IBM System/3 Models 10&15

MANAGEMENT SUMMARY

As announced on July 30, 1969, the IBM System/3 was oriented primarily toward filling the business data processing needs of small companies that had not previously used computers. For these "entry" users, the System/3 clearly had – and still has – a lot to offer: compactness, ease of operation, surprisingly high internal speed, and an attractively low price-tag.

But when viewed by companies that were already using computers, and by first-time users who had familiarized themselves with competitive equipment, the original System/3 had some serious limitations.

During the past four years, a series of IBM product announcements has eliminated most of these limitations and greatly broadened the system's sales appeal. As a result, the System/3 now has something to offer practically every prospective buyer of small-scale computers. It is equally well suited for use as a stand-alone business data processing system or as a programmable batch terminal in a data communications network.

The System/3 processing unit is byte-oriented and uses IBM's integrated "Monolithic Systems Technology" (MST). Internal speed of the System/3 is surprisingly high. Its core storage cycle time is 1.52 microseconds per one-byte access. Moreover, its add time of 24.4 microseconds for two five-digit operands is faster than that of the System/360 Model 30. Conversely, the System/3's instruction repertoire is far smaller and less powerful than that of the System/360 or System/370.

IBM's low-cost systems for small-scale file processing applications are, when coupled with the transaction-oriented System/3 Model 6, destined to become the industry's most widely used computer systems (with more than 20,000 installed to date). System/3 Model 15 was announced in July 1973 as a bigger and better Model 10, showing early System/3 users that this IBM line of computers was going to become a multi-faceted family of products, much as is the larger System/370. (Both families remain essentially non-compatible.)

CHARACTERISTICS

MANUFACTURER: International Business Machines Corporation 1133 Westchester Avenue, White Plains, New York 10604. Telephone (914) 696-1900.

MODELS: System/3 Model 10 and Model 15

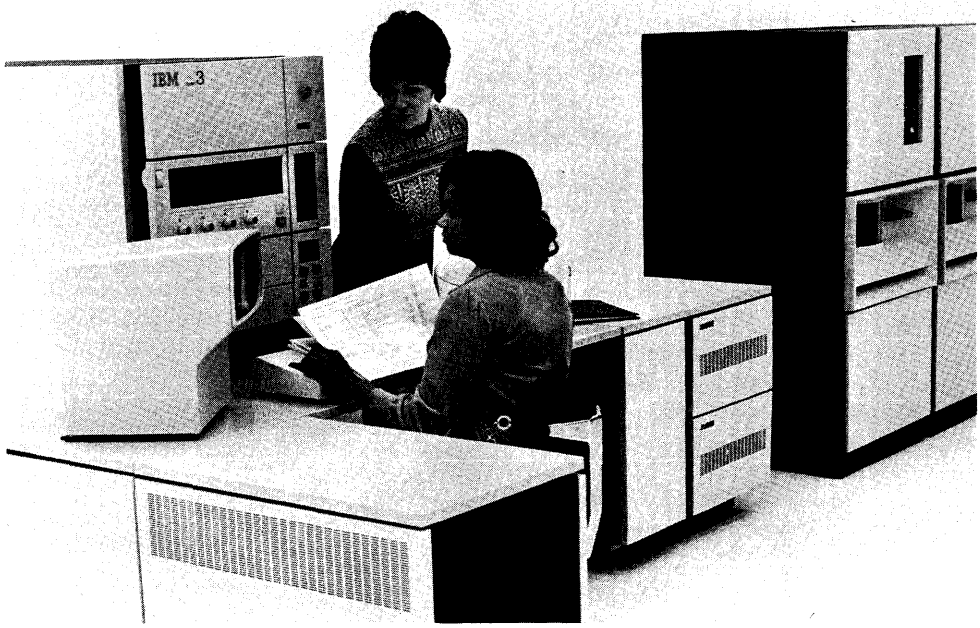
DATA FORMATS

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

FIXED-POINT OPERANDS: Can range from one to 16 digits for source fields and from one to 31 digits for result fields. Logical operands can range from one to 256 bytes.

FLOATING-POINT OPERANDS: No hardware facilities for floating-point arithmetic are provided.

INSTRUCTIONS: four, five, or six bytes long in two-address format; three or four bytes long in one-address format; three bytes long in command format. (Each address can be represented by either a two-byte direct address or a



The July 73-introduced System/3 Model 15 extends the main memory capacity of the small System/3 family to 131K bytes. With its maximum disk storage capacity of 917 million bytes, it's probably not for first-time computer users, but it provides excellent growth potential for System/3 Model 10 users.

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In October, 1970, IBM introduced the System/3 Model 6, a keyboard-oriented system designed to appeal to current users of accounting machines or time-sharing terminals. Simultaneously, the original System/3 was designated the System/3 Model 10. Thus IBM could clearly offer users with small data processing requirements two strikingly different kinds of System 3's: the transaction-oriented Model 6 and the file processing-oriented Model 10. The Model 6 is specifically different from the Model 10 in its peripheral equipment, software, and applications orientation. See Report M11-491-401 for a full description of the System/3 Model 6.

First customer deliveries of card-oriented System/3 Model 10 configurations were made in January 1970, just six months after announcement. Deliveries of disk systems began in the third quarter of 1970. With over 15,000 installations it hardly has to be said that the System/3 Model 10 is the world's most popular computer.

System/3 Model 15

The System/3 Model 15, introduced on July 10, 1973, greatly increases the functional capabilities of IBM's popular small-scale computer line while retaining the proven architecture and software facilities of the earlier System/3 models. Thus, the availability of the Model 15 should ease the minds of thousands of current and prospective System/3 users by eliminating – or at least postponing – the need for a costly, traumatic conversion to a noncompatible system when their needs outgrow the capabilities of their present installations.

The Model 15 represents, in most respects, a bigger, better, and more costly System/3 Model 10. The new model offers up to 131,072 bytes of MOSFET main storage and 91.7 million bytes of disk storage, whereas the Model 10 is limited to a maximum of ~~49,152~~ 65,536 bytes of core storage and 50.8 million bytes of disk storage.

The Model 15 systems software is a compatible superset of the Model 10 software, enhanced to support dual-partition multiprogramming, spooling, device-independent data management, expanded communications control, and other throughput-boosting features (but not virtual storage – at least not yet). Moreover, in addition to accom-

SUMMARY DATA FOR IBM SYSTEM/3 MODELS 10 & 15

	Model 10	Model 15
Announced	July 1969	July 1973
First customer shipments	January, 1970	March 1974*
Basic price:		
Rental	$999	$3,240
Purchase	$44,900	$136,575
Number Installed	15,000	–

*Scheduled

one-byte "displacement," and all instructions contain a one-byte operation code and a one-byte "Q" code.)

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

MAIN STORAGE

STORAGE TYPE: Model 10 utilizes magnetic core and the Model 15 utilizes MOSFET memory technology.

CAPACITY: 8,192, 12,288, 16,384, 24,576, 32,768, 49,152, 65,536, 98,304, or 131,072 bytes.

CYCLE TIME: 1.52 microseconds per one-byte access.

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

STORAGE PROTECTION: None for the Model 10. Write/Fetch Protection, which guards against unauthorized overwriting and/or reading of data in specified 2048-byte segments of storage, is a standard feature of the Model 15.

CENTRAL PROCESSOR

GENERAL: All IBM System/3 Model 10 systems use the model 5410 processor. System/3 Model 15 systems use the model 5415 processor.

INSTRUCTION REPERTOIRE: The Model 10 has 28 instructions, including two-address addition and subtraction of unpacked (one digit per byte), decimal operands, but no multiply or divide. Also included are an edit instruction and addition, subtraction, and comparison of logical characters. In addition to the 28 instructions of the System/3 Model 10, the Model 15 has three new instructions – Load CPU, Store CPU, and Command CPU – which are used to implement its multiprogramming capability.

INSTRUCTION TIMES: The following times, given in microseconds, apply for both the Model 10 and 15. They assume the use of direct (two-byte) operand addresses.

Decimal add (5 digits):	24.4
Decimal subtract (5 digits):	24.4
Dinary (logical) add (5 bytes):	24.4
Binary (logical) subtract (5 bytes):	24.4
Move (5 bytes):	24.4
Compare (5 bytes):	24.4
Edit (5 digits):	24.4
Load or store register (2 bytes):	9.1
Add to register (2 bytes):	9.1
Jump on condition:	4.56

INTERRUPTS: The Model 10 has five levels of program interrupts, in descending priority order: (1) Serial I/O Channel, (2) Unassigned, (3) BSCA, (4) Data Entry Keyboard or Printer-Keyboard, and (5) Dual Program Control (Interrupt Key). Any level of interrupt can interrupt the main program or the servicing of any lower-level interrupt. An interrupt causes a transfer of control to a predetermined location; the interrupt servicing program must store and then restore the index registers and program status register for the interrupted program.

The Model 15 has three additional interrupts including a new I/O Operation End Interrupt, which facilitates spooling, and a new Program Check Interrupt, which improves throughput by preventing errors in one partition from halting the entire system.

CONSOLE: The 3277 Model 1 Display Station, equipped with a 78-key Operator Console Keyboard, is a required component of every Model 15 system. The 3277 displays up to 480 characters, in 12 lines of 40 characters each.

Extra-cost features, called attachments, controls, or channels, must be added to the 5410 and 5415 Processing Units to accommodate each of the standard peripheral devices.

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modating most of the Model 10 peripheral devices, the Model 15 uses a new CRT operator console and can support the 80-column 2560 Multi-Function Card Machine and 2501 Card Reader. Thus, the Model 15 offers Model 10 users a natural and highly welcome growth path with minimum conversion effort.

IBM is also promoting the Model 15 as an appropriate growth system for System/360 Model 20 users who have rebelled against the comparatively high cost of even the smallest System/370 configuration. The Model 15 supports the 2560 MFCM, which is the key peripheral device in most 360/20 installations, and a field-developed program is available to aid in converting 360/20 RPG programs into Model 15 RPG II.

The 5415 Processing Unit has the same basic architecture, instruction set, and cycle time as its Model 10 counterpart, the 5410. Thus, the Model 15's greater throughput is not derived through an increase in raw CPU power but through its increased storage capacity and more powerful software. To support the improved software, IBM has added a number of new facilities to the 5415 Processing Unit:

- Storage Protection, which prevents users' programs from interfering with one another or with the Supervisor.
- I/O Operation End Interrupt, which facilitates multiprogramming by enabling the Model 15 to operate as an interrupt-driven system.
- Program Check Interrupt, which makes it unnecessary to halt the entire system when an error occurs in one partition.
- Two-byte-wide data path for 5444 or 5445 Disk Storage Drives, which reduces the interference with CPU operations imposed by disk input and output.
- Scan/Read for 5445 Disk Storage Drives, which permits a disk index to be scanned and retrieved in a single rotation instead of two.
- An Address Translation Table (ATT), which consists of 32 registers and enables the Model 15 to address up to 131K bytes of storage.

The System/3 Model 15 is generally upward-compatible with the earlier Model 6 and Model 10 systems, but there are a few important caveats. Disk and tape data files and Operation Control Language (OCL), are directly compatible, but all source programs written for a Model 6 or Model 10 must be recompiled before they can be executed under Model 15 SCP. Model 10 programs written in Basic Assembler Language may require changes prior to reassembly. In all cases, naturally, the Model 15 system must include an adequate complement of peripheral equipment.

INPUT/OUTPUT CONTROL

I/O CHANNELS: The 5410 and 5415 Processing Units act as the controller for all System/3 I/O operations. All I/O devices are connected, via the appropriate attachment features, to a single I/O attachment interface called the Input/Output Channel. The channel includes logic to establish the "cycle-stealing" and interrupt priorities and to perform code translations between the punched card and internal EBCDIC codes.

SIMULTANEOUS I/O OPERATIONS: Input/output operations are overlapped with computing through a memory "cycle-stealing" technique. The I/O devices "time-share" the processing unit according to predefined priorities established for each device. The 5415 features a two-byte-wide data path for both 5444 and 5445 disk I/O, which reduces the number of CPU cycles required to service disk I/O requests.

CONFIGURATION RULES: Every System/3 Model 10 requires one 5410 Processing Unit, one 5203 or 1403 Printer, and either one 5424 Multi-Function Card Unit (96-column) or one 1442 Card Read/Punch (80-column); if the 1442 is used, a 5422 disk enclosure with at least one 5444 Disk Storage Drive is also required. Any or all of the following additional peripheral devices can be connected: one or two 5444 Disk Storage Drives, one or two 3410/3411 Magnetic Tape Subsystem with up to four drives, one 1255 Magnetic Character Reader, one or two Binary Synchronous Communications Adapters, and either one 5471 Printer-Keyboard or one 5475 Data Entry Keyboard. To utilize IBM software support, disk-oriented systems must include at least 12K bytes of core storage and one 5444 Disk Storage Drive.

Every System/3 Model 15 requires one 5415 Processing Unit, one 3277 Model 1 Display Station, one 5444 Model A2 Disk Storage Drive, one 1403 Printer (Model 2, 5, or N1) and 5421 Printer Control Unit, and either a 5424 Multi-Function Card Machine, together with the necessary prerequisites. If a 1442 or 2560 is selected as the primary card I/O unit, a 5422 Disk Enclosure is also required.

The basic configuration can be expanded by adding any or all of the following peripheral devices: a second 5444 Disk Storage Drive (Model A2 or A3), one to four 5445 Disk Storage Drives, one 3410/3411 Magnetic Tape Subsystem with up to four drives, one 1255 Magnetic Character Reader or one 3881 Optical Mark Reader (connected via the optional Serial I/O Channel), one or two Binary Synchronous Communications Adapters, one Multiple Line Terminal Adapter (an RPQ feature), and one Local Communications Adapter (which takes the place of the First BSCA and permits local attachment of a 3741 Model 2 Data Station, a 3271 Control Unit, or a 3275 Display Station).

MASS STORAGE

5444 DISK STORAGE DRIVE, MODELS 1, 2 & 3: Models 1 and 2 each consist of one removable single-disk cartridge and one fixed disk on a single drive, served by a single access mechanism with four vertically-aligned heads. Model 3 accommodates one removable single-disk cartridge only. A System/3 can include one or two disk drives, housed in sliding drawers beneath the Multi-Function Card Unit. The following combinations of models and corresponding capacities are available for the Model 10 only.

No. of Drives	Models	Byte Capacity
1	1	2,457,600
1	2	4,915,200
2	2+3	7,372,800
2	2+2	9,830,400

Model 1 has 100 data tracks on each recording surface, while Models 2 and 3 have 200 data tracks per surface. Each track consists of 24 sectors, and each sector can hold a 256-byte record.

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To make the conversion from a Model 10 disk system to a Model 15 even easier, Model 15 users can elect to operate their system under the control of Model 10 software. When this "Model 10 mode" is used, the new features of the Model 15 are ignored and the system operates in the same manner (and, presumably, at about the same speed) as a Model 10.

And what will a System/3 Model 15 user do when he has outgrown the capabilities of his system. At present, he's faced with the same old problem of converting to the System/370 or a competitive computer line. And, despite the availability of upward-compatible System/370 compilers for RPG II, COBOL, and FORTRAN, there are still numerous differences in system control, data management, and operational characteristics which make nearly any System/3-to-370 conversion a costly, time-consuming task. But by the time Model 15 users begin demanding a still bigger and better version of the System/3, the odds are good that IBM will be ready to provide it. System/3 users are making it increasingly clear that they tend to be independent souls who are unwilling to be stampeded into a costly conversion effort to a costly System/370 – and there are so many System/3 users that IBM simply must accommodate them. Therefore, the only reasonable solution seems to be continued expansion and development of the System/3 product line. If IBM doesn't do it, others will. □

For all models, average rotational delay is 20 milliseconds and data transfer rate is 199,000 bytes/second. Average head movement time is 153 milliseconds in Model 1 and 269 milliseconds in Models 2 and 3; minimum head movement time for all three models is 39 milliseconds.

The removable 5540 Disk Cartridge weighs six pounds and is about 15 inches in diameter and 2.5 inches high. It stores 1.22 million bytes when used with the 5444 Model 1 Drive and 2.45 million bytes when used with the 5444 Model 2 or 3.

5444 DISK STORAGE DRIVE, MODELS A1, A2, A3: Provide faster access than the original 5444 drives described above. Average head movement time is 86 milliseconds for Model A1 and 126 milliseconds for Models A2 and A3; minimum head movement time for all three models is 20 milliseconds. In other respects, Models A1, A2, and A3 have the same characteristics as Models 1, 2, and 3, respectively. Disk cartridges can be used interchangeably, and all programs written for the original models will run without change on the faster models. Higher-Performance Disk Attachments (#4501 and #4502) must be added to the 5410 Processing Unit to accommodate the A Model drives. The following combinations of models and resulting capacities are available with the Model 10 and Model 15* systems.

No. of drives	Models	Byte Capacity
1	A1	2,457,600
1	A2	4,915,200
2	A2 + A3	7,372,800
2	A2 + A2	9,830,400

*With the exception of the Model A1, all of the above are available for the Model 15.

5445 DISK STORAGE DRIVE: Provides comparatively large-capacity random-access storage on interchangeable, 11-disk 2316 Disk Packs. Each single-spindle drive holds one pack and stores 20.48 million bytes in 256-byte physical records; when IBM software support is used, all data is recorded in this format. If the System/3 format conventions are followed on a System/360 or System/370, data recorded on 2316 Packs can be interchanged between the systems. Average head movement time is 60 milliseconds, and data transfer rate is 312,000 bytes/second. A maximum of two 5445 drives (one Model 1 and one Model 2) can be connected to a 5410 Processing Unit. The 5410 must be equipped with the appropriate 5445 Disk Attachment and Processing Unit Expansion features. A maximum of four 5445 drives (or 81,92 million bytes of storage) can be connected to a 5415 Processing Unit equipped with the appropriate attachment features. The 5415's Scan/Read feature permits an index in 5445 Disk Storage to be scanned and read during a single revolution of the disk.

The first drive on a system will be a Model 1. The second drive can be either a Model 2 or the Model 1 can be replaced by a Model 3, a two-pack drive.

INPUT/OUTPUT UNITS

See Peripherals/Terminals table.

COMMUNICATION CONTROL

BINARY SYNCHRONOUS COMMUNICATIONS ADAPTER (BSCA): Enables a System/3 to function as a processor terminal communicating with any of the following IBM devices:

- Another similarly equipped System/3.
- Any System/360 or System/370 computer equipped with appropriate communications control facilities.
- A 2770 Data Communications System.
- A 2780 Programmable Buffered Terminal.
- A 3741 Model 2 Data Station.
- A System/7 equipped with the BSCA.

Transmission is in half-duplex binary synchronous mode over a switched, leased, or private line. Either ASCII or EBCDIC transmission code can be used. Transmission over a non-switched data link can occur at 600, 1,200, 2,000, 2,400, 3,600, 4,800, 7,200, 19,200, 40,800, or 50,000 bps. When switched lines are used, transmission speed is limited to 600, 1,200, 2,000, 2,400, or 3,600 bps. BSCA operations are overlapped with computing and other I/O operations.

The BSCA alternately enables a System/3 to operate as a tributary station on a multipoint leased or private line in conjunction with a central System/360 or 370 computer using either OS TCAM or OS or DOS BTAM. In this case the System/3 operates as a compatible member of the IBM family of BSC terminals at transmission rates of 1,200 to 7,200 bps.

Finally, the BSCA can equip the System/3 to function as the control station for a leased or private multipoint communications line supporting the following IBM BSC terminals:

- 3270 Information Display System terminals in single-station or multi-station configurations at 1,200 to 7,200 bps.
- 3735 Programmable Buffered Terminals at 1,200, 2,000, 2,400 or 4,800 bps.
- 2980 General Banking Terminal System at 600 to 4,800 bps.
- System/7 with BSCA.

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The BSCA is an optional feature for the 5410 and 5415 Processing Units; the Processing Unit Expansion Feature A and the Processing Unit Expansion 1 feature, respectively, are prerequisites. Several optional features, in turn, are available to enhance the capabilities of the BSCA. The Text Transparency feature permits transmission and reception of data in eight-bit binary image form as well as in EBCDIC code. The Station Selection feature enables the BSCA equipped System/3 to operate as one of a number of IBM BSC terminals on a multipoint line. The Internal Clock feature generates timing signals for use with modems that lack a clocking facility. The Auto Call feature enables the System/3 to dial and initiate a call to a remote BSC terminal under program control. The EIA Local Attachment permits one 3275 Display Station or one 3271 Display Control Unit to be cable-connected directly to the BSCA without the use of a modem or data communications line.

SECOND BSCA: This optional feature enables a System/3 Model 10 or a Model 15 to control transmissions simultaneously over two communications lines. Either the first BSCA or the Local Communications Adapter is prerequisite. The Second BSCA has the same capabilities, options, and limitations as the First BSCA except that its range of transmission speeds is limited to 600 to 7,200 bps; no broadband facilities are available for the Second BSCA.

LOCAL COMMUNICATIONS ADAPTER (LCA): This optional feature and the 5410 and 5415 Processing Units permits direct, local attachment of either one 3741 Model 2 Data Station, one 3271 Control Unit, or one 3275 Display Station. Data is transferred at 2400 bps in non-transparent EBCDIC mode. The LCA requires the Processing Unit Expansion Feature A on the 5410 and the Processing Unit Expansion 1 feature on the 5415 and cannot be installed in combination with the First BSCA.

MULTIPLE-LINE TERMINAL ADAPTER (MLTA): This RPQ feature for the 5415 Processing Unit permits connection of up to eight communications lines, with multiple low-speed terminals on each line. The MLTA accommodates the following IBM start/stop terminals: 1050 Data Communications System, 2740 and 2741 Communications Terminals, Communicating Magnetic Card Selectric Typewriter (CMCST), and System/7 (supported as a 2740 Model 1.)

SOFTWARE

SYSTEM CONTROL PROGRAMS: These programs, which "perform the system control functions that are basic to every installation", are supplied with the system at no additional charge, in separate versions for card-oriented and disk-oriented configurations. (All other System/3 software in separately priced.)

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CARD-ORIENTED SYSTEM CONTROL PROGRAMS: IBM supplies two principal SCP's for card-oriented systems: a Program Maintenance Program, which facilitates maintenance of program decks, and a System Initialization Program, which initializes a communication area in core storage at the beginning of each day. The programs require a minimum System/3 configuration (8K bytes, printer, and MFCU).

Also available for card-oriented systems is a Remote Job Entry Work Station Support routine that permits a System/3 equipped with a Binary Synchronous Communications Adapter to transmit OS/360 jobs to a central System/360 or 370 computer (256K Model 40 or above) and receive output from the central system upon completion of each job.

DISK-ORIENTED SYSTEM CONTROL PROGRAMS: For disk-oriented systems, IBM supplies four basic types of SPC's: Disk System Management Programs, a Library Maintenance Program, Disk Utility Programs, and a Disk Copy/Dump Program. The Disk System Management Programs include a supervisor and scheduler which provides automatic job-to-job transition, selective retrieval of object programs from a disk library, data management and input/output control, program overlays, a program roll-in/roll-out capability that facilitates the processing of inquiries, and support of the optional Dual Program feature. The Library Maintenance Program creates and updates source and object program libraries in disk storage. The Disk Utilities and Disk Copy/Dump facilitate the initialization and maintenance of disk files. These programs require a System/3 with at least 12K bytes of core storage, one 5444 Disk Storage Drive, a 5203 or 1403 Printer, and 5424 MFCU or 1442 Card Read/Punch, Main memory residence requirements for the Disk System Supervisor range from about 3K to 4.75K bytes, depending upon the system configuration.

Optional SCP facilities for disk-oriented systems include:

- Remote Job Entry Work Station: Enables a System/3 equipped with a BSCA to transmit OS/360 jobs to a central System/360 or 370 computer (256K Model 40 or above) and receive output from the central system upon completion of each job; requires about 5,120 bytes of main memory.
- IBM 5445 Disk Storage Drive Feature: Provides software support for the 5445 Disk Storage Drive as an I/O and data storage device – but not as a system or library residence device. Includes disk utility and copy/dump routines to facilitate the creation and maintenance of disk files.
- Magnetic Tape Support Feature: Provides for the initialization and use of magnetic tape files. The feature will accommodate fixed or variable-length records, blocked or unblocked records, ANSI or IBM label formats, and ASCII or EBCDIC data codes. It will also accumulate and record tape error statistics.
- IBM 3881 Optical Mark Reader Feature: Provides system subroutines to handle data management and input control functions associated with on-line use of the 3881.
- Macros Feature: Permits the use of user-coded macro-instructions for the control of nonstandard data management and I/O functions.
- BSCA Multiline/Multipoint Feature: Provides communications support for a point-to-point switched, point-to-point nonswitched, or multipoint configuration with the System/3 as a multidropped terminal or control station. Can support two BSCA's with different configurations. The Macros Feature (above) is a prerequisite.
- Communications Control Program: Provides control facilities for multi-terminal communications systems. IBM 3270 Information Display Systems or 3735 Programmable Buffered Terminals can be connected to the System/3 via a BSCA, and the System/3, in turn, can operate as a tributary terminal to a host System/360 or 370 computer. At least 24K bytes of main memory are required in the System/3 for any optional SCP facilities.

System/3 Model 15

The Model 15 System Control programs are functionally compatible with their Model 10 counterparts, with additions to support two-partition multiprogramming, disk spooling, and the new Model 15 CPU features and peripheral devices. Source programs written for a System/3 Model 6 or Model 10 must be recompiled prior to operation under Model 15 SCP, but data files and OCL (Operation Control Language) are directly compatible. To further ease the transition from a Model 10 to a Model 15, it is possible to operate a Model 15 system under Model 10 software; when this is done, the new features of the Model 15 are not used and the system operates in the same manner as a

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Model 10. In so doing, the user loses the facility for multiprogramming.

The most significant new feature of the Model 15 SCP is its capability to support multiprogramming in any of three environments: single batch with spooling, dual batch with spooling, or batch, communications, and spooling. The Supervisor controls the allocation of CPU time, giving Partition 2 (communications) priority over Partition 1 (batch). When an interrupt occurs, the Supervisor seizes control, processes the interrupt and transfers control to the highest-priority program that is in a ready state. A high-priority program gives up control whenever it encounters a condition that prevents further processing. The processing of a low-priority program is suspended upon completion of an event (e.g., an I/O operation) for which a higher-priority program is waiting.

When the Communications Control Program (CCP) is used, the communications partition can be further divided into smaller subpartitions ranging from 2K to 32K bytes in size. Multiple communications-oriented application programs can be executed concurrently in these subpartitions under CCP control. A detailed description of the CCP is presented below.

Spooling is another important new feature of the Model 15 SCP. Spooling can increase system throughput by reducing the amount of time the CPU must spend awaiting the completion of card and printer I/O operations.

Moreover, it enables a single input or output device to serve both partitions. When spooling is employed, each job's normal card input (including OCL) is read by the card reader and stored in an input queue on a 5445 Disk Storage Drive, where it can be accessed at disk I/O speed when the job is processed. Similarly, the job's output is stored in a disk output queue and then printed and/or punched at a later time. Spooling on the Model 15 requires a 5445 Disk Storage Drive and from 8K to 20K bytes of main storage, depending on the options selected.

Other new or improved facilities of the Model 15 SCP include: (1) device independent data management, which allows a sequential file to be assigned at execution time to any one of numerous I/O devices; (2) system-assigned half defaults, which reduce the need for operator intervention when errors are encountered; (3) reduced system overhead through improved transient handling, reduced interpartition interlock time, and faster operator communication via the CRT console; and (4) additional OCL statements and options, which define program processing in the multiprogramming and spooling environments.

The Model 15 SCP supports all the peripheral devices available for the system except the 1255 Magnetic Character Reader and the 3881 Optical Mark Reader; these devices are supported only by Model 10 system software. The SCP also supports the following new features of the Model 15 CPU: I/O Operation End Interrupt, Program Check Interrupt, Storage Protection, console CRT display, and expanded main storage capacities to 131K bytes.

The following software facilities which were optional for the Model 10 are standard features of the Model 15 SCP: Magnetic Tape and 5445 Disk Storage Support, Macros, Overlay Linkage Editor, Checkpoint/Restart, and BSCA Multiline/Multipoint. The Macros facility permits the use of user-coded macro-instructions to control nonstandard data management and I/O functions. The Overlay Linkage Editor creates loadable programs from multiple relocatable modules. The Checkpoint/Restart facility aids users in writing checkpoint records and in restoring interrupted programs from the last checkpoint rather than from the beginning. The BSCA Multiline/Multipoint facility provides communications support for a point-to-point switched, point-to-point nonswitched, or multipoint configuration with the System/3 as a multidropped terminal or control station; it can support two BSCA's with different configurations.

The Model 15 SCP can be used on the minimum Model 15 system, as defined in the "Configuration Rules" section of this report. Spooling, however, requires the addition of a 5445 Disk Storage Drive. The minimum main storage requirement from the Supervisor is 18K bytes when a variety of peripheral devices must be supported. Spooling adds another 8K to 20K bytes to the residence requirement, depending on the options selected. Batch partitions can range from 8K to 49K bytes in size. The Model 15 SCP is scheduled for availability in March 1974.

COMMUNICATIONS CONTROL PROGRAM (CCP): This optional SCP component provides control facilities for multi-terminal communications systems connected to a System/3 via either the BSCA or the MLTA (see "Communication Control," above). The System/3, in turn, can operate as a tributary terminal to a host System/360 or 370 computer. The CCP: (1) permits programs coded in COBOL, FORTRAN, or RPG II to access the terminals; (2) handles resource management to reduce contention between programs accessing the same files; (3) monitors the terminals and responds to their commands; and (4) controls the concurrent execution of multiple application programs within the CCP partition. The CCP can occupy a partition larger than the normal 49K-byte maximum size, but individual programs running under CCP control are limited to 32K bytes. When used with a BSCA-equipped System/3, the CCP supports the following IBM terminals; other System/3's (in a point-to-point switched or non-switched arrangement), 3270 Information Display Systems (in a multipoint non-switched arrangement), or 3735 Programmable Buffered Terminals (in any of the above arrangements). The CCP is scheduled to become available to Model 15 users in September 1974.

RPG II (REPORT PROGRAM GENERATOR): This is the principal programming system for the IBM System/3. The programmer, using five different types of preprinted specification sheets, 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. These specifications are transcribed into punched cards and fed into the system. The RPG processor then generates a machine-language object program to perform the specified functions.

The RPG II language is an extended version of earlier IBM RPG languages. It provides the facilities of System/360 RPG plus at least 20 useful extensions, including the ability to define and execute closed subroutines, to use dual input/output areas, and to debug programs at the source-language level.

Two different versions of RPG II are offered for the Model 10:

CARD RPG II: Can be used on a minimum System/3 configuration consisting of an 8K Processing Unit, a 5203 or 1403 Printer, and a 5424 MFCU. Permits full utilization of the capabilities of these three devices. The only limitations on the number of input and/or output files are those imposed by the number of physical I/O devices available. Object programs are produced in the form of punched card decks which can be loaded for immediate execution; there are no associated control programs. The optional Magnetic Tape Feature enables Card RPG II programmers to handle sequential input and output files on magnetic tape; the records must be fixed length, and may be either blocked or unblocked and in either EBCDIC or ASCII code.

DISK RPG II: Requires a System/3 Model 10 with at least a 12K Processing Unit, one 5444 Disk Storage Drive, a 5203 or 1403 Printer, and a 5424 MFCU or 1442 Card Read Punch. Permits full utilization of the capabilities of these devices. Provides all the functions of Card RPG II plus disk-file data management facilities, automatic overlays for programs which exceed core storage capacity, and six other useful language extensions. Permits three basic types of disk file organization: sequential, indexed, and direct. With all three types of organization, processing may be either

IBM System/3 Models 10 & 15

PERIPHERALS/TERMINALS

DEVICE	DESCRIPTION	SPEED
MAGNETIC TAPE EQUIPMENT		
3410-1	9-track, 12.5 ips, 1600 bpi	20 KB
3410-2	9-track, 25 ips, 1600/800 bpi	40/20 KB
3410-3	9-track, 50 ips, 1600/800 bpi	80/40 KB
3411-1	9-track, 12.5 ips, 1600 bpi (includes controller)	20 KB
3411-2	9-track, 25 ips, 1600/800 bpi (includes controller)	40/20 KB
3411-3	9-Track, 50 ips, 1600/800 bpi (includes controller)	80/40 KB
CARD EQUIPMENT		
5424-A1	Multi-Function Card Unit, reads, punches, prints, 96 columns	250/60 cpm
5424-A2	Multi-Function Card Unit, reads, punches, prints, 96 columns	500/120 cpm
1442-6	Card Read Punch, 80 columns	300/60 cpm
1442-7	Card Read Punch, 80 columns	400/120 cpm
2501-A1	Reader, 80-column	600 cpm
2501-A2	Reader, 80 column	1000 cpm
2560-A1	Multi-Function Card Unit, reads, punches, prints, 80-column	500/120 cpm
2560-A2	Multi-Function Card Unit, reads, punches, prints, 80-column	310/90 cpm
PRINTERS		
5203-1	46, 120 or 132 columns chain, 48 characters	100 lpm
5203-2	96, 120, or 132 columns, chain, 48 characters	200 lpm
5203-3	96, 120, or 132 columns, chain, 48 characters	
1403-2	132 columns chain/train, 48 characters	600 lpm
1403-5	132-columns, chain/train, 48 characters	465 lpm
1403-N1	132-columns, chain/train, 48 characters	1100 lpm
OPTICAL READERS		
1255-1	MICR reader, 6 stackers	500 dpm
1255-2	MICR reader, 6 stackers	750 dpm
1255-3	MICR Reader, 12 stackers	750 dpm
3881-1	Mark Reader, on-line	4000 to 6000/hour
3881-2	Mark Reader, off-line	3700 to 5400/hour
PRINTER-KEYBOARD		
5471	44-Key typewriter-style Console	15.5 cps

sequential or random. The optional Magnetic Tape Feature enables Disk RPG II programmers to handle seuqential input and output files on magnetic tape; the records must be fixed length, and may be either blocked or unblocked and in either EBCDIC or ASCII code. The 5445 Disk Storage Drive Feature allows RPG II users to process sequential, indexed, or direct data files on 5445 Drives.

RPG II TELECOMMUNICATIONS FEATURE: This optional extension of either Card or Disk RPG II facilitates the transmission and reception of binary synchronous data over voice-grade or high-speed communications lines. The programmer fills out an RPG II Telecommunications Specification Sheet, which specifies the functions to be performed. The feature permits a System/3 equipped with the BSCA to operate in any of the following communications modes; receive only, transmit only, receive with conversational reply, transmit with conversational reply, or alternate transmit and receive file. The System/3 can function as a terminal in one of three types of networks: point-to-point switched, point-to-point nonswitched, or multipoint.

RPG II AUTO REPORT FEATURE: This optional enhancement of Disk RPG II is a precompiler that reduces the coding effort required to prepare report programs. A single Auto Report output filed specification written by the programmer can result in the generation of RPG II statements to indicate printing with editing, insert column headings, control spacing and horizontal alignment of the data, define total fields, accumulate totals by control levels, and flag total lines with asterisks. The Auto Report functions may be specified for only one printer file in any RPG II program. Auto Report also provides a COPY statement that permits RPG II source statements to be copies from a disk library into source programs that are about to be compiled.

IBM System/3 Models 10 & 15

Model 15 RPG II provides all the facilities of Model 10 Disk RPG II plus device-independent data management variable-length magnetic tape records, support of the 2501 Card Reader, 2560 MFCM, and 3277 Display Station, and several other new facilities. In addition, four features which are separately priced options for the Model 10 are included in the price of Model 15 RPG II: Telecommunications Auto Report, Magnetic Tape support, and 5445 Disk Storage support.

COBOL: The System/3 Subset ANS COBOL Compiler supports these six modules of the American National Standard COBOL language: Nucleus (Level 1), Sequential Access (Level 1), Random Access (Level 1), Table Handling (Level 2), Segmentation (Level 1), and Library (Level 1). The compiler also supports certain elements of higher-level ANS COBOL modules and some IBM extensions. The ANS Sort and Report Writer modules, however, are not implemented. System/3 COBOL compilers for the System/360 and 370, and is a superset of IBM 1130 COBOL. The Model 15 COBOL compiler provides all the facilities of System/3 Model 10 COBOL, plus the ability to use the SCP Roll-in/Roll-out routines, support of multivolume indexed disk files, and support of the 2501 Card Reader, 2560 MFCM, and 3277 Display Station.

FORTRAN: The System/3 Disk FORTRAN IV compiler accepts source programs written in the IBM System/360 Basic FORTRAN IV language, which encompasses American National Standard Basic FORTRAN. It also accepts programs written in IBM 1130 Basic FORTRAN IV with minor modifications. Language extensions beyond the Basic FORTRAN level include the DEBUG facility, the IMPLICIT statement, the relational IF statement, and explicit length specification for the INTEGER and REAL Type statements. Also included are commercial subroutines which perform essentially the same functions as the IBM 1130 Commercial Subroutine Package. The Model 15 FORTRAN compiler provides all the facilities of System/3 Model 6 and Model 10 FORTRAN, and also supports the new I/O devices available for the Model 15.

BASIC ASSEMBLER: Converts programs coded in a symbolic assembly language into executable object programs. Creates stand-alone programs that have no defined interfaces with the other System/3 software support. May be used to assemble relocatable subroutines for use with Card or Disk RGP II programs. The Model 15 Basic Assembler provides all the facilities of the Model 10 Basic Assembler, plus mnemonic operation codes to support the new Model 15 instructions and several other minor improvements.

DISK SORT: Sorts disk files into either ascending or descending sequence. Accepts files organized in sequential, indexed, or direct fashion. Can perform a full-record sort, a tag sort (yielding a file of three-byte record addresses arranged in the desired sequence), or a "tagalong" sort (yielding a sequenced file of records containing only the key fields and data fields specified by the user). The Model 15 Disk Sort program is functionally identical to the Model 10 Disk Sort with the 5445 Disk Storage Drive feature. Up to four 5445 drives are supported for use as input, output, or work files.

TAPE SORT: Sorts fixed-length records on magnetic tape files, in either blocked or unblocked format and EBCDIC or ASCII data code. The Model 15 Tape Sort program is functionally identical to the Model 10 Disk-Resident Magnetic Tape Sort program.

CARD UTILITIES: A set of four disk-resident programs designed to handle a variety of punched card, utility functions. The Sort/Collate Program supports either the 5424 MFCU or the 2560 MFCM and performs numerous sorting, merging, matching, selecting, and sequencing checking functions. The Card List Program lists 80-column or 96-column cards on the printer without reformatting. The Reproduce/Interpret Program handles the reproduction and/or interpretation of 80-column or 96-column cards, with or without reformatting. The Gang-Punch Program (new for the Model 15) handles interspersed master card gangpunching, count-controller gangpunching, and punching based on matching control fields in master and detail cards. Three of the Model 10 Card Utilities programs are not included in the Model 15 Card Utilities: Data Recording, Data Verification, and 80-96 Conversion.

DATA/3: This new System/3 Program Product generates terminal control programs for the following types of applications: inquiry, inquiry with update, data entry, and data entry with master file input. The programmer fills out two RPG-like forms: a data description form and a program definition form. DATA/3 uses this information to generate RPG II source programs, which are subsequently compiled and executed. Programs generated by DATA/3 support the 3270 Information Display System and both the 5444 and 5445 Disk Storage Drives. DATA/3 can be used on either a System/3 Model 10 or Model 15, in connection with either the Multiline/Multipoint software of the Communications Control Program. The planned availability dates are March 1974 for the Model 10 and May 1974 for the Model 15.

PRICING

POLICY: IBM offers the System/3 Models 10 and 15 on a purchase or rental basis. No three- or five-year leases are available. The Standard IBM rental contract includes equipment maintenance and entitles the customer up to 176 hours of billable time per month. Time used in excess of that amount is billed, for most System/3 components, at an extra-use rate of 10% of the basic hourly rate (i.e. 10% of 1/176 of the monthly rental for each hour of extra use).

SOFTWARE: System/3 users receive the basic System Control Programs at no additional cost. All other IBM software, including compilers and utility routines, is priced separately. Prices of the current IBM Program Products are listed at the end of this report.

SUPPORT: IBM Systems Engineering assistance is available to System/3 users at a basic charge of $23.75 per hour.

EDUCATION: Two day introductory courses are offered at no charge. Various other System/3 courses are available at costs averaging about $40 per student per day.

EQUIPMENT: The folliwng typical purchase and rental prices include controllers and adapters.

System/3 Model 10

MINIMUM CARD SYSTEM: Consists of 8K System/3 Model 10/5410 Processing Unit, 5424, Model A1 MFCU, and 5203 Model 1 Printer (with 96 print positions). Monthly rental, $999. Purchase price, $44,900.

For the above configuration with the faster 5424 Model A2 MFCU and 5203 Model 2 Printer: Monthly rental, $1,211. Purchase price, $50,900.

TYPICAL DISK SYSTEM: Consists of 12K 5410 Processing Unit, 5424 Model A2 MFCU, 5203 Model 2 Printer (with 120 print positions), 5471 Printer-Keyboard, and one 5444 Model 2 Disk Storage Drive (4.90 million bytes). Monthly rental, $1,930. Purchase price, $82,145.

For the above configuration with a 32K Processing Unit: Monthly rental, $2,535. Purchase price, $100,805.

EXPANDED DISK SYSTEM: Consists of 49K 5410 Processing Units, 5424 Model A2 MFCU, 1403 Model N1 Printer, 5471 Printer-Keyboard, two 5444 Model A2 Disk Storage Drives (9.8 million bytes), and two 5445 Disk Storage Drives (41 million bytes). Monthly rental, $5,509. Purchase price, $225,135.

System/3 Model 15

IBM System/3 Models 10 & 15

MINIMUM SYSTEM: The basic configuration required to utilize the Model 15 programming support consists of a 5415 Model A17 Processing Unit (49K bytes), 3277 Model 1 Display Station, 1403 Model 5 Printer, 5425 Model A1 MFCU, and one 5444 Model A2 Disk Storage Drive, plus all necessary attachments and control units. Monthly rental (including maintenance), $3,240. Purchase price, $136,575.

EXPANDED SYSTEM: A typical large Model 15 disk system consists of a 5415 Model A20 Processing Unit (131K bytes), 3277 Model 1 Display Station, 1403 Model N1 Printer, 2560 Model A1 MFCM, 2501 Model A2 Card Reader, one 5444 Model A2 Disk Drive, and four 5445 Disk Storage Drives, plus all necessary attachments and control units. Monthly rental (including maintenance), $6,900. Purchase price, $289,330. ■

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (short-term lease)*
PROCESSOR AND MAIN STORAGE				
5410	Model 10 Processing Unit (for non-disk systems)			
	Model A2; 8,192 bytes	$ 16,000	$38	$ 328
	Model A3, 12,288 bytes	21,300	42	434
	Model A4; 16,384 bytes	22,040	42	555
	Model A5; 24,576 bytes	39,220	56	800
	Model A6; 32,768 bytes	39,960	56	1,040
	Model A7; 49,152 bytes	57,870	78	1,360
5410	Model 10 Processing Unit (for disk system)			
	Model A12: 8,192 bytes	22,600	84	461
	Model A13; 12,288 bytes	27,790	88	565
	Model A14; 16,384 bytes	28,540	88	685
	Model A15; 24,576 bytes	45,710	102	930
	Model A16; 32,768 bytes	46,450	102	1,170
	Model A17; 49,152 bytes	64,360	124	1,490
3500	Dual Program Feature (for 5410)	5,720	1	116
5732	Processing Unit Expansion Feature A (for 5410)	1,820	3	37
5415	Model 15 Processing Unit:			
	Model A17; 49,152 bytes	63,000	210	1,510
	Model A18; 65,536 bytes	67,000	215	1,610
	Model A19; 98,304 bytes	78,000	220	1,860
	Model A20; 131,072 bytes	86,000	230	2,060
5501	Power Supply Expansion	2,250	1.00	50
5733	Processing Unit Expansion 1	800	0.50	20
5734	Processing Unit Expansion 2 (5733 is prerequisite)	2,200	1.00	55
5735	Processing Unit Expansion 3 (5734 is prerequisite)	800	1.00	20
CONSOLE				
3277	Display Station, Model 1 (required)	3,400	7	75
4632	78-Key Operator Console Keyboard (required on 3277)	1,400	11	35
MASS STORAGE				
5444	Disk Storage Drive			
	Model 1; 2.46 million bytes	8,550	47	164
	Model 2; 4.92 million bytes	10,280	47	270
	Model 3; 2.46 million bytes	8,550	47	164
	Model A1; 2.46 million bytes	8,450	65	200
	Model A2; 4.92 million bytes	10,075	65	300
	Model A3; 2.46 million bytes	8,450	65	200
5540	Disk Cartridge (for 5444 drives)	175	Time & Maint.	Purchase Only

*Rental prices include equipment maintenance.

IBM System/3 Models 10 & 15

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (short-term lease)*
MASS STORAGE (Continued)				
6378	Second Disk Attachment (required on 5410 and 5415 for a 5444 2 and 3 series)	$2,515	$ 5	$ 47
4501	Higher-Performance First Disk Attachment	980	1	20
4502	Higher-Performance Second Disk Attachment (required on 5410 for a 5444 Mod. A3 or 2nd 5444 Mod. A2; #6378 is a prerequisite)	980	1	20
5445	Disk Storage Drive:			
	Model 1; first 5445 on 5410 or 5415; 20.48 million bytes	15,750	85	350
	Model 2; second 5445 on 5410 or 5415; 20.48 million bytes	15,075	80	335
	Model 3; dual-pack 5445, 40.76 million bytes	30,825	165	685
3901	First 5445 Disk Attachment (for 5410 and 5415); required for Model 1 and 3.	20,000	33	500
3902	Second 5445 Disk Attachment for 5410; required for Model 2 and 3.	600	1	15
3903	Second 5445 Attachment (for 5415); required for Model 2 or Model 3.	3,000	1	75
5732	Processing Unit Expansion A (required on 5410 for connection of #3901)	1,820	3	37
5733	Processing Unit Expansion B (required on 5410 if both #3901 and #2074, BSCA, are installed)	800	1.50	20
INPUT/OUTPUT UNITS				
3410	Magnetic Tape Unit:			
	Model 1; 20 KB	7,700	45	185(2)
	Model 2; 40/20 KB	10,300	50	245(2)
	Model 3; 80/40 KB	12,800	55	305(2)
3411	Magnetic Tape Unit and Control:			
	Model 1; 20 KB	17,000	70	405(2)
	Model 2; 40/20 KB	21,600	75	515(2)
	Model 3; 80/40KB	26,300	80	625(2)
3211	Single Density Feature (for 3410 & 3411, Models 2 & 3 only)	2,500	7.50	55(2)
3221	Dual Density Feature (for 3410 & 3411, Models 2 & 3 only)	3,600	27	80(2)
7003	System/3 Attachment (required on 3411)	3,150	3	75(2)
7951	3411 Magnetic Tape Attachment (required on 5410 Processing Unit)	4,800	10	160
5424	Multi-Function Card Unit:			
	Model A1; reads 250cpm, punched and prints 120 cpm	13,320	200	429
4100	MFCU Attachment (required on 5415 for 5424 Mod. A1)	4,450	14	84
4101	MFCU Attachment (required on 5415 for 5424 Mod. A2; 4100 is prerequisite)	900	2	16
1442	Card Read Punch			
	Model 6; reads 300 cpm punches 80 cols/sec.	14,140	51	257
	Model 7; reads; 400 cpm, punches 160 cols/sec.	15,255	61	370
3950	5415 Coupling (required on 1442)	1,475	1	30
4130	1442 Attachment (required on 5415)	9,310	15	190
2501	Card Reader (Model 15 only)			
	Model A1; 600 cpm	11,010	35	195
	Model A2; 1000 cpm	11,240	49	255

*Rental prices include equipment maintenance.

(2) A discount of 8% or 16% from these rental prices is available under a 12-month or 24-month fixed-Term Lease, respectively.

IBM System/3 Models 10 & 15

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (short-term lease)*
INPUT/OUTPUT UNITS (Continued)				
3630	2501 Coupling (required on 2501)	$ 150	$ NC	$ 5
8090	2501 Attachment (required on 5415)	6,700	7.50	150
2560	Multi-Function Card Machine (Model 15 only):			
	Model A1; reads 500 cpm, punches 160 col/sec.	27,055	97	615
	Model A2; reads 310 cpm, punches 120 col/sec.	19,885	97	480
8100	2560 MFCM Attachment (required on 5415)	6,300	16	150
1580	Card Print Control (for 5415)	1,250	3	25
Card Print Feature for 2560 Model A1:				
1575	First Two Lines (requires 1580 on 5415)	5,880	16	135
1576	Second Two Lines	5,880	16	135
1577	Third Two Lines	5,880	16	135
5422	Disk Enclosure (required for attachment of 5444 Disk Storage Drives when 5424 MFCU is not used)	4,900	12	100
5203	Printer:			
	Model 1; 100 lpm, 96 positions	11,230	67	243
	Model 2; 200 lpm, 96 positions	12,480	76	296
	Model 3; 300 lpm, 96 positions	17,400	127	435
3475	Dual-Feed Carriage (for 5203)	3,890	20	79
4730	Additional Chain Cartridge (for 5203 Mod. 1 & 2)	3,890	1	79
4740	Additional Chain Cartridge (for 5203 Mod. 3)	2,910	33	110
5558	24 Additional Print Positions (for 5203)	1,590	2	53
5560	36 Additional Print Positions (for 5203)	2,380	2	79
8639	Universal Character Set Attachment (for 5203)	318	1	10
3970	Printer Attachment (required for 5203 Mod. 1)	3,100	10	53
3971	Printer Attachment (required for 5203 Mod. 2)	3,100	10	58
3972	Printer Attachment (required for 5203 Mod. 3)	4,525	13	95
3480	Dual Feed Carriage Control (required on 5410 for #3475 on 5203)	1,290	1	26
8642	Universal Character Set Control (required on 5410 for #6639 on 5203)	477	1	15
1403	Printer:			
	Model 2; 600 lpm, 132 positions	28,030	159	750(2)
	Model 5; 465 lpm, 132 positions	26,800	NA	580(2)
	Model N1; 1100 lpm, 132 positions	33,970	163	875(2)
1416	Interchangeable Train Cartridge (for 1403 Mod. N1)	2,910	Time & Mat'l	97
1376	Auxiliary Ribbon Feeding (for 1403 Mod. 2 or 5)	2,540	14.75	73(2)
4740	Interchangeable Chain Cartridge Adapter (for 1403 Mod. 2 or 5)	2,580	NC	73(2)
8640	Universal Character Set Feature (for 1403 Mod. N1)	380	1.75	10(2)
8641	Universal Character Set Feature (for 1403 Mod. 2)	380	1.75	10(2)
5421	Printer Control Unit (required for 1403 Mod. 2, 5, or N1)	12,740	26	260
4135	1403 Model 5; Printer Attachment	4,700	21	110
4140	1403 Model 2 Printer Attachment	5,150	21	120
4150	1403 Model N1 Printer Attachment	5,650	21	175
1255	Magnetic Character Reader:			
	Model 1; 500 dpm, 6 stackers	38,645	210	805
	Model 2; 750 dpm; 6 stackers	44,260	335	980
	Model 3; 750 dpm, 12 stackers	60,240	440	1,300

*Rental prices include equipment maintenance.

(2) A discount of 8% or 16% from these rental prices is available under a 12-month or 24-month Fixed-Term Lease, respecitvely.

IBM System/3 Models 10 & 15

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (short-term lease)*
INPUT/OUTPUT UNITS (Continued)				
3215	Dash Symbol Transmission (for 1255)	$ 35	$ NC	$ 50(1)
4380	51-column Card Sorting (for 1255)	720	NC	15
4520	High-Order Zero & Blank Selection (for 1255 Mod. 3 only)	1,440	5	30
7060	Self-Checking Numbers (for 1255)	2,330	2.50	49
6303	System/3 Adapter (required on 1255)	5,820	4	121
7081	Serial I/O channel (required on 5415 for connection of 1255 or 3881)	7,790	6	159
3881	Optical Mark Reader:			
	Model 1; for on-line use	56,000	140	1,150(3)
	Model 2; for off-line use	51,000	110	1,050(3)
1471	BCD Read (for 3881)	2,350	1.50	56(3)
3450	Document Counters (for 3881)	930	2	22(3)
3550	Dual Density (for 3881 Model 2 only)	5,900	0.50	141(3)
3801	Expanded Storage (for 3881)	2,350	0.50	56(3)
6451	Serial Numbering (for 3881)	6,900	25	165(3)
5471	Printer-Keyboard	4,980	32	106
4110	Printer-Keyboard Attachment (required on 5410)	2,955	5	53
5475	Data Entry Keyboard	2,380	7	42
4120	Data Entry Keyboard Attachment (required on 5410)	2,675	1	47
5486	Card Sorter:			
	Model 1; 1000 cpm	4,690	38	90
	Model 2; 1500 cpm	5,370	58	121
5496	Data Recorder	7,600	54	155
COMMUNICATIONS EQUIPMENT				
2074	Binary Synchronous Communications Adapter (requires #5733 on 5415 Processing Unit)	12,300	65	280
1315	Auto Call Feature (for #2074)	2,075	1	42
3601	EIA Local Attachment (for 2074)	1,000	1	25
4703	Internal Clock Feature (for #2074)	1,295	1	26
7477	Station Selection Feature (for #2074)	1,035	1	21
7850	Text Transparency Feature (for #2074)	1,035	1	21
2084	Binary Synchronous Communications Adapter, Second (#2074 is a prerequisite)	12,300	65	280
1325	Auto Call Feature (for #2084)	2,075	1	42
3602	EIA Local Attachment (for #2084)	1,000	1	25
4723	Internal Clock (for #2084)	1,295	1	26
7487	Station Selection Feature (for #2084)	1,035	1	21
7851	Text Transparency Feature (for #2084)	1,035	1	21
4765	Local Communication Adapter (permits local attachment of a 3741 Model 2 Data Station, a 3271 Control Unit, or a 3275 Display Station)	6,500	28	150

*Rental prices include equipment maintenance.

(1) One-time charge.

(3) A discount of 15% from these rental prices is available under a 24-month Extended-Term Lease.

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SOFTWARE PRICES

	Monthly License Fee
SYSTEM/3 MODEL 10	
Program Products — Systems	
ANS COBOL Subset Compiler	75
Card RPG II	35
Magnetic Tape Feature	30
Telecommunications Feature	35
Card System Utilities	10
Card Magnetic Tape Sort Programs	70
Disk FORTRAN IV	100
Disk RPG II	45
Telecommunications Feature	35
5445 Disk Storage Drive Feature	30
Auto Report Feature	15
Magnetic Tape Feature	30
Disk Sort	10
5445 Disk Storage Drive Feature	50
Disk Magnetic Tape Sort Programs	70
Disk-Resident Card Utilities	10
1255 Magnetic Character Reader Utility	60
Program Products — Applications	
Apparel Business Control (card)	75
Appropriation Accounting System (card)	120
Bill of Material Processor (disk)	50
Card Bill of Material and Requirements Planning	65
Citation Processing System (card)	120
Hospital Accounts Receivable (card)	35
Hospital Patient Billing (card)	65
Inventory and Requirements Planning (disk)	75
Job Analysis System (disk)	70
Law Enforcement System (card)	80
Optimum Blending (card)	90
Order Point Technique for Inventory Mgmt (card)	50
Property and Liability Agency Accounting (card)	65
Retail Unit Inventory Techniques (card)	75
Utility Billing System (card)	80

	Single Use Charge
Application Customizer Service — Card Systems:	
Order Writing and Invoicing	350
Inventory Accounting	325
Accounts Receivable	325
Sales Analysis	305
Payroll	410
General Ledger	280
Accounts Payable	370
Labor Distribution	370

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SOFTWARE PRICES

	Single Use Charge
Application Customizer Service — Disk Systems:	
Order Writing and Invoicing	705*
Inventory Accounting and Management	680*
Accounts Receivable	655*
Sales Analysis	630*
Application Development Service — Card Systems:	
Order Writing and Invoicing	1,525
Inventory Accounting	1,075
Accounts Receivable	1,400
Sales Analysis	1,300

	Monthly License Fee
SYSTEM/3 MODEL 15	
Program Products — Systems	
ANS COBOL Subset Compiler (5704-CB1)	75
Basic Assembler (5704-AS1)	75
Card Utilities (5704-UT1)	15
Disk Sort (5704-SM1)	40
FORTRAN IV (5704-F01)	100
Magnetic Tape Sort (5704-SM2)	70
RPG II (5704-RG1)	75
Program Products — Applications	
Bill of Material Processor (5703-M41)	50
DATA/3	120
Health, Welfare and Pension Funds (5703-N11)	175
Inventory and Requirements Planning (5702-M52)	75
Property and Liability Agency Accounting System (5701-N21)	65
System for Television and Radio (5702-K11)	375

*$100 Additional charge for Customized Source Card