

# IBM 5280 Distributed Data System



*The 5288 Programmable Control Unit (bottom left) provides the processing, control, and storage functions for larger 5280 configurations such as shown above. Also included in this configuration (clockwise) is a 5256 bidirectional serial matrix printer, a 5225 wire-matrix line printer, and a 5281 Data Station.*

## MANAGEMENT SUMMARY

The 5280 Distributed Data System is IBM's General Systems Division's entry into the distributed data processing market. The 5280 system consists of a family of diskette-based intelligent terminals that can be programmed to enter, validate, store, process, and print business information at the point of origin.

The 5280 equipment and software are designed to support a wide range of distributed environments and functions, including intelligent data entry, batch and interactive communications, batch processing, transaction processing, and distributed printing. Therefore, the 5280 is attractive to both large and small data processing users who are considering the use of distributed intelligent terminals as part of new or existing data processing networks. Although the 5280's processing and input/output capabilities are comparable to those of many of the current microprocessor-based small business computers, IBM's marketing emphasis and software support make it clear that the 5280 is intended for use as an element in distributed systems rather than as a standalone computer. ➤

The IBM 5280 Distributed Data System is a diskette-based intelligent terminal system designed for distributed functions such as batch and interactive communications, intelligent data entry, batch processing, and transaction processing. The 5280 system features the 5285 Programmable Data Station, the 5286 Dual Programmable Data Station, and the 5288 Programmable Control Unit.

**MAIN MEMORY:** 32K to 288K bytes  
**DISKETTE CAPACITY:** Up to 9.6M bytes  
**WORKSTATIONS:** Up to four auxiliary keyboard/display stations  
**PRINTERS:** 40 cps to 560 lpm  
**OTHER I/O:** Magnetic Stripe Reader

## CHARACTERISTICS

**MANUFACTURER:** International Business Machines (IBM) Corporation, General Systems Division, 4111 Northside Parkway, Atlanta, GA 30327. Telephone (404) 238-2000.

**MODELS:** The 5280 Distributed Data System consists of a number of programmable data station and programmable control unit models. The 5285 Programmable Data Station features 20 models ranging in main memory capacities of 32K to 96K bytes, and are available in any one of four diskette configurations. The 5286 Dual Programmable Data Station is available in eight models, with main memory capacities ranging in 32K to 96K bytes, configured with either two Diskette 1 drives or two Diskette 2D drives. The 5288 Programmable Control Unit features a total of 98 configurations consisting of 32K, 64K, 96K, 128K, 160K, 224K, or 288K bytes of main memory and any one of 14 diskette configurations.

**DATE ANNOUNCED:** January 10, 1980 (5280 Distributed Data System).

**DATE OF FIRST DELIVERY:** June 1980 (5280 Distributed Data System).

## DATA FORMATS

**BASIC UNIT:** 8-bit byte.

**INSTRUCTIONS:** IBM has not released any information concerning the 5280's instruction set to date.

## MAIN STORAGE

**TYPE:** MOS (metal-oxide semiconductor).

**CYCLE TIME:** Not specified to date.

**CAPACITY:** 32K, 48K, 64K, or 96K bytes in the 5285 Programmable Data Station or 5286 Dual Programmable Data Station; 32K, 64K, 96K, 128K, 160K, 224K, or 288K bytes in the 5288 Programmable Control Unit. ➤

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➤ IBM emphasizes that the 5280 is designed to "process business information where it begins; at a branch office down the street or across the continent, in a plant or on a loading dock." For example, manufacturers or distributors can use the 5280 in remote sales offices to process customer orders and transmit the order information, via telephone lines, to a centralized computer system to update customer records. Retailers can use the 5280 at loading docks to match incoming merchandise with purchase orders and later transmit the corrected receiving data to a central computer to update inventory files.

The 5280 hardware product line consists of nine units: single and dual programmable keyboard/display stations, single and dual auxiliary (nonprogrammable) keyboard/display stations, a programmable control unit, and four printers. Every 5280 system must include a programmable controller and at least one keyboard/display, which may or may not be housed in a single physical unit. System configuration possibilities span a wide range, from a single keyboard/display station with 32K bytes of memory and one diskette drive to a fully expanded system consisting of the programmable control unit with 288K bytes of memory, four keyboard/displays, eight printers, eight diskette drives totaling 9.6 megabytes of storage, and a communications adapter. Hard disk drives and magnetic tape drives, however, are conspicuously absent from the 5280 product line at this writing.

The 5285 Programmable Data Station, the basic unit of the 5280 product line, is a table-top keyboard/display station with a single CRT display and keyboard, one or two diskette drives with a capacity of up to 2.4 megabytes, a programmable controller, and from 32K to 96K bytes of memory. A display capacity of 480, 960, or 1920 characters can be selected. Devices that can be attached to the 5285 are limited to one 5222, 5224, 5225, or 5256 Printer and *either* one auxiliary data station (5281 or 5282) or a communications adapter. Thus, a 5280 system built around the 5285 can have up to three keyboard/display stations (through the attachment of an auxiliary 5282), but a multi-station configuration cannot be equipped for communications.

The 5286 Dual Programmable Data Station is a table-top unit that includes two independent keyboard/display stations, two diskette drives with a capacity of up to 2.4 megabytes, a programmable controller, and from 32K to 96K bytes of memory. The display capacity is limited to 480 characters at each station. The 5286 can control one auxiliary data station (5281 or 5282), but it cannot be equipped with either a printer or a communications adapter. Thus, the 5286 is a limited-function unit that appears to be designed mainly for key-to-diskette data entry functions where no communications capability is required.

The 5288 Programmable Control Unit is a floor-standing controller designed to serve as the central component of larger 5280 configurations. The 5288 contains from 32K to 288K bytes of memory and from one to four diskette drives ➤

➤ CHECKING: Not specified to date.

STORAGE PROTECTION: None.

### PROCESSORS

The controllers within the 5285 Programmable Data Station, 5286 Dual Programmable Data Station, and 5288 Programmable Control Unit control all the functions of a 5280 system, including those of any attached 5281 or 5282 auxiliary data stations. At least one of these three programmable units must be part of any 5280 system configuration. The controllers in the 5285, 5286, and 5288 perform identical processing and control functions but vary in their main storage capacities and device attachment capabilities.

IBM has revealed very few details about the controllers to date. It is known that they utilize multiple microprocessors which allow processing and I/O devices to operate independently. Other features of the controllers include a multiprogramming capability and powerful data editing functions. The number of controller partitions (up to eight) and their size (6K to 64K bytes) are user-specified with a facility provided in the 5280 System Control Programming (SCP) software package. The 2500 Communications Adapter, optionally available for the 5285 and 5288, provides for single-line communications in either BSC or SDLC protocol. In addition to the functions provided by the 2500 Communications Adapter, the 3270 Emulation Communications Adapter, also available for the 5285 and 5288, provides support for the 5280—3270 Emulation licensed program.

The Second Application Microprocessor feature (#6800), available for the 5285 (without the 2500 Communications Adapter), the 5286, and the 5288, performs applications, logic, and arithmetic. Designed for a multiprogramming environment, the Second Application Microprocessor operates concurrently with the standard (base) application microprocessor to provide more processing power to the 5280 Distributed Data System. Both microprocessors operate independently to service active partitions. Each microprocessor can be assigned to specific, contiguous partitions by the user. This allows a specific user program(s) to be serviced by a dedicated application microprocessor. If unassigned by the user, the microprocessors are allocated to all active partitions. In this case, all concurrently executing programs will be serviced by two application microprocessors. Partition assignments are made by using a 5280 System Control Programming (SCP) facility. Release 2 of this facility is required.

### INPUT/OUTPUT CONTROL

Multiple microprocessors within the 5285, 5286, and 5288 allow processing and I/O devices to operate concurrently.

### CONFIGURATION RULES

**WORKSTATIONS:** The 5285 contains one workstation and can accommodate an auxiliary 5281 Data Station or a 5282 Dual Data Station. The 5286 consists of two workstations, plus either of the optional data stations. The 5288 Control Unit accommodates up to four 5281 Data Stations and/or 5282 Dual Data Stations (in any combination).

**DISKETTE STORAGE:** Storage capacities for the 5285, 5286, and 5288 are 2.4 megabytes, 2.4 megabytes, and 9.6 megabytes, respectively.

**PRINTERS:** One printer can be configured to the 5285, while the 5288 Control Unit supports up to eight printers. The 5286 is not capable of supporting a printer. ➤

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### PERIPHERALS/TERMINALS

MODEL	DESCRIPTION & SPEED
INTEGRATED DISPLAY	Standard component of the 5281 Data Station, 5282 Dual Data Station, 5285 Programmable Data Station, and 5286 Dual Programmable Data Station; standard display capacity is 480 characters (6 lines of 80 characters) at each operator position; optional display capacities are 960 characters (12 lines of 80 characters) or 1920 characters (24 lines of 80 characters) for the 5281 or 5285, and 960 characters (12 lines of 80 characters) for each operator position of the 5282; user-selectable character set offers choice of 94-character EBCDIC (upper/lower case), 94-character ASCII, or 185-character Multinational Character Set; 8 x 16 dot matrix; program-controlled screen attributes include reverse image, high intensity, blink, underline, nondisplay, and column separator
INTEGRATED KEYBOARD	Required component of the 5281, 5282 (two keyboards), 5285, and 5286 (two keyboards); choice of four keyboard types; 83-key EBCDIC typewriter, 83-key ASCII typewriter, 66-key data entry, and 66-key data entry with proof arrangement; each keyboard is movable and includes data keys, cursor movement keys, special function keys, and field edit keys
MAGNETIC STRIPE READER	Optional feature for the 5281, 5282, 5285, 5286 or 5288; provides the capability to read up to 128 A.B.A. numeric characters, including control characters from a magnetic stripe on credit cards, identification cards, and other documents
PRINTERS	
5222	Bidirectional wire matrix printer; attaches to the 5285 or 5288; provides a printing speed of 80 characters/second; operator-selectable horizontal spacing of 10 or 15 characters/inch; operator-controlled vertical spacing of 6 or 8 lines/inch; maximum line width of 132 characters at 10 chars./inch or 198 characters at 15 chars./inch; choice of 95-character EBCDIC set, 185-character Multinational set, or 95-character Spanish set; 8 x 7 dot matrix configuration; forms tractor for feeding continuous forms
5224	Impact matrix line printer; attaches to the 5285 or 5288; operator-selectable horizontal spacing of 10 or 15 characters/inch; operator-controlled vertical spacing of 6 or 8 lines/inch; two models are available with the following printing speeds: Model 1, 140 lpm (10 cpi) or 95 lpm (15 cpi), and Model 2, 240 lpm (10 cpi) or 175 lpm (15 cpi)
5225	Wire matrix line printer; attaches to the 5285 or 5288; operator-selectable horizontal spacing of 10 or 15 characters/inch; operator-controlled vertical spacing of 6 or 8 lines/inch; maximum line width of 132 characters at 10 char./inch or 198 characters at 15 char./inch; choice of 95-character EBCDIC, 184-character Multinational (including ASCII graphics), or 95-character Spanish character set; 8 x 7 dot matrix; forms tractor for feeding margin-punched continuous forms; program-controlled forms skipping; connects to the 5285 or 5288 via twinax cabling at a distance of up to 5000 feet; available in four models with the following rated speeds at 10 char./inch: Model 1, 280 lpm; Model 2, 400 lpm; Model 3, 490 lpm; Model 4, 560 lpm; rated speeds at 15 char./inch are: Model 1, 195 lpm; Model 2, 290 lpm; Model 3, 355 lpm; Model 4, 420 lpm
5256	Bidirectional serial matrix printer; attaches to the 5285 or 5288; 132 print positions per line at 10 characters/inch; operator-controlled vertical spacing of 6 or 8 lines/inch; 96-character, upper/lower-case EBCDIC character set; optional Multinational Character Set; forms tractor for feeding margin-punched continuous forms, plus cut forms capability; connects to the 5285 or 5288 via twinax cabling at a distance of up to 5000 feet; available in three models with the following rated speeds: Model 1, 40 chars./sec.; Model 2, 80 chars./sec.; Model 3, 120 chars./sec.

➤ with a total storage capacity of up to 4.8 megabytes. It can control a cluster of up to four keyboard/displays through the attachment of auxiliary data stations (5281 or 5282). The 5288 can also accommodate a communications adapter and up to eight printers. Diskette drives in the attached auxiliary data stations can be accessed by the 5288 along with its own drives, providing a total system capacity of up to 8 drives and 9.6 megabytes.

The 5281 Data Station is a table-top unit containing a single keyboard/display and 0, 1, or 2 diskette drives with a capacity of up to 2.4 megabytes. A nonprogrammable unit, the 5281 must be cable-connected to a 5285, 5286, or 5288 at a maximum distance of 200 feet. The display capacity is 480, 960, or 1920 characters as determined by the attachment feature on the controlling device.

The 5282 Dual Data Station is a table-top unit containing two independent keyboard/display stations and 0, 1, or 2 ➤

➤ A minimum 5280 configuration can consist of: 1) any model of the 5285 Programmable Data Station; 2) any model of the 5286 Dual Programmable Data Station; or 3) any model of the 5288 Programmable Control Unit with an attached 5281 Data Station or 5282 Dual Data Station (any model).

The 5285 Programmable Data Station is a single, table-top keyboard/display unit with 32K, 48K, 64K, or 96K bytes of main memory and one or two diskette drives. The standard 480-character display capacity can be expanded to 960 or 1920 characters. The following devices and features can be attached to the 5285: one auxiliary 5281 Data Station or 5282 Dual Data Station, connected via a cable at a maximum distance of 200 feet; one 5224, 5225, or 5256 Printer, connected via a twinax cable at a maximum distance of 5000 feet; one 5222 Printer, connected by a double-twisted pair cable at a maximum distance of 200 feet; one 2500 Communications Adapter or 3270 Emulation Communications Adapter with the appropriate line interface feature; one magnetic stripe reader; one Elapsed Time Counter; and one Security Keylock. The 5285 and its auxiliary 5281 or 5282 data station must have the same display capacity. An ➤

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▷ diskette drives with a capacity of up to 2.4 megabytes. Like the 5281, the 5282 is a nonprogrammable unit that must be cable-connected to a 5285, 5286, or 5288 at a maximum distance of 200 feet. The display capacity at each station is 480 or 960 characters, as determined by the attachment feature on the controlling device.

The number of printer models that can be configured to either a 5285 or a 5288 recently doubled. The 5225 and 5256 Printers are now accompanied by the 5222 and 5224 Printers. The 5222 is a wire-matrix table-top printer capable of printing 80 characters per second at 10 cpi (characters per inch) or 15 cpi horizontal print density. Each line of print can contain 132 characters (10 cpi) or 198 characters (15 cpi). The printer features bidirectional printing and accommodates one of three upper/lower case character sets: a 95-character EBCDIC set, a 185-character multinational set, or a 95-character Spanish set. Vertical spacing is user selectable at 6 or 8 lines per inch, while the page length is program selectable with a maximum length of 255 lines per page. A variable-width forms tractor provides for the feeding of continuous forms.

The 5224 is an impact dot-matrix (8x7) line printer with a user-selectable print density of 10 or 15 cpi and line spacing of 6 or 8 lines per inch. Forms skipping and vertical spacing are under program control. The 5224 is available in two models: Model 1, with a printing speed of 140 lines per minute (lpm) at 10 cpi or 95 lpm at 15 cpi; and Model 2, with a printing speed of 240 lpm at 10 cpi or 175 lpm at 15 cpi. An audible alarm informs the operator when manual intervention is required due to one of nine printer error conditions. The 5224 features the same three character sets of the 5222 Printer, with the addition of ASCII graphics capabilities with the 185-character multinational set.

The 5225 Printer is a wire-matrix line printer that also features operator-selectable horizontal spacing of either 10 or 15 characters per inch. The 15-cpi spacing makes it possible to print most reports on standard correspondence-size paper to reduce forms costs and simplify the handling and filing of reports. The 5225 is offered in four models with rated speeds of 280, 400, 490, and 600 lines per minute at 10 cpi, and 195, 290, 355, and 420 lines per minute at 15 cpi. Each line can have a maximum of 132 print positions at 10 cpi and 198 positions at 15 cpi.

The 5256 Printer is a serial matrix printer that prints bidirectionally, using a 96-character upper/lower case EBCDIC character set. The 5256 is available in three models with rated speeds of 40, 80, or 120 characters per second.

All of the 5280 units are designated as "customer set-up" machines, and their compact size make them relatively easy to install. The minimum 5280 configuration, a 32K-byte 5285 Programmable Data Station with one diskette drive, can be purchased for \$6,093 or leased for \$191 per month on a 2-year lease.

▶ auxiliary 5281 or 5282 data station cannot be attached if the controlling 5285 has the 2500 or 3270 Communications Adapter.

The 5268 Dual Programmable Data Station is a table-top unit that functions as two independent data stations, each with a keyboard, a display area, and a diskette drive. Main storage capacities of 32K, 48K, 64K, and 96K bytes are available. The display capacity is 480 characters at each operator position and cannot be expanded. The following devices and features can be attached to the 5286: one auxiliary 5281 Data Station or 5282 Dual Data Station, connected via a cable at a maximum distance of 200 feet; one magnetic stripe reader; one Elapsed Time Counter; and one Security Keylock. The 5286 and its auxiliary 5281 or 5282 data station must have the same display capacity (i.e., 480 characters). The 5286 cannot be equipped with either a printer or a communications adapter.

The 5288 Programmable Control Unit is a floor-standing controller that contains from 32K to 288K bytes of main memory and from 1 to 4 diskette drives. The 5288 provides processing, control, main memory, diskette storage, communications and device attachment capabilities for other components of the 5280 system. The following devices and features can be attached to the 5288: 5281 Data Stations and/or 5282 Dual Data Stations in any combination providing a maximum of four keyboards; up to eight printers including any combination of the 5222, 5224, 5225, and 5256 printers; one 2500 or 3270 Emulation Communications Adapter with the appropriate line interface feature; one magnetic stripe reader; one Elapsed Time Counter; and one Security Keylock.

Each data station requires a separate Auxiliary Data Station Attachment on the 5288 and is connected to the system by a cable 200 feet long. All of the attached data stations must have the same display capacity (480, 960, or 1920 characters for the 5281 and 480 or 960 characters for the 5282). Printers are connected to the 5288 via one of four features: the Single Twinax Printer Attachment (#1155), the Multiple Twinax Printer Attachment (#1160), the Single 5222 Printer Attachment (#1157), and the Multiple 5222/Twinax Printer Attachment (#1162). The first attachment provides a single twinax port and connects up to seven 5224, 5225, and/or 5256 printers to the 5288. The second attachment provides four ports for attaching a maximum of eight printers. The third attachment features a single port for the attachment of one 5222 Printer. The fourth attachment provides four 5222 Printer ports and a twinax printer port. A single 5222 printer can be attached to each 5222 port, while up to seven 5224, 5225, and/or 5256 printers can be supported by the twinax port.

The 5281 Data Station is a single, table-top, auxiliary keyboard/display unit containing 0, 1, or 2 diskette drives. A nonprogrammable unit, the 5281 must be cable-connected to a 5285, 5286, or 5288 equipped with the appropriate Auxiliary Data Station Attachment feature. The 5281's display capacity is 480, 960, or 1920 characters, as determined by the attachment feature on the controlling device. If the 5281 contains 1 or 2 diskette drives, the controlling 5285, 5286, or 5288 must also have the appropriate Remote Diskette Drive Attachment feature. The 5281 can be equipped with an optional magnetic stripe reader.

The 5282 Dual Data Station is a table-top unit that functions as two independent auxiliary data stations, each with a movable keyboard, a display area, and an optional diskette. The 5282 is available with 0, 1, or 2 diskette drives. A nonprogrammable unit, the 5282 must be cable-connected to a 5285, 5286, or 5288 equipped with the appropriate Auxiliary Data Station Attachment feature. The display capacity at each operator position is either 480 or 960 characters, as determined by the attachment feature on the controlling

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▷ The programmable controllers in the 5285, 5286, and 5288 perform identical processing and control functions, although they vary in their memory capacities and device attachment capabilities. Multiple microprocessors (up to six) are used in each controller to enable processing and I/O devices to operate independently, and the system supports multiprogramming with up to eight main storage partitions. IBM has been strangely reticent about defining the 5280's processing capabilities, so at this time no performance comparisons can be made between the 5280 and other systems from IBM or competing vendors.

Data communications capabilities for the 5280 system are provided by an optional communications adapter on either the 5285 Programmable Data Station or the 5288 Programmable Control Unit. The 5285 or 5288 can communicate over a single line in half-duplex mode at a speed of up to 4800 bits per second, using either BSC or SDLC protocol. Point-to-point switched or nonswitched operation and multipoint tributary operation are supported. The required line interface can be provided by an internal modem, a Digital Data Service Adapter, or an EIA interface that permits the use of an external modem. The 5280 system can communicate with an IBM System/370, 303X, or 4300 Series computer in SDLC mode or with most current IBM computers and terminals in BSC mode.

The 5280's designers clearly paid considerable attention to data security provisions. Sensitive data can be entered via the keyboard without being displayed on the CRT screen. An optional Security Keylock feature makes it possible to restrict usage of the system to keyholders. An optional magnetic stripe reader, available for each keyboard/display operator position, can be used to enter user identification data. Finally, a communicating 5280 system can exchange identification sequences with the host computer, thereby aiding the user in controlling access to data.

Initial software support for the 5280 consists of bundled System Control Programming (SCP) and eight separately priced licensed programs. The software is oriented toward the support of data entry, transaction processing, batch processing, and both batch and interactive communications.

No integrated operating system has been announced for the 5280. The "free" SCP facilities are limited to a System Configuration Program that is used to define the physical and logical configuration of a 5280 system, an Initial Program Loader that initializes the system for program execution, a PTF/Patch Program that aids in applying program temporary fixes and program patches, and a Close Failure Recovery program that aids in recovering from abnormal program terminations.

Users of the 5280 have a choice of three programming languages: DE/RPG, Cobol, and Assembler. The principal IBM emphasis appears to be on DE/RPG, a programming system that uses RPG-style specification ▷

▷ device. If the 5282 contains 1 or 2 diskette drives, the controlling 5285, 5286, or 5288 must also have the appropriate Remote Diskette Drive Attachment feature. Either or both stations of the 5282 can be equipped with an optional magnetic stripe reader.

### MASS STORAGE

**INTEGRATED DISKETTE DRIVES:** The only mass storage facilities currently available for the 5280 system are diskette (floppy disk) drives, which are standard components of the three units that contain programmable controllers and optional components of the two auxiliary keyboard/display units.

Two types of diskette drives are available for the 5280 system: a drive that can read and write only the IBM Diskette 1 format, and a drive that can read and write the IBM Diskette 1, 2, and 2D formats. (The latter is referred to as a Diskette 2D drive.) The on-line data capacity of each drive can range from 246K bytes to 1.2 megabytes, depending upon the recording format in use (see the recording format table below).

The 5285 Programmable Data Station contains either one or two diskette drives, which can be either Diskette 1 or Diskette 2D drives (or one of each). Thus, the maximum diskette storage capacity of the 5285 is 2.4 megabytes.

The 5286 Dual Programmable Data Station contains two diskette drives of either the Diskette 1 or Diskette 2D type, for a maximum capacity of 2.4 megabytes. The two types of diskette drives may not be intermixed on a 5286.

The 5288 Programmable Control Unit contains from one to four diskette drives in any mixture of the Diskette 1 and Diskette 2D types, for a maximum storage capacity of 4.8 megabytes. The 5288 can also access the diskette drives in the attached 5281 and/or 5282 auxiliary data stations. If the base 5288 contains one or two drives, the maximum number of remote drives is six. If the base 5288 contains three or four drives, the maximum number of remote drives is four. Therefore, the maximum number of diskette drives on a 5288 system is eight, providing a storage capacity of 9.6 megabytes.

The 5281 Data Station and the 5282 Dual Data Station each contain 0, 1, or 2 diskette drives in any combination of the Diskette 1 and Diskette 2D types, for a maximum capacity of 2.4 megabytes.

Three recording formats are available for each of the three types of IBM diskettes, as tabulated below:

Diskette Type	Format	Bytes per sector	Capacity, bytes
1	1	128	246K*
	2	256	284K
	3	512	303K
2	4	128	492K
	5	256	568K
	6	512	606K
2D	7	256	985K
	8	512	1136K
	9	1024	1212K

\*243K bytes when used for Basic Exchange.

For exchanging diskette data between the 5280 and other systems, IBM supports the following exchange types: Basic Exchange, in Formats 1 and 4; H exchange, in format 7 only; and I exchange, in all of the above formats. Diskettes can be interchanged with the IBM Series/1, System/3, System/32, System/34, System/38, System/370, 303X, 4300, 3540, ▷

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forms to simplify the preparation of programs for interactive data entry, high-volume key entry, and user-defined processing functions. The 5280 Cobol language is an implementation of ANS Cobol 74 that supports interactive or batch commercial applications, provides limited data station support for interactive applications, and supports BSC and SDLC communications via a CALL interface. Cobol's usefulness, however, is limited by the fact that Cobol programs for the 5280 must be compiled on a host IBM System/370, 303X, or 4300 Series computer under either OS/VS or DOS/VSE. DE/RPG and Assembler programs, by contrast, can be compiled on the 5280 system itself.

Three utility packages complete the initial 5280 software complement. The 5280 Utilities consist of 11 routines to perform straightforward utility functions such as diskette file maintenance, resource allocation, and system status display. The 5280 Sort/Merge permits flexible sorting and merging operations on diskette files. The 5280 Communications Utilities provide software support for a 5285 or 5288 equipped with a communications adapter. Basic facilities are provided for batch data transfer and inquiry, multi-leaving remote job entry (MRJE), SNA remote job entry (SRJE), and communication configuration and job description. No software to support specific user applications has been announced for the 5280 to date.

The 5280 effectively supersedes the 3740 Data Entry System, IBM's key-to-diskette system. Introduced in 1973, the 3740 had been progressively upgraded through the addition of programmability, communications, and printers—but the older system is clearly outclassed by the greater power and flexibility of the 5280. To assist 3740 users in converting to the 5280, IBM is providing three software conversion aids. The 3740 Format Conversion utility facilitates the conversion of 3740 key entry program levels into DE/RPG source programs. The Key Entry Utility accepts the 3740 key entry string language as input and creates formats for simple key entry functions on the 5280. The 3740 ACL Conversion Aid Program, supplied with the 5280 Assembler, aids in converting 3740 ACL programs into 5280 Assembler language.

IBM's General Systems Division's distributed data system naturally invites comparison with the IBM 8100 Information System, the distributed data processing system developed and marketed by IBM's Data Processing Division (DPD). Introduced in October 1978, the 8100 is a much larger, more powerful, and more costly system; the *smallest* 8100 processor features 256K bytes of main memory, includes 29 megabytes of hard disk storage, and sells for \$27,780—nearly five times the \$5,730 purchase price of a minimum 5280 system. Thus, the two systems occupy separate niches within IBM's growing line of distributed data processing hardware and appear to be complementary rather than competitive.

The 5280's more direct competition will come not from other IBM products but from the distributed data processing systems that have long been marketed by

3740, 3747, 3770, 3790, 5110, 5230, 5260, 8100, and other systems and devices that support a compatible diskette exchange type.

Diskette data transfer rates are 31,250 bytes/second in Diskette 1 or Diskette 2 mode and 62,500 bytes/second in Diskette 2D mode. The rotational speed is 360 rpm for both types of drives.

### INPUT/OUTPUT UNITS

See the Peripherals/Terminals table on the third page of this report.

### COMMUNICATIONS CONTROL

**2500 COMMUNICATIONS ADAPTER:** This optional feature for either the 5285 Programmable Data Station or the 5288 Programmable Control Unit provides either SDLC or BSC data link control over a single communications line. Operating under stored-program control, the feature allows the 5285 or 5288 to communicate at up to 4800 bits/second on a switched point-to-point or nonswitched point-to-point or multipoint line. (On a multipoint line, the 5285 or 5288 operates as a tributary station.) All transmission is in half-duplex mode. Switched network support includes manual dialing and manual or automatic answering (where the attached modem supports the latter capability).

The 5285s, 5288s, or other devices at all the terminations (or drop points) of a network must use the same clocking source, operate at the same transmission rate, use the same transmission code, and have the same two- or four-wire connection to the line. Compatible modems must be used at all terminations in a network.

A 5285 or 5288 using BSC protocol can communicate with the following other IBM systems:

- A System/3 equipped with a 2074, 2084, or 2094 Communications Adapter.
- A System/32 equipped with a 2074 Communications Adapter.
- A System/34 equipped with a 2500, 3500, or 4500 Communications Adapter.
- A System/38 with an appropriately configured BSC Adapter and subfeatures (point-to-point only).
- A System/370 equipped with either an Integrated Communications Adapter, a 2701 Data Adapter Unit, or a 3704 or 3705 Communications Adapter with the ACF/NCP or PEP software, plus a BSC Adapter and appropriate subfeatures.
- A 4331 System equipped with a communications adapter.
- A 303X or 4300 System with a 2701 Data Adapter Unit.
- A Series/1 equipped with a 2074, 2075, or 2093/2094 Binary Synchronous Control.
- A 3741 Model 2 Data Station or a 3741 Model 4 Programmable Workstation.
- A 3747 Data Converter equipped with a 1660 Communications Adapter.
- A 5265 communicating model (XX2).
- Another 5285 or 5288 equipped with either a 2500 or 3270 Emulation Communications Adapter.

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▷ companies such as Datapoint, Four-Phase Systems, Inforex, Mohawk Data Sciences, Nixdorf, and Pertec. Competitive systems with capabilities generally similar to those of the 5280 include the Datapoint 1550 and 1800, the Four-Phase Systems IV Series, the Inforex System 9000, the Mohawk Data Sciences System 2100, the Nixdorf 600/25, /35, /45, and /55, and the Pertec XL20 and XL40. □

▶ A 5285 or 5288 using SDLC protocol can communicate with a System/370, 303X, or 4300 Series computer via a 3704 or 3705 Communications Controller equipped with appropriate features.

The Communications Adapter must be connected to the communications line by means of either an Integrated Modem, an EIA Interface plus an external modem, or a DDS Adapter.

**3270 EMULATION COMMUNICATIONS ADAPTER:** In addition to the functions provided by the 2500 Communications Adapter, this feature supports the 5280—3270 Emulation licensed program, and in conjunction with stored program control, permits the 5285 and 5288 to function on a switched or nonswitched public or private communications line. This adapter is required to attach to a communications line via the appropriate interface or modem (see INTEGRATED MODEMS). The 3270 Emulation Communications Adapter cannot be installed with the 2500 Communications Adapter. In addition, as with the 2500 adapter, the 3270 cannot be configured to an auxiliary data station or to a system equipped with the Second Application Microprocessor.

**INTEGRATED MODEMS:** IBM offers five types of 1200-bps integrated modems for use with a 5285 Programmable Data Station or 5288 Programmable Control Unit equipped with the 2500 or 3270 Emulation Communications Adapter. All five versions permit either BSC or SDLC data transmission at either 600 or 1200 bits per second. Their distinguishing characteristics are as follows: Model 5500—non-switched; Model 5501—switched with auto-answer; Model 5502—switched without auto-answer; Model 5507—non-switched with Switched Network Backup manual answer capability; and Model 5508—non-switched with Switched Network Backup auto-answer capability. The devices communicating with the 5285 or 5288 must be equipped with compatible 1200-bps modems. Only one integrated modem can be installed in a 5285 or 5288, and the integrated modem is mutually exclusive with the EIA Interface and the DDS Adapter. The Power Supply Expansion (#5810) is required for the Model 5501 or 5508 Integrated Modem.

**EIA INTERFACE (#3701):** This feature can be chosen as an alternative to the IBM integrated modems for use with a 5285 or 5288 equipped with the 2500 or 3270 Emulation Communications Adapter. The feature provides a cable and interface that meet the EIA RS-232-C specifications, permitting the attachment of an external modem supplied by IBM or another vendor. The Power Supply Expansion (#5810) is a prerequisite.

**DIGITAL DATA SERVICE (DDS) ADAPTER:** This feature enables a 5285 or 5288, equipped with the 2500 or 3270 Emulation Communications Adapter, to transmit and receive data at 2400 or 4800 bits per second in BSC or SDLC mode over AT&T's non-switched Dataphone Digital Data Service. The DDS Adapter is available in two versions: the Model 5650 for point-to-point operation and the Model 5651 for multipoint operation. Either model provides for appropriate interface and cable to the DDS channel service unit at the customer site.

The DDS Adapter can also be used to locally connect a 5285 or 5288 to another supported device which has a compatible DDS Adapter. This connection requires a special DDS Adapter Connector, and supports point-to-point connections only. The maximum length of the connection is the sum of the modem cable length supported by the two devices.

## SOFTWARE

Software support for the 5280 Distributed Data System is provided by System Control Programming (SCP), which is furnished at no charge, and by a set of separately priced licensed programs. These software facilities collectively provide the necessary support for a wide range of distributed environments including data entry, batch and interactive communications, batch processing, and transaction processing.

**OPERATING SYSTEM:** No integrated operating system for the 5280 has been announced to date. Instead, IBM offers the *5280 System Control Programming (SCP)*, which consists of four routines that provide the following basic system functions: 1) the System Configuration Program is used to describe the physical and logical configuration of a 5280 system; 2) the Initial Program Loader initializes the system and prepares it for program execution; 3) the PTF/Patch Program is used to apply program temporary fixes (PTFs) and to make program patches; 4) the Close Failure Recovery Program allows the user to specify an end-of-data (EOD) record in a diskette data set in the event that a program terminates abnormally.

**LANGUAGES:** IBM currently offers the DE/RPG, Cobol, and Assembler languages for use with the 5280 system. DE/RPG and Assembler programs can be prepared on the 5280 itself, whereas Cobol programs must be compiled on a host System/370, 303X, or 4300 Series computer under either OS/VS or DOS/VSE.

*5280 DE/RPG* is designed to simplify the preparation of programs for applications ranging from simple key entry to high-function data entry jobs that require extensive editing, data set accessing, and user-defined processing.

DE/RPG makes use of the Data Description Specifications (DDS) form, which is also supported on the IBM System/38, for specification of data entry formats. A format or series of formats, defined by the user and presented in the display screen, provides the framework for a data entry job. A typical job would consist of entering data, editing and checking the data, creating records, and writing the records to a diskette data set. The sequence of execution of the formats can be determined by job definition, by operator selection, or by the program on the basis of an analysis of current data.

DE/RPG also features an RPG subroutine capability which provides a subset of the RPG III calculation operation codes. Using the RPG Calculation Specifications, the user can define specialized routines such as complex editing, arithmetic calculations, array handling, master data set access, and report printing. A total of 40 RPG II operation codes from the following categories are available: arithmetic and data manipulation, branching, indicator testing, subroutine operations, and special I/O operations. The RPG subroutine capability can also be used to create standalone batch DE/RPG programs that can run in any partition. RPG programmers should note, however, that the sequence of instruction execution is defined by the user; the usual RPG "cycle" does not apply.

DE/RPG permits considerable flexibility in display screen design and in data editing. Prompts and data fields can be positioned anywhere on the screen below the top line, which is reserved for status information, and multiple formats can be displayed on a single screen. Editing can be performed on a

## IBM 5280 Distributed Data System

► character, field, or record basis, and a wide range of editing, checking, testing, comparison, insertion, and table lookup operations is available.

DE/RPG diskette data sets are organized in sequential fashion. Three access methods are supported: sequential, direct by relative record number, and key indexed. Data sets can be shared by multiple programs on a read or write/update basis. There are safeguards against concurrent updating of a record by two or more programs.

All DE/RPG programs maintain production statistics on both a job basis and a station basis. Counts can be maintained of keystrokes, records, marked records, verify correction keystrokes, elapsed time, and number of jobs.

The DE/RPG licensed program consists of a Source Entry Program and a Compiler. The Source Entry Program permits interactive entry, verification, and updating of DE/RPG source statement data set, which becomes the input to the Compiler. The Compiler produces an object program data set, which is written to diskette, and an optional source listing on either printer or diskette. When two or more operators are to perform the same job, each operator must have an individual copy of the appropriate object program, executing in a separate partition.

The DE/RPG Compiler will run on any 5280 system that has at least one Diskette 2D drive or two Diskette 1 drives. Minimum main storage partition size requirements are 9K bytes for the Compiler and 13K bytes for the Source Entry Program. The 5280 SCP and 5280 Utilities are prerequisites.

5280 *Cobol* is available in two versions, which differ in the host IBM computers and software that are required to compile the Cobol source programs. The 5280 Cobol-OS/VS Host Compiler and Library product requires a System/370, 303X, or 4300 Series computer operating under OS/VS1 or OS/VS2 (MVS) for the compilation process, while the 5280 Cobol-DOS/VSE Host Compiler and Library product requires a System/370, 303X, or 4300 Series computer operating under DOS/VSE. Otherwise, the two versions have similar capabilities and features. Cobol object programs can be executed on a 5285, 5286, or 5288. Object programs can be transferred from the host to the 5280 system via diskette, RJE, or a user-written communications program.

The 5280 Cobol language is an implementation of 1974 ANS Standard Cobol, X.23-1974. It provides support for both interactive and batch commercial application programs, as well as limited data station support for interactive applications. Support for BSC and SDLC communications is provided via a CALL interface.

Cobol object programs will run on any 5280 system with a minimum of 48K bytes of main memory and the 5280 System Control Programming feature. The programs require a minimum partition size of 16K bytes. Actual partition size requirements are a function of the Cobol source program. If data communications is used, a minimum of 64K bytes of memory is required. The 5280 Communications Utilities Licensed Program is also required when utilizing data communications via Cobol, and will require a communications partition.

The 5280 *Assembler* is used to create standalone programs which will run on a 5285, 5286, or 5288. Features of the Assembler include mnemonic operation codes, symbolic referencing for storage addresses, symbolic data representation, automatic storage assignments, address displacement calculation, operand expressions, binary and decimal arithmetic, a source program listing, a cross-reference listing, error checking, and diagnostic messages. The 3740 ACL Conversion Aid Program is supplied along with the Assembler to aid the user in converting ACL (Application

Control Language) programs written for the IBM 3740 Data Entry System into 5280 Assembler Language. Minimum main storage partition size requirements are 9K bytes for the 5280 Assembler and 16K bytes for the 3740 ACL Conversion Aid Program.

UTILITIES: IBM currently offers three licensed programs in this category for the 5280 system: the 5280 Utilities, the 5280 Sort/Merge, and the 5280 Communications Utilities.

The 5280 *Utilities* consist of 11 programs with the following names and functions:

- Diskette Initialization Utility—formats a diskette according to the user's requirements.
- Diskette/Data Set Clear Utility—clears one or all data sets on a diskette in preparation for the recording of new data.
- Diskette Label Maintenance Utility—allocates space for new data sets, deletes old data sets, and modifies the labels of volumes and data sets.
- Diskette Label List Utility—displays or prints diskette volume labels, data set labels, data set names, and data set directories.
- Diskette Copy Utility—copies all or portions of a diskette onto the same or another diskette; supports multi-volume output data sets.
- Diskette Print Utility—prints all or selected records from a diskette, without reformatting or editing.
- Resource Allocation Utility—enables the user to add, delete, display, or alter an entry in the Resource Allocation Table, which contains physical device addresses with their corresponding logical identifiers.
- 3740 Format Conversion Utility—aids in the conversion of 3740 key entry program levels into DE/RPG source programs.
- Diskette Compress Utility—rearranges data sets to make one contiguous space out of the unused space between data sets.
- Key Entry Utility—permits the user to create formats for simple data entry functions using the IBM 3740 key entry string language.
- System Status Utility—displays system status information such as the number and sizes of partitions and names of programs currently being executed.

The 5280 *Sort/Merge* consists of a Sort program and a Merge program. The Sort program sorts a single diskette data set into either ascending or descending sequence, using parameters entered at the keyboard or read from diskette. Records can be selected, omitted, or reformatted, and work space and data set space are allocated automatically. Four output formats are available: Full Record, Address Out (a data set of four-byte relative record numbers), Record Subset (a data set containing user-specified data fields), and Index/Key (a data set with records consisting of a key and a relative record number). The Merge program combines records from two sequentially ordered diskette data sets into another data set, using parameters entered at the keyboard or read from diskette. It supports multi-volume data sets.

The 5280 *Communications Utilities* consist of four basic facilities: Batch Data Transfer/Inquiry, SNA/SDLC Remote Job Entry (SRJE), Multi-Leaving Remote Job Entry (MRJE), and Communications Configuration and Job

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► Description. These programs provide software support for a 5285 Programmable Data Station or 5288 Programmable Control Unit equipped with the 2500 or 3270 Emulation Communications Adapter and communicating over a single line in either BSC or SDLC mode. The communications programs operate concurrently with other applications. Only the 960-character and 1920-character display sizes are supported.

The Batch Data Transfer/Inquiry program provides for batch data transfer to a host system or terminal and inquiry to a host system. It supports SNA/SDLC communications as an LU1-type terminal to a System/370, 303X, or 4300 Series computer with CICS/VS and IMS/VS, or BSC communications with a System/370, 303X, or 4300 with CICS/VS, IMS/VS (as a 3741), and VSE/POWER, or with System/3/32/34 RPG II, System/3 CCP, System/34 SSP-ICF, Series/1 RPS Versions 3 and 4, a 3740, a 5260, or another 5280. The minimum main storage required is 32K bytes for BSC communications and 64K bytes for SNA/SDLC.

The SNA/SDLC Remote Job Entry (SRJE) facility permits the 5280 system to function as an RJE terminal consisting of one console, one reader, one punch, and one printer. Printer data streams can be directed to either a printer or diskette, while punch data streams are directed to diskette. SNA support on the host computer is via ACF/VTAM and ACF/NCP/VS to RES, JES2, JES3, and DOS/VSE/POWER. The minimum main storage requirement on the 5280 is 64K bytes.

The Multi-Leaving Remote Job Entry (MRJE) facility permits the 5280 system to function as an RJE terminal with full multi-leaving support for concurrent device operation of one console, one reader, one punch, and one printer. Printer data streams can be directed to either a printer or diskette, while punch data streams are directed to diskette. BSC support on the host computer treats the 5280 as a System/3 MRJE workstation for RES, JES2, and JES3. The minimum main storage requirement is 48K bytes on a 5285 or 64K bytes on a 5288.

The Communications Configuration and Job Description program is used to prepare communications environments via job step prompts. Descriptions are stored on diskette by job name, and are used to initiate the communications link with the host computer or another terminal. Initiation of the link with the host may be either dynamic or predetermined for operator convenience.

The 5280—3270 Emulation licensed program allows the 5280 Distributed Data System to function as selected 3270 control units and devices to existing host applications. The program consists of the following: the 3270 Device Emulation Program, the 3270 Batch Transfer Utility, and the 3270 Program Interface.

The 3270 Device Emulation Program allows the 5280 to appear to the host as a 3274 Model 1C Control Unit under SNA/SDLC or as a 3271 Model 2 Control Unit under BSC. With the 3270 Device Emulation Program, the 1920-character 5281 Data Station (attached to a 5288 Programmable Control Unit) and the 1920-character 5285 Programmable Data Station appear to a host system as a 3277 Model 2 Display Station with selected features. The 5280 Distributed Data System's printers are also emulated to appear as the 3284 Model 2, the 3286 Model 2, and the 3288 Model 2 printers under BSC and the 3287 Printer Models 1 and 2 under SNA/SDLC. Host system communication subsystems that are supported include System/370 IMS/VS, CICS/VS, TSO, and System/3 Model 15D CCP.

The following BSC host system support is provided for the 5280—3270 Device Emulation Program:

- IMS/VS with BTAM under OS/VS1 or OS/VS2 (MVS)
- IMS/VS with ACF/VTAM under OS/VS1 or OS/VS2 (MVS)
- CICS with BTAM under OS/VS1 or OS/VS2 (MVS)
- CICS/VS with ACF/TCAM under OS/VS1 or OS/VS2 (MVS)
- CICS/VS with BTAM under DOS/VSE or DOS/VS
- CICS/VS with ACF/VTAM under OS/VS1 or OS/VS2 (VMS)
- TSO with ACF/VTAM under OS/VS2 (MVS)\*
- System/3 Model 15D under CCP

(Note: \*TSO does not support printers. All of the above systems, with the exception of the System/3, are also supported when under control of VM/370.)

The following SNA/SDLC host system support is provided for the 5280—3270 Device Emulation Program:

- IMS/VS with ACF/VTAM under OS/VS1 or OS/VS2 (MVS)
- CICS/VS with ACF/VTAM under OS/VS1 or OS/VS2 (MVS)
- CICS/VS with ACF/TCAM under OS/VS1 or OS/VS2 (MVS)
- CICS/VS with ACF/VTAM under DOS/VS or DOS/VSE
- TSO with ACF/VTAM under OS/VS2 (MVS)\*

\*TSO does not support printers.

Minimum 5285 and 5288 system configuration requirements required to support the 5280—3270 Device Emulation Program include 64K bytes of memory (96K bytes if printer is used in conjunction with a keyboard/display), the 3270 Emulation Communications Adapter, and a display size of 1920 characters.

The 3270 Batch Transfer Emulation Utility enables the user to transmit and receive batch data when communicating with a host system via 3270 BSC protocols. Record lengths can be a maximum of 1918 bytes. Transaction IDs and how they are used during transmission may be specified. A user program is required at the host to send or receive batch data.

The 3270 Program Interface provides the 5280 user with a program-to-program interface using 3270 BSC protocols. Up to seven concurrent sessions are supported, with each session representing a different 3270 device address. The user application interface is through DE/RPG and Cobol.

### PRICING

**POLICY:** IBM offers the 5280 system on a purchase, 24-month lease, or rental basis. The warranty period is three months. The standard IBM lease or rental contract entitles the customer to unlimited usage each month. Prime-shift maintenance is included in the lease or rental price. The purchase option accrual equals 45 percent of the monthly charge up to 50 percent of the purchase price. IBM's standard educational allowance of 10 percent applies to the 5280 system for lease, rental, and purchase customers.

The current Agreement for Lease or Rental of IBM Machines provides users with a single contract on which they can specify mixtures of rental and leased equipment, each with various terms. CPUs rented under the plan can be terminated or downgraded on 90-days notice, and all other rented equipment can be terminated or downgraded on 30-days notice. Base terms and extension terms are specified for each piece of equipment obtained through a leasing agreement. The basic lease term is two years, followed by one-year extension terms. ►

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► **MAINTENANCE:** For purchased, leased, or rented systems, the 5280 system is under maintenance group D. The minimum period of maintenance service is 9 consecutive hours between 7:00 a.m. and 6:00 p.m. Monday through Friday. Charges for maintenance coverage outside this period are based upon the following percentages of the minimum monthly maintenance charge (MMC) added to the MMC:

	Consecutive hours				
	9*	12	16	20	24
Monday-Friday (until 8:00 a.m. Saturday)	10	12	14	16	18
Saturday (until 8:00 a.m. Sunday)	4	5	7	8	9
Sunday (until 8:00 a.m. Monday)	5	7	9	11	12

\*Outside of the hours 7:00 a.m. to 6:00 p.m.

For users without a maintenance contract, the 5280 system is maintained under per-call class 2. Under this class, the per-call charge during regular hours is \$105.00 per hour, and during off hours, the charge is \$123.00 per hour. The hourly rate for systems engineering service is \$57.00.

**SOFTWARE:** The 5280 System Control Programming (SCP) is supplied with the hardware at no additional cost. All the other current IBM programs for the 5280 are licensed separately and offered at fixed monthly license fees, as listed under SOFTWARE PRICES.

**INSTALLATION AND TESTING:** All components of the 5280 system are designated as "customer set-up" machines. The customer set-up allowance is two days for the 5281, 5282, 5285, 5286, and 5288. For the 5280 printers, the customer set-

up allowance is two days when the printer is installed concurrently with a 5280 system and one day when the printer is added to a previously installed 5280 system.

A preinstallation testing allowance is also offered for the three programmable units of the 5280 system. The allowance is 8 hours per 5285, 4 hours per 5286, and 8 hours per 5288. This allowance is applicable to only the first two units of each type installed by any one customer.

Communicating 5280 units (i.e., 5285s and 5288s equipped with the 2500 Communications Adapter or the 3270 Emulation Communications Adapter) are eligible for an additional "on-site allowance" (OSA) of seven days each for any combination of the first three communicating 5285 and/or 5288 units installed within an enterprise, together with all devices attached to the 5285 and/or 5288 units.

**EQUIPMENT:** The following configurations show the 5280 system in its minimum configuration and in a representative single-keyboard system with dual diskette drives, a printer, and communications capabilities.

**MINIMUM SYSTEM:** Consists of a 5285 Model A01 Programmable Data Station with 32K bytes of main memory, one Diskette 1 drive, and a keyboard. The purchase price is \$6,096, and the 2-year lease price is \$191 per month.

**TYPICAL SYSTEM:** Consists of a 5285 Model C10 Programmable Data Station with 64K bytes of main memory, two Diskette 2D drives, a keyboard, the 2500 Communications Adapter, and the 120-cps 5256 Model 3 Printer. The purchase price is \$14,950, and the 2-year lease price is \$552 per month. The same configuration with the 3270 Emulation Communications Adapter in lieu of the 2500 Communications Adapter is available for a purchase price of \$15,938 or a 2-year lease price of \$578 per month.

### EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Yr. Lease)*
<b>PROGRAMMABLE DATA STATIONS</b>					
5285	Programmable Data Station:				
	A01 With 32K and one Diskette 1 drive	\$ 5,730	\$ 44.00	\$211	\$179
	A02 With 32K and two Diskette 1 drives	6,815	54.50	258	219
	A05 With 32K and one Diskette 2D drive	6,378	52.50	232	197
	A06 With 32K, one Diskette 1 drive, and one Diskette 2D drive	7,463	63.00	279	237
	A10 With 32K and two Diskette 2D drives	8,111	71.50	300	255
	B01 With 48K and one Diskette 1 drive	6,164	45.00	226	192
	B02 With 48K and two Diskette 1 drives	7,249	55.50	273	232
	B05 With 48K and one Diskette 2D drive	6,812	53.50	247	210
	B06 With 48K, one Diskette 1 drive, and one Diskette 2D drive	7,897	64.00	294	250
	B10 With 48K and two Diskette 2D drives	8,545	72.50	315	268
	C01 With 64K and one Diskette 1 drive	6,377	46.00	235	199
	C02 With 64K and two Diskette 1 drives	7,462	56.50	282	239
	C05 With 64K and one Diskette 2D drive	7,025	54.50	255	217
	C06 With 64K, one Diskette 1 drive, and one diskette 2D drive	8,110	65.00	303	257
	C10 With 64K and two Diskette 2D drives	8,758	73.50	324	275
	D01 With 96K and one Diskette 1 drive	7,024	48.00	259	219
	D02 With 96K and two Diskette 1 drives	8,109	58.50	306	259
	D05 With 96K and one Diskette 2D drive	7,672	56.50	280	237
	D06 With 96K, one Diskette 1 drive, and one Diskette 2D drive	8,757	67.00	327	277
	D10 With 96K and two Diskette 2D drives	9,405	75.50	348	295
5286	Dual Programmable Data Station:				
	A02 With 32K and two Diskette 1 drives	7,702	50.50	258	219
	A10 With 32K and two Diskette 2D drives	8,998	67.00	300	255
	B02 With 48K and two Diskette 1 drives	8,136	51.50	273	232
	B10 With 48K and two Diskette 2D drives	9,432	68.50	315	268
	C02 With 64K and two Diskette 1 drives	8,349	52.50	282	239
	C10 With 64K and two Diskette 2D drives	9,645	69.50	324	275
	D02 With 96K and two Diskette 1 drives	8,996	54.50	306	259
	D10 With 96K and two Diskette 2D drives	10,292	71.00	348	295

\*Rental and lease charges include maintenance.

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### EQUIPMENT PRICES

		<u>Purchase Price</u>	<u>Monthly Maint.</u>	<u>Monthly Rental Charge*</u>	<u>Monthly Lease Charge* (2-Yr. Lease)*</u>
<b>PROGRAMMABLE DATA STATIONS (Continued)</b>					
Keyboards for 5285 and 5286 (one required for each operator position):					
4600	83-key EBCDIC Keyboard	\$ 365	\$4.00	\$14	\$12
4601	66-key Data Entry Keyboard	365	4.00	14	12
4602	66-key Data Entry Keyboard with Proof Arrangement	365	4.00	14	12
4603	83-key ASCII Keyboard	365	4.00	14	12
Special features for 5285 and 5286 (except as noted):					
1150	5224/5225/5256 Twinax Printer Attachment (for 5285 only)	520	2.00	14	12
1152	5222 Printer Attachment	443	2.50	15	13
1200	Attachment for one 480-character 5281 Data Station	629	2.00	16	14
1205	Attachment for one 960-character 5281 Data Station (for 5285 only)	738	2.50	22	19
1210	Attachment for one 1920-character 5281 Data Station (for 5285 only)	846	3.00	31	26
1215	Attachment for one 480-character 5282 Dual Data Station	738	2.50	22	19
1220	Attachment for one 960-character 5282 Dual Data Station (for 5285 only)	846	3.00	31	26
1240	Remote Diskette Drive Attachment (required if an attached 5281 or 5282 has either 1 or 2 diskette drives)	205	1.00	6	5
3300	Display Screen Filter	67	—	—	—
3500	960-Character Display Size (for 5285 only)	108	1.00	6	5
3505	1920-Character Display Size (for 5285 only)	217	1.00	14	12
3610	Elapsed Time Counter (measures elapsed real time)	108	1.00	6	5
4950	Magnetic Stripe Reader (4955 or 4960 is a prerequisite)	412	2.50	14	12
4955	Magnetic Stripe Reader Adapter/Elapsed Time Counter (for 5286 or non-communicating 5285)	618	2.50	20	17
4960	Magnetic Stripe Reader Adapter/Elapsed Time Counter (for communicating 5285)	247	1.00	7	6
6340	Security Keylock	41	—	—	—
6800	Second Application Microprocessor	1,240	2.50	45	38

### PROGRAMMABLE CONTROL UNITS

5288 Programmable Control Unit:

<u>Submodel</u>	<u>Bytes of Main Storage</u>	<u>Diskette 1 Drives</u>	<u>Diskette 2D Drives</u>				
A01	32K	1	0	6,403	35.50	209	180
A02	32K	2	0	7,488	46.00	256	220
A03	32K	3	0	8,573	57.00	303	260
A04	32K	4	0	9,658	68.00	350	300
A05	32K	0	1	7,051	43.00	230	198
A06	32K	1	1	8,136	54.00	277	238
A07	32K	2	1	9,221	65.00	324	278
A08	32K	3	1	10,306	76.00	371	318
A10	32K	0	2	8,784	62.00	298	256
A11	32K	1	2	9,869	73.00	345	296
A12	32K	2	2	10,954	84.00	392	336
A15	32K	0	3	10,517	81.00	366	314
A16	32K	1	3	11,602	92.00	413	354
A20	32K	0	4	12,250	100.00	434	372
C01	64K	1	0	7,050	37.00	233	200
C02	64K	2	0	8,135	48.00	280	240
C03	64K	3	0	9,220	59.00	327	280
C04	64K	4	0	10,305	70.00	374	320
C05	64K	0	1	7,698	45.00	254	218
C06	64K	1	1	8,783	56.00	301	258
C07	64K	2	1	9,868	67.00	348	298
C08	64K	3	1	10,953	78.00	395	338
C10	64K	0	2	9,431	64.00	322	276
C11	64K	1	2	10,516	75.00	369	316
C12	64K	2	2	11,601	86.00	416	356
C15	64K	0	3	11,164	83.00	390	334
C16	64K	1	3	12,249	94.00	437	374
C20	64K	0	4	12,897	102.00	458	392
D01	96K	1	0	7,697	39.00	257	220
D02	96K	2	0	8,782	50.00	304	260
D03	96K	3	0	9,867	61.00	351	300
D04	96K	4	0	10,952	72.00	398	340
D05	96K	0	1	8,345	47.00	278	238
D06	96K	1	1	9,430	58.00	325	278
D07	96K	2	1	10,515	69.00	372	318
D08	96K	3	1	11,600	80.00	419	358
D10	96K	0	2	10,078	66.00	346	296
D11	96K	1	2	11,163	77.00	393	336

\*Rental and lease charges include maintenance.

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### EQUIPMENT PRICES

PROGRAMMABLE CONTROL UNITS (Continued)				Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Yr. Lease)*
Submodel	Bytes of Main Storage	Diskette 1 Drives	Diskette 2D Drives				
D12	96K	2	2	\$12,248	\$ 88.00	\$440	\$376
D15	96K	0	3	11,811	85.00	414	354
D16	96K	1	3	12,896	96.00	461	394
D20	96K	0	4	13,544	104.00	482	412
E01	128K	1	0	8,344	41.00	281	240
E02	128K	2	0	9,429	52.00	328	280
E03	128K	3	0	10,514	63.00	375	320
E04	128K	4	0	11,599	74.00	422	360
E05	128K	0	1	8,992	49.00	302	258
E06	128K	1	1	10,077	60.00	349	298
E07	128K	2	1	11,162	71.00	396	338
E08	128K	3	1	12,247	82.00	443	378
E10	128K	0	2	10,725	68.00	370	316
E11	128K	1	2	11,810	79.00	417	356
E12	128K	2	2	12,895	90.00	464	396
E15	128K	0	3	12,458	87.00	438	374
E16	128K	1	3	13,543	98.00	485	414
E20	128K	0	4	14,191	106.00	506	432
F01	160K	1	0	8,991	43.00	305	260
F02	160K	2	0	10,076	54.00	352	300
F03	160K	3	0	11,161	65.00	399	340
F04	160K	4	0	12,246	76.00	446	380
F05	160K	0	1	9,639	51.00	326	278
F06	160K	1	1	10,724	62.00	373	318
F07	160K	2	1	11,809	73.00	420	358
F08	160K	3	1	12,894	84.00	467	398
F10	160K	0	2	11,372	70.00	394	336
F11	160K	1	2	12,457	81.00	441	376
F12	160K	2	2	13,542	92.00	488	416
F15	160K	0	3	13,105	89.00	462	394
F16	160K	1	3	14,190	100.00	509	434
F20	160K	0	4	14,838	109.00	530	452
H01	224K	1	0	10,285	48.00	353	300
H02	224K	2	0	11,370	58.50	400	340
H03	224K	3	0	12,455	69.00	447	380
H04	224K	4	0	13,540	79.50	494	420
H05	224K	0	1	10,933	56.50	374	318
H06	224K	1	1	12,018	67.00	421	358
H07	224K	2	1	13,103	77.50	468	398
H08	224K	3	1	14,188	88.00	515	438
H10	224K	0	2	12,666	75.50	442	376
H11	224K	1	2	13,751	86.00	489	416
H12	224K	2	2	14,836	96.50	536	456
H15	224K	0	3	14,399	94.50	510	434
H16	224K	1	3	15,484	105.00	557	474
H20	224K	0	4	16,132	113.00	578	492
J01	288K	1	0	11,579	52.50	401	340
J02	288K	2	0	12,664	63.00	448	380
J03	288K	3	0	13,749	73.50	495	420
J04	288K	4	0	14,834	84.00	542	460
J05	288K	0	1	12,227	60.50	420	358
J06	288K	1	1	13,312	71.00	469	398
J07	288K	2	1	14,397	81.50	516	438
J08	288K	3	1	15,482	92.00	563	478
J10	288K	0	2	13,960	79.50	490	416
J11	288K	1	2	15,045	90.00	537	456
J12	288K	2	2	16,130	100.50	584	496
J15	288K	0	3	15,693	98.50	558	474
J16	288K	1	3	16,778	109.00	605	514
J20	288K	0	4	17,426	117.50	626	532

Special features for 5288 Programmable Control Unit:

1245	Attachment for one 480-character 5281 Data Station	NC	NC	NC	NC
1250	Attachment for one 960-character 5281 Data Station	108	1.00	6	5
1255	Attachment for one 1920-character 5281 Data Station	217	1.50	14	12
1260	Attachment for one 480-character 5282 Dual Data Station	108	1.00	6	5
1265	Attachment for one 960-character 5282 Dual Data Station	217	1.50	14	12

\*Rental and lease charges include maintenance.

## IBM 5280 Distributed Data System

## EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Yr. Lease)*
<b>PROGRAMMABLE CONTROL UNITS (Continued)</b>					
1270	Attachment for one additional 480-character 5281 (prerequisite: 1245 or 1260)	\$ 629	\$ 2.00	\$ 16	\$ 14
1275	Attachment for one additional 960-character 5281 (prerequisite: 1250 or 1265)	738	2.50	22	19
1280	Attachment for one additional 1920-character 5281 (prerequisite: 1255)	846	3.00	31	26
1285	Attachment for one additional 480-character 5282 (prerequisite: 1245 or 1260)	738	2.50	22	19
1290	Attachment for one additional 960-character 5282 (prerequisite: 1250 or 1265)	846	3.00	31	26
1300	Remote Diskette Drive Attachment, First (required for first and second remote drives when base 5288 has 1 or 2 drives)	205	1.00	6	5
1301	Remote Diskette Drive Attachment, Second (required for first and second remote drives when base 5288 has 3 or 4 drives, or for third and fourth remote drives when base 5288 has 1 or 2 drives)	933	4.50	28	24
1302	Remote Diskette Drive Attachment, Third (required for third and fourth remote drives when base 5288 has 3 or 4 drives, or for fifth and sixth remote drives when base 5288 has 1 or 2 drives)	205	1.00	6	5
1155	Single 5225/5256 Twinax Printer Attachment (provides a single port for attaching from 1 to 5 printers via a single twinax cable)	520	2.00	14	12
1157	Single 5222 Printer Attachment	443	2.50	15	13
1160	Multiple 5225/5256 Twinax Printer Attachment (provides 4 ports for attaching, via twinax cable, up to 5 printers)	726	3.00	20	17
1162	Multiple 5222/Twinax Printer Attachment	772	3.50	25	21
3300	Display Screen Filter	67	—	—	—
3610	Elapsed Time Counter	108	1.00	6	5
4955	Magnetic Stripe Reader Adapter/Elapsed Time Counter (controls up to 4 Magnetic Stripe Readers on attached 5281 and/or 5282 data stations)	618	2.50	20	17
6340	Security Keylock	41	—	—	—
6800	Second Application Microprocessor	1,240	2.50	45	38
<b>AUXILIARY DATA STATIONS</b>					
5281	Data Station:				
Z00	With no diskette drive	2,207	13.50	68	59
Z01	With one Diskette 1 drive	3,497	25.50	121	104
Z02	With two Diskette 1 drives	4,582	36.00	168	144
Z05	With one Diskette 2D drive	4,145	34.00	142	122
Z06	With one Diskette 1 drive and one Diskette 2D drive	5,230	44.50	189	162
Z10	With two Diskette 2D drives	5,878	53.00	210	180
5282	Dual Data Station:				
Z00	With no diskette drive	2,504	15.00	74	63
Z01	With one Diskette 1 drive	3,794	27.50	127	108
Z02	With two Diskette 1 drives	4,879	38.00	174	148
Z05	With one Diskette 2D drive	4,280	34.00	139	118
Z06	With one Diskette 1 drive and one Diskette 2D drive	5,527	46.00	194	166
Z10	With two Diskette 2D drives	6,175	54.50	216	184
Keyboards for 5281 and 5282 (one required for each operator position):					
4600	83-key EBCDIC Keyboard	365	4.00	14	12
4601	66-key Data Entry Keyboard	365	4.00	14	12
4602	66-key Data Entry Keyboard with Proof Arrangement	365	4.00	14	12
4603	83-key ASCII Keyboard	365	4.00	14	12
Special features for 5281 and 5282:					
3300	Display Screen Filter	67	—	—	—
4950	Magnetic Stripe Reader	412	2.50	14	12
<b>PRINTERS</b>					
5222	Printer:				
Mdl. 1	80 cps at 10 cpi; 80 cps at 15 cpi	2,505	29.00	120	102
5224	Printer:				
Mdl. 1	140 lpm at 10 cpi; 95 lpm at 15 cpi	6,150	45.00	279	237
Mdl. 2	240 lpm at 10 cpi; 175 lpm at 15 cpi	7,000	53.00	318	270
5225	Printer:				
Mdl. 1	280 lpm at 10 cpi; 195 lpm at 15 cpi	12,230	79.00	431	367
Mdl. 2	400 lpm at 10 cpi; 290 lpm at 15 cpi	14,120	111.00	492	419
Mdl. 3	490 lpm at 10 cpi; 355 lpm at 15 cpi	15,690	137.00	548	466
Mdl. 4	560 lpm at 10 cpi; 420 lpm at 15 cpi	17,160	162.00	602	512

\*Rental and lease charges include maintenance.

## IBM 5280 Distributed Data System

### EQUIPMENT PRICES

		<u>Purchase Price</u>	<u>Monthly Maint.</u>	<u>Monthly Rental Charge*</u>	<u>Monthly Lease Charge (2-Yr. Lease)*</u>	
<b>PRINTERS (Continued)</b>						
5256	Printer:					
	Mdl. 1	40 characters per second	\$4,430	\$35.00	\$202	\$172
	Mdl. 2	80 characters per second	4,640	38.00	229	195
	Mdl. 3	120 characters per second	4,850	43.00	249	212
Special features for the Printers:						
1470	Audible Alarm (signals operator when manual intervention is required due to one of nine error conditions; for 5225 and 5256 printers only)	50	—	—	—	
2680	Cable Thru (permits multiple printers to be connected to a single twinax cable; required on each printer except the last; for 5225 and 5256 printers only)	115	1.00	4	3	
4450	Forms Stand (for 5222, 5224 and 5256 printers only)	54	—	—	—	
6100	Rear Document Insert Device (for 5222 only)	130	0.50	7	6	
<b>COMMUNICATIONS</b>						
2500	Communications Adapter (for 5285 or 5288 only)	977	9.50	62	53	
3270	3270 Emulation Communications Adapter (for 5285 or 5288 only)	1,965	14.50	93	79	
3701	EIA Interface (provides RS-232-C interface for an external modem)	358	1.50	15	13	
5500	1200-bps Integrated Modem, non-switched	660	4.00	21	18	
5501	1200-bps Integrated Modem, switched with auto answer	716	3.50	29	25	
5502	1200-bps Integrated Modem, switched without auto answer	660	3.50	21	18	
5507	1200-bps Integrated Modem, non-switched with SNBU manual answer	716	4.00	31	26	
5508	1200-bps Integrated Modem, non-switched with SNBU auto answer	911	4.50	34	29	
5650	Digital Data Service Adapter; Point-to-Point	840	1.50	28	24	
5651	Digital Data Service Adapter, Multipoint	840	1.50	28	24	
5810	Power Supply Expansion (required on 5285 if 5501 or 5508 is installed)	76	1.50	4	3	

### SOFTWARE PRICES

		<u>Basic Monthly License Charge</u>
5708-AS1	Assembler	\$ 33
5708-CB1	COBOL-OS/VS Host Compiler and Library	126
5708-CB2	COBOL-DOS/VSE Host Compiler and Library	126
5708-DC1	Communications Utilities	20
5708-DE1	DE/RPG	10
5708-EM1	5280—3270 Emulation	40
5708-SC1	System Control Programming (SCP)	NC
5708-SM1	Sort/Merge	10
5708-UT1	Utilities	6
5798-NZH	OS/6 Communications and File Conversion System	143
5798-RBZ	5280 Contract Data Entry/Edit Support	50
5798-RCR	5280 Format Design Aid	600**
5798-RDF	5280 Distribution Order Subsystem	35

\*Rental and lease charges include maintenance.

\*\*Available on a one-time charge only.■