IBM 4300 Series

MANAGEMENT SUMMARY

With the announcement of the 4361 and 4381 in September 1983, IBM officially became a competitor in the supermini market. Although most industry hands regard the 4300 machines as mainframes, IBM explicitly announced the 4361 and 4381 as "powerful superminis" and, by implication, conferred that designation upon the other members of the series.

The 4300 Series systems as a group do, in fact, exhibit a number of the characteristics associated with superminis: 32-bit-word addressing, memory capacities of 16 megabytes and below, and capacity for extensive expandability of the basic system. No matter how the machines in the 4300 Series are categorized, however, IBM has continued in recent months to build on this established and highly regarded line of systems.

Since its introduction in January 1979, the 4300 Series has grown to include 13 model groups. The four newest members of the 4300 processor family are the 4361 Model Groups 4 and 5 and the 4381 Model Groups 1 and 2. The two 4361 processors provide a growth path for entry-level systems using System/370 architecture. The 4381 processors fill the gap between the 4341-12 and the 3083 Model Group E.

Other models within the 4300 Series family include: the 4321, the 4331 Model Group 11, the 4331 Model Group 2, the 4341 Model Group 9, the 4341 Model Group 10, the 4341 Model Group 1, the 4341 Model Group 11, the 4341 Model Group 2 and the 4341 Model Group 12.

The 4300 Series processors offer full System/370 compatibility and significant price/performance ratios. Moreover, incremental main memory is currently offered at less than $10,000 per megabyte.

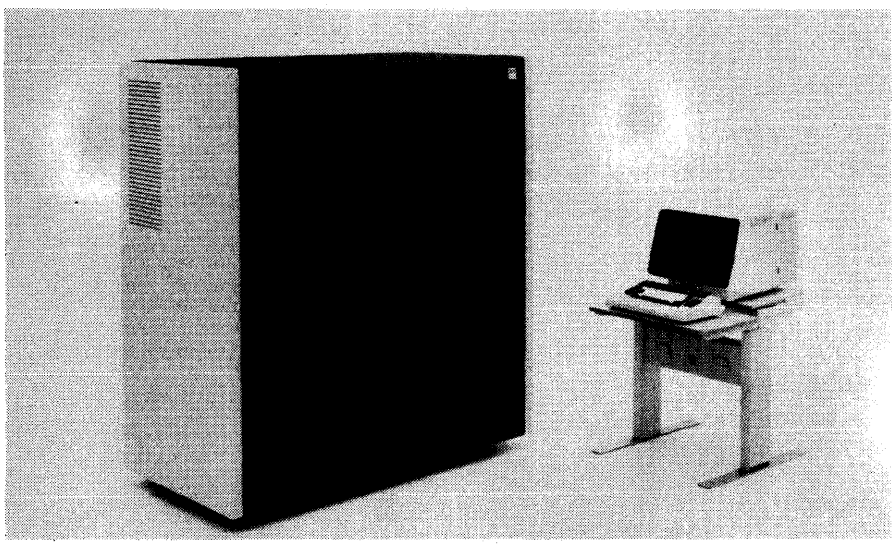
The IBM 4300 Series is a family of upward-compatible superminis for commercial and, especially, engineering/scientific applications. The 4300 Series processors can be employed as standalone systems, as distributed processing systems, or as nodes in communications networks.

MODELS: 4321; 4331 Model Groups 11 and 2; 4361 Model Groups 4 and 5; 4341 Model Groups 9, 10, 1, 11, 2, and 12; and 4381 Model Groups 1 and 2.
MEMORY: 1MB to 16MB.
DISK CAPACITY: 516MB to 403.2GB.
WORKSTATIONS: Depends on number of channels configured.
PRICE: $64,000-$620,000 (base processor prices).

CHARACTERISTICS

MANUFACTURER: International Business Machines Corporation, Old Orchard Road, Armonk, NY 10504. Contact your local IBM representative.

MODELS: 4321; 4331 Model Group 11 (Models J11 and K11); 4331 Model Group 2 (Models J2, K2, KJ2, and L2); 4341 Model Group 9 (Models J9, K9, and L9); 4341 Model Group 10 (Models K10 and L10); 4341 Model Group 1 (Models K1 and L1); 4341 Model Group 11 (Models K11, L11, and M11); 4341 Model Group 2 (Models K2, L2, M2, N2, and P2); 4341 Model Group 12 (Models K12, L12, M12, N12, and P12); 4361 Model Group 4 (Models K4, L4, LK4, M4, and ML4); 4361 Model Group 5 (Models K5, L5, LK5, M5, and ML5); 4381 Model Group 1 (Models L1, M1, and P1); and 4381 Model Group 2 (Models L2, M2, and P2).



The 4381 processor features 4 to 16 megabytes of main memory and 32K bytes of buffer storage. The 4381 can support up to 12 I/O channels, and can use virtually all System/370 communications and peripheral equipment. The 4381 supports the MVS/XA operating system, as well as OS/VS1 and DOS/VSE.

IBM 4300 Series

CHART A. SYSTEM COMPARISON

MODEL	4321	4331 Model Group 11	4331 Model Group 2	4361 Model Group 4
SYSTEM CHARACTERISTICS				
Date of introduction	11/81	11/81	5/80	9/82
Date of first delivery	3/82	3/82	4Q/80	2Q/84
Operating system	SSX/VSE; VM/370 with CMS	DOS/VSE; VM/370; SSX/VSE	DOS/VSE; OS/VS1 Rel. 7; VM/370 Rel. 6; SSX/VSE	VM/370 with VM/SP; VSE and SSX/VSE; OS/VS1
Upgradable from	Not applicable	Not applicable	4321, 4331-11	Not applicable
Upgradable to	4331-2	4331-2, 4361-5	4361-5	4361-5
MIPS	Information unavailable	Information unavailable	.38	.79
Relative performance*	Information unavailable	Information unavailable	22	49
MEMORY				
Minimum capacity, bytes	1M	1M	1M	2M
Maximum capacity, bytes	1M	4M	4M	12M
Type	MOS	MOS	MOS	MOS
Cache memory	None	4KB	8KB	8KB
Cycle time, nanoseconds	Information unavailable	Information unavailable	Information unavailable	Information unavailable
Bytes fetched per cycle	4	4	4	Information unavailable
INPUT/OUTPUT CONTROL				
Number of channels	2	2	4	4
High-speed buses	1	1	3	3
Low-speed buses	1	1	1	1
MINIMUM DISK STORAGE	516MB	516MB	516MB	516MB
MAXIMUM DISK STORAGE	5.8GB	11.7GB	52.5GB	80.6GB
NUMBER OF WORKSTATIONS	Depends on number of channels configured	Depends on number of channels configured	Depends on number of channels configured	Depends on number of channels configured
COMMUNICATIONS PROTOCOLS	Bisync, SDLC, 3270	Bisync, SDLC, 3270, X.25	Bisync, SDLC, 3270, X.25	Bisync, SDLC, 3270, X.25

** Relative Performance ratings are based on an IBM 370/158–3 equaling 45. Data for these figures was gathered by International Data Corporation (IDC).*

PROCESSORS AND PERIPHERALS

The 4300 Series central processors can operate either in a System/370-compatible mode or in an extended control program (ECPS) mode; the 4381 processors can operate in a 370-XA mode which was used previously only on the larger systems. ECPS mode takes full advantage of the extensive microcoding available in these machines to reduce operating system overhead and improve system throughput.

The 4331 Model Group 11 falls between the 4321 and the 4331 Model Group 2 in capacity and performance. According to IBM, the 4331 Model Group 11 provides from 1.4 to 1.6 times the internal performance of a 4321 for commercial workloads and approximately 2.5 times the internal performance of a 4321 for scientific and engineering workloads. The 4331 Model Group 11 is equipped with 1, 2, or 4 megabytes of main memory, 128K bytes of reloadable control storage plus 12K bytes of read-only control storage, and 4K bytes of buffer storage. Many features that are optional on the 4331 Model Group 2 are standard on the Model Group 11. The 4331 Model Group 11 can be field-upgraded to a 4331 Model Group 2. Installed 4331 Model Group 1 processors can be upgraded to a 4331 Model Group 11.

PREVIOUS MODELS: The 4331 Model Group 1 has been withdrawn from marketing.

DATA FORMATS

BASIC UNIT: 8-bit byte. Each byte can represent 1 alphanumeric character, 2 BCD digits, or 8 binary bits. Two consecutive bytes form a "halfword" of 16 bits, while 4 consecutive bytes form a 32-bit "word."

FIXED-POINT OPERANDS: Can range from 1 to 16 bytes (1 to 31 digits plus sign) in decimal mode; 1 halfword (16 bits) or 1 word (32 bits) in binary mode.

FLOATING-POINT OPERANDS: 1 word, consisting of 24-bit fraction and 7-bit hexadecimal exponent, in "short" format; 2 words, consisting of 56-bit fraction and 7-bit hexadecimal exponent, in "long" format; or 4 words in "extended precision" format.

INSTRUCTIONS: 2, 4, or 6 bytes in length, specifying 0, 1, or 2 memory addresses, respectively.

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

MAIN STORAGE

STORAGE TYPE: SAMOS (silicon and aluminum metal oxide semiconductor) process N-channel FET (field effect transistor). The SAMOS process relies on silicon or silicon

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CHART A. SYSTEM COMPARISON (Continued)

MODEL	4361 Model Group 5	4341 Model Group 9	4341 Model Group 10	4341 Model Group 1
SYSTEM CHARACTERISTICS				
Date of introduction	9/83	9/82	11/81	1/79
Date of first delivery	12/84	3/83	3/82	4Q/79
Operating system	VM/370 with VM/SP; VSE and SSX/VSE; OS/VS1; MVS/370 with MVS/SP and JES2 or JES3	DOS/VSE (Adv.); SSX/VSE; OS/VS1; VM/370; MVS/SP; ACP/TPF	DOS/VSE; OS/VS1 Rel. 7; VM/370 Rel. 6; MVS	DOS/VSE; OS/VS1 Rel. 7; VM/370 Rel. 6; MVS
Upgradable from	4331-11, 4331-2, 4361-4	Not applicable	4341-9	Not applicable
Upgradable to	Not applicable	4341-10	4341-11, 4341-12	4341-11, 4341-2, 4341-12
MIPS	1.14	.40	.58	.72
Relative performance*	66	24	34	40
MEMORY				
Minimum capacity, bytes	2M	1M	2M	2M
Maximum capacity, bytes	12M	4M	4M	4M
Type	MOS	MOS	MOS	MOS
Cache memory	16KB	2KB	4KB	8KB
Cycle time, nanoseconds	Information unavailable	Information unavailable	Information unavailable	Information unavailable
Bytes fetched per cycle	Information unavailable	Information unavailable	8	8
INPUT/OUTPUT CONTROL				
Number of channels	5	6	6	6
High-speed buses	4	2, 4, or 5	2, 4, or 5	2, 4, or 5
Low-speed buses	1	1 or 2	1 or 2	1 or 2
MINIMUM DISK STORAGE	516MB	800MB	800MB	800MB
MAXIMUM DISK STORAGE	121GB	161.3GB	161.3GB	161.3GB
NUMBER OF WORKSTATIONS	Depends on number of channels configured	Depends on number of channels configured	Depends on number of channels configured	Depends on number of channels configured
COMMUNICATIONS PROTOCOLS	Bisync, SDLC, 3270, X.25	Bisync, SDLC, 3270, X.25	Bisync, SDLC, 3270, X.25	Bisync, SDLC, 3270, X.25

** Relative Performance ratings are based on an IBM 370/158–3 equaling 45. Data for these figures was gathered by International Data Corporation (IDC). Copyright © 1983, CW Communications, Inc., Framingham, MA 01701*

The 4331 Model Group 2 processor offers twice the performance of the 4321 and a little over one-half the performance of the 4341 Model Group 1. The 4331 Model Group 2 has an 8K-byte buffer storage unit and 1, 2, 3 or 4 megabytes of main memory. The Model Group 2 can be equipped with the same integrated peripheral adapters as the Group 11 processor, plus an optional second DASD Adapter and greatly improved I/O channel capabilities.

According to IBM, the 4361 processors are particularly suited for commercial, office, interactive problem solving, and engineering/scientific applications. The new processors provide up to six times the engineering/scientific and up to three times the commercial performance of the 4331 Model Group 2. The 4361 has a main storage capacity of from 2 to 12 megabytes, up to three times that of the 4331. The 4361 uses a bipolar memory chip which stores up to four times the information of memory chips used in the 4331. Separate instruction and I/O processing units provide improved throughput over previous models. In addition to the 4361–4, all models of the 4331 are field-upgradeable to the 4361–5.

The 4341 Model Group 9 is an entry-level 4341 processor that provides an internal performance which is 70 percent **compounds to enhance gate reliability and to control chip surface leakage. Memory is composed of 64K-bit chips, with four chips mounted on each ceramic substrate. Maximum density is achieved by stacking pairs of substrates to form 8-chip modules. The 4381 uses a 1K X 9 bit bipolar array chip which operates with a 20-nanosecond cycle time. It is used for the microcode control storage and the high-speed buffer in the memory subsystem.**

CYCLE TIME: Information unavailable from vendor.

CAPACITY: 1MB to 16MB. See CHART A for capacities of specific machines.

CHECKING: All data paths between the central processor and main storage are parity-checked by byte. When data is stored, an error-correcting code is substituted for the parity bits. (An 8-bit modified Hamming code is appended to each 8-byte "doubleword" of data.) When the data is retrieved, single-bit errors are detected and corrected automatically, and most multiple-bit errors are detected and signalled so that appropriate program action can be taken.

STORAGE PROTECTION: The Store and Fetch Protection features, which guard against inadvertent overwriting or unauthorized reading of data in specified blocks of storage, are standard in all models.

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CHART A. SYSTEM COMPARISON (Continued)

MODEL	4341 Model Group 11	4341 Model Group 2	4341 Model Group 12	4381 Model Group 1	4381 Model Group 2
SYSTEM CHARACTERISTICS					
Date of introduction	11/81	9/80	10/82	9/83	9/83
Date of first delivery	3/82	2Q/81	2/83	3Q/84	1Q/84
Operating system	DOS/VSE; OS/VS1 Rel. 7; VM/370 Rel. 6; MVS	DOS/VSE; OS/VS1 Rel. 7; VM/370 Rel. 6; MVS	SSX/VSE; DOS/VSE (Adv.); OS/VS1; VM/370; MVS/SP; ACP/TPF	MVS/370; VM/SP; DOS/VSE with VSE/AF; ACP/TPF; OS/VS1; MVS/XA; VM/XA	MVS/370; VM/SP; DOS/VSE with VSE/AF; ACP/TPF; OS/VS1; MVS/XA; VM/XA
Upgradable from	4341-10, 4341-1	4341-1	4341-10, 4341-1, 4341-11	Not applicable	4381-1
Upgradable to	4341-12	4341-12	Not applicable	4381-2	Not applicable
MIPS	.88	1.1	1.2	2.1	2.7
Relative performance*	50	66	76	100	133
MEMORY					
Minimum capacity, bytes	2M	2M	2M	4M	4M
Maximum capacity, bytes	8M	16M	16M	16M	16M
Type	MOS	MOS	MOS	MOS	MOS
Cache memory	8KB	16KB	16KB	8KB	32KB
Cycle time, nanoseconds	Information unavailable	Information unavailable	Information unavailable	Information unavailable	Information unavailable
Bytes fetched per cycle	8	8	Information unavailable	Information unavailable	Information unavailable
INPUT/OUTPUT CONTROL					
Number of channels	6	6	6	12	12
High-speed buses	4 or 5	4 or 5	4 or 5	11	11
Low-speed buses	1 or 2	1 or 2	1 or 2	1	1
MINIMUM DISK STORAGE	800MB	800MB	800MB	800MB	800MB
MAXIMUM DISK STORAGE	161.3GB	161.3GB	161.3GB	403.2GB	403.2GB
NUMBER OF WORKSTATIONS	Depends on number of channels configured	Depends on number of channels configured	Depends on number of channels configured	Depends on number of channels configured	Depends on number of channels configured
COMMUNICATIONS PROTOCOLS	Bisync, SDLC, 3270, X.25	Bisync, SDLC, 3270, X.25	Bisync, SDLC, 3270, X.25	Bisync, SDLC, 3270, X.25	Bisync, SDLC, 3270, X.25

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of that of the Model Group 10 for commercial and scientific workloads involving equivalent memory and I/O configurations, according to IBM. The 4341 Model Group 9 is available with a 2K-byte buffer and 1, 2 or 4 megabytes of main memory. It can be field-upgraded to a 4341 Model Group 10.

The 4341 Model Group 10 provides approximately 0.85 times the performance of a 4341 Model Group 1 for typical commercial applications or 0.95 times the Model Group 1 for engineering and scientific applications. The 4341 Model Group 10 is available with a 4K-byte buffer and 2 or 4 megabytes of main memory. It can be field-upgraded to a 4341 Model Group 11 or 12.

The 4341 Model Group 1 is available with 2 or 4 megabytes of main memory and an 8K-byte buffer. The internal performance of the 4341 Model Group 1 is up to 1.1 times an equivalently configured System/370 Model 158-3. The Model Group 1 can be field-upgraded to a 4341 Model Group 11, Model Group 2 or Model Group 12.

The 4341 Model Group 11 offers 1.25 times the internal performance of the 4341 Model Group 1. The Model Group 11 is available with an 8K-byte buffer and 2, 4, or 8 megabytes of main memory. It can be field-upgraded to a 4341 Model Group 12.

The 4341 Model Group 2 is available with from 2 to 16 megabytes of main memory and 16K bytes of buffer stor-

CENTRAL PROCESSORS

The 4300 Series processors are heavily microprogrammed processors that include these common features: LSI technology, one-level addressing facility, virtual storage capability by dynamic addressing, channels with virtual storage, System/370 Universal Instruction Set, CE maintenance support functions including support processor and remote support facility, store and fetch storage protection, byte-oriented operands, clock comparator and CPU timer, time of day clock, interval timer, reloadable control storage, PSW Key handling, control registers, extended precision floating point, machine check handling, and program event recording.

Microcode is loaded through the system diskette drive. The several diskettes supplied with the system contain field engineering diagnostics, basic system features, and optional system features elected by the user. The system diskette facility also allows storage of failure data from the 4300 Series processors. This data can be subsequently analyzed by field engineering for maintenance purposes.

The no-charge Problem Analysis Feature allows 4341 and 4381 users to identify valid hardware problems as the cause of system interruptions. Screen-prompted instructions lead the user through the steps required to solve the problem. Using the Remote Support Facility, service information can be sent to and received from IBM Field Engineering. The Remote Operator Console Facility is used to run a subset of Problem Analysis from the user installation. The 4381 only, however, is available in six languages other than English.

The 4361 comes equipped with a Problem Finder Facility, a hardware diagnostic tool which is invoked by the customer.

IBM 4300 Series

CHART B. MASS STORAGE

MODEL	3310	3330/3333	3340/3344	3350
Type	Fixed	Removable Pack	Fixed/Removable	Fixed
Controller model	Integrated	3830-2 or 3880-1, 2, or -11	3830-2 or 3880-1, -2, or -11	3830-2 or 3880-1, -2, or -11
Drives per subsystem/controller	4	8-32	8-32	8-32
Formatted capacity per drive, megabytes	129	100 or 200	70/280 per HDA	317.5 per HDA
Number of usable surfaces	—	—	—	—
Number of sectors or tracks per surface	—	—	—	—
Bytes per sector or track	512/sector	13,030/track	8,368-12,288/track	19,069/track
Average seek time	27 ms	30 ms	25 ms	25 ms
Average rotational/relay time	9.6 ms	16.7 ms	10.1 ms	8.4 ms
Average access time	36.6 ms	46.7 ms	35.1 ms	33.4 ms
Data transfer rate	1.03MB/sec.	806KB/sec.	885KB/sec.	1.12MB/sec.
Supported by system models	4321, 4331, 4361	4331-2, 4361, 4341, 4381	4321, 4331-2, 4361, 4341, 4381	4331-2, 4361, 4341, 4381
Comments		A 3333 can control up to three 3330 units.	Fixed-head option available; 3344 attaches to 3340 Model A2.	Fixed-head models available. Model A2 includes logic and power for up to three B2s or two B2s and one C2 unit.

CHART B. MASS STORAGE (Continued)

MODEL	3370	3375	3380
Type	Fixed	Fixed	Fixed
Controller model	3880-1, -2, or -4	3880-1, -2, or -4	3880-2, -3, or -13
Drives per subsystem/controller	16-32	16-32	8-16
Formatted capacity per drive, megabytes	571.3-729.8	819.7	1260 per HDA
Number of usable surfaces	—	—	—
Number of sectors or tracks per surface	—	—	—
Bytes per sector or track	—	—	—
Average seek time	19-20 ms	19 ms	16
Average rotational/relay time	10.1 ms	10.1 ms	8.3
Average access time	29.1-30.1 ms	29.1 ms	24.3
Data transfer rate	1.86MB/sec.	1.86MB/sec.	3MB/sec.
Supported by system models	4321, 4331, 4361 4341, 4381	4331-2, 4361, 4341, 4381	4361, 4341, 4381
Comments	Model A units include logic and power for up to three B units.	Model A1 includes logic and power for up to three B1s or two B1s and one D1 unit.	Model A4 includes logic and power for up to three B4 units.

age. The internal performance of the Model Group 2 is from 1.6 to 1.8 times faster than the Model Group 1.

The 4341 Model Group 12 is available with from 2 to 16 megabytes of main memory and 16K bytes of buffer storage. IBM states that the internal performance is up to 15 percent greater than the Model Group 2 for commercial workloads and up to 7 percent greater for scientific workloads.

The top-of-the-line 4381 Models 1 and 2 are available with from 4 to 16 megabytes of main storage capacity and up to 12 I/O channels. The 4381-1 can provide an internal throughput rate of from 1.4 to 1.6 times that of the 4341-2 for commercial workloads and up to 1.7 times that of the 4341-2 for scientific workloads. The 4381-2 can provide an internal throughput rate of from 1.7 to 2.3 times that of the 4341-2 for commercial workloads and from 2.4 to 3 times that of the 4341-2 for scientific workloads. Despite having approximately double the internal speed of the 4341 Model Group 2, the 4381 requires less space and power, produces less heat and weighs less. A unique air-cooling

Detailed information on machine failures, suspected hardware problem sources and whether a service call should be made are communicated to the customer.

The 4341 and 4381 feature an eight-byte-wide data flow within the processor as well as an eight-byte-wide data flow between the processor, storage, and channels. Data flow within the 4361 ranges from four to eight bytes wide. Data flow within the 4321 and 4331 is four bytes wide.

On the 4321, 4331 and 4361, the mode of operation is selected at initial program load (IPL) time; on the 4341 and 4381, at initial microcode load (IML) time. One operating mode is the Extended Control Program Support (ECPS:VSE) mode, which utilizes the extensive microcoding facilities of the 4300 to reduce DOS/VSE or SSX/VSE overhead and improve system throughput. Another operating mode, 370 mode, has one option on the 4321, three options on the 4331 and 4361, and three options on the 4341. On the 4321, the ECPS:VM/370 option provides improved system performance with VM/370. This option is recommended for operation in a CMS environment only. On the 4331 and 4361, the Basic Control (BC) option provides for execution of System/360 programs, the Extended Control (EC) option provides for execution of programs that require dynamic address translation facilities, and the

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CHART C. TERMINALS

DEVICE	DESCRIPTION
3178 Cluster Display Station	Features tilting/swiveling 12-inch video screen, logic, and 75-key data entry or 87-key typewriter keyboard; screen capacity up to 1920 characters.
3278 Cluster Display Station	Features 14-inch screen and 94-character set; screen display capacity up to 3564 characters. Uses 462X series, 4640, 4651, or 4652 keyboard.
3279 Color Display Station	Available with screen capacities of 1920-2560 characters. Supports either base color mode (red, green, blue, and white) or extended color mode (four base colors plus yellow, pink, and turquoise). Features independent field character addressing of color highlighting. Uses 4640, 4641, or 4652 keyboard.
3290 Information Panel	Large-screen, flat gas-plasma panel display station; orange-on-black image display; screen capacity up to 9920 characters. Uses 4730 or 4731 keyboard.
3771 Communication Terminal	Nonprogrammable keyboard/printer terminal. Features bidirectional serial matrix printer, 40 cps (Model 1), 80 cps (Model 2) or 120 cps (Model 3).
3774 P Series Communication Terminal	Programmable keyboard/printer terminal. Features bidirectional serial matrix printer, 80 cps (Model P1) or 120 cps (Model P2).
3775 Communication Terminal	Programmable keyboard/printer terminal. Model P1 features 80/120 lpm line printer.
3776 Communication Terminal	Nonprogrammable batch keyboard/printer terminal. Features 160-300 lpm printer (Models 1 and 3) or 230-400 lpm printer (Models 2 and 4).
3777 Communication Terminal	Nonprogrammable batch keyboard/printer terminal. Features 870-1200 lpm printer.

technique used on the 4381 which was previously developed for use on the 308X Series, termed "impingement cooling," assures adequate cooling without the need for a raised floor. Room temperature air is blown by a fan into an air chamber equipped with ducts or nozzles allowing each module to receive a similar amount of cooling. This type of cooling facilitates the use of an increased-density 64mm module. The 4381-1 is field-upgradeable to a 4381-2.

The 4300 Series processors support most of the System/370, 303X Series, and 308X Series peripheral devices. These peripheral devices include: the 3310 (4321, 4331, and 4361 only), 3330/3333, 3340/3344, 3350, 3370, 3375, and 3380 Direct Access Storage Devices; the 3830 and 3880 Storage Control Devices; the 3420 Models 3, 5, 7, 4, 6, and 8, 3410/3411 Models 1, 2, and 3, and 3430 and 8809 Magnetic Tape Units; the 1403 Model N1, 3203 Model 5, 3211 Model 1, 3262 Models 1, 5, and 11 (4321, 4331, and 4361 only), 3268 Models 2 and 2C, 3287 Models 1, 1C, 11, 12, 2 and 2C, 3289, and the 3800 Models 1 and 3 Printers; and the 1442, 2501, 2520, 2540, 3505, and 5424 Punched Card Equipment.

All 4300 Series processors require a 3278 Model 2A Display Console or 3279 Model 2C Display Console as the operator console. Both consoles have a 1920-character display and keyboard, for operation and maintenance. Up to three additional consoles or 3287 Printers (for a total of four devices) can be attached to the 4341 or 4381 processors. The Display/Printer Adapter on the 4321, 4331 and 4361 processors can accommodate as many as 15 additional display units or printers.

SOFTWARE

The operating systems available for the 4300 Series processors include: DOS/VS Extended (DOS/VSE), OS/VS1 Re-

ECPS:VM/370 option provides improved system performance with VM/370. On the 4341, the ECPS/VS1 option improves processor performance with OS/VS1, the ECPS:VM/370 option provides improved system performance with VM/370, and the ECPS:MVS option allows the 4341 processor to be supported by MVS/SP JES2 and JES3. With the ECPS Expansion Feature, the 4341 Model Group 2 can support concurrent operation of ECPS:MVS and ECPS:VM/370. Two modes of operation are supported on the 4381: 370 mode and 370-XA mode. When the 4381 is operating in 370 mode, support is provided by: MVS/SP JES2 or MVS/SP JES3; VM/SP; DOS/VSE with VSE/AF; and OS/VS1 with Basic Programming Extensions. When operating in 370-XA mode, the 4381 will support MVS/SP JES2 and MVS/SP JES3 and the VM/XA Migration Aid.

With ECPS:VSE, a reduction of up to 20 percent of total CPU time has been measured by IBM when compared with the same version of DOS/VSE running in a typical DB/DC environment without ECPS:VSE. Likewise, with ECPS:VS1, a reduction of up to 7 percent of CPU busy time for the OS/VS1 supervisor has been measured by IBM when compared to the same version of OS/VS1 without ECPS:VS1. With ECPS:VM/370, a reduction of up to 84 percent of CPU busy time for the VM/370 control program has been measured by IBM when compared to the same version of VM/370 running without ECPS:VM/370.

Programs written to run on IBM 1401, 1440, or 1460 systems can be executed on the 4331 Model Group 2 using the IBM Systems 1401/1440/1460 Emulator program product and can achieve improved performance with a special feature on the processor. Another optional feature allows programs written for DOS, DOS/VS, or DOS/VSE and 2311/2314/2319 disk drives to be executed, with only JCL changes, using IBM 3310 Direct Access Storage.

SUPPORT PROCESSOR: A separately powered subsystem integrated within the processor housing and designed to automate and simplify failure diagnosis, the Support Processor provides failure monitoring, including environmental monitoring and recording capabilities for temperature fluctuations, power variances, and electrostatic discharges. Processor failures result in the generation of an eight-digit

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CHART D. PRINTERS

MODEL	1403 Model N1	3203 Model 5	3211 Model 1	3262 Model 1
Type	Train	Train	Train	Band
Speed	1100 lpm	1200 lpm	2000 lpm	650 lpm
Bidirectional printing	No	No	No	No
Paper size	3.5-18.75 in. wide, 1-22 in. long	3.5-20 in. wide, 3-24 in. long	3.5-18.75 in. wide, 3-24 in. long	3.5-16 in. wide, 6-14 in. long
Character formation	Train	Train	Train	Band
Horizontal character spacing (char./inch)	10	10	10	10
Vertical line spacing (lines/inch)	6 or 8	6 or 8	6 or 8	6 or 8
Character set	48	48	48	48, 63, 64, 96
Controller/Interface	2821	Integrated	3811	Integrated
No. of printers per controller/interface	3	Varies with avail. channel pos.	1	2
Printer dimensions, in. (h x w x d)	Information unavailable	Information unavailable	Information unavailable	Information unavailable
Graphics capability	No	No	No	No

CHART D. PRINTERS (Continued)

MODEL	3262 Model 5	3262 Model 11	3268 Models 2 & 2C	3287 Models 1 & 1C
Type	Band	Band	Matrix	Matrix
Speed	650 lpm	325 lpm	340 cps	80 cps
Bidirectional printing	No	No	Yes	Yes
Paper size	3.5-16 in. wide, 6-14 in. long	3.5-16 in. wide, 6-14 in. long	16 in. wide, continuous	3-15 in. wide
Character formation	Band	Band	Dot matrix	Dot matrix
Horizontal character spacing (char./inch)	10	10	10 or 16.7	10
Vertical line spacing (lines/inch)	6 or 8	6 or 8	3, 4, 6, or 8	6 or 8
Character set	48, 63, 64, 96, 128	48, 63, 64, 96	48, 64, 96, 128	EBCDIC, ASCII
Controller/Interface	Integrated	Integrated	Integrated	Integrated
No. of printers per controller/interface	Varies with available channel positions	2	1	2-3
Printer dimensions, in. (h x w x d)	Information unavailable	Information unavailable	Information unavailable	Information unavailable
Graphics capability	No	No	Yes	Yes
Comments			Model 2C has color print capability	Model 1C has color print capability and is not supported on 4341-1 & -2

lease 7, and the Virtual Machine Facility 370 (VM/370) Release 6, OS/VS2 (MVS), SSX/VSE, and MVS/XA.

DOS/VSE is said to be a major expansion of DOS/VS incorporating functional and I/O support. Unfortunately, DOS/VSE provides only limited multiprogramming capabilities without the DOS/VSE Advanced Function product, an independently priced adjunct that allows the DOS/VSE user to employ up to 12 partitions and also makes it possible to incorporate many of the new program products available with the system.

According to IBM, the OS/VS1 Release 7 support is of particular importance in a distributed data processing environment, since it will generally provide a high level of compatibility with an MVS host system. As with DOS/VSE and VM/370, OS/VS1 Release 7 can run in ECPS mode with the ECPS:VS1 feature on the 4331, 4361 or 4341 processors or in 370 mode.

With VM/370 Release 6, the 4300 user can operate in mixed-mode environments where CMS interactive computing is combined with a guest SCP (DOS/VSE or OS/VS1) on the 4300 processors.

reference code logged on the system diskette and displayed on the console to alert the operator. The reference code contains information to guide the IBM customer engineer to the failing unit.

The Support Processor also provides support functions for the operator/support console and a remote data link for the Remote Support Facility (RSF) software. RSF is implemented via a customer-supplied telephone line to an IBM field technical support center. After customer authorization, initiation of the data link connection can be made only from the customer's location while the system is in maintenance mode and only by IBM customer engineering personnel who have proper sign-on authority. Additionally, all remote console screen activity can be observed on the customer's console display. The remote connection can be completely broken at any time by depression of a console key on the customer's display console.

The design of the 4361 is unique in comparison to the previous 4300 Series processors in that it has three independent processors: the instruction processor, the input/output processor, and the service processor. The instruction processor includes: a high-speed cache buffer; a three port local store; high-speed instruction processing; a 370 instruction buffer; floating point multiply and arithmetic and logic units; a function control element; and control storage. The Input/Output Processor includes: a separate channel pro-

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CHART D: PRINTERS (Continued)

MODEL	3287 Models 2 & 2C	3287 Model 11	3287 Model 12	3289	3800 Models 1 & 3
Type	Matrix	Matrix	Matrix	Belt	Laser
Speed	120 cps	80 cps	120 cps	230-400 lpm	20,040 lpm
Bidirectional printing	Yes	Yes	Yes	No	No
Paper size	3-15 in. wide	3-15 in. wide	3-15 in. wide	6.5-15 in. wide	6.5-14⅞ in. wide, 3.5-11 in. long
Character formation	Dot matrix	Dot matrix	Dot matrix	Belt	Laser/ Electrophotographic
Horizontal character spacing (char./inch)	10	10	10	10	10, 12, 15
Vertical line spacing (lines/inch)	6 or 8	3, 4, 6, or 8	3, 4, 6, or 8	6 or 8	6-12
Character set	EBCDIC, ASCII	EBCDIC	EBCDIC	48, 64, 94	128, 255
Controller/Interface	Integrated	Integrated	Integrated	Integrated	Integrated
No. of printers per controller/interface	2-3	4 (via 2 loops or 4 lobes)	4 (via 2 loops or 4 lobes)	2	8
Printer dimensions, in. (h x w x d)	Information unavailable	Information unavailable	Information unavailable	Information unavailable	Information unavailable
Graphics capability	Yes	No	No	No	No
Comments	Model 2C has color print capability and is not supported on 4341-1 and 4341-2	Supported by 4331 only.			Model 1 can be attached to tape subsystem for off-line operation.

SSX/VSE (Small Systems Executive/VSE) is the principal operating system for the 4321 processors. SSX/VSE is a pregenerated preconfigured subset of DOS/VSE that is designed for users with limited data processing skills. SSX/VSE supports batch or interactive applications on 4321, 4331, 4361 or 4341 processors operating in stand-alone or distributed environments.

MVS support is provided on the 4361, 4341 and 4381 processors. MVS Release 3.8 with Processor Support 2 provides the required basic SCP code. MVS/SP-JES2 and –JES3 are separately priced products that provide major extensions and enhancements to the MVS Base Control Program plus JES2 and JES3, respectively.

MVS/XA is supported only on the 4381 processors and includes two programs: MVS/SP Version 2 and the Data Facility Product. MVS/XA allows address space sizes to be expanded up to 2000 megabytes.

COMPETITIVE POSITION

With the addition of the 4361 and 4381, the 4300 Series can compete successfully against the entire gamut of superminis, from standalone 32-bit workstations to multiprocessor systems. The 4321 competes against the Apollo Domain Systems DN300 and the Data General Eclipse MV/8000 C. The 4331 takes on the following machines: Apollo DN460 and DN660; DEC VAX-11/725 and VAX-11/730; Harris H600; Hewlett-Packard HP9000 series; Microdata Sequel; NCR 9300; Perkin-Elmer Models 3205 and 3210; Prime 2250, 250-II, 450-II, and 550-II; and Wang VS85 and VS90.

The 4361 competes against the Data General Eclipse MV/4000 and MV/8000 II, the VAX-11/750, the Formation F4000, the Harris H700 and H800, the MAI 8000 series, the Prime 750 and 850, and the Wang VS100. The 4341 stacks up against the BTI 8000, Computer Designed Systems' Adviser 1400/32, Convergent Technologies' Megaframe, the VAX-11/780, the Gould Concept 32/27 and 32/6705, the Harris H1000, the Honeywell DPS 6/95, the

cessor for independent I/O processing; a data mover buffer; and channels for control unit attachment and integrated I/O adapters. The service processor, which is similar to the Support Processor on the previous 4300 models, includes: the Problem Finder Facility for detecting and recording recoverable errors; the Remote Operator Console Facility (ROCF); the Remote Service Facility for problem diagnosis performed away from the 4361; and controls for dual diskette drives and system console attachment.

The 4381's design consists of four separate functional units which include: a memory subsystem, an instruction processing unit, a channel subsystem, and a maintenance subsystem. The memory subsystem features: main storage, a high-speed buffer, a swap buffer, and a memory control unit. The instruction processing unit includes: a shifter (to and from memory), a storage address register, an arithmetic logic unit, local storage, control storage, and an instruction buffer. The channel subsystem includes: channel data buffers, a channel operation unit, and standard and optional channels. The maintenance subsystem is similar to the support and service processors on the other 4300 systems and includes: a service processor; a service panel; a power-up microprocessor; direct console attachment; diskette drives; a modem (which connects to the Remote Operator Console Facility and the Remote Service Facility); a direct instruction processor link; and a channel link for operator consoles.

CONTROL STORAGE: All 4300 Series processors except the 4361 utilize reloadable control storage (RCS) to hold the microcode which controls their operations. The RCS is composed of 18K-bit SAMOS-process N-channel FET chips.

On the 4321 and 4331 processors, 131,072 bytes of RCS are standard. The 4331 processors also include 12,288 bytes of read-only control storage. In addition to the RCS, some main memory is required for microcode storage and is therefore unavailable to the user. Approximately 168,000 bytes of main memory are required for microcode and system use on the 4321, and approximately 200,000 bytes are required on the 4331 Model Group 11. On the 4331 Model Group 2, at least 16,348 bytes of main memory are required for microcode storage. The total amount of microcode required is dependent upon the features installed and the functions performed.

On the 4341 processor, the microcode resides entirely in RCS but keeps dynamic tables in main memory, thereby reducing the amount of main memory available to the user

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CHART E. MAGNETIC TAPE EQUIPMENT

MODEL	3420 Model 3	3420 Model 5	3420 Model 7	3420 Model 4
TYPE	Cartridge	Cartridge	Cartridge	Cartridge
FORMAT				
Number of tracks	7; 9	7; 9	7; 9	9
Recording density, bits per inch	556/800; 1600/800	556/800; 1600/800	556/800; 1600/800	1600/6250
Recording mode	NRZI; PE/NRZI	NRZI; PE/NRZI	NRZI; PE/NRZI	PE/GCR
CHARACTERISTICS				
Controller model	3803	3803	3803	3803
Drives per controller	1-16	1-8	1-8	1-8
Storage capacity, bytes	Information unavailable	Information unavailable	Information unavailable	Information unavailable
Tape speed, inches per second	75	125	200	75
Data transfer rate, units per second	41.7K/60K; 120K/60K	69.5K/100K; 200K/100K	111.2K/160K; 320K/160K	120K/470K
Streaming technology	No	No	No	No
Start/stop mode; speed	No	No	No	No
Switch selectable	Yes	Yes	Yes	Yes

CHART E. MAGNETIC TAPE EQUIPMENT (Continued)

MODEL	3420 Model 6	3420 Model 8	3410/3411 Model 1	3410/3411 Model 2
TYPE	Cartridge	Cartridge	Reel-to-Reel	Reel-to-Reel
FORMAT				
Number of tracks	9	9	7; 9	7; 9
Recording density, bits per inch	1600/6250	1600/6250	200/556/800; 1600/800	200/556/800; 1600/800
Recording mode	PE/GCR	PE/GCR	NRZI; PE/NRZI	NRZI; PE/NRZI
CHARACTERISTICS				
Controller model	3803	3803	3411	3411
Drives per controller	1-8	1-8	1-6	1-6
Storage capacity, bytes	Information unavailable	Information unavailable	Information unavailable	Information unavailable
Tape speed, inches per second	125	200	12.5	25
Data transfer rate, units per second	200K/780K	320K/1.25M	2.5K/6.9K/10K; 20K/10K	500/13.9K/20K; 40K/20K
Streaming technology	No	No	Yes	No
Start/stop mode; speed	No	No	No	No
Switch selectable	Yes	Yes	Yes	Yes

Perkin-Elmer Model 3230, and Pyramid Technology's Pyramid 90x.

The top-of-the-line 4381 is positioned against such high-end superminis as the following: Computer Designed Systems' Adviser 1800/64; Data General's Eclipse MV/10000; the VAX-11/782; the Formation F4000-AP; the Gould Concept 32/6780, 32/8705, and 32/8780; Modcomp's Classic 32/85; Perkin-Elmer Models 3250XP and 3200MPS; the Prime 9950; the Stratus/32; and the Tandem NonStop TXP.

ADVANTAGES AND RESTRICTIONS

The IBM 4300 user can grow within the 4300 family of computer systems. Uniprocessor systems range from 1 to 16 megabytes of main memory which allows the user to buy only what he needs today, and provides the capability to upgrade later.

The 4300 Series can function in a distributed processing environment. A communication network allows the user to link the central and remote sites. The advantage of using a distributed processing system is that it can off-load processing activity and data from the central computer.

by from 18K to 124K bytes, depending upon the configuration.

Control storage on the 4361 consists of 16K bytes. The 4381 utilizes reloadable control storage; however, the amount was not specified by IBM.

BUFFER STORAGE: Buffer storage is standard on all 4300 Series models except the 4321. Storage capacities range from 4096 to 32,768 bytes, depending on the model. (See CHART A for the buffer capacities for the individual processor models.) The buffer storage is transparent to all programs and significantly reduces the effective main memory access time. On the 4331, the buffer storage is automatically replenished from main memory in 64-byte units; the 64-byte fetch cycle takes 2.6 microseconds, and the 64-byte store cycle takes 3.1 microseconds.

ADDRESSING: Three types of addresses are recognized: absolute, real, and logical. In all 4300 Series processors, a one-level addressing facility provides for improved virtual storage control by DOS/VSE.

DYNAMIC ADDRESS TRANSLATION: This facility, which is standard in all models, is the mechanism that translates the virtual storage addresses contained in instructions into real main storage addresses as each instruction is executed. All models can address a virtual storage space of 16,777,216 bytes.

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CHART E. MAGNETIC TAPE EQUIPMENT (Continued)

MODEL	3410/3411 Model 3	3430	8809
TYPE	Reel-to-reel	Reel-to-reel	Reel-to-reel
FORMAT			
Number of tracks	7; 9	9	9
Recording density, bits per inch	200/556/800; 1600/800	1600 or 6250	1600
Recording mode	NRZI; PE/NRZI	PE	PE
CHARACTERISTICS			
Controller model	3411	3430	8809
Drives per controller	1-6	1-4	1-6
Storage capacity, bytes	Information unavailable	Information unavailable	Information unavailable
Tape speed, inches per second	50	50	12.5 or 100
Data transfer rate, units per second	10K/27.8K/40K; 80K/40K	80K or 312.5K	20K or 160K
Streaming technology	No	No	Yes
Start/stop mode; speed	No	No	Yes; 12.5 ips
Switch selectable	Yes	Yes	Yes
Comments	Can be used with a 3800 printing subsystem for off-line print operations.		

The 4300 Series uses the S/370 architecture and software which makes it compatible with the 303X and the 308X. This is advantageous for those users migrating to the larger systems.

IBM's Communications Facility/Host licensed program allows the user to process and route transactions between the host 4300 system and Series/1 systems operating with the IBM Series/1 EDX Communications Facility.

Something to consider when installing the 4341 Model Group 12 is that DOS releases in System/370 mode, will not operate on the 12- and 16-megabyte models except under VM/370. A VSE system can utilize up to but not including 16 megabytes of main memory when the VM linkage enhancements of VSE/AF are specified. Another consideration is that concurrent operation of the ECPS:MVS and ECPS;VM/370 requires the ECPS Expansion Feature (#1601).

USER REACTION

Datapro's 1983 survey of general-purpose computer users yielded responses from 557 IBM 4300 users who had a total of 659 processors installed. Of this total, 181 systems were 4331s and 478 systems were 4341s. The 4331 systems had been in use for an average of 33.7 months; the 4341 systems, for an average of 27.7 months.

The survey respondents represented a wide variety of industries, including manufacturing (155 responses), banking/finance (71 responses), retail/wholesale (69 responses), and education (45 responses).

The user's ratings are listed in the table below. Two separate weighted average columns are provided for the 4331 and 4341 systems, although the numbers of user responses for both systems have been combined.

Translation between the virtual and real addresses is accomplished by a hardware-implemented table-lookup procedure that accesses tables in main storage which are created and maintained by the operating system. The translation process is speeded up by a group of high-speed registers (translation look-aside buffer) which hold recently referenced virtual storage addresses and their real storage equivalents.

INSTRUCTION REPERTOIRE: The 4300 Series processors employ the System/370 Universal Instruction Set. The instruction set includes complete arithmetic facilities for processing variable-length decimal and fixed-point binary operands, as well as instructions which handle loading, storing, comparing, branching, shifting, editing, radix conversion, code translation, logical operations, packing, and unpacking. In addition, a group of "privileged instructions," usable only by the operating system, handle input/output and various hardware control functions.

Also standard are some instructions that were optional on some models of the System/370. These include the dynamic address translation instructions of Load Read Address, Reset Reference Bit, Purge Translation Look-Aside Buffer, Store Then AND System Mask, and Store Then OR System Mask; the VTAM support instructions of Compare and Swap and Compare Double and Swap; the OS/VS support instructions of Insert PSW Key, Set PSW Key from Address, and Clear I/O; and the extended precision floating point instructions.

INSTRUCTION TIMES: Average execution times, in microseconds, for some representative instructions on the *IBM 4341 Model Group 1* processor are as follows:

Add (32-bit binary)	**0.600**
Multiply (32-bit binary)	**3.900**
Divide (32-bit binary)	**7.425**
Load (32-bit binary)	**0.375**
Store (32-bit binary)	**0.375**
Add (6-digit packed decimal)	**1.275**
Compare (6-digit packed decimal)	**1.275**
Add (short floating-point)	**1.472**
Multiply (short floating-point)	**4.350**
Divide (short floating-point)	**6.300**
Add (long floating-point)	**1.425**
Multiply (long floating-point)	**5.400**
Divide (long floating-point)	**10.950**

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	Excel.	Good	Fair	Poor	4331 WA*	4341 WA*
Ease of operation	164	335	35	5	3.13	3.26
Reliability of mainframe	455	88	7	2	3.78	3.82
Reliability of peripherals	238	271	36	5	3.40	3.32
Maintenance service:						
Responsiveness	245	272	33	3	3.45	3.34
Effectiveness	234	265	42	4	3.40	3.31
Technical support:						
Trouble-shooting	98	294	129	21	2.88	2.86
Education	62	296	146	27	2.66	2.77
Documentation	54	276	132	24	2.67	2.67
Manufacturers software:						
Operating system	122	353	54	15	3.08	3.06
Compiler & assemblers	143	377	26	1	3.26	3.19
Application programs	35	275	97	13	2.91	2.75
Ease of programming	70	365	84	7	2.96	2.94
Ease of conversion	94	313	86	14	2.91	2.99
Overall satisfaction	123	398	24	2	3.15	3.18

*Weighted Average on a scale of 4.0 for Excellent.

In May 1983, we interviewed three of the survey respondents to gain additional insight into their experiences with the 4300 Series.

The first user interviewed represented an educational institution that had upgraded from an IBM 360 to the 4331. This user said that the conversion went very smoothly; however, a few operating system changes were made at conversion time. He indicated that the system serves them quite well. Future plans include running more application software on the system.

The second user interviewed was a maunfacturer that had converted from an IBM 370 to the 4331. They said that it was a very good changeover. They experienced a few minor problems with the operating software, but IBM solved them very quickly. There was a problem with the power supply on the tape unit controller but it was attended to promptly by IBM field engineers. The manufacturing company representative said that they are very pleased with the system.

The third user interviewed was a retail/wholesale organization that had converted from an IBM 370 to the 4341. They said that the conversion process had gone very smoothly. The operations manager said that it was one of the smoothest conversions he had ever seen with no trouble whatsoever. Recently they have had a few 3370 disk problems but the disk drives were quickly replaced by IBM. Overall, the user was very happy with the equipment.

The users' ratings and comments indicate that they are fairly well satisfied with the 4300 Series processors. Of the 557 respondents, 92 percent said they would recommend the 4300 Series to others, two percent said they would not, and six percent were undecided.□

INTERRUPTS: Classes of interrupts include I/O, external, program, supervisor call, machine check, and restart. Classes of interrupts are distinguished by the storage locations at which the old program status word (PSW) is stored and from which the new PSW is fetched.

ENGINEERING SCIENTIFIC ASSIST: This feature, which is standard on the 4341 Model Groups 9, 10, 11, 2, and 12, and on the 4381, is designed to improve the performance of certain mathematical computations such as matrix inversion, decomposition, and multiplication. Engineering Scientific Assist consists of a new multiply-add instruction that reportedly reduces CPU busy time by 30 percent. The assist feature supports only long precision (64-bit) floating point numbers. It is supplied on a microcode diskette and installed as part of the IML process.

ELEMENTARY MATH LIBRARY ASSIST (EML): This assist is available only on the 4381 Model Group 2 and is a standard feature. It improves the speed of calculations for single- and double-precision versions of square root functions, exponentiation of natural logarithms and common logarithms.

3838 ARRAY PROCESSOR: This special-purpose scientific processor is available on 4361, 4341 and 4381 systems only. The 3838 processes single-precision floating-point vector operations independently of the host CPU. Three models are available: the Model 1 with 256K bytes of bulk storage, the Model 2 with 512K bytes of bulk storage, and the Model 3 with 1024K bytes of bulk storage. The bulk storage provides independent data storage for up to seven concurrent users. The 3838 subsystem also includes an arithmetic processor with 16K bytes of control storage, a control processor, a data transfer controller, and a channel interface that attaches to a block multiplexer channel on the 4361, 4341 or 4381 host.

SYSTEM CONSOLES: A 3278 Model 2A Display Console or a 3279 Model 2C Color Display Console is required with every 4300 Series processor. The 3278-2A and 3279-2C consoles consist of an anti-glare CRT display and a separately priced 75-key operator console keyboard with operator control panel. The CRT displays 1920 characters in 24 rows of 80 characters each. Both models have character sets of 96 characters. The 3279-2C displays console messages in four colors: white, red, blue, and green.

The 3278-2A or 3279-2C console allows the operator to manually control such functions as storage display and operation, address comparing, and normal versus instruction step processing. The console indicates to the operator both proper operations and malfunctions. For maintenance and service, the console can display and store the status of the processor complex and other valuable servicing information as well as initiating and monitoring diagnostic tools. An audible alarm is a standard feature sounded under program control for special conditions.

The 3278-2A or 3279-2C connects directly to a 4300 Series processor. On the 4321, 4331 or 4361, connection is via the standard Display/Printer Adapter, which permits connection of the required 3278-2A or 3279-2C plus up to 7 (or 15 with the optional Display/Printer Adapter Expansion) additional devices chosen from the following list: 3278 Display Station Model 2, 3287 Printer Models 1 (80 cps) and 2 (120 cps), 3287 Color Printer Model 1C (80 cps) and 2C (120 cps), 3289 Line Printer Model 4 (400 lpm), and 3262 Line Printer Models 1 (650 lpm) and 11 (325 lpm). These devices may be installed in any combination, except that the number of system printers (3262 Model 1 or 3289 Model 4) may not exceed two. On the 4341 or 4381, up to three optional 3278-2A display consoles, 3279-2C display consoles, or 3287 printers can be added.

INPUT/OUTPUT CONTROL

I/O CHANNELS: The *4321* processor includes one-byte multiplexer channel and one block multiplexer channel which allow input/output devices to be attached to the system.

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On the *4331 Model Group 11,* one block multiplexer channel and one-byte multiplexer channel are standard. The block multiplexer channel has a data transfer rate of 1.25 million bytes per second. It provides 8 control unit positions and can be configured with up to 256 shared or nonshared subchannels that support a maximum of 256 devices. The block multiplexer channel on the 4331 Model Group 11 does not support 33XX series disk units.

The byte multiplexer channel attaches the 3203-5 Printer and System/370 byte multiplex devices to the 4331 Model Group 11. With this channel, the single-byte interleaved mode provides a speed of 36K bytes per second, and the burst mode provides a speed of up to 500K bytes per second. The byte multiplexer channel provides 8 control unit positions and up to 32 subchannels, 4 of which are shared subchannels supporting up to 16 devices each. The maximum number of subchannels is reduced by five with the Additional Line Group feature.

The *4331 Model Group 2* processor can have up to four integrated channels: one 5248 Byte Multiplexer Channel, one 1421 Block Multiplexer Channel, one 1422 Additional Block Multiplexer Channel, and one 1431 High-Speed Block Multiplexer Channel.

The 5248 Byte Multiplexer Channel operates at up to 36K bytes per second in single-byte mode and at up to 500K bytes per second in burst mode. The 5248 provides 8 control unit positions and up to 36 subchannels, 4 of which are shared subchannels with up to 16 devices each. The number of subchannels is reduced by one if the Communications Adapter is installed. In addition, each communications line reduces by one the number of subchannels available.

The 1421 and 1422 Block Multiplexer Channels can each accommodate a data transfer rate of up to 1.25 million bytes per second. The 1431 High-Speed Block Multiplexer Channel can handle a data transfer rate of up to 1.86 million bytes per second, permitting the attachment of high-speed peripheral devices such as the 3330/3333, 3340/3344, 3350, and 3370 via control units. If both the 1422 and the 1431 are installed on the same processor, the data transfer rate of the 1422 cannot exceed 600K bytes per second. Each of the block multiplexer channels for the 4331 Model Group 2 provides 8 control unit positions and can be configured with up to 128 nonshared subchannels and up to 16 shared subchannels, each with devices in multiples of 8. (The maximum number of devices is 128.) The high-speed block multiplexer channel and the second DASD Adapter are mutually exclusive.

In addition to the I/O channels described above, the 4331 processors can be equipped with integrated I/O adapters. A Display/Printer adapter, for attaching the required 3278-2A or 3279-2C Display Console and up to seven additional displays or printers, is standard on both the 4331 Model Group 11 and the 4331 Model Group 2. The following adapters are standard on the Model Group 11 and optional on the Model Group 2: the DASD Adapter (for 3310, 3370, or 3340/344 Direct Access Storage Devices), 8809 Adapter (for up to six 8809 Magnetic Tape Units), and Communications Adapter (for controlling up to eight communications lines). A 5424 Adapter (for a 96-column 5424 Multi-Function Card Unit) and a second DASD Adapter are also optional on the 4331 Model Group 2.

The *4361 Model Groups 4 and 5* come standard with one and two block multiplexer channels respectively. The block multiplexer channel operates at up to 1.25 megabytes per second for the attachment of tape units, system printers, and displays. A byte multiplexer channel is optional on Model Group 4 and standard on Model Group 5, and operates at up to 36K bytes per second in byte mode and 500K bytes per second in burst mode. It is used primarily for the attachment of unbuffered card readers, MICR and OCR devices.

The 4361 processors have integrated Direct Access Storage Device/8809 Adapters and High-Speed Block Multiplexer Channels for the attachment of high performance Direct Access Storage Devices, tape and other I/O devices. Model Group 4 can have a maximum configuration of either two DASD/8809 Adapters and one High-Speed Block Multiplexer Channel or one DASD/8809 Adapter and two High-Speed Block Multiplexer Channels. Model Group 5 has four possible maximum configurations: four DASD/8809 Adapters; two DASD/8809 Adapters and one High-Speed Block Multiplexer Channel; one DASD/8809 Adapter and two High-Speed Block Multiplexer Channels; or three High-Speed Block Multiplexer Channels. The DASD/8809 Adapters operate at up to 1.86 megabytes per second for the attachment and control of 3310, 3370 Models A1, A2, B1 and B2, and 3340/44 Direct Access Storage Devices, or the 8809 Magnetic Tape Unit. The High-Speed Block Multiplexer Channels include support for the 3880/3380, 337X, 3350, 334X and 333X Direct Access Storage Devices. The data transfer rate is up to 3.0 megabytes per second.

The *4341 Model Groups 9, 10, and 1* processors can have up to six I/O channels in two three-channel groups, one standard and the other optional. The standard group consists of one byte multiplexer channel and two block multiplexer channels. The standard byte multiplexer channel has a maximum data rate of 16K bytes per second in single-byte mode, 64K bytes per second in 4-byte mode, and 1.0 million bytes per second in burst mode. Each of the two standard block multiplexer channels accommodates a maximum block transfer rate of 3.0 million bytes per second.

The Optional Channel Group (feature 1870) for the 4341 Model Groups 9, 10 and 1 consists of three additional block multiplexer channels. Two of the optional block multiplexer channels have a data rate of 2.0 million bytes per second each. The data rate of the third channel is 1.0 million bytes per second. One of the three channels can optionally be configured as a second byte multiplexer channel with a maximum data rate of 22K bytes per second in single-byte mode, 88K bytes per second in 4-byte mode, and 2.0 million bytes per second in burst mode.

The aggregate data rate of the two standard block multiplexer channels is six million bytes per second. The aggregate data rate of the five block multiplexer channels including the optional group is 11 million bytes per second. If one of the three optional channels is configured as a second byte multiplexer channel, the aggregate data rate of the remaining four block multiplexer channels is nine million bytes per second. All of the block multiplexer channels support the Data Streaming mode.

The *4341 Model Group 11 and Model Group 2* processors provide six channels as standard: one byte multiplexer channel and five block multiplexer channels. The transfer rate for the block multiplexer channels is 3.0 million bytes per second for channels 1 and 2, and 2.0 million bytes for channels 3, 4, and 5. One of the block multiplexer channels can be selected as a second byte multiplexer channel.

The aggregate data rate of the five block multiplexer channels is 12 million bytes per second. If one of the channels is configured as a byte multiplexer channel, the aggregate data rate of the remaining four channels is 10 million bytes per second.

The 4341 Model Group 12 processors also provide six channels as standard including one byte multiplexer channel and five block multiplexer channels. The transfer rate,

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however, is 3.0 million bytes per second for channels 1, 2 and 4, and 2.0 million bytes per second for channels 3 and 5. One of the block multiplexer channels may be selected as a second byte multiplexer channel.

The aggregate data rate of the five block multiplexer channels is 13 million bytes per second. If channel 5 is selected as a byte multiplexer channel, the aggregate data rate of the remaining four channels is 11 million bytes per second. If channel 4 is selected as a byte multiplexer channel, the aggregate data rate of the remaining four channels is 10 million bytes per second. All block multiplexer channels support the Data Streaming Mode.

The capability for the attachment and automatic I/O power sequencing of up to 24 separate control units is standard on the 4341. Optionally, 48 control units can be accommodated through the addition of the 1890 Channel Control Unit Positions Feature. No one channel may attach and power-sequence more than eight control units.

A Channel-to-Channel Adapter (feature 1850) allows the interconnection of two channels, which may be on a 4341, 4381, System/360, or System/370. Only one of the interconnected processors needs to be equipped with this feature.

The 3088 Multisystem Channel Communication Unit is a standalone I/O Control Unit that provides channel-to-channel communication facilities for multiple IBM 303X, 308X, or 4341 processors. The 3088 provides the capability of interconnecting from four to eight processor channels. The channel interfaces can be configured with 32 or 64 contiguous unit addresses that provide the function of a Channel-to-Channel Adapter. From 126 to 252 logical Channel-to-Channel Adapter links are provided. The 3088 requires one control unit position on each processor channel to which it is attached. One unshared subchannel is required on each attached channel for each unit address.

The *4381 Model Groups 1 and 2* come equipped with six channels: five block multiplexer and one byte multiplexer channels. Four of the block multiplexer channels have data rates of up to 3.0 megabytes per second in data streaming mode. The fifth block multiplexer channel has a data rate of up to 2.0 megabytes per second; this channel may alternatively be selected as a byte multiplexer channel. An additional group of six block multiplexer channels may be installed as an option which increases the maximum aggregate data rate to 22 megabytes per second. The optional channels consist of two two-megabyte and four one-megabyte data streaming block multiplexer channels.

SIMULTANEOUS OPERATIONS: Concurrently with computing, a 4331, 4361, 4341 or 4381 can control one high-speed I/O data transfer operation per block multiplexer channel and one low-speed I/O operation on each subchannel of a byte multiplexer channel. Alternatively, a byte multiplexer channel can operate in burst mode and handle a single higher-speed I/O operation.

CONFIGURATION RULES

IBM enhanced the 4321 with additional features previously available on the 4331 Model Group 1. One DASD Adapter base is now standard. Supported devices include the 3310, 3340/3344 and 3370. One adapter for 8809 tape drives, supporting up to six drives, is standard. A Display/Printer adapter is standard with 16 ports for the attachment of the operator console, line printers, displays and printer terminals. Supported devices include 3278-2A and 3279-2C Operator Consoles, 3278-2 and 3279 Model S2A Display Stations, 3287 Printer Models 1, 2, 1C and 2C, 3262 Line Printer Models 1 and 11, 3289 Line Printer Model 4, and 3268 Printer Model 2.

The 4331 is a highly integrated system, with numerous peripheral adapters mounted in the processor cabinet, including those for 3310, 3370, and 3340 Direct-Access Storage Devices (up to 9000 megabytes per adapter); 8809 Magnetic Tape Units; diskette drive; 5424 Multi-Function Card Unit; and communications adapter. Also available are byte and block multiplexer channels, as described under the "Input/Output Control" heading. The integrated Support Processor has a standard Display/Printer Adapter for up to 8 devices, with optional expansion to 16 devices. These devices include a 3278-2A Console, 3278-2 Displays, 3287 Printer Models 1, 2, 1C, and 2C, 3262 Printer Model 1, and 3289 Printer Model 4.

The 4361 processor includes most of those features available with the 4331 with the exception of the 5424 Adapter, 1400 Compatibility and integrated modems for the Communications Adapter.

The 4341 and 4381 are more traditional mainframes, with only the Support Processor, the byte and block multiplexer channels, and the optional Channel-to-Channel Adapter feature integrated into the processor cabinet. Up to four 3278-2A Consoles, 3279-2C Consoles, 3268 Printers, Model 2, or 3287 Printers, Models 1, 2, 1C, and 2C, can be attached to the Support Processor on the 4341 or the Maintenance Subsystem on the 4381.

For information on channel configurability, see the Input/Output Control and Communications Control sections of this report.

MASS STORAGE

For information on mass storage devices available on the 4300 Series, refer to CHART B.

INPUT/OUTPUT DEVICES

For information on printers and magnetic tape units supported on the 4300 Series, refer to CHART D and CHART E, respectively.

The 4300 Series also supports the following card devices: 1442 Card Read Punch; 2501 Card Reader; 2520 Card Punch; 3505 Card Reader; 3525 Card Punch; and 5424 Multifunction Card Unit.

4250 PRINTER: A high-resolution, non-impact printer with a printing density of 600 x 600 dots per square inch. The printing time for an 8.5″ x 11″ size page ranges from 1.5 to 2.5 minutes. The 4250 provides the capability of printing and merging text and graphics. The printer uses electro-erosion technology and produces a typeset quality camera-ready masterpage directly from the host computer system.

3814 SWITCHING MANAGEMENT SYSTEM: This facility is designed to aid in the management of complex EDP configurations by providing centralized control of control-unit switching. The 3814 uses an integrated microcode-driven processor and features password authorization, stored configurations, and extensive self-diagnostic functions. As compared to the earlier IBM 2914 Model 1 Switching Unit, the 3814 provides increased capacity, extended functions, and improved reliability.

MICR/OCR EQUIPMENT: MICR devices supported on the 4300 Series include models 1255, 1419, and 3890. Each model has an E13B type font. Their speed in documents per minute ranges from 500 to 2400 and the number of stackers ranges from 6 to 36. Document size ranges from 2.5 to 4.17 inches in width and from 4.85 to 8.75 inches in length.

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Options include a 51-column sort, self-checking numbers, batch numbering, item numbering and microfilming. Optical reading devices supported include models 1287, 1288, 3881 and 3886. Readable fonts include: OCR-A, OCR-B, and OCR-C; 1428; marks; and handprint numeric. Speed in documents per minute range from 96 to 665 and each reader can accommodate from two to three stackers. Document size ranges from 2.25 to 9 inches in width and from 3 to 14 inches in length. Options include serial numbering, expanded symbols, and document counters.

TERMINALS: Numerous IBM display terminals, batch terminals, and typewriter terminals can be connected to a 4300 system in remote and/or local configurations. For details, refer to CHART C in this report and to Reports M13-300-101 and M14-700-101 in Volume 3 of DATAPRO REPORTS ON MINICOMPUTERS.

COMMUNICATIONS CONTROL

The principal communications control unit for the IBM 4321, 4331 and 4361 is the Integrated Communications Adapter, described below. The programmable 3704 and 3705 Communications Controllers, also described below, are the prime communications devices for the 4341 and 4381 and can also serve as alternatives to the Communications Adapter when more than eight lines must be connected to a 4331 or 4361. Loop Adapters are also available for the 4331 and 4361.

4321 COMMUNICATIONS ADAPTER: A standard feature on the 4321, the Integrated Communications Adapter supports eight BSC or SDLC communications lines. Line speeds range from 1200 to 9600 bits per second. The SDLC protocol is supported by ACF/VTAME operating under SSX/VSE. Each communications line has one Line Attachment Base for clocked modems and one EIA/CCITT interface for external modems. The communications adapter provides the following functions: auto answer, autopoll operation, multipoint central station functions, multipoint tributary station functions for BSC only, EBCDIC Transparent mode for BSC only, and EBCDIC/ASCII code for BSC only.

Certain parameters for each line can be configured from the operator console. These include selected stand-by, half-speed operation, NRZI mode in SDLC Mode, error index byte mode for BSC lines, ASCII code instead of EBCDIC code for BSC lines, and tributary station addresses for BSC lines. The following parameters can be configured at installation time and set by the IBM CE: BSC or SDLC protocol per line, duplex instead of half-duplex transmission, switched network facility instead of non-switched, new sync for multipoint primary station functions, and connect data set to line or data terminal ready procedure.

4331 and 4361 COMMUNICATIONS ADAPTER: This feature is standard on the 4331 Model Group 11 and optional on the Model Group 2. The feature is standard on Model Groups 4 and 5 of the 4361. It provides for the direct attachment of up to eight BSC, start/stop, or SDLC communications lines in any combination. (At any given time, the "any combination" may be two of the three available types.) The aggregate data rate capacity may not exceed 64,000 bits per second. For seven of the eight lines, the data rate per line may not exceed 9600 bps. The eighth line may be a BSC or SDLC high-speed line with data rate of up to 56,000 bps, operating concurrently with other lines provided that the data rate limitations are not exceeded. The adapter operates with start/stop and BSC lines in 2703 compatibility mode. SDLC is supported only by ACF/VTAME operating under DOS/VSE or by ACF/VTAME operating under VM/370 Release 6 with DOS/VSE running as a guest. The communications adapter provides auto answer, auto-poll operation, multipoint station functions, EBCDIC transparent mode for BSC only, and EBCDIC/ASCII code for BSC only.

The eight lines attached to the communications adapter may have these optional features in addition to the high-speed line feature (4720) already mentioned: up to eight line features without internal clock for attachment to external modems with (4695) or without (4696) clock (data circuit-terminating equipment); up to eight line features with integrated 1200-bps modems (nonswitched, 4781; switched with auto answer, 4782; non-switched with switched network backup and manual answer, 4787; non-switched with switched network backup and auto answer, 4788); up to eight line features with local attachments (4801); up to eight line features wth digital data service adapters (5650); and autocall unit interfaces for up to two of the installed lines (1020).

Certain configuration parameters for each line may be specified from the display console keyboard. These parameters include select stand-by, half-speed operation for synchronous lines only (for both clocked and nonclocked modems which have this capability), NRZI mode in SDLC mode, write interrupt (start/stop line), read interrupt (start/stop line), unit exception suppression (start/stop line), error index byte mode (BSC line), and ASCII code instead of EBCDIC (BSC line).

Certain configuration parameters can be selected at installation time and set by the IBM CE. These parameters include duplex instead of half-duplex connection (two-way alternate data flow transmission), switched network facility instead of nonswitched lines for external modems, new sync for BSC or SDLC in multipoint primary station function only, connect data set to line or data terminal ready procedure, and selection of WE202 or V.23 answer tone frequencies for 1200-bps integrated modems with automatic answering.

The 4321, 4331 and 4361 have an attachment capability for intelligent workstations. The IBM Displaywriter, IBM Personal Computer and the 3270 Personal Computer Attachment are supported by one of the following: the Integrated Communications Adapter; the 3274 control unit; or the Display/Printer Adapter. On the 4321 and 4331, start/stop attachment requires the Integrated Communications Adapter.

The 4331 and 4361 Communications Adapter supports communications with virtually all of the current IBM terminals, systems, and communications controllers in one or more of the three transmission modes: SDLC, BSC, or start/stop.

4331 and 4361 LOOP ADAPTERS: Provide the capability to attach certain terminals and control units to a 4331 Model Group 2 and Model Group 11, and a 4361 Model Group 4 and Model Group 5, either directly or via a data link. Loop Adapter 1 (feature 4830) and Loop Adapter 2 (4831) provide for direct attachment. The Data Link Adapter (4840) provides remote attachment capabilities for 3843 Loop Control Units. Each Data Link Adapter can be used as a point-to-point or multipoint connection to attach up to four 3843 Loop Control Units.

The following devices can be connected to direct attached loops at 9600 bps or to data link attached loops at 2400, 4800, or 9600 bps: the 3640 Plant Data Communications Terminals, the 8775 Display Terminal Model 1 or 2, the 3287 Printer Model 11 or 12, and the 3274 Control Unit Model 51C and 3276 Control Unit Display Station Models 11 to 14, with their associated terminals (3278 Display Station, 3279 Color Display Station, 3262 Line Printer, 3287 Printer, and 3289 Printer). In addition, the 8775, 3287 Models 11 and 12, and the 3274 control unit and associated terminals can also be attached at 38,400 bps. Up to 80 terminals can be connected to a 4331 Model Group 2 or a 4361 via the Loop or Data Link Adapters.

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Cable length for direct attached loops can be up to 1.25 miles (2000 meters) when operating at 38,400 bps or 2 miles (3200 meters) when operating at up to 9600 bps. Data link attached loops can be up to 2 cable miles in length. The 4331 and 4361 support one Loop Adapter 1, one Loop Adapter 2, and up to two Data Link Adapters. The loop and data link adapters are mutually exclusive with the 5424 Adapter.

3705 COMMUNICATIONS CONTROLLER: This programmable front-end network processor can be connected to either a byte or block multiplexer channel on a 4331, 4361, 4341, or 4381 processor.

The 3705 consists of a Basic Module and up to three Expansion Modules. The Basic Module houses the Central Control Unit and Control Panel. Also contained in these modules are the storage, Channel Adapters, Communications Scanners, Line Interface Bases, and Line Sets required to accommodate up to 352 communication lines. Configuration rules for the 3705 are quite complex. The maximum number of lines that can be connected is a function of the 3705 model, the line speeds and types, and the mode of operation. In the 2701/2/3 Emulation mode, a maximum of 255 lines can be controlled. Line speeds can range from 45.5 to 56,000 bits per second. In the Network Control Program (NCP) mode, data is transferred between the 3705 and the host computer via a single subchannel interface.

The 3705-II offers significant price/performance improvements over the original model, now designated the 3705-I. (The 3705-I is no longer available.) The 3705-II is available in 44 different models depending upon the number of frames and the storage capacity, which ranges from 32K to 512K bytes. Processor cycle time is 1.0 microseconds on Models E1-E8, F1-F8, G1-G8, and H1-H8, and 900 nanoseconds on Models J1-J4, K1-K4, and L1-L4. Other 3705-II features include a high-speed Communications Scanner, an upgraded Channel Adapter that transfers data in blocks of 32 characters, transmission speeds to 9600 bps in synchronous mode, a maximum transmission rate of 56,000 bps, and a Cycle Utilization Counter that accumulates statistical data to assist in measuring machine performance.

The entry-level 3705-80 series consists of Models 81, 82, and 83. The 3705-80 has 256K bytes of storage and supports 4, 10, or 16 communication lines. The 3705-80 can be used as a front-end communications processor or as a remote concentrator linked to a local 3705-II Controller.

When connected to a host IBM processor, a 3705 can use either the Network Control Program (NCP) or the 2701/2/3 Emulation Program. NCP/VS, for virtual environments, includes all of the facilities of the original NCP and also has the partitioned Emulation Programming Extension (PEP) capability which permits operation in the NCP mode and Emulation mode concurrently.

The 3705 Controllers are supported under the VTAM and TCAM access methods. The Advanced Communications Function for NCP, ACF/NCP/VS (and related Systems Support Programs), adds capabilities for multiple-processor environments. An X.25 NCP Packet Switching Interface is now available for use with ACF/NCP/VS. To utilize ACF/NCP/VS, the Advanced Communication Function for VTAM and TCAM is required. ACF/VTAM supports CICS/VS, IMS/VS, Power/VS, JES1/RES, JES2/RJE, TSO, VSPC, SSS, and BTP user programs. ACF/TCAM supports CICS/VS, TSO, SSS, and user programs.

3704 COMMUNICATIONS CONTROLLER: The 3704 is a smaller version of the 3705 that can be connected to a byte multiplexer channel on either a 4331, 4361, 4341 or 4381 processor. The 3704 is available in only four models with a main memory capacity of from 16K to 64K bytes. It can accommodate a maximum of 32 lines, just one-half the capacity of the basic 3705 configuration. The 3704 uses the same software as the 3705, thereby ensuring upward compatibility for economic expansion of a small network into a large one.

3725 COMMUNICATIONS CONTROLLER: The 3725 consists of the Model 1 and the Model 2. It consists of a central control unit which operates under control of the Advanced Communications Function/Network Control Program, Emulator Program, or Partitioned Emulator Program. Main storage is available in 512K-, 786K-, or 1024K-byte sizes. It can be attached to either byte or block multiplexer or selector channels on the host processor. Up to six channel adapters are available with two adapters standard in the base frame and four can be added via the 3726 Expansion Unit. With the optional two-processor switch feature, connection can be made to a maximum of eight processors, six of which can operate concurrently. The Maintenance and Operator Subsystem allows for host-independent maintenance. Communication scanners and line interfaces are provided by a transmission subsystem. The scanners are microprocessor-based and can control eight Line Interface Couplers with up to 32 lines. The 3727 Operator Console provides an operator interface to the Maintenance and Operator Subsystem of the 3725.

Model 1 consists of the 3725 Communication Controller and the 3726 Communication Controller Expansion. Up to 256 full-duplex or half-duplex lines may be attached with Model 1. Model 2, however, allows for attachment of up to 24 full-duplex or half-duplex lines. Model 2 is field-upgradeable to Model 1.

4994 ASCII Device Control Unit: The 4994 comprises three models: the A00 which supports up to 16 devices, the B00 which supports up to 32 devices, and the C00 which supports up to 48 devices. In conjunction with its program offering support, Host Loaded Yale ASCII Communications System, the 4994 allows the attachment of ASCII devices to the 4331, 4361, 4341 or the 4381 running VM/CMS. ASCII terminals appear to the host as IBM 3277 terminals. In order to be supported, devices must: perform clear screen or clear to end of screen; provide absolute cursor positioning; and allow characters written to the screen to replace, not overstrike (except APL). Features provided include full-duplex operation between the 4994 and the terminals, type-ahead capability from the terminal and normal keyboard functions. Physical connection is made via EIA RS-232-C or 20 mA current loop.

REMOTE OPERATOR CONSOLE FACILITY (ROCF): The ROCF, an extension of the 4300 Remote Support Facility, is designed to facilitate dial-up and initialization of a remote 4300 Series processor from a real or emulated 3275 Model 2 Display Station at the host site. A network can include a 4300 Series processor with ROCF installed and an IBM System/370, 303X, 308X, or 4300 Series host processor running either of two software products that provide 3275 emulation: the MVS/Operator Communications Control Facility (MVS/OCCF) or the VM/Pass-Through Facility Release 2. MVS/OCCF is designed to operate on any IBM host computer that supports MVS/SP Version 1, while the VM/Pass-Through Facility Release 2 requires the new VM/SP Release 2 program product. No software support is required if a real 3275 Model 2 Display Station is available at the host site or if both the host and the remote systems are 4331 or 4361 processors. In the latter instance, 3275 emulation is performed by microcode in the host 4331 or 4361.

The following 4300 system operations can be performed from the host site: initial microcode load (IML), initial program load (IPL), reset, restart, compare/trace, and alter/

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display. Power-on for the remote 4300 processor must be performed at the remote site. A password verification function is provided to help protect against unauthorized access to the remote 4300 system. ROCF supports bisynchronous communications at 1200 bits per second.

After a remote 4300 is initialized from the host, communications control should continue through the existing network facilities of the host processor. ROCF is not designed to perform interactive jobs. On a 4321, 4331 or 4361 system, ROCF suppresses the activities of all devices attached to the Display/Printer Adapter. When MVS/OCCF is used to initialize a remote 4341 or 4381 MVS or DOS/VSE system, continued control can be provided by MVS/OCCF in conjunction with the Network Communications Control Facility. After a remote 4341 or 4381 VM system has been initialized, continued control can be provided by the Programmable Operator Facility of VM/SP Release 2.

7770 AUDIO RESPONSE UNIT: Provides audio responses, in recorded human-voice form, to digital inquiries from push-button telephones or other inquiry-type terminals. Handles a maximum of 48 lines, any or all of which can be active simultaneously. Has a 32-word basic vocabulary, expandable in 16-word increments to a maximum of 128 words. Receives inquiry messages and forwards them to the processing unit, which processes each message and composes an appropriate reply. The 7770 then converts the reply into a sequence of English words which are read from its magnetic drum and transmitted to the inquirer.

SOFTWARE

COMPATIBILITY: Any program written for an IBM System/370 computer will operate on a 4300 Series processor in System/370 mode, provided that it is not time-dependent; does not depend on system facilities such as storage size, I/O equipment, optional features, etc., being present when the facilities are not included in the configuration; does not depend on system facilities such as interruptions, operation codes, etc., being absent when the facilities are included in the 4300 Processor; and does not depend on results or functions which IBM specifies to be unpredictable or model-dependent.

Any program written for a System/360 will operate on a 4300 Series processor in System/370 mode, provided that it follows the above rules and does not depend on functions that differ between the System/360 and System/370.

OPERATING SYSTEMS: The 4300 Series processors are supported by DOS/VSE (a significant expansion of DOS/VS), SSX/VSE (a subset of DOS/VSE), VM/370 Release 6, OS/VS1 Release 7, OS/VS2 (MVS), and MVS/XA (on the 4381 only).

DOS/VSE: This disk-resident operating system is designed to control system resources and job processing and it is a prerequisite for VSE-related program products. DOS/VSE is enhanced by the VSE/Advanced Functions licensed program which provides functional and performance-related capabilities. VSE Performance Tool (VSE/PT) is a software-system monitor for measuring and evaluating the performance of a DOS/VSE system.

DOS/VSE supports 4300 processors operating in System/370 or ECPS:VSE mode; the 4321, however, is supported when operating in ECPS:VSE mode only. The components of DOS/VSE are stored in DASD resident system libraries and can be loaded into main storage when needed. The functions of DOS/VSE include: initial program load; resource management; job control; linkage editing; paging management; library management; data management; system-to-operator communication; system utilities; system serviceability; and debugging aids.

Device support within DOS/VSE includes: the 3330, 3340/3344, 3350, 3375, 3310 and 3370 Direct Access Storage Devices; the 3203, 3211, 3262, 3289, and 3800 printers; the 8809 and 3420 magnetic tape drives; and the 3270, 3600, 3650, 3660, 3760, 3767, 3770 and 3790 terminals. DOS/VSE requires a minimum of 160K bytes of processor storage.

SMALL SYSTEMS EXECUTIVE/VSE (SSX/VSE): A subset of DOS/VSE, SSX/VSE is a pregenerated, preconfigured operating system designed for use by personnel with limited data processing skills. SSX/VSE supports batch, interactive, and on-line applications on 4321, 4331, 4341 or 4361 processors operating in standalone or distributed environments. Prompts and procedures are provided to aid in installation, operation, program development, and service related activities. According to IBM, a standalone SSX/VSE system can be installed in two hours or less. SSX/VSE Release 3 is a complete, self-contained operating system with no prerequisite software. It is ready for use immediately after installation.

SSX/VSE consists of components that are unique to SSX/VSE and components that are based on DOS/VSE. SSX/VSE unique functions include: 1) system installation and initialization; 2) system administration and operation functions, including library maintenance support, program development support, data set management support, CICS/VS table maintenance, and system operation support such as job creation and submission and backup and recovery; 3) problem determination aid; 4) an application installation interface that aids in adapting applications programs to SSX/VSE; and 5) a network installation interface that allows the integration of SSX/VSE into an SNA cross domain environment.

The minimum hardware configuration required for the installation and operation of SSX/VSE consists of a 4321, 4331, 4341, or 4361 with one megabyte of main memory, one 3278 Model 2A or 3279 Model 2C System Console, one 3178 or 3278 or 3279 locally attached display station, one 3262, 3289 Model 4, 3203, 3211, or 4245 Line Printer, one 8809, 3411, 3420, or 3430 Magnetic Tape Unit, either two 3310 or one 3370 Direct Access Storage Devices, and the associated integrated I/O adapters.

VM/370: VM/370 Release 6 is an operating environment that manages a computer system's facilities in such a way that each of many users has use of the functional equivalent of a dedicated computer system. The four main components of VM/370 are: Control Program (CP); Conversational Monitor System (CMS); Remote Spooling Communication Subsystem (RSCS); and Interactive Problem Control System (IPCS).

The Control Program makes all system resources (processor time, real storage and I/O devices) available to many users at the same time. CP enables multiple independent virtual machines to run concurrently under control of different operating systems or different releases of the same operating system. The Conversational Monitor System (CMS) creates and maintains source programs, supports a wide range of compilers, provides testing and debugging functions and allows for time-sharing in either a distributed system or centralized environment. The Remote Spooling Communication Subsystem (RSCS) transfers unit record files between virtual machines and remote stations connected via BSC switched or non-switched lines. The Interactive Problem Control System (IPCS) aids systems programmers in managing and resolving programming problems by reducing the need for using hardcopy documentation.

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Hardware supported under VM/370 includes: the 3340, 3344, 3350, 3375, 3380, 3850, 3310 and 3370 Direct Access Storage Devices; the 3410, 3420 and 8809 magnetic tape drives; the 3270 terminal; and the 3800 printing subsystem.

The *VM/System Product* (VM/SP), Release 3, contains all of the functions currently available in the VM/Basic System Extensions and VM/System Extensions program products, which extend the system control program of VM/370. These Extensions make VM/370 and the Conversational Monitor System (CMS) more flexible and productive and increase the number of devices supported. VM/SP provides the following functions as well: dynamic SCP transition with an IPL; SNA support with VM/VCNA; inter-user communication capability; CMS full screen 3270 editor; additional CMS functions and productivity aids; a command retrieve capability; a trace table recording facility; and SQL/DS Release 2 support. Hardware supported includes: the 3310, 3370, 3375 and 3380 Direct Access Storage Devices and the 3800 Printing Subsystem.

OS/VS1 RELEASE 7: This release of IBM's OS/VS1 operating system provides support for the 4331, 4341, 4361 and 4381 processors in the System/370 mode. OS/VS1 is highly compatible with MVS which makes it a logical interim step for future MVS users. The four major functions of the control program routines of OS/VS1 are: job management through the use of operator commands and job control statements; task management which monitors and controls the entire system; data management which controls all operations associated with input and output devices; and recovery management which attempts to overcome the effects of a processor, channel, or I/O device malfunction. Additional features of OS/VS1 include automatic partition redefinition, dynamic dispatching or time slicing, concatenated procedure libraries, and I/O load balancing. Hardware support includes: the 3270 terminal; the 3340, 3344, 3350, and 3375 Direct Access Storage Devices; and the 3800 Printing Subsystem.

The *OS/VS1 Basic Programming Extensions* provide support for the 4331 and 4341 Model Group 2 processors, the 4341 Model Group 9, 10, 11 and 12 processors, the 4361 Model Groups 4 and 5, the 4381 Model Groups 1 and 2, the 3380 Direct Access Storage unit, the 3375 Direct Access Storage unit, the 3880 Storage Controller Model 13, the 3262 Printer Models 1 and 11, the 4245 printer, and the 3430 Magnetic Tape Subsystem. Additional features include: an enhanced dump facility; VM/VTAM Communications Network Applications support; support for the Data Facility/Device Support program, which provides a new indexed volume table of contents (VTOC) for improved system performance; enhanced 3880 Control Unit Buffer; and support for 4K page sizes.

MVS: MVS is supported on the 4361, 4341 and 4381 processors. These processors can utilize either of two MVS/System Products, MVS/SP-JES2 or MVS/SP-JES3. MVS Release 3.8 with Processor Support 2 provides the required basic SCP code. MVS/SP-JES2 and MVS/SP-JES3 are separately priced products that provide major extensions and enhancements to the MVS Base Control Program plus JES2 and JES3, respectively. IBM has stated that the MVS/System Products will replace the earlier MVS/System Extensions product and serve as the base for future enhancements to MVS, JES2, and JES3. MVS features include: the System Resource Manager (SRM) which provides optimum system resource use; the Job Entry Subsystem (JES2 or JES3) which reduce restart and rerun costs; and the Virtual Input/Output Facility (VIO) which stores temporary data in a buffer. Hardware support includes the 3330, 3340, 3344, 3350, 3375, and 3380 Direct Access Storage Devices and the 3420 Models 4, 6, and 8 Magnetic Tape Units.

MVS/XA: The 4381 processors are the only processors in the 4300 line that support MVS/Extended Architecture (MVS/XA). MVS/XA allows the use of address space sizes beyond the 16-megabyte maximum of MVS/370. The address space sizes can be expanded up to 2000 megabytes, and there can be 32,000 such address spaces simultaneously active. MVS/XA consists of two programs: MVS/SP Version 2 and the Data Facility Product. The Data Facility Product provides data management, device support, program library management, and utility functions. In the process of converting to MVS/XA, the VM/XA Migration Aid permits other operating systems to run with the 370-XA microcode as VM guest operating systems. Such support is also available for VSE and VS1.

RMF (Resource Measurement Facility) is a centralized management tool for MVS users which monitors system activity to collect performance and capacity planning data. It can be used either dynamically by displaying selected real time activity reports, or statistically by recording in SMF data sets for post-processing. RMF measures the following activities: processor usage; address space usage; channel activity; device activity and contention; detailed I/O queuing for logical control unit groups; detailed system paging; detailed system workload; and page/swap data sets.

OTHER SOFTWARE FACILITIES: Information about other IBM software products supplied with the operating system software previously described is summarized below.

To assist the DOS/VSE user in improving productivity, IBM offers the VSE/ICCF program product, which is the successor to the popular DOS/VS ETSS-II (Entry Time-Sharing System) field-developed product. VSE/ICCF is an integrated system of productivity tools for: program development, program maintenance, editing, documentation, security, and coordination.

In the System Installation Productivity Options/Extended (System IPO/E), the IPO concept has been extended to facilitate the installation, management, and use of the 4300 Series software products. IPO/E consists of a base set of integrated program products, pregenerated, preconfigured, and pretested with the latest service levels preapplied, and ready to use in specific operating environments.

The Time-Sharing Option (TSO) is a full-function time-sharing system that provides interactive computing through the following functions: maintenance of system libraries, catalogs, and procedure libraries; application development and maintenance of existing applications; and the creation, maintenance, and control of development support libraries and production libraries. TSO Extensions (TSO/E) provides all of the functions of TSO and includes the following enhancements: simplification of the process of sending data between nodes in a network; performance improvements in the area of sending work from the foreground to the batch stream for execution; and display of information displayed about a command during command entry. Under MVS/XA, TSO/E also provides support for testing a program located in addresses above 16 megabytes.

The Advanced Communications Function/Virtual Telecommunications Access Method (ACF/VTAM) is the base for the major IBM communication subsystems and provides an "operating system" for the network. Its functions are the same as those of a host operating system in terms of resource sharing and logical handling of user requests.

PRICING

POLICY: The 4321 and 4331 are currently available for purchase or monthly rental only. (Prior to February 1984,

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4331 systems could be leased; those 4331s ordered for lease prior to February 10, 1984 and shipped prior to August 10, 1984 are still subject to lease agreements.) IBM offers the 4361, 4341 and 4381 systems on a purchase, lease, or rental basis. The standard IBM lease or rental contract includes equipment maintenance and entitles the customer to unlimited usage each month. The purchase option accrual equals 40 percent of the monthly charge up to 50 percent of the purchase price. The period in which 4321 and 4331 rental systems can earn accruals is limited to six 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. CPUs rented under the plan can be terminated or downgraded on 90 days' notice, and all other rented equipment can be terminated or downgraded on 30 days' notice. Base terms and extension terms are specified for each piece of equipment obtained through a leasing agreement. The basic lease term is two years, followed by one-year extension terms.

In October 1982, IBM introduced a volume purchase discount plan for the 4300 Series. A discount of 6 percent is offered on the purchase of 5 to 9 4300 Series processors. For quantities of 10 or more, the discount is 9 percent.

MAINTENANCE: For purchased, leased, or rented systems, the IBM 4300 Series is under maintenance group D. The minimum period of maintenance service is 9 consecutive hours between 7:00 a.m. and 6:00 p.m. Monday through Friday. Charges for maintenance coverage outside this period are based upon the following percentages of the minimum monthly maintenance charge (MMC) added to the MMC:

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

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

For users without a maintenance contract, the 4300 Series is maintained under per-call class 3. Under this class, the per call charge during regular hours is $147 per hour, and during off hours the charge is $170 per hour.

SOFTWARE: IBM 4300 Series users receive the basic DOS/VSE, OS/VS1 Release 7, VM/370 Release 6, or OS/VS2 (MVS) system control programs at no additional cost. All other IBM software, including the DOS/VS Advanced Functions and the SSX/VSE operating system, is priced separately. In addition, basic monthly charges have been established for maintenance of the IBM system control programs and other licensed program products.

Charges for most software products are based on a continuous monthly charge. A one-time license fee is available for SSX/VSE. Users who have multiple systems controlled from a central site can pay the Basic License Fee for the central site and the Distributed Systems License Option (DSLO) fee for all other locations. Central Service, including the IBM Support Center, is provided through the customer location designated for the Basic License.

Local programming support is available on two levels. The Monthly Licensed Program Support Charge provides local support for a single licensed program. The Monthly Multiple Licensed Program Support Charge provides local support for multiple copies of a program. The multiple copies can be installed at more than one customer location, but the local support is performed at one designated location. Local program support for Class 1 SCPs is offered on the same two levels.

An alternative to contracted software maintenance is per-call service, charged to the applicable hourly rate. Program service/programming assistance costs $158 per hour during regular hours and $181 per hour at other times. The initial and prime interface for software problems and their solution is the IBM Support Center, described below.

SUPPORT CENTER: The centralized IBM Support Center provides 24-hour, 7-day customer access by telephone (an 800 number is provided). It utilizes the Software Support Facility data base, which incorporates every problem encountered and resolved (or unresolved) by the central support group. The customer is assisted in making out any APAR (program problem report), and he gets advice on temporary fixes or bypasses.

RETAIN is a data base which serves as the heart of service support. It is available to 4300 customers as an on-line service. It is scanned for existing solutions to a problem as it occurs. RETAIN is also used as a place to store solutions to new problems so that others will not rediscover the same problems. If the Support Center cannot resolve a problem, the customer is put in touch with the Change Team Support Specialist, who is directly familiar with the section of coding relating to the problem being reported. If, after working with this individual, the problem still cannot be resolved, the PSR (Program Support Representative) from the customer's local office will be dispatched to assist. Under the new support plan, many of the facilities that were previously provided by IBM support personnel at no charge have become billable activities.

EQUIPMENT: The indicated prices for the following typical configurations include all the required control units and adapters, but do not include software.

TYPICAL 4321 SYSTEM: Includes a 4321 Processor with one megabyte of main memory, two 3278-2A Operator Consoles with keyboards, a 3310 DASD Model A2 with attached Model B2 (258 megabytes), two 8809 Magnetic Tape Units, a 650-lpm 3262 Model 1 Printer, and integrated tape and disk adapters. The monthly maintenance charge is $882 and the purchase price is $130,516.

TYPICAL 4361 GROUP 5 SYSTEM: Includes a 4361 Model L5 Processor with four megabytes of main memory and one I/O channel, two 3278-2A Operator Consoles with keyboards, a 3310 DASD Model A2 with a Model B2 attached (258 megabytes), four 8809 Magnetic Tape Units, a 2520 Card Read Punch, two 3262 Model 1 Printers, and integrated tape and disk adapters. The monthly rental charge is $20,025, the monthly maintenance charge is $2,178, and the purchase price is $362,910.

TYPICAL 4341 GROUP 12 SYSTEM: Includes a 4341 Model N12 Processor with 12 megabytes of main memory and six I/O channels, two 3278-2A Operator Consoles with keyboards, 3287 Model 2 Console Printer, a 3380 DASD Model A4 (2.5 billion bytes), a 3880 Model 2 Storage Control, eight 3420 Model 3 Magnetic Tape Units (120KBS), a 3803 Model 1 Tape Control, a 2520 Card Read Punch, and two 1200-lpm 3203 Model 5 Printers with 1416 Interchangeable Train Cartridges. The monthly charge on a two-year lease is $35,075.00, the monthly maintenance charge is $5,004.50, and the purchase price is $892,100.00.

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TYPICAL 4381 GROUP 2 SYSTEM: Includes a 4381 Model P2 Processor with 16 megabytes of main memory and six I/O channels, two 3279-2C Color Display Consoles with keyboards, one 3287 Color Console Printer, one 3380 DASD Model A4 (2.5 billion bytes), one 3880 Model 2 Storage Control, eight 3420 Model 3 Magnetic Tape Units (120KBS), one 3803 Model 1 Tape Control, one 2520 Card Read Punch, and three 1200-lpm 3203 Model 5 Printers with 1416 Interchangeable Train Cartridges. The monthly rental charge is $61,372.00, the monthly maintenance charge is $4,962.50, and the purchase price is $1,091,350.00.

IBM 4300 Series

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Year Lease)*
PROCESSORS AND UPGRADES					
4321 J11	Processor with 1,048,576 bytes of main memory, one DASD Adapter, one 8809 Magnetic Tape Unit Adapter, one Display/Printer Adapter, one Communications Adapter, one Communications Adapter Base	$ 64,000	$301.00	$4,765	$ —
4331 J11	Processor with 1,048,576 bytes of main memory, 4K-byte buffer, one byte and one block multiplexer channel, one DASD Adapter, one 8809 Magnetic Tape Unit Adapter, one Display/Printer Adapter, one Communications Adapter Base	82,420	351.00	5,534	4,710
4331 K11	Same as 4331 J11, but with 2,097,152 bytes of main memory	89,920	377.00	6,092	5,185
4331 L11	Same as 4331 J11, but with 4,194,304 bytes of main memory	104,920	429.00	7,208	6,135
4331 J2	Processor with 1,048,576 bytes of main memory and 8K-byte buffer	82,500	343.00	6,709	5,710
4331 K2	Same as 4331 J2, but with 2,097,152 bytes of main memory	90,000	369.00	7,267	6,185
4331 KJ2	Same as 4331 J2, but with 3,145,738 bytes of main memory	97,500	395.00	7,825	6,660
4331 L2	Same as 4331 J2, but with 4,194,304 bytes of main memory	105,000	421.00	8,323	6,135
4341 J9	Processor with 1,048,576 bytes of main memory and 2K-byte buffer	81,000	388.00	6,786	5,775
4341 K9	Same as 4341 J9, but with 2,097,152 bytes of main memory	88,500	414.00	7,385	6,285
4341 L9	Same as 4341 J9, but with 4,194,304 bytes of main memory	103,500	466.00	8,578	7,300
4341 K10	Processor with 2,097,152 bytes of main memory and 4K-byte buffer	142,500	518.00	9,888	8,415
4341 L10	Same as 4341 K10, but with 4,194,304 bytes of main memory	157,500	570.00	11,174	9,510
4341 K1	Processor with 2,097,152 bytes of main memory and 8K-byte buffer	184,500	541.00	11,239	9,565
4341 L1	Same as 4341 K1, but with 4,194,304 bytes of main memory	199,500	593.00	12,526	10,660
4341 K11	Processor with 2,097,152 bytes of main memory and 8K-byte buffer	211,200	675.00	14,030	11,940
4341 L11	Same as 4341 K11, but with 4,194,304 bytes of main memory	226,200	727.00	15,322	13,040
4341 M11	Same as 4341 K11, but with 8,388,608 bytes of main memory	256,200	831.00	17,895	15,230
4341 K2	Processor with 2,097,152 bytes of main memory and 16K-byte buffer	297,000	791.00	16,920	14,400
4341 L2	Same as 4341 K2, but with 4,194,304 bytes of main memory	312,000	843.00	18,213	15,500
4341 M2	Same as 4341 K2, but with 8,388,608 bytes of main memory	342,000	947.00	20,786	17,690
4341 N2	Same as 4341 K2, but with 12,582,912 bytes of main memory	372,000	1,050.00	23,371	19,890
4341 P2	Same as 4341 K2, but with 16,777,216 bytes of main memory	402,000	1,155.00	25,944	22,080
4341 K12	Processor with 2,097,152 bytes of main memory and 16K-byte buffer	316,800	900.00	18,859	16,050
4341 L12	Same as 4341 K12, but with 4,194,304 bytes of main memory	331,800	952.00	20,046	17,060
4341 M12	Same as 4341 K12, but with 8,388,608 bytes of main memory	361,800	1,055.00	22,431	19,090
4341 N12	Same as 4341 K12, but with 12,582,912 bytes of main memory	391,800	1,160.00	24,828	21,130
4341 P12	Same as 4341 K12, but with 16,777,216 bytes of main memory	421,800	1,265.00	27,213	23,160
4361 K4	Processor with 2,097,152 bytes of main memory and 8K-byte buffer	150,000	490.00	8,500	—
4361 L4	Same as 4361 K4, but with 4,194,304 bytes of main memory	165,000	542.00	9,616	—
4361 LK4	Same as 4361 K4, but with 6,291,456 bytes of main memory	185,000	594.00	10,732	—
4361 M4	Same as 4361 K4, but with 8,388,608 bytes of main memory	200,000	646.00	11,848	—
4361 ML4	Same as 4361 K4, but with 12,852,912 bytes of main memory	230,000	750.00	14,080	—
4361 K5	Processor with 2,097,152 bytes of main memory and 16K-byte buffer	200,000	590.00	11,300	—
4361 L5	Same as K5, but with 4,194,304 bytes of main memory	215,000	642.00	12,416	—
4361 LK5	Same as K5, but with 6,291,456 bytes of main memory	230,000	694.00	13,532	—
4361 M5	Same as K5, but with 8,388,608 bytes of main memory	245,000	746.00	14,648	—
4361 ML5	Same as K5, but with 12,582,912 bytes of main memory	275,000	850.00	16,880	—
4381 L1	Processor with 4,194,304 bytes of main memory and 8K-byte buffer	370,000	564.00	24,665	—
4381 M1	Same as L1, but with 8,388,608 bytes of main memory	410,000	614.00	27,330	—
4381 P1	Same as L1, but with 16,777,216 bytes of main memory	490,000	714.00	32,660	—
4381 L2	Processor with 4,194,304 bytes of main memory and 32-byte buffer	500,000	672.00	33,330	—
4381 M2	Same as L2, but with 8,388,608 bytes of main memory	540,000	722.00	35,995	—
4381 P2	Same as L2, but with 16,777,216 bytes of main memory	620,000	822.00	41,325	—

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EQUIPMENT PRICES (Continued)

► System upgrades:

	Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Year Lease)*
4321 to 4331 J11				
4321 to 4331 K11				
4321 J11 to 4331 J2	40,000	—	—	—
4321 J11 to 4331 K2	47,500	—	—	—
4321 J11 to 4331 KJ2	55,000	—	—	—
4321 J11 to 4331 L2	62,500	—	—	—
4331 I1 to 4331 J11***	33,750	—	—	—
4331 I1 to 4331 K11***	41,250	—	—	—
4331 I1 to 4331 L11***	56,250	—	—	—
4331 J1 to 4331 J11***	33,865	—	—	—
4331 J1 to 4331 K11***	37,500	—	—	—
4331 J1 to 4331 L11***	52,500	—	—	—
4331 I1 to 4331 J1***	3,750	—	—	—
4331 I1 to 4331 J2***	45,000	—	—	—
4331 I1 to 4331 K2***	51,250	—	—	—
4331 I1 to 4331 KJ2***	58,750	—	—	—
4331 I1 to 4331 L2***	66,250	—	—	—
4331 I1 to 4361 K5***	134,590	—	—	—
4331 I1 to 4361 L5***	149,590	—	—	—
4331 I1 to 4361 LK5***	164,590	—	—	—
4331 I1 to 4361 M5***	179,590	—	—	—
4331 I1 to 4361 ML5***	209,590	—	—	—
4331 J1 to 4331 J2***	43,865	—	—	—
4331 J1 to 4331 K2***	47,500	—	—	—
4331 J1 to 4331 KJ2***	55,000	—	—	—
4331 J1 to 4331 L2***	62,500	—	—	—
4331 J1 to 4361 K5***	130,840	—	—	—
4331 J1 to 4361 L5***	145,840	—	—	—
4331 J1 to 4361 LK5***	160,840	—	—	—
4331 J1 to 4361 M5***	175,840	—	—	—
4331 J1 to 4361 ML5***	205,840	—	—	—
4331 J11 to 4331 K11	7,500	—	—	—
4331 J11 to 4331 K11	30,000	—	—	—
4331 J11 to 4331 J2	16,465	—	—	—
4331 J11 to 4331 K2	23,965	—	—	—
4331 J11 to 4331 KJ2	31,465	—	—	—
4331 J11 to 4331 L2	38,965	—	—	—
4331 J11 to 4331 L11	22,500	—	—	—
4331 J11 to 4361 K5***	130,840	—	—	—
4331 J11 to 4361 L5***	145,840	—	—	—
4331 J11 to 4361 LK5***	160,840	—	—	—
4331 J11 to 4361 M5***	175,840	—	—	—
4331 J11 to 4361 ML5***	205,840	—	—	—
4331 K11 to 4331 K2	16,465	—	—	—
4331 K11 to 4331 KJ2	23,965	—	—	—
4331 K11 to 4331 L2	31,465	—	—	—
4331 K11 to 4331 L11	15,000	—	—	—
4331 K11 to 4361 K5***	123,340	—	—	—
4331 K11 to 4361 L5***	138,340	—	—	—
4331 K11 to 4361 LK5***	153,340	—	—	—
4331 K11 to 4361 M5***	168,340	—	—	—
4331 K11 to 4361 ML5***	193,340	—	—	—
4331 L11 to 4331 L2	16,465	—	—	—
4331 L11 to 4361 L5***	123,340	—	—	—
4331 L11 to 4361 LK5***	138,340	—	—	—
4331 L11 to 4361 M5***	153,340	—	—	—
4331 L11 to 4361 ML5***	183,340	—	—	—

*Rental/lease prices include equipment maintenance.
**Requires Feature 1901 if not already installed.
***Standard features of the 4361 which are optional on the 4331 must already be installed.

IBM 4300 Series

EQUIPMENT PRICES (Continued)

System upgrades:	Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Year Lease)*
4331 J2 to 4331 K2	7,500	—	—	—
4331 J2 to 4331 KJ2	15,000	—	—	—
4331 J2 to 4331 L2	22,500	—	—	—
4331 J2 to 4361 K5***	117,500	—	—	—
4331 J2 to 4361 L5***	132,500	—	—	—
4331 J2 to 4361 LK5***	147,500	—	—	—
4331 J2 to 4361 M5***	162,500	—	—	—
4331 J2 to 4361 ML5***	192,500	—	—	—
4331 K2 to 4331 KJ2	7,500	—	—	—
4331 K2 to 4331 L2	15,000	—	—	—
4331 K2 to 4361 K5***	110,000	—	—	—
4331 K2 to 4361 L5***	125,000	—	—	—
4331 K2 to 4361 LK5***	140,000	—	—	—
4331 K2 to 4361 M5***	155,000	—	—	—
4331 K2 to 4361 ML5***	185,000	—	—	—
4331 KJ2 to 4331 L2	7,500	—	—	—
4331 KJ2 to 4361 L5***	117,500	—	—	—
4331 KJ2 to 4361 LK5***	132,500	—	—	—
4331 KJ2 to 4361 M5***	147,500	—	—	—
4331 KJ2 to 4361 ML5***	177,500	—	—	—
4331 L2 to 4361 L5***	110,000	—	—	—
4331 L2 to 4361 LK5***	125,000	—	—	—
4331 L2 to 4361 M5***	140,000	—	—	—
4331 L2 to 4361 ML5***	170,000	—	—	—
4341 J9 to 4341 K9	7,500	—	—	—
4341 J9 to 4341 L9	22,500	—	—	—
4341 J9 to 4341 K10	61,500	—	—	—
4341 J9 to 4341 L10	76,500	—	—	—
4341 K9 to 4341 L9	15,000	—	—	—
4341 K9 to 4341 K10	54,000	—	—	—
4341 K9 to 4341 L10	69,000	—	—	—
4341 L9 to 4341 L10	54,000	—	—	—
4341 K10 to 4341 L10**	15,000	—	—	—
4341 K10 to 4341 K11**	50,910	—	—	—
4341 K10 to 4341 L11**	65,910	—	—	—
4341 K10 to 4341 M11**	95,910	—	—	—
4341 L10 to 4341 L11**	50,910	—	—	—
4341 L10 to 4341 M11**	80,910	—	—	—
4341 K10 to 4341 K12**	156,510	—	—	—
4341 K10 to 4341 L12**	171,510	—	—	—
4341 K10 to 4341 M12**	201,510	—	—	—
4341 K10 to 4341 N12**	231,510	—	—	—
4341 K10 to 4341 P12**	261,510	—	—	—
4341 L10 to 4341 L12**	156,510	—	—	—
4341 L10 to 4341 M12**	186,510	—	—	—
4341 L10 to 4341 N12**	216,510	—	—	—
4341 L10 to 4341 P12**	246,510	—	—	—
4341 K1 to 4341 L1**	15,000	—	—	—
4341 K1 to 4341 K11**	28,910	—	—	—
4341 K1 to 4341 L11**	43,910	—	—	—
4341 K1 to 4341 M11**	73,910	—	—	—
4341 L1 to 4341 L11**	28,910	—	—	—
4341 L1 to 4341 M11**	58,910	—	—	—

*Rental/lease prices include equipment maintenance.
**Requires Feature 1901 if not already installed.
***Standard features of the 4361 which are optional on the 4331 must already be installed.

IBM 4300 Series

EQUIPMENT PRICES (Continued)

System upgrades:	Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Year Lease)*
4341 K1 to 4341 K2**	94,710	—	—	—
4341 K1 to 4341 L2**	109,710	—	—	—
4341 K1 to 4341 M2**	139,710	—	—	—
4341 K1 to 4341 N2**	169,710	—	—	—
4341 K1 to 4341 P2**	199,710	—	—	—
4341 L1 to 4341 L2**	94,710	—	—	—
4341 L1 to 4341 M2**	124,710	—	—	—
4341 L1 to 4341 N2*	154,710	—	—	—
4341 L1 to 4341 P2**	184,710	—	—	—
4341 K1 to 4341 K12**	114,510	—	—	—
4341 K1 to 4341 L12**	129,510	—	—	—
4341 K1 to 4341 M12**	159,510	—	—	—
4341 K1 to 4341 N12**	189,510	—	—	—
4341 K1 to 4341 P12**	219,510	—	—	—
4341 L1 to 4341 L12**	114,510	—	—	—
4341 L1 to 4341 M12**	144,510	—	—	—
4341 L1 to 4341 N12**	174,510	—	—	—
4341 L1 to 4341 P12**	204,510	—	—	—
4341 K11 to 4341 L11	15,000	—	—	—
4341 K11 to 4341 M11	45,000	—	—	—
4341 L11 to 4341 M11	30,000	—	—	—
4341 K11 to 4341 K2	84,000	—	—	—
4341 K11 to 4341 L2	115,400	—	—	—
4341 K11 to 4341 K12	105,600	—	—	—
4341 K11 to 4341 L12	120,600	—	—	—
4341 K11 to 4341 M12	150,600	—	—	—
4341 K11 to 4341 N12	180,600	—	—	—
4341 K11 to 4341 P12	210,600	—	—	—
4341 L11 to 4341 L12	105,600	—	—	—
4341 L11 to 4341 M12	135,600	—	—	—
4341 L11 to 4341 N12	165,600	—	—	—
4341 L11 to 4341 P12	195,600	—	—	—
4341 M11 to 4341 M12	105,600	—	—	—
4341 M11 to 4341 N12	135,600	—	—	—
4341 M11 to 4341 P12	165,600	—	—	—
4341 K11 to 4341 M2	178,200	—	—	—
4341 K11 to 4341 N2	241, 000	—	—	—
4341 K11 to 4341 P2	303,800	—	—	—
4341 L11 to 4341 L2	84,000	—	—	—
4341 L11 to 4341 M2	146,800	—	—	—
4341 L11 to 4341 N2	209,600	—	—	—
4341 L11 to 4341 P2	272,400	—	—	—
4341 M11 to 4341 M2	84,000	—	—	—
4341 M11 to 4341 N2	146,800	—	—	—
4341 M11 to 4341 P2	209,600	—	—	—
4341 K2 to 4341 L2	15,000	—	—	—
4341 K2 to 4341 M2	45,000	—	—	—
4341 K2 to 4341 N2	75,000	—	—	—
4341 K2 to 4341 P2	105,000	—	—	—
4341 L2 to 4341 M2	30,000	—	—	—
4341 L2 to 4341 N2	60,000	—	—	—
4341 L2 to 4341 P2	90,000	—	—	—

*Rental/lease prices include equipment maintenance.
**Requires Feature 1870 if not already installed.

IBM 4300 Series

EQUIPMENT PRICES (Continued)

System upgrades:	Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Year Lease)*
4341 M2 to 4341 N2	30,000	—	—	—
4341 M2 to 4341 P2	60,000	—	—	—
4341 N2 to 4341 P2	30,000	—	—	—
4341 K2 to 4341 K12	19,800	—	—	—
4341 K2 to 4341 L12	34,800	—	—	—
4341 K2 to 4341 M12	64,800	—	—	—
4341 K2 to 4341 N12	94,800	—	—	—
4341 K2 to 4341 P12	124,800	—	—	—
4341 L2 to 4341 L12	19,800	—	—	—
4341 L2 to 4341 M12	49,800	—	—	—
4341 L2 to 4341 N12	79,800	—	—	—
4341 L2 to 4341 P12	109,800	—	—	—
4341 M2 to 4341 M12	19,800	—	—	—
4341 M2 to 4341 N12	49,800	—	—	—
4341 M2 to 4341 P12	79,800	—	—	—
4341 N2 to 4341 N12	19,800	—	—	—
4341 N2 to 4341 P12	49,800	—	—	—
4341 P2 to 4341 P12	19,800	—	—	—
4341 K12 to 4341 L12	15,000	—	—	—
4341 K12 to 4341 M12	45,000	—	—	—
4341 K12 to 4341 N12	75,000	—	—	—
4341 K12 to 4341 P12	105,000	—	—	—
4341 L12 to 4341 M12	30,000	—	—	—
4341 L12 to 4341 N12	60,000	—	—	—
4341 L12 to 4341 P12	90,000	—	—	—
4341 M12 to 4341 N12	30,000	—	—	—
4341 M12 to 4341 P12	60,000	—	—	—
4341 N12 to 4341 P12	30,000	—	—	—
4361 K4 to 4361 L4	15,000	—	—	—
4361 K4 to 4361 LK4	35,000	—	—	—
4361 K4 to 4361 M4	50,000	—	—	—
4361 K4 to 4361 ML4	80,000	—	—	—
4361 L4 to 4361 LK4	20,000	—	—	—
4361 L4 to 4361 M4	35,000	—	—	—
4361 L4 to 4361 ML4	65,000	—	—	—
4361 LK4 to 4361 M4	15,000	—	—	—
4361 LK4 to 4361 ML4	45,000	—	—	—
4361 M4 to 4361 ML4	30,000	—	—	—
4361 K4 to 4361 K5	47,335	—	—	—
4361 K4 to 4361 L5	62,335	—	—	—
4361 K4 to 4361 LK5	77,335	—	—	—
4361 K4 to 4361 M5	92,335	—	—	—
4361 K4 to 4361 ML5	122,335	—	—	—
4361 L4 to 4361 L5	47,335	—	—	—
4361 L4 to 4361 LK5	62,335	—	—	—
4361 L4 to 4361 M5	77,335	—	—	—
4361 L4 to 4361 ML5	107,335	—	—	—
4361 LK4 to 4361 LK5	42,335	—	—	—
4361 LK4 to 4361 M5	57,335	—	—	—
4361 LK4 to 4361 ML5	87,335	—	—	—
4361 M4 to 4361 M5	42,335	—	—	—
4361 M4 to 4361 ML5	72,335	—	—	—
4361 ML4 to 4361 ML5	42,335	—	—	—
4361 K5 to 4361 L5	15,000	—	—	—

*Rental/lease prices include equipment maintenance.

IBM 4300 Series

EQUIPMENT PRICES (Continued)

System upgrades:	Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Year Lease)*
4361 K5 to 4361 LK5	30,000	—	—	—
4361 K5 to 4361 M5	45,000	—	—	—
4361 K5 to 4361 ML5	75,000	—	—	—
4361 L5 to 4361 LK5	15,000	—	—	—
4361 L5 to 4361 M5	30,000	—	—	—
4361 L5 to 4361 ML5	60,000	—	—	—
4361 LK5 to 4361 M5	15,000	—	—	—
4361 LK5 to 4361 ML5	45,000	—	—	—
4361 M5 to 4361 ML5	30,000	—	—	—
4381 L1 to 4381 L2	130,000	—	—	—
4381 L1 to 4381 M1	40,000	—	—	—
4381 L1 to 4381 M2	170,000	—	—	—
4381 L1 to 4381 P1	120,000	—	—	—
4381 L1 to 4381 P1	120,000	—	—	—
4381 L1 to 4381 P2	250,000	—	—	—
4381 M1 to 4381 M2	130,000	—	—	—
4381 M1 to 4381 P1	80,000	—	—	—
4381 M1 to P2	210,000	—	—	—
4381 P1 to P2	130,000	—	—	—
4381 L2 to 4381 M2	40,000	—	—	—
4381 L2 to 4381 P2	120,000	—	—	—
4381 M2 to 4381 P2	80,000	—	—	—

PROCESSOR FEATURES & CHANNELS

Many of the features listed below include microcode as well as hardware. Microcode is supplied on diskettes.

Features for the 4321 and 4331:

5655 X.21 Adapter, nonswitched	770	2.00	29	25
9201 3370 Direct Attachment (standard on 4321-J11)	—	—	—	—
9202 3310 Direct Attachment (standard on 4321-J11)	—	—	—	—
1001 Adapter Power Prerequisite for Communications Adapter	1,815	9.50	96	82
1002 Adapter Logic Prerequisite for 5424 Adapter	3,340	18.00	177	151
1421 Block Multiplexer Channel (standard on 4331-11)	3,340	2.50	177	151
1422 Block Multiplexer Channel, Additional	3,930	3.00	179	153
1431 High-Speed Block Multiplexer Channel	4,760	3.50	275	235
1901 Control Storage Expansion	3,865	54.00	220	188
2001 Display/Printer Adapter Expansion	920	3.00	45	38
3201 DASD Adapter; for 3310/3340/3370	2,730	5.00	146	124
3202 DASD Adapter, Additional	2,730	5.00	146	124
3401 Diskette Drive; reads IBM Type 1 Diskettes	2,665	27.50	141	120
3898 External Signals; for external interrupt	225	1.50	12	10
3901 5424 Attachment	5,005	12.50	267	227
3950 1401/1440/1460 Compatibility	—	—	—	—
4910 8809 Mag Tape Unit Adapter	2,730	5.00	146	124
5248 Byte Multiplexer Channel (standard on 4331-11)	2,665	2.50	141	120
5531 Power Interface (standard on 4331-11)	1,670	2.00	88	75
5532 Power Interface, Additional	830	2.00	43	37
7851 3340/3344 Direct Attachment	—	—	—	—
7901 Direct-Access Storage Compatibility; provides 2311/2314 emulation on 3310 or 3370 DASDs and 3330 emulation on 3370 DASDs	—	—	—	—
8701 ECPS: VM/370	—	—	—	—

*Rental/lease prices include equipment maintenance.

IBM 4300 Series

EQUIPMENT PRICES (Continued)

		Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Year Lease)*
Features for the 4341:					
	1601 ECPS Expansion Feature (for 4341 Model Group 2 or Group 12 Processors only)	26,250	22.00	1,129	961
	1850 Channel-to-channel adapter	23,150	29.00	983	837
	1870 Optional channel group; three additional channels (for 4341 Group 1 and 10 Processors only)	35,580	6.00	757	644
	1890 Channel control unit positions, additional	2,755	10.00	116	99
	3088 Multisystem Channel Communication Unit:				
	Model 1; connects to 4 processors	95,000	120	—	—
	Model 1; connects to 8 processors	145,000	150	—	—
	3838 Array Processor:				
	Model 1; 256K bytes of bulk storage	553,600	1,810.00	26,785	24,350
	Model 2; 512K bytes of bulk storage	613,150	2,180.00	32,549	29,590
	Model 3; 1024K bytes of bulk storage	732,250	2,925.00	44,099	40,090
Features for the 4361:					
	3701 EIA/CCITT Interface	330	3.50	15	—
	5650 DDS Adapter	770	2.50	29	—
	5655 X.21 Adapter, nonswitched	770	2.50	29	—
	5248 Byte Multiplexer Channel (Model Group 4 only)	2,665	3.00	141	—
	1020 Autocall Unit Interface	330	3.50	15	—
	1431 High-Speed Block Multiplexer Channel	4,760	3.50	275	—
	1432 High-Speed Block Multiplexer Channel, Additional	4,760	3.50	275	—
	1433 High-Speed Block Multiplexer Channel, Additional	4,760	3.50	275	—
	3201 DASD/8809 Adapter	2,730	5.00	146	—
	3202 DASD/8809 Adapter, Additional	2,730	5.00	146	—
	3203 DASD/8809 Adapter, Additional	2,730	5.00	146	—
	3204 DASD/8809 Adapter, Additional	2,730	5.00	146	—
Features for the 4381:					
	1850 Channel-to-Channel Adapter	23,150	29	1,545	—
	1870 Block Multiplexer Channels, Additional	35,580	12.00	2,372	—
System Consoles:					
3278 2A	Display Console	2,505	18.50	126	108
3279 2C	Color Display Console	4,525	39.50	195	166
	4631 75-Key Operator Console Keyboard with channel-to-channel interface and operator control panel (for 4341)	1,085	5.50	51	43
	4632 Same as 4631 without channel-to-channel interface (for 4341)	1,010	5.50	49	42
	4633 Same as 4631 without operator control panel (for 4341)	524	5.00	22	19
	4634 Same as 4631 without channel-to-channel interface (for 4321 or 4331)	1,010	6.00	49	42
	6340 Security Keylock	35	—	—	—
MASS STORAGE					
3310	Disk Storage				
	Model A1; one drive with controller; 64.5MB	10,710	62.00	542	462
	Model A2; two drives with controller; 64.5MB each	11,570	100.00	899	766
	Model B1; one drive; 64.5MB (for attachment to Model A2)	5,510	57.00	428	364
	Model B2; two drives; 64.5MB each (for attachment to Model A2)	10,120	95.00	785	668

*Rental/lease prices include equipment maintenance.

IBM 4300 Series

EQUIPMENT PRICES (Continued)

		Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Year Lease)*
3330	Disk Storage:				
	Model 1; 2 drives; 200MB	33,670	178.00	2,160	1,814
	Model 2; 1 drive; 100MB5	20,110	105.00	1,287	1,095
	Model 11; 2 drives; 400MB	47,920	178.00	3,085	2,591
3333	Disk Storage and Control (up to three 3330 modules can be attached):				
	Model 1; 2 drives; 200MB	42,200	199.00	2,691	2,290
	Model 11; 2 drives; 400MB	56,450	199.00	3,619	3,080
3336	Disk Pack, Model 1	775	—	—	—
3336	Disk Pack, Model 11	1,150	—	—	—
3340	Direct Access Storage Facility; 34.9 or 69.8MB per drive:				
	Model A2; Two drives plus control	8,600	116.00	1,745	1,485
	Model B1; One drive	4,730	62.00	981	835
	Model B2: Two drives	6,020	100.00	1,234	1,050
	4301 Fixed-Head Feature (for 3340 A2 or B2)	1,165	2.50	73	62
	4302 Fixed-Head Feature (for 3340 B1)	583	2.00	37	31
	6201 Rotational Position Sensing (for 3340 B1)	467	1.50	29	25
	6202 Rotational Position Sensing (for 3340 or A2 or B2)	590	1.50	38	32
	6148 Remote Switch Attachment	—	—	—	—
	8150 String Switch for 3340 A2	4,915	15.00	348	296
3344	Direct Access Storage; 279.6MB per drive:				
	Model B2; Add-on Dual Disk Drive for 3340 Direct-Access Storage Facility	14,820	115.00	1,569	1,335
	Model B2F; Add-on Dual Disk Drive for 3340 Direct-Access Storage Facility with 2MB fixed-head storage	19,460	161.00	2,050	1,745
3348	Data Module (for 3340 drives):				
	Model 35; 34.9MB	1,600	—	59	50
	Model 70; 69.8MB	2,200	—	82	70
	Model 70F; 69.8MB of which 502,080 are served by fixed heads	4,400	—	192	163
3350	Direct Access Storage; 317.5MB per drive:				
	Model A2; Dual Disk Drive	41,600	162.00	1,968	1,675
	Model A2F; Dual Disk Drive with 2MB fixed-head storage	51,910	210.00	2,450	2,085
	Model B2; Add-on Dual Disk Drive	32,940	122.00	1,569	1,335
	Model B2F; Add-on Dual Disk Drive for 2MB fixed-head storage per drive	43,250	171.00	2,050	1,745
	Model C2; Two-drive disk storage and associated control	43,030	171.00	2,050	1,745
	Model C2F; Two-drive disk storage and associated control	53,340	219.00	2,532	2,155
	1320 Primary Controller Adapter (permits selection of A2/AF controller as on-line controller via manual switch on the C2/C2F	286	1.50	15	13
	8150 String Switch for 3350 A2, A2F, C2, C2F	4,790	9.00	241	205
3830	Storage Control, Model 2; for 3330/3333, 3340/3344, or 3350 disk drives	8,120	113.00	2,635	2,213
	2150 Control Store Extension	1,880	10.50	608	511
	2151 Expanded Control Store; requires 2150	3,285	11.50	371	311
	6111 Register Expansion	109	3.50	35	29
	6148 Remote Switch Attachment	—	—	—	—
	6149 Remote Switch Attachment, Additional	—	—	—	—
	8170 Two-Channel Switch	2,290	11.50	255	214
	8171 Two-Channel Switch, Additional	2,290	11.50	255	214
3370	Direct Access Storage:				
	Model A1; Single Disk Drive; 571.3MB	35,480	138.00	1,463	1,245
	Model B1; Add-on Single Disk Drive for attachment to Model A1	26,600	103.00	1,096	933
	Model A2; 729.8MB; contains logic and power for up to three Model B2 units	35,480	126.00	1,900	—
	Model B2; connects to a 3370 Model A2	26,600	94.50	1,425	—
	8150 String Switch for 3370 A1	4,505	1.50	143	1,122

*Rental/lease prices include equipment maintenance.

IBM 4300 Series

EQUIPMENT PRICES (Continued)

		Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Year Lease)*
3375	Direct Access Storage; 819.7MB per drive:				
	Model A1; contains logic and power for up to three Model B1 units	38,040	130.00	1,463	1,245
	Model B1; connects to a 3375 Model A1	18,770	98.50	1,171	831
	Model D1; provides dual controller function in a 3375 string; requires one Model A1 and two Model B1s	36,290	120.00	1,392	1,185
	4951 Model D1 Attachment for Model A1	2,590	6.00	89	76
	4952 Model D1 Attachment for Model B1	—	—	—	—
	8150 String Switch Feature for 3375 A1	3,795	1.50	157	134
3380	Direct Access Storage; 2.52 billion bytes per unit:				
	Model A4; connects to one 3880 storage director	86,310	285.00	3,161	2,690
	Model AA4; connects to one 3880 storage director	98,640	325.00	3,613	3,075
	Model B4; connects to a Model A unit	71,600	240.00	2,620	2,230
3880	Storage Control; includes two storage directors:				
	Model 1; each storage director can attach up to four 3330/3333, 3340 A2, 3350 A2/A2F, 3370 A1 ,or 3375 A1 or D1 in any combination	66,970	176.00	2,703	2,300
	Model 2; provides one storage director for 3330/3333, 3340/3344, 3350, 3370, or 3375 storage and one for 3380 storage	66,970	176.00	2,703	2,300
	Model 3; provides two storage directors for 3380 storage	66,970	176.00	2,703	2,300
	Model 4; provides one storage director which can attach up to four 3375 Model A1s	35,000	82.50	2,055	—
	Model 11; paging subsystem for 3350	251,520	676.00	7,145	6,080
	Model B13, includes two cache storage directors for 3380; 4 megabytes	179,950	576.00	6,821	5,805
	Model D13; same as B13, but with 8 megabytes	224,300	711.00	8,713	7,415
	6148 Remote Switch Attachment	—	—	—	—
	6149 Remote Switch Attachment, additional	—	—	—	—
	6150 Remote Switch Attachment for Eight-Channel Switch	—	—	—	—
	6550 Speed Matching Buffer for 3380	11,420	40.00	341	290
	8170 Two-Channel Switch Pair	8,140	11.00	241	205
	8171 Two-Channel Switch Pair, additional	21,720	38.50	647	551
	8172 Eight-Channel Switch	29,870	53.50	894	761
MASS STORAGE UPGRADES					
3344	B2 to 3344 B2F	7,440	—	—	—
3375	B1 to 3375 D1	7,520	—	—	—
MAGNETIC TAPE EQUIPMENT					
3410	Magnetic Tape Unit:				
	Model 1; 20,000 bytes/sec.	3,365	115	304	255
	Model 2; 40,000/20,000 bytes/sec.	4,365	127	404	339
	Model 3; 80,000/40,000 bytes/sec.	5,365	140	509	427
3411	Magnetic Tape Unit and Control:				
	Model 1; 20,000 bytes/sec.	7,910	178.00	677	569
	Model 2; 40,000/20,000 bytes/sec. (not in new production)	9,910	191.00	861	723
	Model 3; 80,000/40,000 bytes/sec. (not in new production)	11,910	202.00	1,045	878
	3211 Single Density Feature (for 3410 & 3411)	1,140	15.00	88	74
	3221 Dual Density Feature (for 3410 & 3411)	2,185	53.50	130	109
	7360 System/360/370 Attachment (required on 3411)	1,950	37.00	243	204
3420	Magnetic Tape Units:				
	Model 3; 120,000 bytes/sec. at 1600 bpi; 75 ips	11,930	212.00	606	509
	Model 4; 470,000 bytes/sec. at 6250 bpi; 75 ips	15,340	212.00	848	712
	Model 5; 200,000 bytes/sec. at 1600 bpi; 125 ips	16,000	232.00	817	686
	Model 6; 780,000 bytes/sec. at 6250 bpi; 125 ips	17,920	232.00	980	824
	Model 7; 320,000 bytes/sec. at 1600 bpi; 200 ips	17,920	278.00	968	813
	Model 8; 1,250 bytes/sec. at 6250 bpi; 200 ips	19,880	342.00	1,160	974

*Rental/lease prices include equipment maintenance.

IBM 4300 Series

EQUIPMENT PRICES (Continued)

		Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Year Lease)*
	6420 6250 bpi Density Feature (for 3420 Models 4, 6, and 8)	1,600	64.00	83	70
	6425 6250/1600 bpi Density Feature (for 3420 Models 4, 6, and 8)	2,205	84.50	120	101
	6631 Single Density Feature (for Models 3, 5, and 7)	2,870	63.50	141	118
	3550 Dual Density Feature (for Models 3, 5, and 7)	3,705	106.00	184	154
	6407 7-Track Feature (for Models 3, 5, and 7)	2,870	92.00	141	118
3430	Magnetic Tape Subsystem				
	Model A1; Tape Unit and Control	33,400	235	2,035	—
	Model B1; Tape Unit Only	16,900	165	1,080	—
3803	Tape Controller:				
	Model 1; for 3420 Model 3, 5, and 7 drives	20,680	135.00	1,055	886
	Model 2; for 3420 Model 3 through 8 drives	27,550	186.00	1,535	1,289
	5310 9-Track NRZI Feature (permits connection of 800-bpi drives to 3803-2)	3,850	2.00	148	124
	6320 7-track NRZI Feature (permits connection of 800-bpi drives to 3803-2; 5310 is prerequisite)	1,890	2.00	74	62
	Multiple Tape Control Switches (for switching up to sixteen 3420 tape drives between up to four 3803 control units):				
	1792 For 2 Tape Controls	6,130	13.50	307	258
	1793 For 3 Tape Controls	7,820	21.50	398	334
	1794 For 4 Tape Controls	9,195	21.50	466	391
	3551 Dual Density Feature (for 3803-1)	2,300	3.50	112	94
	6148 Remote Switch Attachment	910	—	45	38
	6408 7-Track Feature (for 3803-1)	2,300	3.50	112	94
	8100 Two-Channel Switch	4,600	6.50	228	192
8809	Magnetic Tape Unit:				
	Model 1A; first drive; operates in start/stop mode at 20,000 bytes/sec. or in streaming mode at 160,000 bytes/sec. (not in new production)	11,960	82.50	727	461
	Model 2; second, fourth, or sixth drive; attaches to Model 1A or 3	10,610	74.50	647	410
	Model 3; third or fifth drive; attaches to Model 2	11,960	82.50	720	461
DISKETTE EQUIPMENT					
3540	Diskette Input/Output Unit:				
	Model B1; one drive; 242.9KB	27,520	85.00	1,181	1,005
	Model B2; two drives	41,910	117.00	1,763	1,500
PUNCHED CARD EQUIPMENT					
1442	Card Read Punch (with control), Model N1; 400/91 cpm	24,040	332.00	1,150	—
2501	Card Reader (with control):				
	Model B1; 600 cpm	19,610	144.00	583	—
	Model B2; 1000 cpm	19,920	158.00	717	—
2520	Card Punch (with control):				
	Model B2; 500 cpm	47,340	638.00	1,815	—
	Model B3; 300 cpm	46,950	509.00	1,400	—
2821	Control Unit:				
	Model 1; one 2540 and one 1403 printer	43,850	118.00	1,675	1,407
	Model 5; for one 2540 and two 1403's	71,050	207.00	2,730	2,293
	Model 6; for one 2540 only	14,920	259.00	770	647
	8100 Two-Channel Switch	9,895	19.50	344	289
	8637 Universal Character Set Adapter	718	6.50	21	18
3505	Card Reader:				
	Model B1; 800 cpm	36,030	267.00	1,265	—
	Model B2; 1200 cpm	37,270	364.00	1,495	—
	5450 Optical Mark Read	10,130	99.00	373	—
	6555 Selective Stacker	2,845	14.00	95	—
	8103 3525 Punch Adapter	6,370	8.00	221	—
	8105 3525 Read/Punch Adapter	7,010	10.00	277	—
	8100 3525 Card Print Control	3,810	10.00	121	—

*Rental/lease prices include equipment maintenance.

IBM 4300 Series

EQUIPMENT PRICES (Continued)

		Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Year Lease)*
3525	Card Punch:				
	Model P1; 100 cpm	25,520	181.00	898	—
	Model P2; 200 cpm	26,520	245.00	1,135	—
	Model P3; 300 cpm	27,520	306.00	1,360	—
	1533 Card Read Feature	7,645	45.50	265	—
	1421 Basic Card Print	16,750	180.00	581	—
	5273 Multi-Line Card Print	1,365	52.50	156	—
	8339 Two-Line Card Print	874	8.00	24	—
5424	Multi-Function Card Unit, 96 col.:				
	Model A1; 60 cpm	8,950	328.00	652	—
	Model A2; 120 cpm	11,840	493.00	985	—
	6510 4331 Attachment	2,670	7.00	69	—
PRINTERS					
1403	Printer:				
	Model N1; 1100 lpm; 132 print positions	40,040	687.00	1,555	1,306
	1416 Interchangeable Train Cartridge (required for 1403 N1)	2,930	—	144	—
	4740 Interchangeable Train Cartridge Adapter (for 1403-2 or -7)	2,030	—	99	83
	8640 Universal Character Set Feature (for 1403 N1)	447	4.00	14	12
	8641 Universal Character Set Feature (for 1403-2)	313	4.00	14	12
2821	Control Unit:				
	Model 1; one 2540 card unit and one 1403 printer	43,850	118.00	1,675	1,407
	Model 2; for one 1403	27,190	89.50	1,050	882
	Model 3; for two 1403s	54,270	183.00	2,095	1,760
	Model 5; for one 2540 and two 1403s	71,050	207.00	2,730	2,293
	3615 1100 lpm Printer Adapter (for 2821; required for 1403 N1)	2,815	3.00	123	103
	7945 Third Printer Control (for 2821 Model 3 or 5)	22,560	15.50	878	738
	8100 Two-Channel Switch	9,895	19.50	344	289
	8637 Universal Character Set Adapter	718	6.50	21	18
3203	Printer, Model 5; 1200 lpm, 132 print positions	33,875	410.00	2,015	1,715
	1416 Interchangeable Train Cartridge (required)	2,930	—	144	—
3211	Printer; 200 lpm, 132 print positions	40,080	890.00	2,610	2,192
	3216 Interchangeable Train Cartridge	11,600	179.00	574	—
	5554 18 Additional Print Positions	2,150	15.50	81	68
3811	Control Unit for 3211 Printer	17,685	115.00	1,150	966
	5553 18 Additional Print Positions	789	5.00	27	23
3262	Line Printer:				
	Model 1; 650 lpm	15,040	180.000	595	506
	Model 5 (attachment to virtual storage processors)	17,000	180.00	823	700
	Model 11; 325 lpm	12,620	132.00	437	372
3268	Model 2	7,500	—	—	—
	Model 2C; Color printer	8,990	84.00	534	—
	5951 0.079-inch char. height	—	—	—	—
	5950 0.095-inch char. height	—	—	—	—
	5940 48-char. EBCDIC Set	186	—	—	—
	5944 64-char. EBCDIC Set	186	—	—	—
	5946 64-char. EBCDIC Set (optimized)	186	—	—	—
	5948 96-char. EBCDIC Set	186	—	—	—
	5961 128-char. text EBCDIC (Model 5 only)	—	—	—	—
	5980 48-char. International	—	—	—	—
	5988 96-char. International	—	—	—	—

*Rental/lease prices include equipment maintenance.

IBM 4300 Series

EQUIPMENT PRICES (Continued)

		Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Year Lease)*
3287	Serial Printer:				
	Model 1; 80 cps	5,365	37.50	257	219
	Model 2; 120 cps	5,720	46.50	314	267
	Model 1C; 4 colors; 80 cps	5,790	42.50	318	271
	Model 2C; 4 colors; 120 cps	6,145	51.50	374	318
	Model 11; 80 cps	4,995	41.50	298	254
	Model 12; 120 cps	5,315	50.00	356	303
	1120 APL/Text	183	0.50	6	5
	3610 Extended Character Set Adapter	477	3.00	20	17
	3880 Extended Print Buffer	220	0.50	7	6
	4110 Friction Feed Paper Handling	168	0.50	6	5
	8330 3271/3272 Attachment for Models 1 and 2	955	2.50	46	39
	8331 3274/3276 Attachment for Models 1 and 2	183	0.50	6	5
	8700 Variable-Width Forms Tractor	168	0.50	6	5
3289	Line Printer, Model 4; 230 to 400 lpm	13,140	161.00	868	739
	5821 48-chr. EBCDIC print belt	160	—	—	—
	5822 64-char. EBCDIC print belt	160	—	—	—
	5823 94-char. EBCDIC print belt	160	—	—	—
3800	Printing Subsystem; up to 20,040 lpm	373,150	1,030.00	13,910	10,710
	5401 Additional Character Generation Storage	4,475	26.50	114	97
	8170 Two-Channel Switch	9,790	20.50	305	260
	1490 Burster-Trimmer-Stacker	56,280	316.00	2,075	1,595
	7810 Tape to Print Subsystem Feature	12,030	51.00	551	424
4250	Non-impact printer, Model 1; 600 x 600 dots per square inch	21,000	155	1,205	—
OPTICAL AND MAGNETIC READERS					
1255	Magnetic Character Reader:				
	Model 1; 500 dpm, 6 stackers	41,040	375.00	1,405	—
	Model 2; 750 dpm, 6 stackers	46,970	601.00	1,720	—
	Model 3; 750 dpm, 12 stackers	63,960	791.00	2,265	—
	3215 Dash Symbol Transmission (for 1255 or 1419)	35	NC	56	—
	4380 51-Column Card Sorting (for 1255 or 1419)	661	NC	17	—
	4520 High-Order Zero and Bank Selection (for 1255 Model 3 only)	1,515	7.00	50	—
	7060 Self-Checking Numbers (for 1255)	2,465	3.50	82	—
	6360 System/360/370 Adapter (required on 1255)	22,910	55.00	793	—
1287	Optical Reader:				
	Model 1; reads documents only	108,450	1,815	4,900	—
	Model 3; reads documents only	163,550	2,605.00	7,575	—
	Model 5; reads handprinted digits from documents only	120,650	2,630.00	6,160	—
	3945 Farrington 7B Font	968	3.00	42	—
	4470 1428 and ANSCS OCR Font	968	3.00	42	—
	5300 NCR Optical Type Font	3,885	9.00	171	—
	5370 Numeric Handwriting	31,140	113.00	1,390	—
	5479 Optical Mark Reading	3,885	8.50	171	—
1288	Optical Page Reader	198,600	1,785.00	8,630	—
	3850 Expanded Symbol Set	2,710	5.50	120	—
	5370 Numeric Handwriting	46,710	108.00	1,745	—
	5479 Optical Mark Reading	4,575	8.50	171	—
	6550 Serial Numbering (for 1288 or 1287)	11,100	99.00	522	—
1419	Magnetic Character Reader; 1600 dpm	145,950	802.00	3,580	—
	7061 Self-Checking Number, Modulus 10	2,560	4.50	61	—
	7062 Self-Checking Number, Modulus 11	3,950	7.50	100	—

*Rental/lease prices include equipment maintenance.

IBM 4300 Series

EQUIPMENT PRICES (Continued)

		Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Year Lease)*
3881	Optical Mark Reader:				
	Model 1; for on-line use	62,420	271.00	2,505	2,130
	Model 2; for off-line use with 3410 Model 1 Magnetic Tape Unit	56,860	215.00	2,274	1,935
	Model 3; on-line use with IBM Diskette Unit	72,800	257.00	2,765	2,350
	1471 BCD Read	2,600	3.50	98	83
	3450 Document Counters	1,030	4.00	31	26
	3550 Dual Density (for Model 2 only)	6,565	2.50	257	219
	3801 Expanded Storage	2,600	2.50	98	83
	6451 Serial Numbering	7,680	48.00	301	256
3886	Optical Character Reader:				
	Model 1; on-line	101,500	536.00	4,342	3,695
	Model 2; off-line	109,200	536.00	4,671	3,975
	3210 Additional Data Storage	1,020	1.00	40	34
	4520 Additional Hopper and Stacker Capacity	8,235	28.00	345	294
	4610 Additional Instruction Storage	5,120	12.00	214	182
	4720 Line Marking	5,680	12.00	234	199
	5340 Numbering/Marking Adapter	1,545	1.00	54	46
	5360 Numeric Handprinting	6,685	32.50	277	236
	6450 Serial Numbering	8,235	28.00	345	294
2890	Document Processor; Model A has 13K bytes, Model B has 29K bytes of memory:				
	Model A1; 6 pockets	280,350	400.00	7,473	6,360
	Model A2; 12 pockets	327,300	481.00	8,666	7,375
	Model A3; 18 pockets	374,250	559.00	9,858	8,390
	Model A4; 24 pockets	421,200	514.00	11,045	9,400
	Model A5; 30 pockets	468,150	714.00	12,244	10,420
	Model A6; 36 pockets	515,100	794.00	13,419	11,420
	Model B1; 6 pockets	328,400	488.00	9,306	7,920
	Model B2; 12 pockets	375,350	569.00	10,487	8,925
	Model B3; 18 pockets	422,300	645.00	11,680	9,940
	Model B4; 24 pockets	469,250	726.00	12,878	10,960
	Model B5; 30 pockets	516,200	803.00	14,053	11,960
	Model B6; 36 pockets	563,150	880.00	15,252	12,980
SYSTEM MANAGEMENT					
3814	Switching Management System (requires one Model A):				
	Model A1; Controller; 4x4 switch	47,480	136.00	2,281	1,825
	Model A2; Controller; 4x8 switch	60,420	177.00	2,906	2,325
	Model A3; Controller; 8x4 switch	64,740	173.00	3,119	2,495
	Model A4; Controller; two 4x4 switches	69,570	190.00	3,356	2,685
	Model B1; Remote Unit; 4x4 switch	39,710	92.00	1,913	1,530
	Model B2; Remote Unit; 4x8 switch	52,660	134.00	2,531	2,025
	Model B3; Remote Unit; 8x4 switch	56,970	129.00	2,744	2,195
	Model B4; Remote Unit; two 4x4 switches	61,800	146.00	2,975	2,380
	Model C1; Expansion Unit; 4x4 switch	37,980	89.00	1,825	1,460
	Model C2; Expansion Unit; 4x8 switch	50,930	130.00	2,444	1,955
	Model C3; Expansion Unit; 8x4 switch	55,240	126.00	2,656	2,125
	Model C4; Expansion Unit; two 4x4 switches	60,070	143.00	2,894	2,315
	3604 Keyboard/Display, Model 6, one required	1,745	12.50	—	83
	1520 Channel Expansion Internal—4 Control Unit Interfaces	1,550	1.00	75	60
	1521 Channel Expansion Internal—8 Control Unit Interfaces	3,100	1.00	146	117
	1530 Channel Expansion External	5,350	1.00	236	189
	1810 Control Unit Power Sequencing	518	1.00	22	18
	6010 Remote Two-Channel Switch Control—Basic	5,180	18.50	246	197
	6011 Remote Two-Channel Switch Control—Additional	2,415	14.00	116	93
	6350 System Power Sequencing—Additional	207	—	8	6

DISPLAY AND DATA ENTRY TERMINALS

A number of IBM terminals can be connected to a 4300 system in local or remote configurations. For details and prices please refer to Reports M13–300–101 and M14–700–101 in Volume 3 of Datapro Reports on Minicomputers.

*Rental/lease prices include equipment maintenance.

IBM 4300 Series

EQUIPMENT PRICES (Continued)

		Purchase Price	Monthly Maint.	Monthly Rental Charge*	Monthly Lease Charge (2-Year Lease)*
	COMMUNICATIONS EQUIPMENT				
For the 4331 Model Group 2, 4331 Model Group 11, 4321 Model J11					
	1020 Autocall Unit Interface	330	3.00	15	13
	1601 Communications Adapter, base	2,330	3.00	123	105
	3701 EIA/CCITT Interface	330	3.00	15	13
	4695 Line Attachment Base; for clocked modems	330	2.00	15	13
	4696 Line Attachment Base; for non-clocked modems	390	1.50	19	16
	4720 High-Speed Modem Adapter	1,000	3.00	45	38
	4781 1200-bps Integrated Modem; non-switched	505	5.00	25	21
	4782 1200-bps Integrated Modem; switched, with auto-answer	650	5.00	34	29
	4787 1200-bps Integrated Modem; non-switched, with switch network backup and manual answer	690	5.00	35	30
	4788 1200-bps Integrated Modem; non-switched, with switch network backup and auto-answer	765	5.50	39	33
	4801 Local Attachment Interface	830	4.50	39	33
	5650 Digital Data Service Adapter	750	4.00	32	27
	3863 2400-bps Modem:				
	Model 1; non-switched	2,685	13.00	102	87
	Model 2; switched	2,935	15.50	110	94
	3864 4800-bps Modem:				
	Model 1; non-switched	4,410	21.00	176	150
	Model 2; switched	4,660	22.00	188	160
	3865 9600-bps Modem; non-switched	6,690	30.50	282	240
	4830 Loop Adapter 1; requires Adapter Power Prerequisite; cannot be installed with 5424 Adapter	8,065	48.50	524	446
	4831 Loop Adapter 2; requires 4830	1,630	25.00	98	83
	4840 Data Link Adapter; requires 4830	1,000	11.50	61	52
	3843 Loop Control Unit	5,625	25.50	224	191
7770	Audio Response Unit, Model 3 (up to 4 lines)	58,760	91.00	2,150	—
	4677 I/O Line Expander (up to 4 more lines)	8,575	28.50	314	—
	4679 I/O Line Panel (one required for each 8 lines beyond the first 8)	3,660	3.50	133	—
	4668 I/O Line Frame (required for over 16 lines)	9,790	4.00	359	—
	8721 16 Additional Vocabulary Words	4,890	4.00	177	—
3705-II	Communication Controller: For detailed pricing see Report 70C–491–06 (303X Series) in Datapro 70				
3725	Communication Controller:				
	Model 1; up to six channel adpaters and from 512K to 1024K bytes of main storage capacity	75,000	213	3,485	—
	Model 2; up to two channel adapters and 512K bytes of main storage capacity (Model 2 to Model 1 Upgrade charge is $16,000)	60,500	190	2,630	—
	1561 Channel Adapter	6,750	8	315	—
	4666 Internal Clock Control	1,500	2	69	—
	4771 LAB Type A	19,000	16	882	—
	4772 LAB Type B	26,400	27	1,230	—
	4911 LIC Type 1	2,600	2	123	—
	4921 LIC Type 2	3,000	2	139	—
	4931 LIC Type 3	3,000	2	139	—
	4941 LIC Type 4A	2,600	2	123	—
	4942 LIC Type 4B	3,000	2	139	—
	7100 Storage Increment 256K	4,375	19	203	—
	8320 Two Proc Switch	4,000	3	187	—
3726	Communication Controller Expansion	32,000	40	1,485	—
3727	Operator Console	2,390	27	171	—

*Rental/lease prices include equipment maintenance.

IBM 4300 Series

SOFTWARE PRICES

			Monthly Charge			
			Basic License Charge	DSLO Charge	Monthly Licensed Program Support Charge	Monthly Multiple Licensed Program Support Charge
➤	5666-265	SSX/VSE**	$1,150	$862	$112	$179
	5666-274	SSX/VSE RPG II	114	86	7	11
	5666-276	SSX/VSE PL/1 Optimizing Compiler and Library	281	211	50	80
	5666-277	SSX/VSE PL/1 Transient Library	28	20	7	11
	5666-275	DL/1 SSX/VSE	372	279	126	201
	5668-981	X.25 Packet Switching Interface	190	112	36	58
	5735-RC2	ACF/VTAM, OS/VS	322	241	50	80
		Networking Feature	773	579	127	203
	5746-RC3	ACF/VTAM, DOS/VSE	134	100	53	85
		Networking Feature	254	190	127	203
	5735-RC3	ACF/TCAM Version 2, OS/VS	615	461	83	132
		Networking Feature	1,035	776	88	141
	5735-XX1	ACF/NCP/VS	180	135	32	51
	5735-XX7	Network Terminal Option	146	109	11	18
	5746-XE8	VSE/Advanced Functions, Releases 1 and 2	180	135	56	90
	5746-RC7	Advanced Communications Function for VTAM Entry (ACF/VTAME)	131	98	75	120
	5746-TS1	VSE/Interactive Computing and Control Facility	97	72	26	42
	5746-XE3	VSE/POWER Releases 1 and 2	51	38	16	26
	5666-273	VSE/POWER Version 2	300	225	22	35
	5746-TC9	DOS/VSE Remote Job Entry Workstation	103	—	—	—
	5746-AM5	VSE/3270 Bisync Pass Through	185	—	—	—
	5746-AM2	VSE/VSAM Releases 1 and 22	55	41	22	35
		VSE/VSAM Space Management for SAM feature	32	24	7	11
	5746-AM4	VSE/Fast Copy Data Set Program	417	—	—	—
	5746-UT3	VSE/Data Interfile Transfer, Testing and Operations Utility (VSE/DITTO)	36	27	5	8
	5746-XE7	VSE/Access Control—Logging and Reporting	48	36	22	35
	5746-SA1	VSE/Interactive Problem Control System	35	23	6	10
	5746-RC5	Basic Telecommunications Access Method Extended Support	32	24	7	11
	5746-SU1	IBM Systems 1401/1440/1460 Emulator	133	99	5	8
	5746-LM3	DOS FORTRAN IV Library Option I	38	28	7	11
	5746-CB1	DOS/VS Cobol Compiler and Library	157	117	14	22
	5746-LM4	DOS/VS Cobol Library	29	21	7	11
	5736-PL1	DOS PL/1 Optimizing Compiler	235	176	37	59
	5736-LM4	DOS PL/1 Resident Library	55	41	7	11
	5736-LM5	DOS PL/1 Transient Library	32	24	7	11
	5736-PL3	DOS PL/1 Optimizing Compiler and Library	322	241	50	80
	5746-RG1	DOS/VS RPG II	131	98	71	11
	5746-SM2	DOS/VS Sort/Merge (Version 2)	128	90	13	21
	5746-XX1	DL/1 DOS/VS (Version 1)	372	279	136	218
	5748-XXJ	SQL/Data System	345	258	131	209
	5748-XX8	VM/Basic System Extensions	136	102	41	65
	5748-XE1	VM/System Extensions	1,345	1,005	185	296
	5664-167	VM/System Product	330	247	63	100
	5748-XP1	Remote Spooling Communications Subsystem (RSCS) Networking	84	63	35	56
	5748-XXC	VM/Interactive File Sharing	40	25	15	24
	5748-XXB	Display Management System/CMS	30	22	9	14
	5748-XE4	VM/Directory Maintenance	98	73	29	46
	5748-XT3	VM/CMS-3270 Display Support and Structured Programming Facility	448	—	—	—
	5748-SA1	VM/Interactive Problem Control System Extension	47	30	6	10
	5748-MS1	Interactive Productivity Facility	41	30	6	10
	5748-RC1	VM/Pass-Through Facility	139	104	82	131
	5746-XX3	CICS/VS/DOS	450	331	116	186
	5740-XX1	CICS/OS/VS	1,425	589	145	232
	5740-XC5	Development Management System/CICS/VS-OS	269	290	51	82
	5746-XC4	Development Management System/CICS/VS-DOS	139	104	51	82
	5740-XXF	DB/DC Data Dictionary for OS/VS	805	603	108	172
	5746-XXC	DB/DC Data Directory for DOS/VS	366	274	83	133
	5662-257	OS/VS1 Basic Programming Extension	189	141	45	72
	5740-XYW	OS/VS1 Job Networking Facility	200	—	—	—

**One-time license charge of $20,000 (Basic License) or $15,000 (DSLO) is also available. ➤

IBM 4300 Series

SOFTWARE PRICES (Continued)

			Monthly Charge			
			Basic License Charge	DSLO Charge	Monthly Licensed Program Support Charge	Monthly Multiple Licensed Program Support Charge
➤	5740-XE1	MVS/System Extension	1,700	1,275	107	171
	5740-XYS	MVS/SP-JES2 Release 1	1,700	1,375	110	176
		Release 2 or 3	1,715	1,285	175	280
	5740-XYN	MVS/SP-JES3 Release 1	1,700	1,275	100	160
		Release 2 or 3	1,880	1,410	375	600
	5665-288	MVS Operator Communication Control Facility	300	225	8	13
	5740-XY4	RMF Version 2, Release 4	380	285	16	26
	5740-XR8	JES2 NJE	693	519	90	144
	5799-AZT	JES3 NJE	1,795	1,920	326	522
	5740-XRB	MVS Hierarchical Storage Manager, Release 3	420	315	121	193
	5748-FO3	VS Fortran Compiler and Library	212	159	17	27
	5748-LM3	VS Fortran Library	63	47	7	11
	5748-AP1	VS APL Release 4	305	228	39	62
	5734-PL3	OS PL/1 Compiler and Library	339	254	50	80
	5734-PL1	OS PL/1 Compiler	252	189	37	59
	5734-LM4	OS PL/1 Resident Library	55	41	7	11
	5734-LM5	OS PL/1 Transient Library	32	24	7	11
	5740-SM1	OS/VS Sort/Merge Release 5	231	173	18	29
	5740-CB1	OS/VS Cobol Compiler and Library	311	233	14	22
	5740-LM1	OS/VS Cobol Library	101	75	7	11
	5740-AM6	Data Facility/Device Support Release 1 (OS/VS1)	66	49	24	38
	5740-UT3	Data Facility/Data Set Services Release 1 (OS/VS1 and MVS)	67	50	21	34
	5740-XYQ	Data Facility/Extended Function (MVS)	103	77	107	171
	5740-AM7	Data Facility/Device Support (MVS)	70	52	14	22
	5668-002	Direct Access Storage Device Migration Aid Release 1 (OS/VS1 and MVS)	1,150	—	—	—

CHARGES FOR LOCAL PROGRAMMING SUPPORT	Monthly Program Support Charge	Monthly Multiple Program Support Charge
For Class 1 SCP on 4321	$180	288
For Class 1 SCP on 4331 Model Group 11:		
Category A (DOS/VSE, OS/VS1 Release 7, VM/370 Release 6)	213	340
For Class 1 SCP on 4331 Model Group 2:		
Category A	258	412
For Class 1 SCP on 4341 Model Group 10:		
Category A	459	734
Category B (all SCP's in Category A, MVS Release 3.8, MVS corequisite SCP's)	646	1,030
For Class 1 SCP on 4341 Model Group 11:		
Category A	529	846
Category B	1,130	1,220
For Class 1 SCP on 4341 Model Group 2:		
Category A	902	974
Category B	1,290	1,390
For Class 1 SCP on 4341 Model Group 9:		
Category A	432	465
Category B	776	836
For Class 1 SCP on 4341 Model Group 12		
Category A	984	1,060
Category B	1,400	1,510
For Class 1 SCP on 4361 Model Group 4		
Category A (VM, DOS/VSE, VS1)	506	810
For Class 1 SCP on 4361 Model Group 5		
Category A (VM, DOS/VSE, VS1)	656	1,050
Category B	934	1,495
For Class 1 SCP on 4381 Model Group 1		
Category A	643	1,030
Category B	918	1,470
For Class 1 SCP on 4381 Model Group 2		
Category A	677	1,085
Category B	966	1,545 ■