logical format chaining		X	
Data required		X	

Figure 18. Comparison of Functions Supported by the 3741, DE/RPG, and KEU

CHANGING YOUR ACL PROGRAMS (FROM THE IBM 3741) TO IBM 5280 ASSEMBLER LANGUAGE PROGRAMS

The IBM 3740 conversion aid program (which is included with the IBM 5280 Assembler Language Licensed Program) has been designed to help users convert from ACL to the IBM 5280 assembler language. The languages are similar, but, many instructions have been added, others have been deleted, addressing has been changed, and control statements have been completely revised. Some parts of the programs might have to be rewritten. This utility is intended only as a one-time conversion technique. New programs should be written either using DE/RPG or the IBM 5280 assembler language.

EXCHANGING DISKETTES

IBM diskette 1 diskettes are interchangeable between the IBM 3740 system and the IBM 5280 system when initialized at 128 bytes per sector for basic exchange data sets and conforming to the diskette exchange manual.

CUSTOMER SETUP

The 5280 system is easy to set up. Step-by-step instructions that are packaged in the shipping container will enable you to set up and check out your system immediately upon its arrival without the assistance of a service representative in most cases. This allows your system to be operational and productive in a minimum amount of time. The setup procedures also allow you to relocate the system.

EDUCATION

IBM offers courses that range from elementary implementation techniques to advanced programming techniques. Many of these courses are self-study courses that you can take at your convenience.

IBM offers professional courses for a charge to teach your people the 5280 skills associated with their jobs. These courses provide an understanding of the features, characteristics, and operating principles of IBM products and services.

Your IBM marketing representative or systems engineer can provide the details of the 5280 education curriculum.

MAINTENANCE

IBM emphasizes quality in all its products, and serviceability is a major component of your IBM 5280 system. Specially designed service techniques combined with built-in features offer maximum reliability and availability.

With an IBM Maintenance Agreement or lease, you can expect:

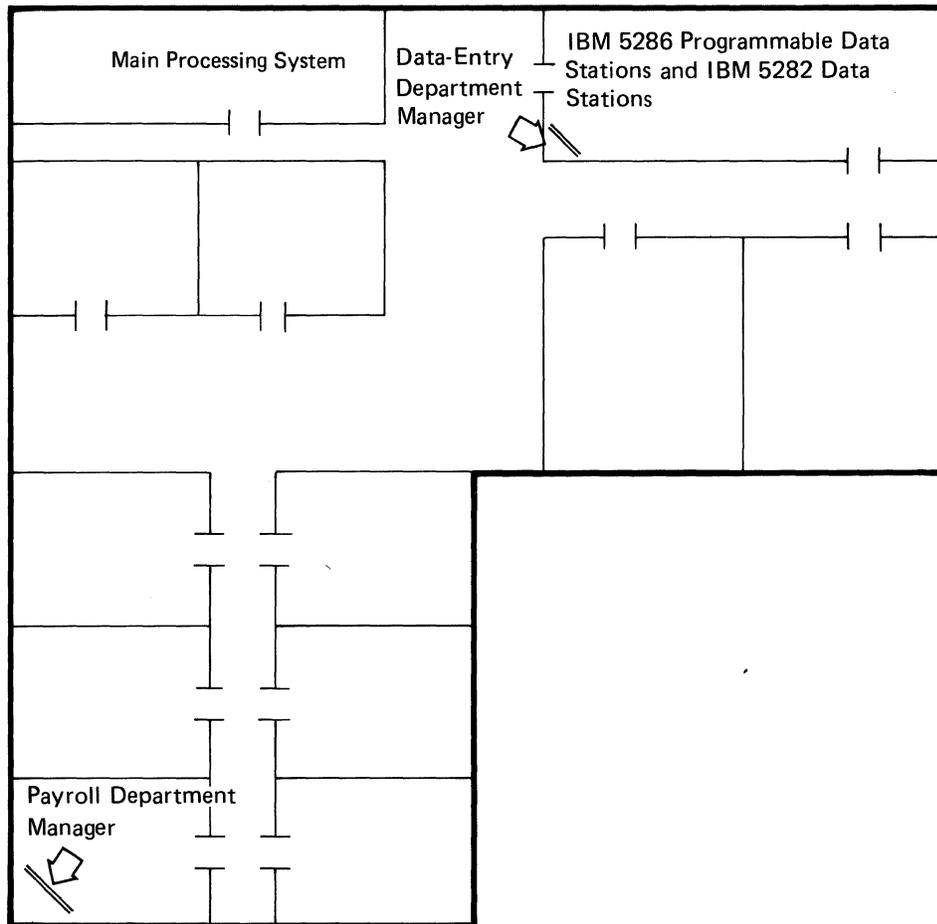
- **Planned service.** A customer engineer is assigned to your installation to keep your IBM equipment in top working order.
- **IBM management commitment.** IBM management is accountable for having adequate manpower, skills, and parts available to sustain machine performance.
- **Equipment improvements.** Any engineering changes that improve safety and reliability are distributed from IBM plants and automatically applied to your 5280 by a customer engineer.
- **Plan support.** Every modification made to your 5280 is recorded in a Machine Level Control history. This history is used by plant management in determining future engineering changes and requirements.
- **Stable maintenance costs.** There will not be unexpected charges for service or parts.

Appendix A. Examples Showing the 5280 System Being Used for Three Applications

AN EXAMPLE USING THE 5280 SYSTEM FOR A DATA-ENTRY APPLICATION

A data-entry department of five employees will illustrate the use of the 5280 in a data-entry application.

One of the users of the data-entry department is the payroll department. Once a week, data entry receives a stack of time cards for entry onto diskette.



The programmer who supports the data-entry department has written a data-entry program to enter the payroll information and perform simple calculations that automatically supply the gross calculations. This program is stored in a diskette data set labeled PAYROL1.

		NAME	TOTAL REG.				
		MARY TRACY	38.5				
		LOCATION	OVERTIME	SICK	HOLIDAY	APPROVED BY (Initials)	HOURS:
		648Y					
MONDAY	0800						-
	1900	2.0				PTN.	
TUESDAY	0800						-
	1900	2.0				PTN.	
WEDNESDAY	1050			1.5			-
	1700					PTN.	
THURSDAY	0800						-
	1700						
FRIDAY	0800						-
	1900	1.5				PTN.	
TOTAL		15.5	5.5	1.5		PTN.	

Employee No. 659600

Mary A. Tracy
 EMPLOYEE SIGNATURE (IN INK)

[Signature]
 MANAGER APPROVED SIGNATURE (IN INK)

The operator inserts the diskette containing the payroll program into the diskette drive of the 5286 Dual Programmable Data Station. The operator completes the series of events that loads the payroll program. When PAYROL1 is loaded, the following display prompts the operator to enter the appropriate employee number from the time card.

Enter the employee number

Employee Number: 659600

Name: 01/06/80

Location: Total hours:

Regular hours: Overtime hours: Sick hours: Holiday hours:

When the operator presses Enter, the program uses the employee number to find the name and location data. It displays this information.

```
Employee number: 659600
Name: Mary Tracy                                01/06/80
Location: 648Y                                Total hours:
Regular hours:      Overtime hours:      Sick hours:      Holiday hours:
```

The operator completes the record by entering the hourly data. When all fields have been entered, the program calculates the total hours and compares it to the operator's total hours entry. If they match, the program prompts the operator for the next employee number. If they do not match, the program displays a message that tells the operator an error has occurred. The operator can then either mark the record using the Mark Field key or can correct the record as needed before it is written to the diskette.

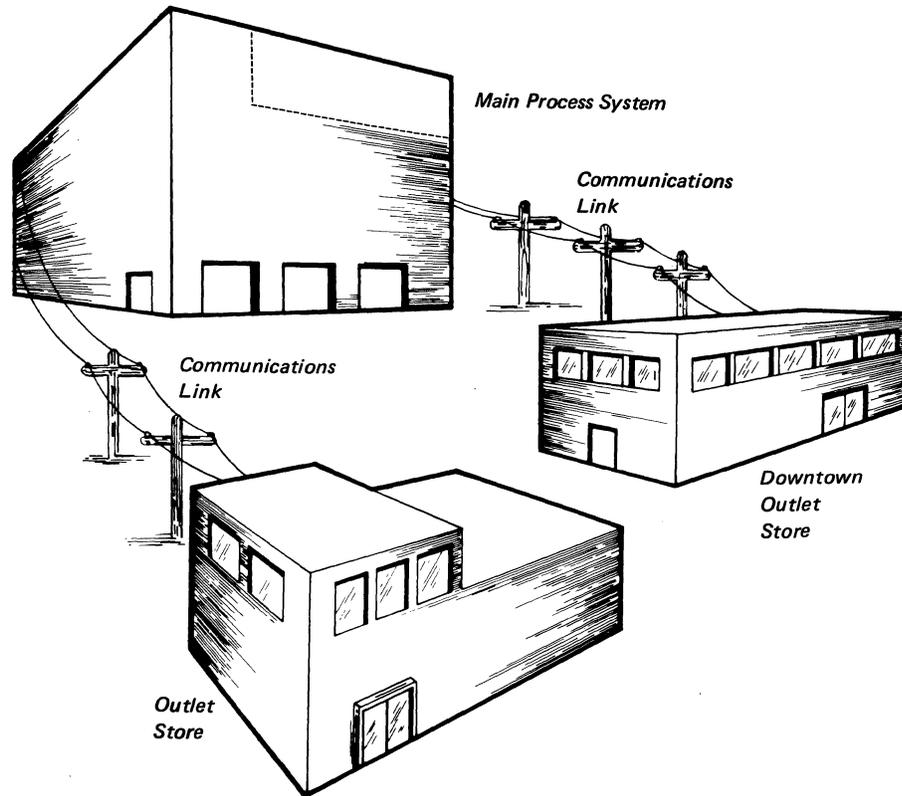
```
Employee number: 659600
Name: Mary Tracy                                01/06/80
Location: 648Y                                Total hours: 45.5
Regular hours: 38.5 Overtime hours: 5.5 Sick hours: 1.5 Holiday hours:
```

Records continue to be displayed until the operator has entered all the source information provided by the payroll department. When the last record is entered, the operator uses the End of Job key sequence to terminate the job, and then removes the diskette and labels it.

Later the payroll manager picks up the diskette from the data-entry department and takes it to the computer room; the operator there enters it into the host processing system's master data base. The data from the diskette is used to calculate and print the pay checks and reports for that week. The system operator stores the diskette containing the payroll until all checks are printed. This process provides an informal backup procedure for protecting the weekly payroll calculations.

AN EXAMPLE USING THE 5280 SYSTEM IN A REMOTE BATCH ENTRY ENVIRONMENT

The example of the 5280 in the remote batch environment is a wholesale auto parts company with three locations in one of the larger cities of the United States. Two of these locations are outlet stores and one is a warehouse where the main process system is located.



Each outlet store has a remote 5280 system consisting of an IBM 5288 Programmable Control Unit and four attached IBM 5281 Data Stations and a 5222 Printer. The four 5281 Data Stations are for the use of the clerks at the service desk. As a clerk closes a purchase, he enters the customer's name and information about the item that was purchased.

Customer name: Mac's Auto Body

Address: 33 N Main St., Winchester, Minn. 10112

ITEM SOLD	PRICE	QUANTITY	TOTAL
AAA01	\$ 99.95	1	\$ 99.95

The program uses the name to search a customer number table to provide a customer number that can be used in future processing.

The entered data and the customer number are written into a transaction data set on the diskette. At the close of the working day, the outlet supervisor collects all the diskettes, prints their contents, and puts the printed copy in his files.

Customer Name and Address	Item	Price	Quant	Total
Mac's Auto Body, 33 N Main St. Winchester, Minn.	AAA01	99.95	1	\$ 99.95
Sibley's Repair, 213 W. Center St. Ruby, Wisc.	BBB00	.15	50	
	AB002	87.50	3	
	DB343	.67	20	\$ 283.40
Fixit Whiz, South Parkway Ely, Minn.	AAA01	99.95	3	\$ 299.85
South Broadway Repair, 10 S Broadway Mpls, Minn.	BBB03	8.95	10	\$ 89.50

He then loads the SNA or BSC data communications utility. During the night, the host system calls the 5280 system. The 5280 system then transmits the data entered during the day and receives information (on diskette and on the printer) concerning sale items and any special accounting information.

*****OVERDUE ACCOUNTS*****

DRAK'S TRUCK REPAIR, 23 4TH ST., MPLS. MINN.
NEW WHEELS, INC., 30 WESTMINSTER BLVD., ST. PAUL, MN.
OK SUPPLY CO., MILLHOUSE ROAD, AMERY, WISC.

*****NEW CUSTOMER DISCOUNTS*****

ALLRITE MOTORS 10%
SPERLING TRANSMISSIONS 5%
U-DO-IT CAR CLEANERS 5%

SALE ITEM ****SALE PRICE****

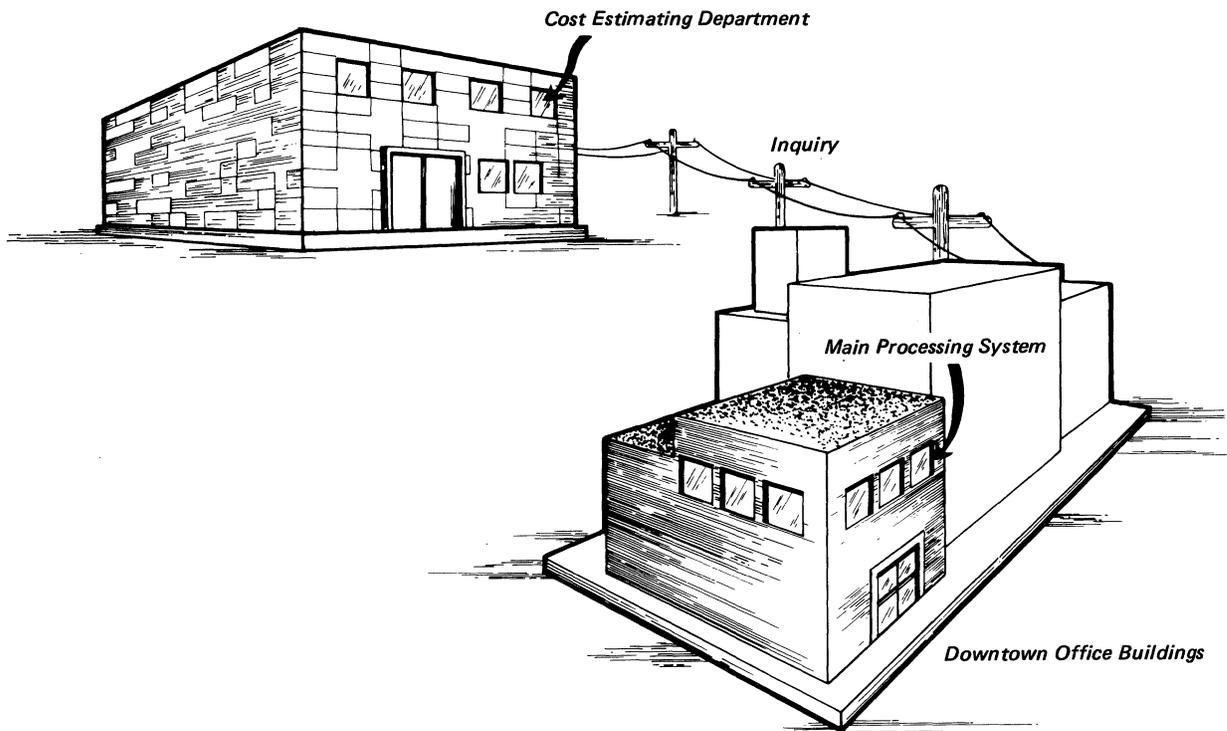
AAA23	15.30
BBA05	199.99
DDC06	32.98
DDB89	.30

AN EXAMPLE OF THE 5280 SYSTEM IN A DATA PROCESSING ENVIRONMENT

The cost-estimating department of a dress manufacturer on the outskirts of a large city has a remote 5280 system. It uses this system to communicate with the host processing system located in a downtown office building.

The employees of the cost-estimating department are only occasional system users, so they require prompts to help use the 5280. The type of 5280 configuration they use is an IBM 5285 Programmable Data Station with a 1920-character display, and an attached IBM 5256 Printer.

A programmer has been assigned to the department to write applications for them.



The programmer has written explanatory prompts and calculations and has provided a display that lists the options. This display is called the main menu.

Enter the number of the selection you want

- | | |
|-------------------------|---------------------------|
| 1. Inventory Listing | 4. Order Information |
| 2. Inventory Changes | 5. Cost Calculation |
| 3. Shipping Information | 6. Lot Supply Information |

Selection: _

When the operator makes a selection, the appropriate prompts appear on the display to guide the operator through the task. Today, the operator is interested in determining what it will cost to cut the most recent collection of dresses. To do this, he uses the menu to select the user-written cost calculations program which he obtains by entering 5 in the Selection field.

This is the cost calculation program

Enter the lot number and quantity of material being cut. Next, enter the employee ID of those cutting the material and the time spent performing the job.

LOT#	QUANTITY	EMPLOYEE ID	HOURS
101-D	3 BOLTS	659-0	3.3
101-D	10 BOLTS	887-2	6.5

When he has completed the entry and pressed the Enter key, the 5280 performs the calculations and provides the requested information about the amount it would cost to cut the dresses.

The cost of cutting 13 bolts of lot number 101-D is \$ 346.78

Please select the choices you want:

1. Subtract the bolts from the inventory
2. Write this information on the printer
3. Write the information on diskette
4. Return to the main menu

Place your choices here: ____ and press ENTER

The operator decides to select all the offered options. First, the master data base in the host processing system is updated to reflect this transaction. Next, the data is written in the data set on the operator's diskette. A confirmation of the order is then printed.

Cutting Information		
Dept. 555 Acct No. 34C-109		
09/18/80		
Lot No.	Quantity	Charge Code
101-D	3 Bolts	659-0
101-D	10 Bolts	887-2
		Total: \$ 346.78

The main menu is redisplayed in preparation for the next transaction.

The process is simple and quick and allows the operators of the 5280 system at a remote location to access the data they need without having to be physically close to the host processing system.

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access method: A technique for moving data between main storage and the input/output devices.

application program: A user-written program that processes data to perform a particular data processing task; for example, inventory control or payroll.

autoanswer: Pertaining to a machine feature that allows a transmission control unit or a station to automatically respond to a telephone call that it receives over a switched line.

batch: An accumulation of data to be processed.

blank: A part of a data media in which no characters are recorded.

bps: Bits per second. In serial transmission, the instantaneous bit speed with which a device or channel transmits data.

BSC (binary synchronous communications): Communications using binary synchronous transmission.

CBS: A type of data access arrangement for automatic originating indoor answering (over a switched network incoming calls).

CDT: A type of data access arrangement for manual originating and answering.

common area: An area of storage reserved for common routines (and tables and a system control area) required for executing all IBM program products.

common carrier: In the United States, a government-regulated private company that furnishes the general public with telecommunication service facilities; for example, a telephone or telegraph company.

communications access method: A program that provides a necessary link between a communications program (IBM-supplied or user-written) and the communications network. It provides functions such as link protocol and data formatting.

compile: To translate a computer program expressed in a problem-oriented language into a computer-oriented language.

conditioning: Giving a set of specified values to a data item.

CSU (channel service unit): The customer site termination of the DDS network.

cursor: A movable visible mark used to indicate a position or a display space.

data base: The master collection of data sets for an application.

data entry: The high-volume entry of data into a computer.

data set: An organized collection of related data records treated as a unit and existing on diskette.

DB/DC: Data base/data communications

default: An alternative value, attribute, or option that is assumed when none has been specified.

diacritic: A character consisting of a character and a special accent mark; for example, the German umlaut (¨ over an a).

diskette: A thin flexible disk and a semi-rigid protective jacket in which the disk is permanently enclosed.

edit: The rearrangement or addition of data, the deletion of unwanted data, format control, and the application of standard processes such as zero suppression.

field: A specified area of a record used for data.

format: An arrangement of information on the diskette or display. In 3740 terminology, synonymous with program.

format 0: A display format in which each character is a field and in which no edits are valid.

full duplex: In data communications, the simultaneous independent flow of data in two directions.

half duplex: In data communications, the independent flow of data in one direction only at any given time.

host processing system: The central or controlling processing unit in a multiple processing unit configuration.

inquiry: A request for information; when used with communications, a request for information from the host processing system.

K: Refers to 1024 bytes of storage.

key value: One or more characters in a set of data that can be used to identify the data; for example, the customer number.

licensed program: A program that performs a function for the user and usually interacts with and relies upon system control programming or some other IBM-provided control program.

logical device address: A representation of the physical device address.

modem: A functional unit that modulates and demodulates signals. One of the functions of a modem is to enable digital data to be transmitted over telephone lines.

multipoint line: In data communications, a line or circuit interconnecting more than two data stations.

multiprogramming: The concurrent operation of more than one program in a single device.

multivolume: A data set that is contained on more than one diskette.

network: In communications, a configuration in which two or more terminal installations are connected.

nonswitched line: A communications line that is always available and that does not require dialing, synonymous with leased line.

object program: the machine executable code that results from the compilation of a DE/RPG or COBOL program or the assembly of an Assembler program.

operator: Any person who is using one of the devices.

partition: An area of the 5280's storage in which programs can execute.

physical device address: The actual device address such as the address of the diskette drive.

point-to-point: A data communications line that connects a single data station to the processing system.

program: A set of sequential instructions written in a form that the computer can interpret.

program support: All programs available from IBM for the 5280 system.

programmable: A device that can load and execute a DE/RPG or assembler program.

prompt: A message that appears on the display to guide the operator.

PTF: Program temporary fix.

relative record number: The position of a record within a data set.

remote: A system or data station that is linked with data communications lines to another system or data station.

remote batch processing: Batch processing in which input/output units have access to a computer through telephone lines.

reverse image: A display attribute in which dark characters appear on a light background.

RJE (remote job entry): Submission of jobs through an input unit that has access to a computer through a data link.

SCP (system control programming): IBM-supplied programming that is fundamental to the operation and maintenance of the system.

sequential data set organization: The arrangement of data based on its entry sequence.

shifts: Pertains to the keyboard. It determines the types of entries allowed; for example, if numeric only shift is active, the operator cannot enter the character A in the field.

source document: The document from which a data entry operator derives information such as a sales order form.

split screen: A screen of a dual data station in which two displays are provided by using a mirror image of each half of a single screen.

status line: The top line of the display which contains information about the operation of the system.

subroutine: An ordered set of instructions that have some general or frequent use.

supervisor: A person who manages the work of others.

switched line: A communications line that uses the equipment and transmission lines for the telephone communications.

SNA/SDLC: Systems network architecture/synchronous data link control.

SNBU: Switched network backup. In data communications, an optional facility that allows the user to specify the switched line to be used as an alternative path when a leased line fails.

transaction data set: The data set that is used or created by an application program.

transaction related jobs: Tasks related to performing a business process such as recording item sales, processing refunds, handling voids, and verifying checks.

typamatic: Pertains to keys on the keyboard that automatically repeat when held down.

user storage: The area of main storage available for executing programs and program products.

World Trade: Pertains to keyboard characters and support that are unique to non-United States countries.

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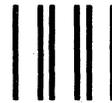
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