IBM System/34

The System/34 is a business computer system packaged for use in standard office environments. Unlike the earlier IBM System/32, however, the System/34 offers a number of stand-alone peripheral devices, including both table-top and free-standing printers and a magnetic character reader.

The System/34 offers an attractive growth path for System/32 users, and provides multiprogramming support for up to 16 workstations. A wide range of models is available and the System/34 can be used in numerous types of communications environments.

MODELS: 5340 A11-A15, A21-A25, A31-A35, B11-B15, B21-B25, B31-B35, C11-C15, C21-C25, C31-C37, D11-D15, D21-D25, D31-D37, E11-E15, E21-E25, E31-E37, F22-F25, and F33-F37.
CONFIGURATION: A System/34 can have from 32K to 256K bytes of main memory, 8.6 to 257.4 megabytes of non-removable disk storage, 246,272 to 1,212,416 bytes of diskette storage, and from 1 to 16 workstations and/or printers.
COMPETITION: Burroughs B 1800, B 1900; DEC PDP-11; Hewlett-Packard HP 1000; Honeywell Level 6, DPS 6, Level 62, NCR 8300, 8400; and Univac 90/25 and 90/30.
PRICE: Purchase prices for basic System/34 models range from $15,310 (Model A11) to $88,660 (Model F37).

MANAGEMENT SUMMARY

IBM's System/34 is a multiprogramming entry-level business data processing system that represents a logical evolutionary step from the single-user System/32. It also represents the next technological step by offering an internal performance level nearly eight times that of its predecessor, at substantially lower cost.

The System/34 was the first in a series of upward-compatible IBM small business computer systems that overlap both the System/32 and System/3 performance ranges. The second and latest product in the evolutionary line is the System/38 (Report 70C-491-29), announced in October 1978. The System/34 and System/38 are the successors to IBM's highly successful System/3 family.

The most significant difference between the System/32 and the System/34 is the number of users each can support. While the S/32 is designed to serve one user at a time, the S/34 can handle up to 16 independently ▷

CHARACTERISTICS

MANUFACTURER: International Business Machines Corporation, General Systems Division, 875 Johnson Ferry Road, N.E., Atlanta, Georgia 30342. Telephone (404) 256-7000.

MODELS: System/34 Models A11 through A15, A21 through A25, A31 through A35, B11 through B15, B21 through B25, B31 through B35, C11 through C15, C21 through C25, C31 through C37, D11 through D15, D21 through D25, D31 through D37, E11 through E15, E21 through E25, E31 through E37, F22 through F25, and F33 through F37.

DATE ANNOUNCED: April 1977.

DATE OF FIRST DELIVERY: December 1977.

NUMBER INSTALLED: 35,000 (estimated).

DATA FORMATS

BASIC UNIT: 8-bit byte. Each byte can represent one alphanumeric character, one BCD digit, or eight binary bits.

FIXED-POINT OPERANDS: Can range from 1 to 16 digits for source fields and form 1 to 35 digits for result fields. Logical operands can range from 1 to 256 bytes.

FLOATING-POINT OPERANDS: No hardware facilities for floating-point arithmetic are provided as standard. Scientific instruction set firmware is installed when the FORTRAN program product is used. ▶

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▷ functioning users plus an output spooling task operating as a system utility in a background mode. Although much of the early emphasis was on the multi-user interactive capabilities of the system, the S/34 can also function well as a batch system. One of the concurrent jobs on the system can be a batch-mode job.

During the three years since its introduction, IBM has expanded the System/34 in fixed disk capacity, main memory capacity, remote workstation capability, and software products. Fixed disk capacity, originally limited to 27.1 megabytes, has been expanded to 257.4 megabytes. Main memory, originally set at a maximum of 64K bytes, has been increased to 256K bytes. The System/34's remote workstation capability now allows for the attachment of up to 64 workstations. Program products include BASIC, COBOL, FORTRAN, a Workstation Search Facility, and the Interactive Communications Feature of SSP. To date, a number of application software products have been announced for the System/34, including new products, System/32 carryover products, and System/32 products revised to make use of System/34 facilities.

The System/34 hardware components were all newly designed for use in the system. The CPU consists of two microcomputers plus several microcomputer-based I/O controllers. One of the microcomputers functions as a system control processor, while the other functions as an execution processor, performing the actual computations. The system control processor is most visible to users and is available with six capacities of 600-nanosecond memory: 32K, 48K, 64K, 96K, 128K, and 256K bytes. The execution processor is transparent to users and has its own 16K-byte memory. Both processors and the I/O controllers operate asynchronously to provide overlapped operations to enhance performance. It has been estimated that the System/34 will yield internal performance eight times as great as the System/32 and over twice that of the System/3 CPU.

The System/34 is a much more unbundled package than the System/32, especially from a hardware point of view. Whereas the S/32 was purposely constructed in a single desk-like module to reduce its "computer appearance," the S/34 consists of individual components in more conventional packaging. The 5340 CPU and fixed disk are housed in a separate stand-alone cabinet, as are the optional 3262 and 5211 line printers. The S/34 console and workstations each consist of a 5251 or 5252 CRT display and/or a 5224, 5225, or 5256 tabletop-mounted printer.

The System/34 disks are fixed within the system like those of the S/32, but have higher capacities and offer faster average access times. Seven capacities of disk storage are available: 8.6, 13.2, 27.1, 63.9, 128.4, 192.9, and 257.4 million bytes. ▷

▶ INSTRUCTIONS: 4, 5, or 6 bytes long in 2-address format; 3 or 4 bytes long in 1-address format; 3 bytes long in command format. Each address can be either a 2-byte direct address or a 1-byte displacement. All instructions contain a 1-byte operation code and a 1-byte "Q" code.

INTERNAL CODE: EBCDIC (Extended Binary-Coded Decimal Interchange Code).

MAIN STORAGE

TYPE: MOSFET (metal oxide semiconductor field-effect transistor).

CYCLE TIME: 600 nanoseconds per 1-byte access.

CAPACITY: 32,768, 49,152, 65,536, 98,304, 131,072, or 262,144 bytes.

CHECKING: A parity bit with each byte is generated during writing and checked during reading.

STORAGE PROTECTION: None.

RESERVED STORAGE: A 14K-byte area is reserved for the System Support Program (SSP) and may be increased in 2K-byte increments. The remainder of main storage is available for user programming.

CENTRAL PROCESSOR

The System/34 central processing unit uses a combination of LSI/MSI logic circuitry and consists of two computing elements: a system processor and an execution processor.

The system processor is a firmware-controlled version of a System/3 language processor. It addresses main storage, and performs all system-level functions such as OCL commands and I/O operations, as well as higher-level functions associated with the System Support Program. This is the processor most visible to users, and associated with it is the 32K-, 48K-, 64K-, 96K-, 128K-, or 256K-byte main memory.

The execution processor operates in parallel with the system processor and has its own separate and independent 16K-byte control memory. It performs the actual computations and executes machine-level instructions, and is invisible to users.

INSTRUCTION TIMINGS: The following average times, in microseconds, assume the use of direct (2-byte) operand addresses. Please note that the figures are *approximations* calculated by scaling the times for the same instructions executed on a System/32.

Decimal add (5 digits):	68.5
Decimal subtract (5 digits):	68.5
Binary (logical) add (5 bytes):	3.27
Binary (logical) subtract (5 bytes):	32.4
Move (5 bytes):	19.4
Compare (5 bytes):	25.5
Load or store register (2 bytes):	9.0 to 11.5
Add to register (2 bytes):	11.9 to 17.4
Jump on condition:	11.9 to 13.1

PHYSICAL SPECIFICATIONS: The 5340 System Unit houses the CPU, memory, diskette drive, diskette magazine facility, and disk drive. The unit is 48 inches high, 26 inches wide, 60 inches deep, and weighs a minimum of 884 pounds.

Service clearance requirements are 36 inches in front of the 5340, 30 inches in the rear, 36 inches to the right, and 30 inches to the left.

The system is designed to operate at altitudes from sea level up to 7000 feet above sea level. Operating temperature range is 60 to 100 degrees F., with a noncondensing relative humidity of 8 ▶

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▷ The System/34 diskette subsystem offers two different drives, designated Diskette 1 and Diskette 2D. Diskette 1 is a conventional 3741-compatible unit. Using 128-byte sectors, the unit can store up to 246,272 bytes. When 512-byte extended-format sectors are used, the capacity is increased to 303,104 bytes. Diskette 2D uses an IBM drive that records data on both sides of the diskette at twice the standard density. Using the 2D drive, the diskette subsystem has a storage capacity of 985,008 bytes using 256-byte sectors or 1,212,416 bytes with 1024-byte extended-format sectors. Diskettes can be exchanged between S/34s and other compatible systems (S/32 or 3741) with one restriction: Diskette 1 systems can read only identically formatted diskettes, while Diskette 2D systems can read and write on both types of diskettes. The diskette subsystem cannot be extended beyond one drive. The diskette magazine drive can process either individual diskettes or magazines holding up to 10 diskettes each. The diskettes may be of either the Diskette 1 or Diskette 2D type in either extended or basic format.

The CRT display/keyboard and tabletop printer are the elements of the Model 5250 workstation, the principal operator device in the System/34. The workstations and the associated controller make up a single microcomputer-controlled subsystem within the S/34. Up to eight workstations can be attached to the 5250 Workstation Controller. Using the optional Work Station Control Expansion B feature, eight additional workstations can be connected to the system. Each workstation consists of a 5251 Display Station and keyboard (or a 5252 Dual Display Stations unit and its keyboards) and/or a 5224, 5225, or 5256 tabletop printer. All workstation components can be installed by the customer, using connectors provided for the purpose.

The 5251 Display Station includes either a 1920-character display (24 lines of 80 characters) or a 960-character display (12 lines of 80 characters) and a movable typewriter-style alphanumeric keyboard with a 10-key numeric pad. Both upper and lower case characters can be displayed. The display is capable of normal or bright intensity levels, nondisplay, blinking, underscore, and reverse-image functions. The keyboard also features 24 user-defined command functions through dual-purpose keys. The 5252 Dual Display Stations unit functions as two 960-character displays. Each of these displays has the same functional characteristics as the 5251.

The 5256 Printer is a bidirectional serial matrix printer available in three speeds: 40, 80, or 120 characters per second. It features a lookahead capability that permits the print head to begin at any point instead of moving to a margin before printing. The 5256 has 132 print positions and can accept up to 15-inch forms. Like the 525X displays, it uses a 96-character set with both upper and lower cases. A multinational character set of up to 128 characters is optional. ▷

▶ to 80 percent. Optimum operating conditions are a temperature of 70 to 75 degrees and a noncondensing relative humidity of 40 to 50 percent. The 5340 outputs 3400 BTU per hour (1000 watts).

The power requirement for the 5340 is 208/330 VAC, single phase. Voltage must be maintained with ±10 percent of the rated system voltage. A transient voltage condition must not exceed +15 or -18 percent of the nominal voltage and must return to the normal range within one-half second. Line frequency is 60 Hertz ±½ Hertz. Voltages outside the USA and Canada are 200/220/230 volts, 50 Hertz or 200/208/230 volts, 60 Hertz.

INPUT/OUTPUT CONTROL

I/O CHANNELS: A direct memory access channel is a standard feature.

SIMULTANEOUS OPERATIONS: Diskette reading or writing is overlapped with system and execution processing and with other device functions except disk storage data transfers. All diskette seek operations are overlapped with processing and I/O device operation.

CONFIGURATION RULES

Each 5340 submodel includes a CPU, either 32K, 48K, 64K, 96K, 128K, or 256K bytes of memory, a diskette magazine drive, a diskette drive, and a fixed-disk storage unit. The system must also include an operator console/workstation consisting of one 5251 Model 1 or Model 11 CRT Display Station or 5252 Dual CRT Display Station and a printer, which can be either a 5256 Serial Matrix Printer or a 3262, 5211, 5224, or 5225 Line Printer.

The 5340 System Unit provides four twinax cable connectors for attachment of 5251 Model 1 and 11 Display Stations, 5252 Dual Display Stations, and 5224, 5225, or 5256 Printers. One cable connector is dedicated to the exclusive attachment of a display station utilized as the system console. No other devices may be attached to this cable. The three additional twinax cable connectors on the 5340 are provided for attachment of additional workstations.

Up to seven additional workstations can be directly connected. A workstation consists of a 5251 with keyboard, one of the dual displays of a 5252 with keyboard, and/or a 5224, 5225, or 5256 printer. The operator console/workstation must be within 20 feet of the 5340 System Unit, while the remaining workstations (up to 7) can be located up to 5000 feet away and attached through twinax cable. A maximum of 16 workstations and/or printers can be connected to the system if the optional Work Station Control Expansion B feature is installed. Remote attachment of up to 64 workstations is possible via the 2500/3500 Communications Adapters or the 4500 Multiline Communications Adapter and up to eight 5251 Models 2 or 12, each acting as a controller for up to eight 5251s and/or 5224, 5225, or 5256 printers.

The addition of communications capabilities or the 1255 MICR Reader/Sorter requires the use of one or more Processor Unit Expansions, depending on the exact configuration desired. Refer to the Equipment Prices and Communications Control sections of this report for additional details.

DISK STORAGE: Up to 257.4 megabytes of disk storage is available via a 4-spindle subsystem using non-removable disks.

MAGNETIC TAPE UNITS: None currently available from IBM. ▶

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The IBM 5250 Information Display System consists of the 5251 Display Station, Models 1, 2, 11, and 12; the 5252 Dual Display Station; and the 5256 Serial Printer, Models 1, 2, and 3. The 5250 components can be connected to the System/34 both locally (up to 16 workstations) and remotely (up to 64 workstations).

▷ The 5224 or 5225 Printer can be substituted for the 5256 console printer. The 5224 includes two models with print speeds of 140 and 280 lines per minute. The 5225 is available in four models that offer speeds ranging from 195 to 560 lines per minute.

The operator console is one of the directly attached workstations and must include both a 525X display and either a 5224, 5225, or 5256 serial printer or, optionally, a 3262 or 5211 line printer. The 5211 line printer is a separate stand-alone unit that can be substituted for the console printer. It is attached to the S/34 through the 5811 Printer Attachment and is available in two models rated at 160 and 300 lines per minute. A variety of print belts, including multinational character sets, makes the 5211 an unusually versatile printer. The 3262 Model B1 is the fastest printer that IBM offers for the System 34. It operates at a rated speed of 650 lines per minute with a 48 character set.

The System/34 is expected to play a major role in IBM's System Network Architecture (SNA). It supports, interchangeably, both the binary synchronous (BSC) and SDLC protocols. The 2500/3500 Communications Adapters and the 4500 Multiline Communications Adapter (MLCA) are microcomputer-based and operate under program control. They can function on switched, non-switched, private, or public communications lines. The appropriate protocol program is loaded into the adapter from system memory, as required. A separate adapter is available for connection to the AT&T Dataphone Digital Service (DDS) network. The System/ ▷

▶ MASS STORAGE

FIXED DISK DRIVES: The 5340 System Unit contains the System/34 disk storage facilities. Seven sizes of non-removable disk storage are offered: an 8.6-megabyte, 13.2-megabyte, or 63.9-megabyte single-spindle configuration, a 27.1-megabyte or 128.4-megabyte dual-spindle subsystem, a 192.2-megabyte subsystem with 3 spindles, and a 257.4-megabyte subsystem with 4 spindles. The disk subsystem is an integral part of every System/34.

Data is recorded in 256-byte sectors. The 8.6-megabyte unit has 201 cylinders, while the 13.2-megabyte unit has 301 cylinders per drive, of which 187 and 288 cylinders, respectively, are available for data storage. The 27.1-megabyte unit uses two 301-cylinder drives of which 589.33 cylinders are available for data storage. The 63.9-megabyte drive contains a total of 359 cylinders, with 354.50 cylinders available for data storage. On the 128.4-megabyte drive, 712.50 cylinders are available for data storage out of the 718 cylinders present. The 192.9-megabyte drive uses three spindles with 359 cylinders each, of which 1070.5 cylinders are available for data storage. On the 257.4-megabyte drive, 1428.5 cylinders are available for data storage out of the total of 1435 cylinders contained on the unit's four spindles.

For the 8.6-, 13.2-, and 27.1-megabyte units, the disk rotational speed is 2964 rpm, the average rotational delay is 10 milliseconds, and the data transfer rate is 889,000 bytes per second. Average head positioning times for these drives are 10 milliseconds cylinder-to-cylinder, 33 milliseconds (8.6-megabyte) or 38 milliseconds (13.2- or 27.1-megabyte) average, and 55 milliseconds (8.6-megabyte) or 70 milliseconds (13.2- or 27.1-megabyte) across-all-tracks. Disk rotational speed for the 63.9-, 128.4-, 192.9- and 257.4-megabyte units is 3125 rpm, with an average rotational delay of 9.4 milliseconds and a data transfer rate of 1,031,000 bytes per second. These four drives have head positioning times of 9 milliseconds cylinder-to-cylinder, 27 milliseconds average, and 46 milliseconds across-all-tracks.

INTEGRATED DISKETTE UNITS: Each IBM 5340 System Unit includes a single diskette drive or a diskette magazine drive. Two types of single diskette drives are available for the System/34: the Diskette 1 drive, which is identical to the drives offered with the System/32 and the IBM 3740 data entry terminals; and the Diskette 2D drive, which records data on both sides of each diskette and at twice the density of the Diskette 1.

Diskette 1 diskettes are organized into 74 tracks with 26 sectors per track and 128 bytes per sector in the basic format, and with 8 sectors per track and 512 bytes per sector in the extended format. Both formats provide one track per cylinder. Total capacity is 246,272 bytes in basic format and 303,104 bytes in extended format.

Diskette 2D diskettes provide four times the capacity of Diskette 1 by recording data at twice the density of the Diskette 1 and by recording on both sides of the diskette. These higher-capacity diskettes are organized into 74 two-track cylinders, with 26 sectors per track and 256 bytes per sector, providing a total diskette capacity of 985,088 bytes. Extended format recording, also applicable to these units, increases the sectors to 1,024 bytes each and total diskette capacity to 1,212,416 bytes. Extended format recording employs eight sectors per track.

Diskette 1 drives can read and write on diskettes only from other Diskette 1 drives or from similar devices such as the ▶

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▷ 34 can support one 2500 and one 3500 communications adapter, or one 4500 MLCA. The MLCA provides for the attachment of up to four communications lines. With these adapters, up to 64 remote workstations can be supported.

The System/34 is largely firmware-driven, implementing several operating system functions in microcode. In particular, the functions of task management, storage management, and I/O control have been removed from the software operating system and placed in system firmware, a change that allows effective multiprogramming on the small system.

System software for the S/34 now consists of a System Support Program Product (SSP), a Utilities Program Product, a Workstation Search Facility, an RPG II compiler, a BASIC compiler, a COBOL compiler, a FORTRAN compiler, and an assembler. The SSP provides the functions of an operating system in conjunction with the S/34 firmware facilities. It executes programs, processes system commands and data from display stations, manages both the disk and diskette subsystems, and outputs data to display terminals and printers. It also provides multiprogramming support, performs spooling as needed, maintains and executes operator-specified job queues, performs basic file utilities such as copying or deleting files, and prepares assembly-language programs for execution.

Each workstation that has been designated as a command terminal can initiate one job. Workstations that are designated as data terminals by the system console can only input or receive data. Each job can initiate one or more programs. Programs are divided into 2K-byte segments and do not have to be located in contiguous areas.

The Interactive Communications Feature (SSP-ICF) provides the necessary functions to allow the System/34 to operate in an interactive distributed network. The network can be hierarchical, with either a System/370 or a System/3 Model 15 as the host, or it can provide System/34-to-System/34 communications. SSP-ICF provides for multiple users sharing the same communications line, remote initiation of System/34 programs, program-to-program communication within the System/34, and program independence from host subsystem support and line protocol. RPG II, Assembler, and COBOL support SSP-ICF.

The System/34 Utilities Program product provides users with the ability to create and maintain files on disk. It is a group of five routines: the Data File Utility (DFU), the Source Entry Utility (SEU), the Sort Utility, the Screen Design Aid (SDA), and the Workstation Utility.

The RPG II compiler has been enhanced to support the System/34 in multiple-workstation environments, and is source-compatible with S/32 RPG II. System/32 users who upgrade to a System/34 can retain their Industry Application Programs by recompiling them. ▷

▶ IBM 3741 data entry terminals. Diskette 2D drives can read and write on diskettes from both types of drives.

The data transfer rates are 31,250 bytes per second for the Diskette 1 drive, 62,500 bytes per second for the Diskette 2D drive using Diskette 2D, and 125,000 bytes per second for the diskette magazine drive using Diskette 2D.

INPUT/OUTPUT UNITS

3262 LINE PRINTER: The 3262 Model B1 is a stand-alone belt-type printer that attaches to the 5340 System Unit via the 3262 Printer Attachment Feature (5815) and the 5211/3262 Base Printer Attachment Feature (1110). A number of character sets are available: 48-character standard or FORTRAN sets; 64-character EBCDIC, EBCDIC Optimized, ASCII, or ASCII Optimized sets; 96-character EBCDIC or ASCII sets; and 64-, 96-, and 188-character multinational sets. Two identical print belts are provided with each printer; the second belt serves as a spare. The 3262-B1 prints on pin-fed, continuous forms at 650 lines per minute with a 48-character print set. The printer provides 132 print positions. Horizontal spacing is 10 characters per inch, and vertical spacing is operator-selectable at 6 or 8 lines per inch. Forms skipping and spacing are performed under program control.

5211 LINE PRINTER: This 132-position belt-type printer is available as a substitute for the 5256 Serial Printer where higher printing speeds are required. It attaches to the 5340 System Unit through a 5811 Printer Attachment and 5211/3262 Base Printer Attachment. The 5211 can be used only in place of the system printer. IBM offers numerous sizes of character sets, many in both ASCII and EBCDIC formats: 38- and 42-character special sets; 48-character OCR A or B; 48-, 64-, or 96-character standard sets; and 64-, 96-, or 188-character multinational sets. The 5211 operates at 10 characters per inch with operator-controlled line spacing of 6 or 8 lines per inch. Formatting is program-controlled. The 5211 also has a translation capability (printed character substitution via OCL).

The 5211 is available in two models. The printing speed in lines per minute depends upon the character set, as summarized below.

Characters	Model 1 Speed	Model 2 Speed
38	190	355
42	160 or 225*	300 or 395*
48	160	300
64	123	235
96	84	164
188	44	86

*The higher speed is for lines containing numerics only.

5224 MATRIX PRINTER: The 5224 Models 1 or 2 can be used as the system printer, a local workstation printer, or a remote printer attached to 5251 Display Station through the Cluster Feature (2550) or Dual Cluster Feature (2551). The Model 1 is rated at 140 lines per minute at a spacing of 10 characters per inch. The Model 2 is rated at 280 lines per minute, also with 10-characters-per-inch spacing. Vertical spacing is operator-selectable at 6 or 8 lines per inch. A maximum of 132 print positions is provided.

5225 MATRIX PRINTER: Similar to the 5224, the 5225 includes Models 1, 2, 3, and 4. Maximum speeds for the Model 1, Model 2, Model 3, and Model 4 are 280, 400, 490, and 560 lines per minute, respectively, at 10 characters per ▶

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▷ System/34 BASIC is an interactive compiler that allows users to check the syntax of each line and to display the correct syntax. The compiler can also display screen formats and halt execution to examine or change variables.

System/34 COBOL conforms to the standards of ANSI COBOL, X3.23 1974. Most of the processing modules are implemented on level 2, with the exception of Indexed I O, Segmentation, Debug, and Interprogram Communications, which are implemented on level 1. IBM has also implemented numerous extensions to the standard language.

The Workstation Search Facility (WSF) provides the means to search the System 34 disk files for records meeting terminal user-selected search criteria. WSF consists of an interactive entry/edit program, a tailoring program, and two skeletal programs which, when copied and modified by the tailoring program, provide user-unique index build and search programs.

IBM has released versions of numerous System/32 Industry Applications Programs (IAPs) that have been modified for execution on the System/34, plus several new programs developed explicitly for the S/34. However, the S/32 IAPs will execute only a *single-program mode*, thereby effectively reducing the multiprogramming System/34 to a single-workstation System/32 that cannot take advantage of the S/34's spooling and file sharing capabilities. Only the packages developed specifically for the System/34 can fully exploit the new features of the system.

USER REACTION

Datapro's 1981 survey of general-purpose computer systems yielded responses from 456 System/34 users, who had a total of 495 CPUs installed. The systems had been in use for an average of 18.5 months. RPG II again was the primary programming language. The users' principal applications were accounting (88 percent), payroll/personnel and order processing/inventory control (a tie at 62 percent), and sales distribution (35 percent). The ratings assigned by these users are summarized in the following table.

	Excellent	Good	Fair	Poor	WA*
Ease of operation	303	144	8	0	3.65
Reliability of mainframe	352	95	4	1	3.76
Reliability of peripherals	293	143	6	1	3.64
Maintenance service:					
Responsiveness	236	193	24	1	3.46
Effectiveness	221	193	35	1	3.41
Technical support:					
Trouble-shooting	121	222	78	25	2.98
Education	118	232	81	15	3.01
Documentation	133	226	75	12	3.08
Manufacturer's software:					
Operating system	233	190	13	2	3.49
Compilers and assemblers	222	204	8	2	3.48
Applications programs	69	169	62	21	2.89
Ease of programming	219	205	18	2	3.44
Ease of conversion	148	196	41	8	3.23
Overall satisfaction	242	196	12	0	3.51

*Weighted Average on a scale of 4.0 for Excellent. ▷

▶ inch, and 195, 290, 355, and 420 lines per inch, respectively, at 15 characters per inch. Horiziontal spacing is operator-selectable at 10 or 15 characters per inch, and vertical spacing is operator-selectable at 6 or 8 lines per inch. At 10 characters per inch, a maximum of 132 print positions is provided. A maximum of 198 print positions is provided at 15 characters per inch. A variety of character sets is available.

The following devices are components of the 5250 Information Display System.

5251 CRT DISPLAY STATION: This device consists of two units, a CRT display and a separate, movable Model 4600 keyboard. The CRT unit features either a 1920-character screen of 24 lines by 80 characters (Models 11 and 12) or a 960-character screen of 12 lines by 80 characters (Models 1 and 2). Models 1 and 11 attach to the 5340 as a system console or to the 5251 Model 2 or 12. The set of 188 multinational characters or the set of 96 EBCDIC characters includes both upper and lower cases in an 8-by-16 dot matrix. Display attributes include normal or bright intensity, non-display, blinking, underscore, column separator, and reverse image; these functions, as well as 11 data entry functions, are controlled from within the display and do not interfere with System/34 processing.

Models 2 and 12 communicate with a System/34 communications adapter operating in SDLC mode only; these models communicate in half-duplex mode on non-switched point-to-point and multipoint communications lines which may be duplex or half-duplex facilities at speeds up to 9600 bps, and on switched point-to-point communications lines at speeds up to 4200 bps. A Model 2 or 12 can serve as a communications controller for up to eight additional workstations which may be 5251s, 5224s, 5225s, or 5256s. A combination of up to eight Model 2 or Model 12 Display Stations can be attached remotely to a System/34 for a total of up to 64 remotely attached workstations. The optional Work Station Control Expansion B feature permits up to 16 display stations and/or printers to be locally attached to the 5340 System Unit.

5252 DUAL CRT DISPLAY STATION: The 5252 functions as a pair of independent 960-character display stations, allowing separate jobs to be executed concurrently on each. Its specifications are the same as those of the 5251 Models 1 and 2. The user has the option to employ the 5252 as a system console.

4600 KEYBOARD: This unit, employed by all models of the 5251 and 5252, is functionally identical to the System/32 keyboard, offering the standard 49 alphanumeric keys in typewriter format and a 10-key numeric pad. As in the System/32, the 12 top keys are dual-defined and provide 24 user-defined command functions. The 4600 provides an EBCDIC character set and a typewriter-like keyboard layout. The keyboard is movable and is optionally available with a keylock.

4910 MAGNETIC STRIPE CHARACTER READER: This optional device for either the 5251 (all models) or the 5252 reads magnetic stripes containing up to 128 ABA numeric characters (including control characters). The unit is useful in enhancing data security by providing the ability to read an operator identification card without information on the card being displayed.

5256 SERIAL PRINTER: This unit is similar in characteristics to the System/32 bidirectional integrated printer. It uses the same 4-by-8 dot matrix to form 96 EBCDIC characters. The 5256 Printer is available in three versions: Model 1, rated at 40 cps; Model 2, 80 cps; and Model 3, 120 cps. All three models have 132 positions and print 10 characters per inch, at 6 or 8 lines per inch, on continuous forms 3 to 15 inches wide and individual forms 6 to 14.5 inches wide. The tabletop-mounted 5256 is designed for use as a workstation either ▶

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▷ The above ratings indicate a continuing high degree of user satisfaction, which was borne out by the users' responses to the survey questions asking them to check off any of 10 specific advantages of the system and any of 10 specific problems encountered. The most frequently mentioned advantages were ease of expansion/reconfiguration (mentioned by 84 percent of the users), response time (67 percent), productivity aids (58 percent), and compatibility of programs and data carried over from other systems (45 percent). Under problems, 9 percent of the users said the vendor's enhancements and changes to the system were difficult to keep up with, and 8 percent said the system cost more than expected. Nine out of ten said they had no plans to replace their system, 94 percent felt the system performed as expected, and 97 percent said they would recommend the System/34 to other users.

Datapro contacted two System/34 users by telephone to learn more aobut their experiences with their systems. Our first call went to a midwestern manufacturing company that uses a System/34 to handle various on-line services. They recently installed a second S/34 for development activities. The primary S/34 also operates in batch mode with an Amdahl 470 host located in another facility. The DP manager told us they had no computer prior to the S/34. After some initial "learning curve" problems and a few memory upgrades, the S/34 is performing up to his company's expectations. IBM's service received mixed reviews, but generally is satisfactory. Their plans include more applications, which are being developed on the newer S/34.

We next telephoned the office manager of a wholesale firm in the far west. He told us the conversion from a System/3 Model 8 to the System/34 was "very clean." Currently the S/34 handles the usual array of financial applications in a batch operation. Each of his firm's field offices mails accounting forms into the main office, where they are processed. To speed things up, a major conversion to a distributed environment, with Vector General microcomputers in the field offices, is underway. The System/34 typically provides 95+ percent up time, and has experienced little or no problems in the past 18 months.□

▶ separately or with the 5251 CRT Display Station and 4600 Keyboard or the 5252 Dual CRT Display Station and 4600 Keyboards. The print head is capable of moving directly to any specified starting point, thereby reducing lost time due to unnecessary print head travel.

5250 SYSTEM MULTIPLE UNITS AND CLUSTERING: Feature 2680 provides the capability to connect multiple 5251 Models 1 and 11, 5252s, 5224s, 5225s, and 5256s to a single cable. Feature 2550 allows the attachment of up to four workstations, including 5251 Models 1 or 11, 5252s, 5224s, 5225s, or 5256s; feature 2551 increases the number of directly attached workstations to eight.

1255 MAGNETIC CHARACTER READER: Reads and sorts MICR-encoded documents from 5.75 to 8.875 inches in length, 2.5 to 4.25 inches in width, and 0.003 to 0.007 inch in thickness. Three models are available. Model 1 reads up to 500 six-inch documents per minute, while Models 2 and 3 read up to 750 six-inch documents per minute. Models 1 and 2 have six horizontal stackers arranged in a single vertical bay

and require one and one-half sort passes for each digit position. Model 3 has twelve horizontal stackers in two vertical bays. The optional Self-Checking Number, 51-Column Card Sorting, and Dash Symbol Transmission features are available for all three models. Model 3 can be equipped with the High-Order Zero and Blank Selection feature, which reduces off-line sorting times. One 1255 can be connected to a System/34 via a Model 1100 attachment.

COMMUNICATIONS CONTROL

Three communications adapters are available for the System/34: the 2500 Communications Adapter, the 3500 Communications Adapter, and the 4500 Multiline Communications Adapter.

MODEL 2500 AND 3500 BSC/SDLC COMMUNICATIONS ADAPTERS: Operate in conjunction with stored-program control to provide a half-duplex mode of communications on non-switched point-to-point lines or multipoint lines at data rates up to 9600 bps, or on switched point-to-point lines at data rates up to 4800 bps. Non-standard point-to-point lines may be either duplex or half-duplex facilities. Up to two communications adapters (the first a Model 2500 and the second a Model 3500) can be attached to a System/34, with each adapter operating independently under program control at a maximum aggregate bit rate of 9600 bps for both adapters operating concurrently. The System/34 operates as a control station on a multipoint line for the 5251 Model 2 or 12 Display Station and another System/34 under Synchronous Data Link Control (SDLC). However, if the other device on a multipoint line is a control station, the System/34 operates as a tributary station for Binary Synchronous Communications (BSC) or a secondary station for SDLC. Communications between the System/34 and other non-control stations can be accomplished only on a point-to-point line. The 2500/3500 Communications Adapter requires a minimum of 48K bytes of main storage.

Switched network versions include a basic capability to support manual dial and manual or auto answer operations (based on modem support of the latter capability).

The 2500/3500 is a microcomputer-based controller that provides either the BSC or SDLC protocol. ASCII, EBCDIC, or EBCDIC Text Transparency are standard. The controller is loaded from system memory with the appropriate protocol, which can be changed as required. The adapter operates asynchronously with other System/34 I/O controllers and with CPU processing. Units at each end or drop point of a network must use the same clocking source and must transmit at the same data rate, using the same transmission code.

IBM also offers six types of integrated modems, two switched-network backup adapters, an EIA interface adapter for use with non-IBM modems, an internal clock for modems without a clocking source, and an adapter for attaching the System/34 to an AT&T Dataphone Digital Service (DDS) network, for use with the 2500/3500 adapter.

INTEGRATED MODEMS FOR 2500/3500 ADAPTER: IBM offers a choice of six types of integrated modems for use with a System/34 equipped with the 2500/3500 Communications Adapter. Their characteristics can be summarized as follows (the 5000 series modems are used with the 2500, and the 6000 series modems with the 3500):

Models 6500 & 5500—1200 bps, non-switched.

Models 6501 & 5501—1200 bps, switched network with Auto-Answer. ▶

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▶ Models 6600 & 5600—2400 bps, non-switched point-to-point.

Models 6601 & 5601—2400 bps, non-switched multipoint control.

Models 6602 & 5602—2400 bps, non-switched multipoint tributary.

Models 6610 & 5610—2400 bps, switched network with Auto-Answer.

Only one integrated modem can be installed in a System/34. The modems are mutually exclusive with the 3701/3702 EIA Interface and the 5650/5651/5652/5653 Dataphone Digital Service Adapter. Processing Expansion Units B and/or D are required to attach the three 2400-bps modems, and a Processing Expansion Unit C may be required for the Model 5500 and 5501 modems.

MODEL 7951/7952/7953/7954 SWITCHED NETWORK BACKUP (SNBU): This unit provides for backup attachment of a System/34 to the public switched network when one of the 2400-bps integrated modems (Model 5600, 5602, 6600, or 6602) is used on a non-switched line as the prime communications link. Models 7951 and 7952 are for use with the 2500 Communications Adapter, and Models 7953 and 7954 with the 3500. Models 7952 and 7954 provide auto answer capability, while Models 7951 and 7953 do not.

Attachment to the switched network is made via a common carrier arrangement, type CDT or equivalent (Models 7951 and 7953) or type CBS or equivalent (Models 7952 and 7954). Calls must be established and answered manually. Operator intervention, program modification, or both may be required on the using system/terminal. This feature can be used with BTAM programs for DOS, DOS/VS, OS, OS/VS1, OS/VS2 in certain configurations, or with TCAM/VTAM under OS/VS1 or OS/VS2. Additional customer program routines will be required, in existing BTAM programming, to fully utilize the capabilities of the Switched Network Backup feature.

MODEL 4500 MULTILINE COMMUNICATIONS ADAPTER (MLCA): Permits four communications lines to be attached to a System/34. MLCA operates in conjunction with stored-program control to provide communications over switched or non-switched, public or private communications lines. Each line provides BSC or SDLC protocol, which is loaded into the control processor at program execution time. Each line operates independently at up to 9600 bits per second. One line can operate at a higher speed, but the aggregate rate of the remaining lines must not exceed 9600 bps, and the aggregate rate of all four lines cannot exceed 65,600 bps.

An auto-monitoring function is provided for BSC multipoint tributary operation. The MLCA in a primary SDLC environment offloads from the main storage processor. In a secondary SDLC environment, an SDLC auto-response mode is implemented to enable MLCA to handle some redundant supervisory responses.

Only one 4500 Multiline Communications Adapter can be attached to a System/34. One Model 5301/5302/5303/5304 Line Base Adapter feature is required for attaching each of the four communications lines to the MLCA. The four models are identical. The Model 5301 is used for the first communications line, the Model 5302 for the second line, etc. Installation of the 4500 MLCA will reduce the disk storage available to the user by 80,640 bytes. This feature is mutually exclusive with the 2500/3500 Communications Adapter. SDLC support requires a maximum of 48K bytes of main storage.

For the 4500 MLCA, IBM offers four types of integrated modems, an EIA Interface Adapter, an internal clock for modems without a clocking source, a Dataphone Digital Service (DDS) Adapter, an Analog Wideband Adapter, and an Auto-Call Adapter.

INTEGRATED MODEMS FOR 4500 MLCA: Four types of integrated modems are offered for the 4500 Multiline Communications Adapter. Their characteristics are as follows:

Models 5331, 5332, 5333, and 5334—1200 bps, nonswitched.

Models 5341, 5342, 5343, and 5344—1200 bps—switched with Auto-Answer.

Models 5351, 5352, 5353, and 5354—4800 bps, nonswitched.

Models 5361, 5362, 5363, and 5364—4800 bps, switched with Auto-Answer and Integrated Protective Coupler.

One integrated modem can be installed per Line Base Adapter. Two 4800-bps modems can be installed per MLCA. The modems cannot be used with the EIA Interface, Analog Wideband Adapter, Auto-Call Adapter, or Model 5391/5392/5393/5394 DDS Adapter on the same Line Base Adapter. The 1200- and 4800-bps modems are mutually exclusive.

MODEL 5401/5402/5403/5404 ANALOG WIDEBAND ADAPTER: This adapter is available for the 4500 Multiline Communications Adapter only. It provides for the attachment of a WE 303-type modem or equivalent operating at 19,200 or 50,000 bits per second. The Line Base Adapter is required, and only one Analog Wideband Adapter is permitted per MLCA. This adapter cannot be installed with an integrated modem, EIA Interface, Auto-Call Adapter, or DDS Adapter on the same Line Base Adapter. When the Analog Wideband Adapter is installed on one communications line, the aggregate rate of the other lines cannot exceed 9600 bps.

MODEL 5411/5412/5413/5414 AUTO-CALL ADAPTER: This feature, available on the 4500 Multiline Communications Adapter only, permits a System/34 attached to a switched network by an appropriate external modem and auto-call unit to initiate a datalink connection to a remote device. Automatic dialing is provided under program control. The Auto-Call Adapter requires an EIA Interface, thus using two of the four communications lines supported on the MLCA. One Auto-Call Adapter is permitted per Line Base Adapter and two per MLCA. The Auto-Call Adapter cannot be installed with an EIA Interface, integrated modem, Analog Wideband Adapter, or DDS Adapter on the same Line Base Adapter.

Using a 2500/3500 Communications Adapter or 4500 Multiline Communications Adapter, a System/34 can communicate in binary synchronous mode with the following other systems:

● Another System/34 equipped with a 2500 or 3500 Communications Adapter or a 4500 MLCA.

● A System/32, System 360/20, System/7, 5110 (as a 3741 Model 2 or 4), or 5231 Model 2 (point-to-point unidirectional transmission only) equipped with a 2074 BSC Adapter.

● A System/3 equipped with a 2074, 2084 or 2094 Communications Adapter.

● A Series 1 equipped with a 2074, 2075, 2093, or 2094 BSC Adapter. ▶

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► • A System/370 supported by OS BTAM; DOS BTAM; OS TCAM; OS/VS1 or OS/VS2 BTAM, TCAM, or VTAM: DOS/VS BTAM or VTAM; using an Integrated Communications Adapter, a 4331 Communications Adapter, a 2701 Data Adapter Unit, a 2703 Transmission Control Unit, or a 3704/3705 Communications Controller under control of either the Network Control program (NCP) or Partitioned Emulation Program (PEP).

• A 3741 Model 2 Data Station or a 3741 Model 4 Programmable Workstation.

• A 3747 Data Converter equipped with a Model 1660 Communications Adapter.

• A 5280 Distributed Data System equipped with a 2500 Communications Adapter.

SDLC-mode communications can be accomplished between a System/34 with a 2500/3500 or 4500 controller and a System/370 Model 115 to 168 under control of DOS/VS, OS/VS1, or OS/VS2 VTAM through a 3704/3705 Communications Controller operating under the Network Control Program/VS (NCP/VS).

The System/34 SSP provides SDLC communications support for multipoint line control when 5251 Model 2 or 12 CRT Display Stations are attached to the 2500 or 3500.

A prerequisite to the use of the 2500/3500 and 4500 adapters is any one of the integrated modems described above or any EIA-compatible modem connected through the EIA Interface adapter.

MODEL 3701/3702/531X EIA INTERFACE: This feature can be chosen as an alternative to the IBM integrated modems for use with a System/34 equipped with the 2500/3500 Communications Adapters or the 4500 Multiline Communications Adapter. The Model 3701 EIA Interface works on the 2500 adapter, the Model 3702 on the 3500 adapter, and Models 5311, 5312, 5313, and 5314 on the 4500 adapter. The EIA Interface provides a cable and interface that meet the EIA RS-232-C specifications and permits the attachment of an external modem supplied by IBM or another vendor. If the modem does not provide its own clocking, the Model 4703 (2500/3500 adapter) or Model 5321 (4500 MLCA) Internal Clock feature, which provides a clocking speed of 600 or 1200 bps, is also required. IBM modems that can be connected to the EIA Interface include the 3863 (2400 bps), 3864 (4800 bps), 3865 (9600 bps), 3872 Model 1 (2400/1200 bps), 3874 Model 1 (4800/2400 bps), and 3875 Model 1 (7200/3600 bps).

MODEL 5650/5651/5652/5653/539X DATAPHONE DIGITAL SERVICE (DDS) ADAPTER: This adapter is available in five versions for use on AT&T non-switched DDS lines. The unit interfaces to a DDS channel service unit at the customer site. Four data transmission rates are offered: 2400, 4800, 9600, and 56,000 (Model 539X only) bits per second. The Model 5650 adapter is for use in point-to-point or multipoint control in conjunction with the 2500 Communications Adapter; the 5652 with the 3500. The Model 5651 is for multipoint tributary applications in conjunction with the 2500; the 5653 with the 3500. Models 5391, 5392, 5393, and 5394 support point-to-point connections in conjunction with the 4500 Multiline Communications Adapter.

Models 5650, 5651, 5652, and 5653 are mutually exclusive with the integrated modems. The Model 539X cannot be installed with an integrated modem, EIA Interface, Analog Wideband Adapter, or Auto-Call Adapter on the same Line Base Adapter on the 4500 MLCA. When the Model 539X adapter is operating at 56,000 bps, the remaining communications lines cannot exceed an aggregate rate of 9600 bps.

INTEGRATED MODEMS FOR THE 5251 DISPLAY STATION: IBM now offers six modems for the 5251. Their characteristics are listed below.

• Model 5500—1200 bps, non-switched.

• Model 5502—1200 bps, switched.

• Model 5640—2400 bps, non-switched.

• Model 5641—2400 bps, switched with Integrated Protective Coupler.

• Model 5740—4800 bps, non-switched.

• Model 5741—4800 bps, switched with Integrated Protective Coupler.

These modems are mutually exclusive with other integrated modems, the 3701 EIA Interface, and the 5650 and 5651 DDS Adapters.

SOFTWARE

OPERATING SYSTEM: The System/34 System Support Program (SSP) is so named because many of its routines have been implemented in system firmware. The SSP occupies a minimum of 14K bytes, and this can be increased in 2K-byte increments to include spooling support, increase the number of possible active tasks, or optimize overall system performance. The SSP resident nucleus includes data management for disk, printer, and workstations; buffers for workstation I/O and printer spooling; and a task control work area for system use.

The SSP permits users to select either single-program mode or multiple-program mode. Single-program mode is invoked to execute System/32 IAP's that have been converted for execution on the System/34. In this mode only one workstation may be active as a command terminal. The remaining workstations may be used as data terminals. In multiple-program (multiprogramming) mode, all workstations that have been designated as command terminals may concurrently invoke control commands and Operation Control Language (OCL) procedures.

Multiprogramming mode also provides an input job queue that consists of a list of jobs that are to be executed in sequence concurrently with other batch or operator-interactive jobs. The jobs in the queue are designated by any command terminal and executed under control of the system console. The station that initiated the job via the job queue is then available for other work.

Main memory is managed as a pool of non-contiguous 2048-byte segments, and all programs occupy multiples of these blocks. No segmenting is provided, and entire programs are swapped in and out of memory to make room for other active programs. Total main memory required by all active tasks can exceed the actual physical main memory, but no single program can exceed the physical limitations of main memory.

Communication between the user and the SSP is provided through the Operation Control Language (OCL). These statements provide the system with information describing the way in which a job is to be executed, such as the names of files to be processed, where the files are located, and which programs to load.

Control of all I/O operations is provided by the SSP data management routines. Support is provided for the CRT display, the keyboard (including the capability to recognize and interpret special function and command keys), the printer, the disk unit, and the diskette unit. The display station ►

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➤ data management feature supports multiple directly and remotely attached units of the 5250 Information Display System, for both 960- and 1920-character displays. The display station management routine manages all input and output to the display stations, including the retrieval of display formats from a disk library and merging program data prior to displaying the format on the screen.

An interrupt/resume capability is provided to suspend processing programs in order to allow an inquiry to be made into the disk file. The executing program is rolled out to disk storage, the inquiry program is executed, and the interrupted processing program is then returned to main memory to resume processing.

Utility programs supplied with the SSP assist the user in preparing and maintaining his disk files. The programs provided include Disk Initialization, Alternate Track Assignment, Alternate Track Rebuild, File and Volume Display, and File Delete. In addition, a set of routines is provided to permit copying of data, programs, and procedures from the diskette to the disk file and to transfer such information from the disk file to the diskette to provide back-up files and off-line storage. The entire system library, selected files, or portions of files can be transferred to diskette files. In order to provide sufficient contiguous storage space for creation of new files, the operator can invoke the COMPRESS OCL procedure to reorganize the contents of the disk file in a contiguous area next to the systems library. The SAVE procedure allows one file or all files to be transferred to diskette with a specified retention period. Files can also be added to existing files saved previously on diskette. Additional utilities provide for allocating files, renaming files, building display formats, and building job names.

Additional features added to the System/34 SSP include:

• A system measurement facility, which, in conjunction with new firmware, monitors and reports system and SSP utilization data.

• Additional security through support of operator badge entry on the 5250 Magnetic Stripe Reader and expansion of the operator profile by restricting job selection to menu entries from an assigned menu.

• A HELP procedure to facilitate entering of command procedures for SSP, utilities, languages, data communications, and service aids.

• Support for new peripherals or hardware features including the diskette magazine drive; support for multinational character sets on the 5211, 5251, 5252, and 5256; support for the magnetic stripe reader, 1255 multiple modulus checking, and 5211 translation capability.

• A checkpoint/restart facility supporting COBOL RERUN statements.

COMMUNICATIONS SOFTWARE: Communications software for the System/34 consists of the RPG II Telecommunications Feature, BSC support for RPG II and the basic assembler, the MRJE and SRJE utilities, SNA/SDLC data management support for remote workstations, SNA assembler macro support, and the Interactive Communications Feature of SSP.

The *RPG II Telecommunications Feature* provides support for transmission and reception of binary synchronous data over voice-grade or high-speed communications lines. The feature permits a System/34 executing a program written in RPG II to function as a terminal in one of the three types of networks; point-to-point switched, point-to-point non-switched, or multipoint.

BSC (binary synchronous communications) support is provided via RPG II and basic assembler macro instructions, where SSP provides the management for transmitting and receiving data. BSC transfers are possible between a System/34 and another System/34 with basic assembler or RPG II; a System/32 with basic assembler or RPG II; a System/3 with RPG II, MLMP, or CCP; a System/7 with MSP/7; a Series 1 supported as a System/3; a System/360 with BTAM or TCAM/NCP; a System/360 Model 20 with IOCS for the binary synchronous communications adapter; a System/370 with BTAM, TCAM/NCP, VTAM/NCP, CICS/VS, or IMS/VS; an IBM 3741 Model 2 Data Station or 3741 Model 4 Programmable Workstation; an IBM 3747 Data Converter; an IBM 5231 Data Collection Controller Model 2 acting as a 3741 Model 2 in transmit mode; and an IBM 5110 acting as a 3741. The System/34 appears as a System/3 when communicating with a System/360 or System/370.

The *MRJE utility* uses BSC to communicate with the host system over point-to-point switched or nonswitched communications lines via a 2500 or 3500 Communications Adapter or a 4500 Multiline Communications Adapter. Under MRJE, the System/34 acts as a System/3 and is always considered to be the remote station which must initiate transmission of data to the host system. MRJE allows submission of jobs to an IBM System/370 for processing by RES under OS/VS1, JES2 under OS/VS2, JES3 under OS/VS2, HASP II under OS/VS2, ASP under OS/VS2, or VM/370 RSCS.

The *SRJE utility* supports SNA/SDLC communications with a host System/370. SRJE allows submission of jobs to an IBM System/370 that uses VTAM and NCP/VS for processing by OS/VS1 RES, OS/VS2 JES2, and DOS/VS POWER/VS.

The System/34 SSP includes a print utility for both the MRJE and SRJE utilities. This utility prints or makes new disk files from punch output and printer output that was directed to the disk during an MRJE or SRJE session.

The System/34 SSP provides *SNA/SDLC data management support for remote workstations,* including the IBM 5251 or 5252 Display Stations and 5256 Printers. The remote workstations may be on one to four communications lines, depending upon the communications adapter installed. Whether a workstation is directly attached or remotely attached is transparent to an application program.

SNA assembler macro support is provided for the System/34, in conjunction with the Basic Assembler and Macro Processor program product. The macros support all communications programs that use SNA/SDLC.

The *Interactive Communications Feature of SSP (SSP-ICF)* provides support for both BSC and SNA/SDLC interactive communications between application programs, remote procedure initiation on the System/34, and communications line monitoring on a multipoint line where the System/34 is a tributary station (maintained even though no user application program is active). Interactive communications permits multiple concurrent communications sessions over the same data link.

System/34 link connection is either point-to-point or multipoint tributary (except for 5250 devices). In the BSC environment, SSP-ICF supports a System/3 Model 15 with CCP, RPG II T/P or ML/MP; a System/370 with IMS/VS Version 1.1.4 via IRSS; a System/370 with CICS/VS Version 1.3.0, OS/VS, DOS/VS with BTAM, or OS/VS TCAM where the System/34 acts as a System/3; a System/34 with SSP-ICF, RPG II, COBOL with the workstation support subroutines PRPQ, or Basic Assembler; an IBM 5110 as a 3741, point-to-point only; a System/7 with MSP/7 where the ➤

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▶ System/7 acts as a System/3; a System/32 with RPG II or Basic Assembler; IBM 3741 Models 2 and 4, point-to-point only (no multiple file support); an IBM 3747, point-to-point only; an IBM 5231 Model 2 as a 3741; and a Series 1 as a System/3. In the SNA/SDLC environment, SSP-ICF supports a System/370 using NCP/VS and TCAM Direct (TCAM 10), or VTAM or ACF/NCP/VS and ACF/TCAM or ACF/VTAM; a System/370 with IMS/VS Version 1.1.4 using SLU type P protocols; a System/370 with CICS/VS Version 1.3.0 and OS/VS where the System/34 acts as a 3790; a System/370 with CICS/VS Version 1.3.0 and DOS/VS where the System/34 acts as a 3790; and a System/370 with user-written communication support using SNA protocol profiles TSP 3 or 4 and FMP 3 or 4. System/34-to-System/34 SDLC communications are also supported.

SYSTEM/34 UTILITIES PROGRAM PRODUCT (5726-UT1): In addition to the file management utilities supplied with the SCP control program, IBM offers a System/34 Utilities Program Product that provides basic data management capabilities. This separately priced program product consists of five programs; Data File Utility (DFU), Sort, Source Entry Utility (SEU), Screen Design Aid (SDA), and Work Station Utility (WSU).

The *Data File Utility (DFU)* program provides the following data base management functions: data file creation and maintenance, data file inquiry, and data file list. All three functions utilize catalogued RPG II File Description and Input Specifications so that the operator need enter only the name of the file and the name of the catalogued RPG II specifications. The utility prompts the operator to enter additional information required to tailor the program to the user's processing requirements.

The *System/34 Sort Utility* provides basically the same functions as the System/3 and System/32 sorts. Disk files can be sorted in ascending, descending, or user-defined sequence. The Sort program accepts file organized in sequential, indexed, or direct order and automatically allocates disk space for a work file. IBM enhancements to the System/34 Sort include support for multiple input files, a loadable Sort interface from user programs written in COBOL or Basic Assembler, ALTSEQ by field, and standard sequencing when control fields are equal.

The *Source Entry Utility (SEU)* program can be used to create and maintain user-written OCL procedures; specifications for display formats, 1255 control, Auto Report, and the Workstation Utility; FORTRAN, Assembler, and RPG II source code statements; and Sort source code statements. The SEU is accompanied by Sort, RPG II, Auto Report, and format descriptions to aid the user in entering source statements correctly. Display formats are free-form for any statement to be entered, with user-defined display formats permitted.

The *Work Station Utility (WSU)* provides a set of specifications for defining interactive data entry programs which support one or more IBM 5251 Display Stations. Included in the program variables provided by the WSU specifications are job name, number of workstations, region size; Transaction File (a special direct-organization disk file created and managed by WSU to contain key-entered records for disk files); formats to be displayed on the IBM 5251 to prompt for data entry and/or display error messages; arithmetic, logical edit, or I/O operations to be performed on conjunction with the entry of data in response to a display format; and references to RPG II file and input specifications for a description of the transaction and master files.

The *Screen Design Aid (SDA)* is an interactive utility for the design, creation, and maintenance of display formats and job menus. Entire formats can be updated or deleted, and individual source specifications can be updated, inserted, or deleted. SDA allows for the creation and updating of menus and their associated source members.

LANGUAGES: IBM now offers the BASIC, COBOL, RPG II, FORTRAN and Assembly languages for use with the System/34.

System/34 BASIC (5726-BA1) is an interactive compiler that enables the user to check the syntax of each line and to display the correct syntax. Additional features of System/34 BASIC include the ability to halt execution for examining or changing variables followed by resumption of program execution, the ability to display screen formats, and a screen scrolling capability.

System/34 COBOL (5726-CB1) is designed according to the specification for American National Standard (ANS) COBOL, X3.23 1974. IBM extensions to the standard COBOL include use of apostrophe instead of quotes, extended data types of computational-3 (packed) and computational-4 (binary), indexed file support for CORE-INDEX, additional debugging support with EXHIBIT and TRACE, ACCEPT from the console, DISPLAY upon the console, and the elimination of the need for CALLs to assembler routines.

RPG II (Report Program Generator (5726-RG1) is identical to its System/32 counterpart except for certain functions implemented to support multiple workstations and to provide SSP-ICF support. The programmer, using preprinted coding forms, prepares a set of specifications that describe the form of the input data, the calculations to be performed, and the format of the desired output.

System/34 FORTRAN IV (5726-F01) contains the features defined in ANS Basic FORTRAN, X3.10.1966. The System/34 FORTRAN IV library contains mathematical and service subprograms required during execution to perform arithmetic operations, input and output constant conversions, and input/output control.

The *Basic Assembler and Macro Processor (5726-AS1)* produces relocatable object programs that are subsequently converted to executable format by the SSP overlay linkage editor. Source statement programs, relocatable object programs, and executable load modules are stored in the System/34 libraries.

PRPQ WORK STATION SUPPORT SUBROUTINES (5799-AYW): These subroutines operate under SSP and provide the COBOL and Basic Assembler user with access to the workstation formatting capabilities of the Screen Format Generation Routine (SFGR) and Work Station Data Management (WSDM).

WORK STATION SEARCH FACILITY (WSF/34 5726-XRI): WSF/34 allows the user to search his disk files for records meeting terminal user-selected search criteria. These records are then processed by user-written routines.

5230 ONLINE DATA COLLECTION: This program product (5798-NNE) accommodates 80- or 96- column card, diskette, and/or BSC teleprocessing inputs. Its function is to edit, verify, format, and consolidate data from an IBM 5230 Data Collection System.

APPLICATION PROGRAMS

Every System/32 IAP can be executed on a System/34 after recompilation. The programs listed in this section, with a few Specified exceptions, are recompiled System/32 IAPs (now called APs on the System/34) that can be executed *only in single-program mode*. When these programs are being executed, only one workstation is supported and the multiprogramming, spooling, and file-sharing capabilities of the System/34 cannot be utilized. Numerous Field ▶

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➤ Developed Programs (FDPs) and Installed User Programs (IUPs) are also available from IBM.

- Distributors Management Accounting System:
  Single-program mode (DMAS)
    Billing (5726-D4A)
    Accounts Receivable (5726-D4B)
    Inventory Control (5726-D4C)
    Sales Analysis (5726-D4D)
  Multiple-program mode (DMAS II)
    Billing (5726-D41)
    Accounts Receivable (5726-D42)
    Inventory Control (5726-D43)
    Sales Analysis (5726-D44)

- Food Distribution Management Accounting System (5726-D65 to -D68)

- System/34 Distribution Financial Accounting System:
  Single-program mode (DFAS)
    General Ledger (5726-D6A)
    Accounts Payable (5726-D6B)
    Payroll (5726-D6C)
  Multiple-program mode (DFAS II)
    General Ledger (5726-M47)
    Accounts Payable (5726-M43)
    Payroll (5726-M42)

- System/34 Client Accounting and Financial Reporting System:
  Single-program mode (5726-C21)
  Multiprogram mode (5726-C22)

- Medical Group Management System:
  Single-program mode (5726-H15)
  Multiprogram mode (5726-H16)

- System/34 Hospital Financial Management System:
  Patient Billing (5726-H11)
  Accounts Receivable (5726-H12)
  Payroll (5726-H13)
  General Ledger/Accounts Payable (5726-H14)

- System/34 Manufacturing Management Accounting System:
  Production Scheduling/Costing (5726-M31)
  Payroll (5726-M32)
  Accounts Payable (5726-M33)
  Accounts Receivable (5726-M34)
  Inventory Management (5726-M35)
  Production Definition/Costing (5726-M36)
  General Ledger (5726-M37)
  Sales Analysis (5726-M38)
  Order Entry/Invoicing (5726-M39)
  5230 Data Collection Support (5726-M3A)

- System/34 Construction Management Accounting System:
  Single-program mode (CMAS)
    Job Costing (5726-M61)
    Accounts Payable (5726-M62)
    Payroll (5726-M63)
    General Ledger (5726-M64)
  Multiprogram mode (CMAS/34)
    Job Costing (5726-M66)
    Accounts Payable (5726-M68)
    Payroll (5726-M69)
    General Ledger (5726-M67)

- Lumber and Building Material Dealers Management Accounting System (5726-D4E to D4H)

- System/34 Membership and Mailing List System (5726-K11)

- Motor Freight Accounting System (5726-T21)

- Financial Institutions Customer Accounting System:
  Customer Information File (5726-F11)
  Demand Deposit Accounting (5726-F12)
  Savings Accounting (5726-F13)
  Installment Loan Accounting (5726-F14)

- System/34 Management System for Law Firms (5726-F52)

- Student Administration System:
  Student Records (5726-E31)
  Student Accounting (5726-E32)
  Student Scheduling (5726-E33)

- Manufacturing Accounting and Production Information Control System (MAPICS):
  Production Control/Costing (5726-M41)
  Payroll (5726-M42)
  Accounts Payable (5726-M43)
  Accounts Receivable (5726-M44)
  Inventory Management (5726-M45)
  Product Data Management (5726-M46)
  General Ledger (5726-M47)
  Sales Analysis (5726-M48)
  Order Entry/Invoicing (5726-M49)
  Data Collection System Support (5726-M4A)
  Material Requirements Planning (5726-M4B)

- System/34 Public Budgeting and Accounting System (5726-G21)

PRICING

EQUIPMENT: The following systems represent stand-alone systems with no communications capabilities.

MINIMUM SINGLE-USER SYSTEM: Consists of a 5340 Model A11 System Unit with 32K bytes of main memory, 8.6 megabytes of disk storage, a Diskette 1 drive, 1 40-cps 5256 serial printer, and a 5251 Model 11 CRT display/keyboard unit. The purchase price is $22,160.

MEDIUM-SCALE THREE-USER SYSTEM: Consists of a 5340 Model C13 System Unit with 64K bytes of main memory, 27.1 megabytes of disk storage, a Diskette 1 drive, a 160-lpm 5211 line printer, and three 5251 Model 11 CRT display/keyboard units. The purchase price is $42,175.

LARGE-SCALE SIX-USER SYSTEM: Consists of a 5340 Model E35 System Unit with 128K bytes of main memory, 128.4 megabytes of disk storage, a Diskette Magazine Drive, a 300-lpm 5211 line printer, six 5251 Model 11 CRT display/keyboard units, and two 120-cps 5256 serial printers. The purchase price is $94,220.

SOFTWARE: All software is licensed separately, including the System Support Program, the RPG II compiler, the COBOL compiler, the Basic Assembler, and the system utilities. Users pay a monthly license fee for all System/34 software. No initial charges are made.

TESTING: IBM provides a 72-hour pre-installation program testing allowance for each basic System/34, plus additional testing hours depending upon the configuration. Some of the additional testing allowance times are as follows:

16K main memory increment (over 32K):	2 hours
27.1-megabyte disk storage:	4 hours
5251 display/keyboard:	3 hours
2500 Communications Adapter:	5 hours
1255 Magnetic Character Reader:	5 hours ➤

IBM System/34

▶ **CONTRACT TERMS:** IBM offers the System/34 on a purchase, rental, or lease basis. Warranty period for the System/34 is three months.

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. CPU's 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 three years, followed by one-year extension terms.

System/34 provides a 10 percent educational allowance on leased or purchased systems.

MAINTENANCE: The IBM System/34 is leased to the user under rental plan B, which entitles the user to maintenance for 24 hours per day, 7 days per week.

For purchased systems, the IBM System/34 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				
	10	12	14	16	18
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

For users without a maintenance contract, the System/34 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 $68.00.

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly Rental*	Monthly Lease*
PROCESSORS					
5340	System Unit with 32K bytes of main memory; includes CPU, main memory, fixed disk storage, and one diskette drive:				
	A11 Diskette 1 drive, 8.6 megabytes of disk storage	$15,310	$159.00	$1,078	$ 981
	A12 Diskette 1 drive, 13.2 megabytes of disk storage	17,090	169.00	1,168	1,064
	A13 Diskette 1 drive, 27.1 megabytes of disk storage	23,470	208.00	1,462	1,332
	A14 Diskette 1 drive, 63.9 megabytes of disk storage	39,130	208.00	1,626	1,482
	A15 Diskette 1 drive, 128.4 megabytes of disk storage	48,580	258.00	1,959	1,785
	A21 Diskette 2D drive, 8.6 megabytes of disk storage	17,470	164.00	1,162	1,059
	A22 Diskette 2D drive, 13.2 megabytes of disk storage	19,250	174.00	1,252	1,142
	A23 Diskette 2D drive, 27.1 megabytes of disk storage	25,630	213.00	1,546	1,410
	A24 Diskette 2D drive, 63.9 megabytes of disk storage	41,290	213.00	1,710	1,560
	A25 Diskette 2D drive, 128.4 megabytes of disk storage	50,740	263.00	2,043	1,863
	A31 Diskette Magazine Unit, 8.6 megabytes of disk storage	19,990	186.00	1,261	1,149
	A32 Diskette Magazine Unit, 13.2 megabytes of disk storage	21,770	196.00	1,351	1,232
	A33 Diskette Magazine Unit, 27.1 megabytes of disk storage	28,150	235.00	1,645	1,500
	A34 Diskette Magazine Unit, 63.9 megabytes of disk storage	43,810	235.00	1,809	1,650
	A35 Diskette Magazine Unit, 128.4 megabytes of disk storage	53,260	285.00	2,142	1,953
5340	System Unit with 48K bytes of main memory; includes CPU, main memory, fixed disk storage, and one diskette drive:				
	B11 Diskette 1 drive, 8.6 megabytes of disk storage	16,095	164.00	1,130	1,029
	B12 Diskette 1 drive, 13.2 megabytes of disk storage	17,875	174.00	1,220	1,112
	B13 Diskette 1 drive, 27.1 megabytes of disk storage	24,255	213.00	1,514	1,380
	B14 Diskette 1 drive, 63.9 megabytes of disk storage	39,915	213.00	1,678	1,530
	B15 Diskette 1 drive, 128.4 megabytes of disk storage	49,365	263.00	2,011	1,833
	B21 Diskette 2D drive, 8.6 megabytes of disk storage	18,255	169.00	1,214	1,107
	B22 Diskette 2D drive, 13.2 megabytes of disk storage	20,035	179.00	1,304	1,190
	B23 Diskette 2D drive, 27.1 megabytes of disk storage	26,415	218.00	1,598	1,458
	B24 Diskette 2D drive, 63.9 megabytes of disk storage	42,075	218.00	1,762	1,608
	B25 Diskette 2D drive, 128.4 megabytes of disk storage	51,525	268.00	2,095	1,911
	B31 Diskette Magazine Unit, 8.6 megabytes of disk storage	20,775	191.00	1,313	1,197
	B32 Diskette Magazine Unit, 13.2 megabytes of disk storage	22,555	201.00	1,403	1,280
	B33 Diskette Magazine Unit, 27.1 megabytes of disk storage	28,935	240.00	1,697	1,548
	B34 Diskette Magazine Unit, 63.9 megabytes of disk storage	44,595	240.00	1,861	1,698
	B35 Diskette Magazine Unit, 128.4 megabytes of disk storage	54,045	290.00	2,194	2,001
5340	System Unit with 64K bytes of main memory; includes one CPU, main memory, fixed disk storage, and one diskette drive:				
	C11 Diskette 1 drive, 8.6 megabytes of disk storage	16,880	169.00	1,182	1,077
	C12 Diskette 1 drive, 13.2 megabytes of disk storage	18,660	179.00	1,272	1,160
	C13 Diskette 1 drive, 27.1 megabytes of disk storage	25,040	218.00	1,566	1,428
	C14 Diskette 1 drive, 63.9 megabytes of disk storage	40,700	218.00	1,730	1,578
	C15 Diskette 1 drive, 128.4 megabytes of disk storage	50,150	268.00	2,063	1,881
	C21 Diskette 2D drive, 8.6 megabytes of disk storage	19,040	174.00	1,266	1,155
	C22 Diskette 2D drive, 13.2 megabytes of disk storage	20,820	184.00	1,356	1,238
	C23 Diskette 2D drive, 27.1 megabytes of disk storage	27,200	223.00	1,650	1,506

*Monthly charges include equipment maintenance. Processors and features have a 3-year lease period. Peripherals and features have a 2-year lease period. ▶

IBM System/34

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly Rental*	Monthly Lease*

▶ PROCESSORS (Continued)

		Purchase Price	Monthly Maint.	Monthly Rental*	Monthly Lease*
	C24 Diskette 2D drive, 63.9 megabytes of disk storage	42,860	223.00	1,814	1,656
	C25 Diskette 2D drive, 128.4 megabytes of disk storage	52,310	273.00	2,147	1,959
	C31 Diskette Magazine Unit, 8.6 megabytes of disk storage	21,560	196.00	1,365	1,245
	C32 Diskette Magazine Unit, 13.2 megabytes of disk storage	23,340	206.00	1,455	1,328
	C33 Diskette Magazine Unit, 27.1 megabytes of disk storage	29,720	245.00	1,749	1,596
	C34 Diskette Magazine Unit, 63.9 megabytes of disk storage	45,380	245.00	1,913	1,746
	C35 Diskette Magazine Unit, 128.4 megabytes of disk storage	54,830	295.00	2,246	2,049
	C36 Diskette Magazine Unit, 192.9 megabytes of disk storage	67,770	349.00	2,715	2,476
	C37 Diskette Magazine Unit, 257.4 megabytes of disk storage	77,220	399.00	3,048	2,779
5340	System Unit with 96K bytes of main memory; includes one CPU, main memory, fixed disk storage, and one diskette drive:				
	D11 Diskette 1 drive, 8.6 megabytes of disk storage	18,450	179.00	1,286	1,173
	D12 Diskette 1 drive, 13.2 megabytes of disk storage	20,230	189.00	1,376	1,256
	D13 Diskette 1 drive, 27.1 megabytes of disk storage	26,610	228.00	1,670	1,524
	D14 Diskette 1 drive, 63.9 megabytes of disk storage	42,270	228.00	1,834	1,674
	D15 Diskette 1 drive, 128.4 megabytes of disk storage	51,720	278.00	2,167	1,977
	D21 Diskette 2D drive, 8.6 megabytes of disk storage	20,610	184.00	1,370	1,251
	D22 Diskette 2D drive, 13.2 megabytes of disk storage	22,390	194.00	1,460	1,334
	D23 Diskette 2D drive, 27.1 megabytes of disk storage	28,770	233.00	1,754	1,602
	D24 Diskette 2D drive, 63.9 megabytes of disk storage	44,430	233.00	1,918	1,752
	D25 Diskette 2D drive, 128.4 megabytes of disk storage	53,880	283.00	2,251	2,055
	D31 Diskette Magazine Unit, 8.6 megabytes of disk storage	23,130	206.00	1,469	1,341
	D32 Diskette Magazine Unit, 13.2 megabytes of disk storage	24,910	216.00	1,559	1,424
	D33 Diskette Magazine Unit, 27.1 megabytes of disk storage	31,290	255.00	1,853	1,692
	D34 Diskette Magazine Unit, 63.9 megabytes of disk storage	46,950	255.00	2,017	1,842
	D35 Diskette Magazine Unit, 128.4 megabytes of disk storage	56,400	305.00	2,350	2,145
	D36 Diskette Magazine Unit, 192.9 megabytes of disk storage	69,340	359.00	2,819	2,572
	D37 Diskette Magazine Unit, 257.4 megabytes of disk storage	78,790	409.00	3,152	2,875
5340	System Unit with 128K bytes of main memory; includes one CPU, main memory, fixed disk storage, and one diskette drive:				
	E11 Diskette 1 drive, 8.6 megabytes of disk storage	20,020	189.00	1,390	1,269
	E12 Diskette 1 drive, 13.2 megabytes of disk storage	21,800	199.00	1,480	1,352
	E13 Diskette 1 drive, 27.1 megabytes of disk storage	28,180	238.00	1,774	1,620
	E14 Diskette 1 drive, 63.9 megabytes of disk storage	43,840	238.00	1,938	1,770
	E15 Diskette 1 drive, 128.4 megabytes of disk storage	53,290	288.00	2,271	2,073
	E21 Diskette 2D drive, 8.6 megabytes of disk storage	22,180	194.00	1,474	1,347
	E22 Diskette 2D drive, 13.2 megabytes of disk storage	23,960	204.00	1,564	1,430
	E23 Diskette 2D drive, 27.1 megabytes of disk storage	30,340	243.00	1,858	1,698
	E24 Diskette 2D drive, 63.9 megabytes of disk storage	46,000	243.00	2,022	1,848
	E25 Diskette 2D drive, 128.4 megabytes of disk storage	55,450	293.00	2,355	2,151
	E31 Diskette Magazine Unit, 8.6 megabytes of disk storage	24,700	216.00	1,573	1,437
	E32 Diskette Magazine Unit, 13.2 megabytes of disk storage	26,480	226.00	1,663	1,520
	E33 Diskette Magazine Unit, 27.1 megabytes of disk storage	32,860	265.00	1,957	1,788
	E34 Diskette Magazine Unit, 63.9 megabytes of disk storage	48,520	265.00	2,121	1,938
	E35 Diskette Magazine Unit, 128.4 megabytes of disk storage	57,970	315.00	2,454	2,241
	E36 Diskette Magazine Unit, 192.9 megabytes of disk storage	70,910	369.00	2,923	2,668
	E37 Diskette Magazine Unit, 257.4 megabytes of disk storage	80,360	419.00	3,256	2,971
5340	System Unit with 256K bytes of main memory; includes one CPU, main memory, fixed disk storage, and one diskette drive:				
	F22 Diskette 2D drive, 13.2 megabytes of disk storage	32,260	249.00	2,064	1,890
	F23 Diskette 2D drive, 27.1 megabytes of disk storage	38,640	288.00	2,358	2,158
	F24 Diskette 2D drive, 63.9 megabytes of disk storage	54,300	288.00	2,522	2,308
	F25 Diskette 2D drive, 128.4 megabytes of disk storage	63,750	338.00	2,855	2,611
	F33 Diskette Magazine Unit, 27.1 megabytes of disk storage	41,160	310.00	2,457	2,248
	F34 Diskette Magazine Unit, 63.9 megabytes of disk storage	56,820	310.00	2,621	2,398
	F35 Diskette Magazine Unit, 128.4 megabytes of disk storage	66,270	360.00	2,954	2,701
	F36 Diskette Magazine Unit, 192.9 megabytes of disk storage	79,210	414.00	3,423	3,128
	F37 Diskette Magazine Unit, 257.4 megabytes of disk storage	88,660	464.00	3,756	3,431

OPTIONS AND FEATURES

		Purchase Price	Monthly Maint.	Monthly Rental*	Monthly Lease*
4655	Keylock Feature for the 5340 Processor ($72 single use charge)	—	—	—	—
1110	5211/3262 Base Printer Attachment; max. one per system	567	3.50	21	19
5811	Printer Attachment for Model 5211 line printer; max. one per system	567	3.50	21	19
5815	Attachment for 3262 line printer; max. one per system	1,130	4.50	44	40
1100	Magnetic Character Reader Attachment for Model 1255 reader; max. one per system; requires 5732 to 5733 Processor Expansion Unit	8,775	27.50	360	327
1105	1255 Attachment Expansion; provides additional 28K of user storage; max. one per system; requires feature 1100	3,210	14.00	122	111

*Monthly charges include equipment maintenance. Processors and features have a 3-year lease period. Peripherals and features have a 2-year lease period. ▶

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly Rental*	Monthly Lease*

OPTIONS AND FEATURES (Continued)

		Purchase Price	Monthly Maint.	Monthly Rental*	Monthly Lease*
5732	Processor Expansion Unit A; I/O board; required for attachment of Model 1100 MICR attachment except on all System Unit models with 27.1-megabyte disk storage; max. one per system, not required if 5733 Processor Expansion Unit is installed	1,130	2.50	46	42
5733	Processor Expansion Unit B; I/O board and additional power for communications features; required for attachment of Model 1100 MICR attachment or Models 5600, 5602, or 5610 2400-bps modems; max. one per system	756	5.50	31	28
5734	Processor Expansion Unit C; I/O modem regulator; required for installation of Model 3701 EIA Interface or Model 5501 1200-bps modem; max. one per system; not required if Model 5733 Processor Expansion Unit is installed	302	1.00	11	10
5735	Processor Expansion Unit D; gate assembly for installation of Models 5600, 5602, or 5610 2400-bps modems; max. one per system	302	1.00	11	10
5736	Processor Expansion Unit E; additional power required for 1255 Attachment on certain models	945	5.50	35	32
4900	Work Station Control Expansion A; for 4910 on 525X	378	3.50	13	12
4901	Work Station Control Expansion B for adding 9-16 525X workstations or printers	945	6.50	34	31
4905	Multinational Control	378	1.00	13	12

PRINTERS

		Purchase Price	Monthly Maint.	Monthly Rental*	Monthly Lease*
3262-B1	Line Printer; 650 lpm; max. one per system; requires 1110 and 5815 attachments	17,010	144.00	525	447
	Print belts EBCDIC	178	—	—	—
	Print belts, ASCII	186	—	—	—
5211	Line Printer; may be substituted for Model 5256 console printer; max. one per system; requires Model 1110 and 5811 attachment				
	Model 1; 160 lpm	9,875	63.00	335	285
	Model 2; 300 lpm	12,030	105.00	410	349
	Print Belts for the 5211	178	—	—	—
5224	Matrix Printer; may be substituted for Model 5256 console printer; max. one per system				
	Model 1; 140 lpm	6,150	—	—	237
	Model 2; 280 lpm	7,000	—	—	270
5225	Matrix Printer; may be substituted for Model 5256 console printer; max. one per system				
	Model 1; 280/155 lpm	11,650	79.00	400	340
	Model 2; 400/290 lpm	14,450	111.00	456	388
	Model 3; 490/355 lpm	14,950	137.00	508	432
	Model 4; 560/420 lpm	16,350	162.00	558	475

TERMINALS

		Purchase Price	Monthly Maint.	Monthly Rental*	Monthly Lease*
5251	Mdl. 11 CRT Display Station, 1920 characters; one required for each system	2,420	20.50	108	92
5251	Mdl. 12 CRT Display Station, 1920 characters; attaches up to eight 5251 Model 11 display stations or 5256 printers; Model 4600 keyboard required	3,445	44.50	172	146
2550	Cluster Adapter for 5251 Model 2 or Model 12 Display; permits attachment of up to four workstations (5251 Models 1 and 11 Displays, 5252 Displays, or 5225 or 5256 Printers); four cable connections can be used with 2680 cable-through feature to attach up to four workstations per line; cannot be used with 2551 dual cluster; max. one per system	1,290	11.50	58	49
2551	Dual Cluster Adapter for 5251 Model 2 or Model 12 Display; same characteristics as 2550 cluster adapter except attaches up to eight 5251 Model 11 displays or 5225 or 5256 printers	2,580	23.00	116	99
5251	Mdl. 1 CRT Display Station; same as 5251 Model 11 but with 960-character display	2,260	19.50	101	86
5251	Mdl. 2 CRT Display Station; same as 5251 Model 12 but with 960-character display	3,295	41.50	165	140
3600	Expanded Function for 5251; includes copy screen to printer and modulus 10 to 11 keyboard checking	255	1.50	13	11
3225	Display Screen Filter for 5251 Models 11 and 12	39	—	—	—
3226	For 5251 Models 1 and 2	39	—	—	—
5252	CRT Display Station; functions as two independent 960-character CRT displays with two keyboards	2,585	23.00	116	99
4600	Keyboard for Model 5251 and 5252 CRT Display Stations	300	3.50	14	12
4655	Keylock feature for Model 5251, 5252 CRT Display Stations ($40 single use charge)	—	—	—	—
2680	Cable-Through feature for 5251 Model 1 and 11 or 5252 CRT Display Stations, and Model 5225 or 5256 Printers	115	1.00	4	3
5256	Serial Printer for workstation; one required for each system; Model 5211 or 5225 printer may be substituted for console printer; max. eight per system:				
	Model 1; 40 cps	4,430	35.00	202	172
	Modle 2; 80 cps	4,640	38.00	229	195
	Model 3; 120 cps	4,850	43.00	249	212
1470	Audible Alarm for Model 5225 or 5256 printers ($50 single use charge)	—	—	—	—
4450	Forms Stand for 5256	76	0.50	2	2
4910	Magnetic Stripe Reader for 5251 and 5252	420	2.00	13	11
6300	Selector Light Pen for 5251	760	8.50	27	23

*Monthly charges include equipment maintenance. Processors and features have a 3-year lease period. Peripherals and features have a 2-year lease period.

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly Rental*	Monthly Lease*

► **COMMUNICATIONS**

Modems for 5251 Display Station; cannot be used with EIA Interface, DDS Adapter, or other modems:

		Purchase Price	Monthly Maint.	Monthly Rental*	Monthly Lease*
5502	1200-bps Integrated Modem Switched; requires 4703 Internal Clock	660	5.50	21	18
5640	2400-bps Integrated Modem Non-Switched	2,050	26.50	83	71
5641	2400-bps Integrated Modem Switched	2,260	27.50	90	77
5740	4800-bps Integrated Modem Non-Switched	3,570	39.00	145	123
5741	4800-bps Integrated Modem Switched	3,750	41.50	152	129
2500	BSC/SDLC Communications Adapter; required for remote communications; requires one 1200-bps or 2400-bps modem, Model 3701 EIA Interface, or DDS adapter; max. one per system	3,020	22.00	125	114
5500	1200-bps Integrated Modem; for use with 5251 Display Station or 2500 adapter on non-switched lines; requires 4703 internal clock; cannot be used with other modems, 3701 EIA Interface, or 5650 and 5651 DDA adapter	660	5.50	21	19
5501	1200-bps Integrated Modem, with Auto-Answer, for use with 2500 adapter on switched lines; requires 5734 Processor Expansion Unit and 4703 internal clock; cannot be used with other modems, 3701 EIA Interface, or 5650 and 5651 DDS adapters	880	7.50	31	28
	2400-bps Integrated Modems for use with 2500 adapter; requires 5734 and 5735 Processor Expansion Units; cannot be used with other modems, 3701 EIA Interface, or 5650 and 5651 DDS adapters:				
5600	For non-switched point-to-point lines	2,240	12.50	102	93
5601	For non-switched multipoint lines	2,240	12.50	102	93
5602	For non-switched multi-point tributary lines	2,490	14.00	111	101
5610	With Auto-Answer; for switched lines	2,550	15.00	112	102
3500	Second BSC/SDLC Communications Adapter; requires 2500 adapter and either an integrated modem, EIA Interface, or Dataphone Digital Service adapter	3,020	22.00	125	114
6500	1200-bps Integrated Modem, for use with 3500 adapter on non-switched lines, requires 3734 Processor Unit Expansion C and 4703 internal clock; cannot be used with other modems	660	5.50	21	19
6501	1200-bps Integrated Modem with Auto-Answer; same characteristics as 6500 integrated modem	880	7.50	31	28
6600	2400-bps Integrated Modem; for use with 3500 adapter; non-switched point-to-point lines, equivalent to IBM 3872 modem; requires 5733 and 5735 Processor Unit Expansions; cannot be used with other modems	2,240	12.50	102	93
6601	2400-bps Integrated Modem; for use with 3500 adapter; non-switched multipoint control; same characteristics as 6600 modem	2,240	12.50	102	93
6602	2400-bps Integrated Modem; for use with 3500 adapter; non-switched multipoint tributary, same characteristics as 6600 modem	2,490	14.00	111	101
6610	2400-bps Integrated Modem; for use with 3500 adapter; switched lines; auto-answer capability; same characteristics as 6600 modem	2,550	15.00	112	102
4500	Multiline Communications Adapter (MLCA); BSC/SDLC; provides for attachment of 1 to 4 communications lines; requires one Line Base Adapter per line and one 1200- or 4800-bps modem, 531X EIA Interface, or 539X DDS Adapter	7,560	35.00	290	264
5301	Line Base Adapter 1	1,130	7.50	44	40
5302	Line Base Adapter 2	1,130	7.50	44	40
5303	Line Base Adapter 3	1,130	7.50	44	40
5304	Line Base Adapter 4	1,130	7.50	44	40
	Modems for 4500 MLCA; max. one per Line Base Adapter, two per MLCA; cannot be used with EIA Interface, DDS Adapter, Analog Wideband Adapter, or Auto-Call Adapter on same Line Base Adapter				
5331	1200-bps Integrated Modem 1	693	5.50	22	20
5332	1200-bps Integrated Modem 2	693	5.50	22	20
5333	1200-bps Integrated Modem 3	693	5.50	22	20
5334	1200-bps Integrated Modem 4	693	5.50	22	20
5341	1200-bps Integrated Modem Switched/Auto-Answer 1	924	7.50	31	28
5342	1200-bps Integrated Modem Switched/Auto-Answer 2	924	7.50	31	28
5343	1200-bps Integrated Modem Switched/Auto-Answer 3	924	7.50	31	28
5344	1200-bps Integrated Modem Switched/Auto-Answer 4	924	7.50	31	28
5351	4800-bps Integrated Modem 1	3,635	16.50	145	132
5352	4800-bps Integrated Modem 2	3,635	16.50	145	132
5353	4800-bps Integrated Modem 3	3,635	16.50	145	132
5354	4800-bps Integrated Modem 4	3,635	16.50	145	132
5361	4800-bps Integrated Modem Switched/Auto-Answer 1	3,855	16.50	153	139
5362	4800-bps Integrated Modem Switched/Auto-Answer 2	3,855	16.50	153	139
5363	4800-bps Integrated Modem Switched/Auto-Answer 3	3,855	16.50	153	139
5364	4800-bps Integrated Modem Switched/Auto-Answer 4	3,855	16.50	153	139
5411	Auto-call Adapter 1; requires EIA Interface	1,190	1.50	44	40
5412	Auto-call Adapter 2; requires EIA Interface	1,190	1.50	44	40
5413	Auto-call Adapter 3; requires EIA Interface	1,190	1.50	44	40
5414	Auto-call Adapter 4; requires EIA Interface	1,190	1.50	44	40

*Monthly charges include equipment maintenance. Processors and features have a 3-year lease period. Peripherals and features have a 2-year lease period. ►

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly Rental*	Monthly Lease*

► **COMMUNICATIONS (Continued)**

		Purchase Price	Monthly Maint.	Monthly Rental*	Monthly Lease*
5321	Internal Clock for use with 1200-bps modems and EIA Interface on 4500 MLCA	210	1.00	6	6
5401	Analog Wideband Adapter for attachment of 19,200- or 50,000-bps modem to MLCA; cannot be used with integrated modem, EIA Interface, DDS Adapter, or Auto-Call Adapter on same Line Base Adapter	2,835	2.50	109	99
5402	Analog Wideband Adapter 2	2,835	2.50	109	99
5403	Analog Wideband Adapter 3	2,835	2.50	109	99
5404	Analog Wideband Adapter 4	2,835	2.50	109	99
5650	Dataphone Digital Service Adapter for use with 2500 adapter in point-to-point connection; cannot be used with other modems or 3701 EIA Interface	840	5.50	29	26
5651	Dataphone Digital Service Adapter for use with 2500 adapter in multipoint tributary connection; cannot be used with other modems or 3701 EIA Interface	840	5.50	29	26
5652	Same as 5650 but for use with 3500; cannot be used with other modems or 3702 EIA Interface	840	5.50	29	26
5653	Same as 5651 but for use with 3500; cannot be used with other modems or 3702 EIA Interface	840	5.50	29	26
5391	Dataphone Digital Service Adapter 1 for use with 4500 MLCA; cannot be installed with an integrated modem, EIA Interface, Analog Wideband Adapter, or Auto-Call Adapter on same Line Base Adapter	840	5.50	29	26
5392	Dataphone Digital Service Adapter 2; same as 5391, but for use on second communications line	840	5.50	29	26
5393	Dataphone Digital Service Adapter 3; same as 5391, but for third communications line	840	5.50	29	26
5394	Dataphone Digital Service Adapter 4; same as 5391, but for fourth communications line	840	5.50	29	26
3701	EIA Interface for connection of 2500 communications adapter for non-integrated modems; requires 5734 Processor Expansion Unit; may require 4703 internal clock; cannot be used with integrated modems or 5650 and 5651 DDS adapter	430	5.00	15	14
3702	EIA Interface, for use with 3500 adapter; permits attachment of IBM and non-IBM modems; cannot be used with 650X, 660X, 6610, or 525X modems or adapters; requires 5734 Processor Unit Expansion C; may require 4703 internal clock	430	5.00	15	14
4703	Internal Clock for use with 5501 modem or 3701 EIA Interface	210	1.00	6	6
5311	EIA Interface for 4500 MLCA for non-integrated modems; cannot be used with an integrated modem, DDS Adapter, Analog Wideband Adapter, or Auto-Call Adapter on same Line Base Adapter	430	5.00	15	14
5312	EIA Interface 2; same as 5311, but for second communications line	430	5.00	15	14
5313	EIA Interface 3; for third communications line	430	5.00	15	14
5314	EIA Interface 4; for fourth communications line	430	5.00	15	14
7951	Switched Network Backup Unit; for use with 5600 and 5602 modems	567	4.00	21	19
7952	Switched Network Backup Unit with Auto-Answer; for use with 5600 and 5602 modems	869	5.50	33	30
7953	Switched Network Backup Unit; for use with 660X modems; requires 3500 adapter; cannot be used with 7954 backup unit	567	4.00	21	19
7954	Switched Network Backup Unit; for use with 660X modems; includes auto-answer capability; requires 3500 adapter; cannot be used with 7953 backup unit	869	5.50	33	30

*Monthly charges include equipment maintenance. Processors and features have a 3-year lease period. Peripherals and features have a 2-year lease period.

SOFTWARE PRICES

		Monthly License Charge

PROGGRAM PRODUCTS

		Monthly License Charge
5726-SS1	System Support Program	$133
6000, 6001	Interactive Communications Feature for SSP	94
5726-UT1	System/34 Utilities	46
5726-XR1	Workstation Search Facility	399
5799-AYW	PRPQ Workstation Support Subroutines	15
5726-AS1	Basic Assembler and Macro Processor	117
5726-BA1	BASIC	55
5726-CB1	COBOL	114
5726-FO1	FORTRAN IV	158
5726-RG1	RPG II	38
5798-NNE	5230 On-Line Data Collection	115

APPLICATION PROGRAMS

		Monthly License Charge
5726-C21	Client Accounting and Financial Reporting System	170
5726-C22	Client Accounting and Financial Reporting System II	170
	Distributors Management Accounting System II (DMAS II):	
5726-D41	Billing	90
5726-D42	Accounts Receivable	61
5726-D43	Inventory Control	81
5726-D44	Sales Analysis	81
	Disributors Management Accounting System (DMAS):	
5726-D4A	Billing	85 ►

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SOFTWARE PRICES

APPLICATION PROGRAMS (Continued)

		Monthly License Charge
5726-D4B	Accounts Receivable	59
5726-D4C	Inventory Control	77
5726-D4D	Sales Analysis	77
	Lumber Dealers Management Accounting System (LDMAC):	
5726-D4E	Billing	87
5726-D4F	Accounts Receivable	59
5726-D4G	Inventory Control	77
5726-D4H	Sales Analysis	77
	Food Distributors Management Accounting System (FDMAS):	
5726-D65	Billing	87
5726-D66	Accounts Receivable	60
5726-D67	Inventory Control	77
5726-D68	Sales Analysis	77
	Distribution Financial Accounting System (DFAS):	
5726-D6A	General Ledger	49
5726-D6B	Accounts Payable	49
5726-D6C	Payroll	63
	Distribution Financial Accounting System II (DFAS II):	
5726-M47	General Ledger	61
5726-M43	Accounts Payable	61
5726-M42	Payroll	83
	Student Administrative System (SAS):	
5726-E31	Student Records	107
5726-E32	Student Accounting	119
5726-E33	Student Scheduling	142
	Financial Institutions Customer Accounting System (FICAS):	
5726-F11	Customer Information File	146
5726-F12	Demand Deposit Accounting	131
5726-F13	Savings Accounting	128
5726-F14	Installment Loan Accounting	148
5726-F52	Management System for Law Firms (MSLF)	328
5726-G21	Public Budgeting and Accounting Application	282
	Hospital Financial Management System (HFMS):	
5726-H11	Patient Billing	52
5726-H12	Accounts Receivable	44
5726-H13	Payroll	87
5726-H14	General Ledger/Accounts Payable	69
5726-H15	Medical Group Management System	163
5726-H16	Medical Group Management System II	227
5726-K11	Membership and Mailing List System	123
	Manufacturing Management Accounting System (MMAS):	
5726-M31	Product Status and Costing	63
5726-M32	Payroll	63
5726-M33	Accounts Payable	49
5726-M34	Accounts Receivable	51
5726-M35	Inventory Management	63
5726-M36	Product Definition and Costing	59
5726-M37	General Ledger	49
5726-M38	Sales Analysis	63
5726-M39	Order Entry and Invoicing	77
5726-M3A	5230 Data Collection Support for System/34	63
	Manufacturing Accounting and Production Information System (MAPICS):	
5726-M41	Production Control and Costing	148
5726-M42	Payroll	83
5726-M43	Accounts Payable	61
5726-M44	Accounts Receivable	61
5726-M45	Inventory Management	81
5726-M46	Product Data Management	134
5726-M47	General Ledger	61
5726-M48	Sales Analysis	81
5726-M49	Order Entry and Invoicing	90
5726-M4A	Data Collection System Support	95
5726-M4B	Material Requirements Planning	148
	Construction Management Accounting System (CMAS):	
5726-M61	Job Costing	51
5726-M62	Accounts Payable	64
5726-M63	Payroll	89
5726-M64	General Ledger	51
	Construction Management Accounting System/34 (CMAS/34):	
5726-M66	Job Costing	55
5726-M67	General Ledger	55
5726-M68	Accounts Payable	74
5726-M69	Payroll and Labor Costing	99
5726-T21	Motor Freight Accounting System	265 ∎