# IBM 9370 Information System

## MANAGEMENT SUMMARY

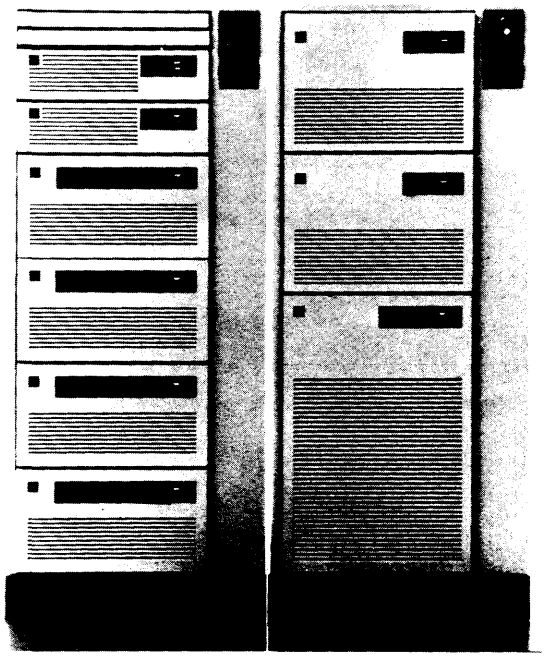
**UPDATE:** *Since Datapro's last report on the 9370, IBM has increased the functionality of its 9370 Information System. Significant changes have made in the data communications and the peripheral product base.*

*IBM has extended the range of systems support, flexibility, and distributed processing capabilities of the 9370 with the introduction of products such as Advanced Communication Function/VirtualTelecommunicationsAccessMethod(ACF/VTAM) Version 3, NetView Release 3, and NetView Network Definer, which allow peer-to-peer communications and centralized network management.*

*The addition of high-performance, high-capacity DASD devices and high-performance DASD controllers enhance the price/performance and functionality of the 9370.*

Introduced in October 1986, the 9370 Information System is IBM's strategic departmental processing system. It arms IBM with a more competitive product for office and departmental computing.

The 9370 delivers mainframe-class performance in a low-cost, compact package. It offers greater price/performance than the IBM System/36 (S/36) and System/38 (S/38), a group of non-System/370-compatible office systems, and is



*IBM's 9377 Model 90, the top-of-the-line 9370 Information System, rivals the lower end IBM 4381 systems in processing power. It supports up to 384 local workstations and can attach a maximum of 7742GB of DASD storage.*

**The IBM 9370 is a compact, office-environment system that maintains full compatibility with IBM System/370-architecture-based(S/370-architecture-based) systems. It offers a higher level of price/performance and cost effectiveness than other entry-level S/370 systems. Designed for use as a departmental system, the 9370 is primarily intended to run VM/SP, IBM's primary end-user, interactive operating system for S/370 machines. Also, the 9370 supports Ethernet, IBM Token-Ring, and SNA networks, making the system suitable for departmental computing.**

**MODELS: 9373 Model 20, 9375 Model 40 and Model 60, and 9377 Model 90.**
**MAIN MEMORY: 4MB to 16MB.**
**DISK CAPACITY: 368MB to 7742GB.**
**WORKSTATIONS: Up to 384.**
**PRICE: $31,000 to $190,000 (base system prices).**

## CHARACTERISTICS

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

**CANADIAN ADDRESS: IBM Canada Ltd., Markham, 3500 Steeles Avenue East, Markham, Ontario, Canada L3R 2Z1. Telephone (416) 474-2111.**

### DATA FORMATS

**BASIC UNIT: An eight-bit byte. Each byte can represent one alphanumeric character, two BCD digits, or eight binary bits. Two consecutive bytes form a "halfword" of 16 bits, while four consecutive bytes form a 32-bit "word."**

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

**FLOATING-POINT OPERANDS: One word, consisting of 24-bit fraction and seven-bit hexadecimal exponent, in "short" format; two words, consisting of 56-bit fraction and seven-bit hexadecimal exponent, in "long" format; or four words, in "extended precision" format.**

**INSTRUCTIONS: Two, four, or six bytes in length, specifying 0, 1, or 2 memory addresses, respectively.**

**The 9370 processors employ the S/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**

# IBM 9370 Information System

## CHART A. SYSTEM COMPARISON

| MODEL | 9373 Model 20 | 9375 Model 40 | 9375 Model 60 | 9377 Model 90 |
|---|---|---|---|---|
| SYSTEM CHARACTERISTICS | | | | |
| Date of introduction | October 1986 | October 1986 | October 1986 | October 1986 |
| Date of first delivery | 3rd Quarter 1987 | 4th Quarter 1987 | 3rd Quarter 1987 | 4th Quarter 1987 |
| Operating system | VM/SP; IX/370; VSE/SP | VM/SP; IX/370; VSE/SP | VM/SP; IX/370; VSE/SP; MVS/SP | VM/SP; IX/370; VSE/SP; MVS/SP |
| Upgradable from | Not applicable | Not applicable | 9375-40 | Not applicable* |
| Upgradable to | Not applicable | 9375-60* | Not applicable* | Not applicable |
| MIPS | — | — | — | — |
| Relative performance (based on a rating of the 9373-20 at 1.0 ) | 1.0 | 1.0-1.4 | 2.2-3.0 | 4.5-5.2 |
| MEMORY | | | | |
| Minimum capacity, bytes | 4M | 8M | 8M | 8M |
| Maximum capacity, bytes | 16M | 16M | 16M | 16M |
| Type | 1M-bit | 1M-bit | 1M-bit | 1M-bit |
| Cache memory | None | None | 16KB | 16KB |
| Cycle time, nanoseconds | — | — | — | — |
| Bytes fetched per cycle | — | — | — | — |
| INPUT/OUTPUT CONTROL | | | | |
| Number of channels | 1 | 4 | 4 | 6 |
| High-speed buses | 1 | 2 | 2 | 16 |
| Low-speed buses | 3 | 14 | 14 | 12 |
| MINIMUM DISK STORAGE | 368MB | 368MB | 368MB | 368MB |
| MAXIMUM DISK STORAGE | 6.5GB | 968GB | 968GB | 7742GB |
| NUMBER OF WORKSTATIONS | 64 | 192 | 192 | 384 |
| COMMUNICATIONS PROTOCOLS | BSC, SDLC, X.21, HDLC, X.25, IBM Token-Ring, Ethernet, SNA | BSC, SDLC, X.21, HDLC, X.25, IBM Token-Ring, Ethernet, SNA | BSC, SDLC, X.21, HDLC, X.25, IBM Token-Ring, Ethernet, SNA | BSC, SDLC, X.21, HDLC, X.25, IBM Token-Ring, Ethernet, SNA |

*Note: A dash (—) in a column indicates that the information is unavailable from the vendor.*
**The 9375 Models 40 and 60 can be converted to the 9377 Model 90; the conversion requires a processor cage swap so that a second rack can be added.*

more powerful and less costly than the 4361, IBM's previous office-level System/370 (S/370)-architecture system. Additionally, the 9370 is less costly than the IBM 4381, the entry point for high-performance S/370 computing.

Besides delivering better cost effectiveness and greater price/performance than IBM's other departmental and distributed processing solutions, the 9370 provides greater functionality. For example, the 9370 supports several types of database management systems; in contrast, the S/36 cannot support a DBMS. Furthermore, the 9370 delivers a much improved communications architecture when compared to other IBM departmental offerings, such as the S/36 and S/38. Besides using SNA and the IBM Token-Ring Local Area Network (LAN), the 9370 also supports the IEEE 802.3-recommended Ethernet LAN; the S/36 and S/38, at the present, only are equipped with SNA and Token-Ring LAN communications facilities, thus limiting distributed processing functionality. The de facto industry-standard Ethernet network offers a wider range of connectivity than the Token-Ring; i.e., Ethernet supports a wide variety of systems from a variety of vendors. By not supporting Ethernet, the S/3X products cede ground to the 9370.

One of the most important advantages of the 9370 is that it is software compatible with IBM S/370-architecture systems such as the 4381 superminicomputers and 3080 and 3090 mainframes, in selected environments such as VM. The S/3X systems do not offer S/370-compatibility, thus

**instructions," usable only by the operating system, handles input/output (I/O) and various hardware control functions.**

**Also standard are extended-precision floating-point, dynamic address translation, and Virtual Telecommunications Access Method (VTAM) instructions.**

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

### MAIN STORAGE

**TYPE: The 9370 main memory employs 1-megabit chips.**

**CYCLE TIME: Information unavailable from the vendor.**

**CAPACITY: The 9373 supports 4MB, 8MB, or 16MB of main storage; the 9375 and 9377 models support either 8MB or 16MB.**

**CHECKING: Single-bit errors are detected and corrected automatically, and multiple-bit errors are detected.**

**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.**

**RESERVED STORAGE: Similar to that in the S/370. Main memory is reserved for interrupt routines, program status words, CPU timer logout area, machine-check interrupt code, and register save area.**

**Key-controlled storage protection provides both store and fetch protection, preventing unauthorized access or modifi-**

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## CHART B. MASS STORAGE

| MODEL | 9332 | 9335 | 3370 | 3375 | 3380 Models AD4, BD4 |
|---|---|---|---|---|---|
| Type | Fixed | Fixed | Fixed | Fixed | Fixed |
| Controller model | DASD/Tape Subsystem Controller | A01 Device Function Controller | 3880-1, -2, or -4 | 3880-1, -2, or -4 | 3880-3 or -23 |
| Drives per subsystem/controller | 4 | 4 per A01 | 16-32 | 16-32 | 8-16 |
| Formatted capacity per drive, megabytes | 368 | 824 | 571-730 | 819.7 | 2520 (1260 per HDA) |
| Number of usable surfaces | 8 | 6 | — | — | — |
| Number of sectors or tracks per surface | 1,349 tracks | 3,926 tracks | — | — | — |
| Bytes per sector or track | 512/sector | 512/sector | — | — | — |
| Average seek time | 23-25 ms | 18 ms | 19 or 20 ms | 19 ms | 15 ms |
| Average rotational/relay time | 9.6 ms | 8.28 ms | 10.1 ms | 10.1 ms | 8.3 ms |
| Average access time | 32.6-34.6 ms | 26.28 ms | 29.1 or 30.1 ms | 29.1 ms | 23.3 ms |
| Data transfer rate | 2.6MB/sec. | 3MB/sec. | 1.86MB/sec. | 1.86MB/sec. | 3MB/sec. |
| Supported by system models | All | All | All | All | All except 9373-20 |
| Comments | | A01 Controller attaches to DASD/Tape Subsystem Controller, supporting 4 B01 drive units. | 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. | AD4 can control up to three BD4 or BE4 drives. |

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placing them at a disadvantage in terms of application development and distributed processing within the host-based S/370 environment.

IBM is counting on the 9370 to provide the S/370-architecture compatibility needed for delivering the top-to-bottom, entry-level-to-mainframe application portability and distributed processing that have enabled competitors such as Digital Equipment to seriously cut into IBM's share of the medium-scale systems marketplace.

Even though the 9370 has just reached general availability status, IBM is making moves to ensure its success within the mid-range system marketplace. To increase the 9370's competitiveness and functionality, IBM has recently enhanced its 9370 products by introducing new and improved communications and networking offerings and new peripheral devices.

Significant communications and networking announcements include the following: a new release of Advanced Communication Function/Virtual Telecommunications Access Method (ACF/VTAM), a new release of NetView, the introduction of VM/Distributed Systems Node Executive (DSNX), the introduction of NetView Network Definer, IBM Token-Ring Local Area Network (LAN) enhancements, and X.25 support. Such offerings add connectivity and network management functions that were previously missing in the IBM distributed systems networking solution.

The presence of the enhanced ACF/VTAM Release 3 enhances cross-system connectivity and makes it easier to implement and manage distributed applications. ACF/VTAM Release 3 provides peer-to-peer communications among SNA Physical Unit Type 2.1 (PU2.1) devices. It enables distributed IBM VM-, MVS-, and VSE-based S/370-architecture systems to communicate with one another; with distributed IBM S/3X, Series/1, and System/88

**cation of information in central storage. Store protection prevents the contents of main storage from being altered by storage addressing errors in programs or input from I/O devices. Fetch protection prevents the unauthorized fetching of data and instructions from main storage. Up to 15 programs and their associated main storage areas can be protected at one time. A 7-bit storage key, acting as a security lock, protects each 4K-byte block of storage. Key-controlled protection is standard on all 370-based machines.**

**CACHE MEMORY: Only the 9375 Model 60 and the 9377 Model 90 include cache memory. Refer to Chart A for the sizes of the cache on those models.**

### CENTRAL PROCESSOR

**GENERAL: The four 9370 processors support the performance enhancements of Extended Control Program Support (ECPS) for the Virtual Machine/System Product (VM/SP) operating system (ECPS:VM), as well as assists for the Interactive Executive for System/370 (IX/370) operating system. The 9375 Model 60 and the 9377 Model 90 processors support ECPS:MVS, for the Multiple Virtual Storage/System Product (MVS/SP) operating environment.**

**The 9370 processors differ from one another primarily in physical packaging, performance, and number of attachable devices. Each processor is a rack-mountable, modular unit. Memory and integrated I/O controllers are packaged on logic cards. On the 9373 and 9375 processors, these cards fit into slots inside the processor unit. On the 9377 processor, the memory cards fit into slots inside the processor unit, but the integrated I/O controllers reside in slots in a separate I/O card unit, which may be mounted in the same or an adjacent rack enclosure. The cards are flat—7.64 inches by 8.12 inches by 0.64 or 0.68 inches (191 mm by 203 mm by 16 or 27 mm) and are enclosed in protective casings.**

**The entry-level 9373 Model 20 includes a floating-point facility to speed execution of floating-point instructions.**

**The two models (40 and 60) of the 9375 processor are the intermediate systems in the 9370 family. In both 9375 models, a high-performance arithmetic unit provides hardware support for single- and double-precision floating-point operations. This facility contains eight 64-bit floating-point**

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## CHART B. MASS STORAGE (Continued)

| MODEL | 3380 Models AE4, BE4 | 3380 Models AJ4, BJ4 | 3380 Models AK4, BK4 | 3380 Model CJ2 |
|---|---|---|---|---|
| Type | Fixed | Fixed | Fixed | Fixed |
| Controller model | 3880-3 or -23; 3990-1, -2, or -3 | 3880-3 or -23; 3990-1, -2, or -3 | 3880-3 or -23; 3990-1, -2, or -3 | Integrated controller offering 3880/3990 functionality |
| Drives per subsystem/controller | 8-16 | 8-16 | 8-16 | 4 |
| Formatted capacity per drive, megabytes | 5040 (2520 per HDA) | 2520 | 7560 | 1260 |
| Number of usable surfaces | — | — | — | — |
| Number of sectors or tracks per surface | — | — | — | — |
| Bytes per sector or track | — | — | — | — |
| Average seek time | 17 ms | 12 ms | 16 ms | 12 ms |
| Average rotational/relay time | 8.3 ms | — | — | — |
| Average access time | 25.3 ms | — | — | — |
| Data transfer rate | 3MB/sec. | 3MB/sec. | 3MB/sec. | 3MB/sec. |
| Supported by system models | All except 9373-20 | All except 9373-20 | All except 9373-20 | All |
| Comments | AE4 can control up to three BD4 or BE4 drives. | AJ4 can control up to three BJ4 or BK4 drives. | AK4 can control up to three BJ4 or BK4 drives. | CJ2 can control up to three BJ4 or BK4 drives. |

*Note: A dash (—) in a column indicates that the information is unavailable from the vendor.*

minicomputers; with distributed PC and PS/2 microcomputers; and with other non-IBM SNA-compatible systems without host assistance.

Although the new version of ACF/VTAM will not be delivered until 1988, it is very important. Because ACF/VTAM Release 3 avoids host intervention in system-to-system communications, the complexities and performance degradations experienced when interconnecting systems, when sharing resources, when uploading and downloading files, and when passing data between programs are reduced.

Besides reducing system interconnection complexities, ACF/VTAM Release 3 reduces network management tasks. It provides the routines for automating network configuration management tasks, thus freeing the communications programming and operations staff from the time-consuming programming tasks associated with configuring and reconfiguring networks. It also provides facilities for reducing the amount of communications programming needed to recover from a system crash or communications error.

NetView Release 2, the new NetView release, and VM/DSNX, a new VM-based software product, reduce the expenses of managing a network by providing centralized system and network management. NetView Release 2 permits departmental and distributed 9370 systems to run virtually unattended, with almost all network and systems management being performed by a central operations staff. VM/DSNX provides for centralized software development, implementation, and maintenance; i.e., it manages the distribution of new software, software changes, files, and maintenance through the SNA network to distributed 9370 systems and other VM-based processors, further enhancing the ability of customers to run distributed VM-based systems unattended. By using products that perform centralized system and network management, the customer

**registers and provides hardware for addition, subtraction, multiplication, and division as well as for square root functions.**

**The 9377 Model 90—the top-of-the-line 9370 processor—provides 2.1 times the commercial throughput of the 9375 Model 60; in compute-intensive or engineering/scientific applications, the 9377 delivers 1.9 times the 9375 Model 60's throughput in short-precision floating-point operations and 2.0 times its throughput in long-precision floating-point functions.**

**A hardware floating-point accelerator in the 9377 executes add, subtract, multiply, divide, and square root long- and short-precision floating-point instructions. A High Accuracy Arithmetic (ACRITH) facility for solving problems in numerical analysis with verified accuracy and verified results is also standard. The ACRITH consists of 20 arithmetic instructions that supplement those in the S/370 floating-point instruction complement.**

**Each 9370 CPU includes a cable-attached Processor Console, which uses a specially configured IBM PC. The console initializes and monitors the system; analyzes machine checks; handles errors; supports manual operations; aids in problem determination; supports the automatic/secure power control feature of the systems' 9309 rack, which allows automatic or remote system start-up, shutdown under control of the operating system, and automatic restart after a power outage; and 3270 display emulation, which lets the console be attached to a Work Station Subsystem Controller or a 3274 Control Unit to serve as a user workstation.**

**Other standard features on the 9370 processors include automatic restart after power failures and time-of-day clock and calendar.**

**CONTROL STORAGE: The 9375 Model 60 incorporates a microinstruction store containing a translation lookaside buffer (TLB) and a 16KB high-speed buffer storage that acts as a smaller and faster subset of processor storage.**

**The 9377 Model 90 includes 8KB of microinstruction storage that holds complex and less frequently used microinstructions. Frequently used microinstructions are executed directly in hardware.**

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## CHART C. WORKSTATIONS (Continued)

| MODEL | 3151 | 3161, 3163, 3164 | 3162 | PC Models 5150, 5160, 5162, 5170 | PC Models 5371 and 5373 | PS/2 Models 8530, 8540, 8560, and 8580 |
|---|---|---|---|---|---|---|
| DISPLAY PARAMETERS | | | | | | |
| Max. chars./screen | — | 2000 | 1920, 2240, 3168, or 3696 | 2000 | 4000 | 2000 or 7446 |
| Buffer capacity | — | — | — | — | — | — |
| Screen size (lines x chars.) | — | 25 x 80 | 24 x 80, 28 x 80, 24 x 132, or 28 x 132 | 25 x 80 | 50 x 80 | 25 x 80 or 51 x 146 |
| Tilt/swivel screen | Standard | Standard | Standard | Standard | Standard | Standard |
| Symbol formation | — | 8 x 16 dot matrix | 9 x 13 dot matrix | 7 x 9 dot matrix | 12 x 20 dot matrix | 9 x 16, 12 x 20, or 7 x 15 dot matrix |
| Character phosphor | Green or amber-gold | Green or amber-gold on 3161 and 3163; Color on dark on 3164 | Color on dark | — | — | — |
| Total colors/no. simult. displayed | Not applicable | 8 on 3164 | Not applicable | — | Up to 16 | Up to 64 shades of gray or up to 256 colors out of a color base of 256,000 |
| KEYBOARD PARAMETERS | | | | | | |
| Style | Typewriter | Typewriter | Typewriter | Typewriter | Typewriter | Typewriter |
| Character/code set | ASCII | ASCII | ASCII | ASCII | ASCII | ASCII |
| Detachable | Yes | Yes | Yes | Yes | Yes | Yes |
| Program function keys | 12 to 36 | 12 to 24 | 12 to 24 | — | — | — |
| TERMINAL INTERFACE | ASCII Subsystem Controller; 7171 Control Unit. | ASCII Subsystem Controller; 7171 Control Unit. | ASCII Subsystem Controller; 7171 Control Unit. | Work Station Subsystem Controller; 3174 or 3274 Control Unit. | Work Station Subsystem Controller; 3174 or 3274 Control Unit. | Work Station Subsystem Controller; 3174 or 3274 Control Unit. |
| COMMENTS | Supports up to 10 terminal emulations. | Supports DEC VT200/100/50, TeleVideo 900, Wyse 50, and IBM 3101 terminal emulation features/options. | Supports DEC VT200/100/50, TeleVideo 900, Wyse 50, and IBM 3101 terminal emulation. | | | Resolution of 720 x 400 pels in text mode and 640 x 480 pels in graphics mode. |

*Note: A dash (—) in a column indicates that the information is unavailable from the vendor.*

reduces the staffing requirements needed to run the distributed system and the skill levels needed to maintain and operate a distributed processor.

VM-based networks can be built and maintained in a more time-effective manner with the NetView Network Definer. The Netview Network Definer reduces the effort and skills needed to build and maintain VM-based SNA networks—an important feature in the 9370's target VM environment.

With the enhancements made to the VSE operating system and ACF/VTAM, the VSE-based 9370 now can function on the IBM Token-Ring LAN. Previously, only a 9370 running VM/IS or VM/SP could function on the Token-Ring LAN; a 9370 working under the VSE environment could not employ the IBM Token-Ring LAN, the IBM-developed LAN which provides a common communication path among distributed IBM and non-IBM information systems and workstations. By providing the VSE-oriented 9370 systems with the facilities to communicate across the Token-Ring LAN, IBM is increasing distributed processing functionality. The VSE-based 9370 has access to a greater amount of application environments through the Token-Ring LAN. In addition, system interconnectivity expenses for the 9370 are reduced through the Token-Ring LAN's cabling, connection, and communications carrier schemes.

**REGISTERS: The 9370 processors incorporate 16 general-purpose registers.**

**ADDRESSING: Three types of addresses are recognized: absolute, real, and logical. The dynamic address translation facility, 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 16MB.**

**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 sped up by the TLB, a group of high-speed registers, which holds recently referenced virtual storage addresses and their real storage equivalents. The 9373 and 9375 translation lookaside buffers can hold addresses for 512KB of processor storage; the buffer on the 9377 can hold addresses for up to 128KB.**

**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.**

# IBM 9370 Information System

## CHART C. WORKSTATIONS (Continued)

| MODEL | 3192 Model C | 3192 Model D | 3193 Model F | 3192 Model G | 3192 Model L | 3193 Models 1 and 2 |
|---|---|---|---|---|---|---|
| DISPLAY PARAMETERS | | | | | | |
| Max. chars./screen | 1920 or 2560 | 1920, 2560, 3440, or 3564 | 1920, 2560, 3449, or 3564 | 1920 or 2560 | 1020 or 2560 | 3840 |
| Buffer capacity | — | — | — | — | — | — |
| Screen size (lines x chars.) | 24 or 32 x 80 | 24 x 80, 32 x 80, 43 x 80, or 27 x 132 | 24 x 80, 32 x 80, 43 x 80, or 27 x 132 | 24 or 32 x 80 | 24 or 32 x 80 | 48 x 80 |
| Tilt/swivel screen | Standard | Standard | Standard | Standard | Standard | Standard |
| Symbol formation | — | — | — | — | — | 11 x 24 dot matrix |
| Character phosphor | Red, green, blue, yellow, turquoise, white on black | Green | Red, green, blue, yellow, turquoise, white on black | Red, green, blue, yellow, turquoise, white on black | Red, green, blue, yellow, turquoise, white on black | White on black |
| Total colors/no. simult. displayed | 7 | Not applicable | 7 | 7 | 7 | Not applicable |
| KEYBOARD PARAMETERS | | | | | | |
| Style | Typewriter or IBM Enhanced | Typewriter or IBM Enhanced | Typewriter or IBM Enhanced | Typewriter or IBM Enhanced | TYpewriter or IBM Enhanced | Typewriter |
| Character/code set | 94 | 94 | 94 | 94 | 94 | — |
| Detachable | Yes | Yes | Yes | Yes | Yes | Yes |
| Program function keys | 24 | 24 | 24 | 24 | 24 | 24 |
| TERMINAL INTERFACE | Work Station Subsystem Controller; 3174, 3274, or 3276 Control Unit | Work Station Subsystem Controller; 3174, 3274, or 3276 Control Unit | Work Station Subsystem Controller; 3174 or 3274 Control Unit | Work Station Subsystem Controller; 3174 or 3274 Control Unit | Work Station Subsystem Controller; 3174 or 3274 Control Unit | Work Station Subsystem Controller; 3174 or 3274 Control Unit |
| COMMENTS | Can support a mouse and a printer or plottter. | Can support a mouse and a printer or plotter. | Has the record/play/pause feature. | Can support a mouse and a printer or plotter. | Has the record/play/pause feature. | Provides up to 880 x 1200 dots of image. The display screen supports two logical terminals. |

*Note: A dash (—) in a column indicates that the information is unavailable from the vendor.*

The addition of the X.25 protocol to the 9370 communication and networking architecture extends distributed data processing functions. It permits the 9370 to communicate with those information systems using networks based on the International Standards Organizations' Open Systems Interconnect (OSI) standards or the U.S. Department of Defense's (DOD's) networking recommendations (the DDN network).

By adding such products as ACF/VTAM Release 3 and IBM Token-Ring LAN support for the VSE operating system, IBM is better able to meet networking requirements at the departmental level of organizational processing; such functions reduce the complexities, expenses, efforts, and skills required for having departmental and distributed processors communicate with one another and with the host, and provide for greater connectivity options at the departmental level.

Furthermore, the addition of ACF/VTAM, Netview, VM/DSNX, and NetView Network Definer to the SNA network makes IBM's distributed processing network more competitive with other networking solutions such as Digital Equipment's DECnet, a decentralized (or peer-to-peer) network.

The 9370's competitiveness and capabilities are further increased with the addition of new DASD subsystems and 3270-compatible workstations. Of the peripheral device announcements, the most significant announcements involve the availability of higher density DASD drives and higher performance DASD controllers. The addition of the

**OPERATING ENVIRONMENT: Physical specifications for the 9370 models are as follows:**

| | Height (inches) | Width (inches) | Depth (inches) | Weight (pounds) |
|---|---|---|---|---|
| 9373 | 14 (35.6 cm) | 19 (48.3 cm) | 28 (71.1 cm) | 132 (60 kg) |
| 9375 | 28 (71.1 cm) | 19 (48.3 cm) | 31 (78.2 cm) | 280 (127 kg) |
| 9377 | 28 (71.1 cm) | 19 (48.3 cm) | 31 (78.2 cm) | 268 (122 kg) |

| | Temperature, degrees F (C) | Relative Humidity |
|---|---|---|
| 9373 | 50 to 105 (10 to 40.6) | 8 to 80 percent |
| 9375 | 50 to 90 (10 to 32.2) | 8 to 80 percent |
| 9377 | 60 to 90 (15.6 to 32.2) | 8 to 80 percent |

**The 9370 processors are housed in IBM's 9309 Rack Enclosure, which comes in Models 1 and 2; any of the processors can be mounted in either model. Model 1 stands 39.3 inches (1 m) high; Model 2 is 62.9 inches (1.6 m) tall.**

**The 9370 processors and the 9309 Rack Enclosure use single-phase power. All processor models can operate on 220 V power. The 9373 processor Model 20 can also operate on 120 V power; the 9309 Rack Enclosure Model 1 can be ordered with either power supply module.**

**The logic of the 9377 processor is housed in an air-cooled thermal conduction module (TCM). Raised-floor construction and special electrical and plumbing facilities are not required for this processor.**

# IBM 9370 Information System

## CHART C. WORKSTATIONS

| MODEL | 3178 | 3179 Model G | 3180 | 3191 Models A and B | 3191 Models E and F | 3191 Model L |
|---|---|---|---|---|---|---|
| DISPLAY PARAMETERS | | | | | | |
| Max. chars./screen | 1920 | 1920 or 2560 | 1920, 2560, 3440, or 3564 | 1920 | 1920 or 2560 | 1920 or 2560 |
| Buffer capacity | — | — | — | — | — | — |
| Screen size (lines x chars.) | 24 x 80 | 24 or 32 x 80 | 24 x 80, 32 x 80, 43 x 80, or 27 x 132 | 24 x 80 | 24 or 32 x 80 | 24 or 32 x 80 |
| Tilt/swivel screen | Standard | Standard | Standard | Standard | Standard | Standard |
| Symbol formation | 7 x 14 dot matrix | — | 9 x 11 dot matrix | 7 x 14 dot matrix | — | — |
| Character phosphor | — | Red, green, blue, white, yellow, turquoise, pink on black | — | Green or amber-gold | Green or amber-gold | Green |
| Total colors/no. simult. displayed | Not applicable | 8 total colors | Not applicable | Not applicable | Not applicable | Not applicable |
| KEYBOARD PARAMETERS | | | | | | |
| Style | 75-key data entry or 87-key typewriter | Typewriter or typewriter/APL2 | Typewriter, data entry, or typewriter/APL | Typewriter | 122-key typewriter, 102-key typewriter, or 104-key typewriter | 122-key typewriter, 102-key typewriter, or 104-key typewriter |
| Character/code set | 94 | — | — | 94 | — | — |
| Detachable | Yes | Yes | Yes | Yes | Yes | Yes |
| Program function keys | 10 (data entry keyboard) or 24 (typewriter keyboard) | 24 | — | 24 | 24 | 24 |
| TERMINAL INTERFACE | Work Station Subsystem Controller; 3274 Control Unit | Work Station Subsystem Controller; 3274 Control Unit | Work Station Subsystem Controller; 3274 Control Unit | Work Station Subsystem Controller; 3174 or 3274 Control Unit | Work Station Subsystem Controller; 3174 or 3274 Control Unit | Work Station Subsystem Controller; 3174 or 3274 Control Unit |
| COMMENTS | | Provides 720 x 384 pixel resolution; can add mouse, color jetprinter, and plotter through 3979 Expansion Unit. | | | Has record/play/pause feature and vertical/horizontal rule expansion feature. | Has selector light pen option and a printer port. Also has the rule expansion feature and the record/play/pause feature. |

*Note: A dash (—) in a column indicates that the information is unavailable from the vendor.*

3990 Storage Controller increases overall system performance since that controller is 30 percent more powerful than the 3880 Storage Controller, the predecessor to the 3990. The addition of the high-density 3380 DASD increases the amount of on-line storage that the 9370 can support, thus allowing larger databases and bigger work loads than before. The newest high-end 3880 DASD offers approximately 50 percent more storage than the 5GB-3380 DASD model, the previous high-end 3380 DASD; i.e., the new high-end 3380 contains 7.6GB of storage whereas the former top-of-the-line 3380 contains 5GB of storage. Furthermore, the new DASD controller and 3880 DASDs offer better price/performance than their predecessors. For example, the entry-level 3990 Storage Control costs almost as much as the entry-level 3880 Storage Controller, the DASD controller it effectively replaces, but the 3990 provides 30 percent more processing power than the 3880. As another example, the 7.6GB-3380 DASD costs $128,000, or $16,842 per GB; the previous high-end 3380 DASD, offering 5GB of storage, is priced at $124,480, or $24,896 per GB.

### COMPETITIVE POSITION

IBM positions its 9370 Information System against the MicroVAX and VAX 8000 systems from Digital Equip-

### INPUT/OUTPUT CONTROL

**The 9373 processor includes one internal I/O bus; the system provides an estimated aggregate I/O capacity of up to 5.5MB per second. I/O slots for attachment of up to seven card features are provided inside the processor unit.**

**The two 9375 processor models each have four I/O buses. Each system provides an estimated aggregate I/O capacity of up to 22MB per second. Up to 17 card features can be configured in the available I/O slots in the processor unit.**

**The 9377 processor accommodates from two to six buses; depending on the configuration chosen, the number of available I/O card slots ranges from 10 to 54. The 9377 processor offers an estimated aggregate I/O capacity of up to 39MB per second.**

**The 9370 processors have an integrated I/O control structure. All integrated I/O is compatible with the S/370 I/O control structure of channel and control unit.**

**The 9370 I/O controller is used to attach I/O devices to the 9370 processor. An I/O controller consists of the following components:**

- **An I/O processor (IOP). The IOP provides the means to handle I/O commands from the CPU and pass data to system memory. It communicates with the CPU over the internal I/O bus.**

# IBM 9370 Information System

## CHART D. PRINTERS

| MODEL | 3262 Models 3/13 | 3268 Models 2 & 2C | 3287 Models 1, 1C/2, 2C | 3812 | 3820 | 4224 |
|---|---|---|---|---|---|---|
| Type | Band | Matrix | Matrix | Nonimpact (LED) | Laser | Dot matrix |
| Speed | 650/325 lpm | 340 cps | 80/120 cps | 12 ppm | 22 ppm | 200 or 400 cps |
| Bidirectional printing | Not applicable | Yes | Yes | Not applicable | Not applicable | Yes |
| Paper size | 3.5 to 16 in. | Up to 16 in. wide | 3 to 14⅞ in. wide | 7 to 8.5 in. wide; 10.1 to 14 in. long | Up to 8.5 in. wide; Up to 14 in. long | 3 to 15 in. wide |
| Character formation | Full | 4 x 8 dot matrix | 4 x 8 dot matrix | Electrophotographic | Full | Up to 12 x 13 dot matrix |
| Horizontal character spacing (char./inch) | 10 | 10 or 16.7 | 10 | Variable | Variable | 10, 12, 15; 11.5 optional |
| Vertical line spacing (char./inch) | 6 or 8 | 3, 4, 6, or 8 | 6 or 8 | Variable | Variable | 6 or 8 |
| Character set | 48, 64, 96, or 128 | 48, 64, 96, or 128 | EBCDIC; ASCII opt. | Variable fonts (62 std.) | Variable fonts (Prestige Elite std.) | — |
| Controller/Interface | Workstation Subsystem Controller; 3174 or 3274 Control Unit | Workstation Subsystem Controller; 3174 or 3274 Control Unit | Workstation Subsystem Controller; 3174 or 3274 Control Unit | Telecommunications Subsystem Controller; System/370 Block Multiplexer Channel | System/370 Block Multiplexer Channel; Telecommunications Subsystem Controller | Workstation Subsystem Controller |
| No. of printers per controller/interface | — | — | — | — | — | — |
| Printer dimensions, in. (h x w x d) | — | — | — | 15 x 27 x 19 | 47 x 60 x 26.5 | 10.5 x 25.3 x 14.0 |
| Graphics capability | No | Yes | Yes | 240 x 240 dpi | 240 x 240 pixels | 144 x 144 dpi |
| Comments | Model 13 is convertible to Model 3. | Model 2C has color print capability. | Models 1C & 2C have color print capability. | | Permits two-sided printing. | Four models available. |

*Note: A dash (—) in a column indicates that the information is unavailable from the vendor.*

ment, IBM's chief rival within the medium-scale marketplace. The 9370 Model 20 is positioned against the Digital Equipment MicroVAX II and the VAX 8250. The 9375 Model 40 is positioned against the Digital Equipment VAX 8250 and VAX 8350. The 9375 Model 60 goes up against the VAX 8350 and the VAX 8530. The 9377 Model 90 competes against both the 8530 and the 8550.

The 9370 remains competitive with the VAX 8000's in functionality. For example, as previously stated, the new IBM communications and networking products enable IBM to present a distributed 9370 processing solution that is competitive with Digital Equipment's DECnet, the distributed processing solution for its VAX systems. With the addition of the new connectivity and network management functions, SNA will be able to deliver the same level of network functionality as Digital Equipments's DECnet—i.e., peer-to-peer communications that reduces system interconnection complexities, connection costs, and network management complexities and expenses.

It should be noted that the products that enable SNA to support peer-to-peer communications across the entire network are not readily available. The required products that support SNA peer-to-peer networking will be delivered in approximately six months; thus, these new SNA facilities do not readily solve IBM's networking problems. Even so, these new SNA products will force those customers looking for peer-to-peer distributed system solutions to consider the 9370 and IBM's SNA products since they enable IBM to deliver the same level of functionality as DECnet.

In addition to the 9370's capabilities to remain competitive with the VAX 8000s in functionality, the 9370 systems

**• An I/O adapter (IOA). The IOA provides the control mechanisms and channels needed for transferring data between the IOP and I/O device. It communicates with the devices over the respective external interface.**

**The IOP and IOA may be combined on a single card, or they may exist on multiple cards. In multiple-card configurations, the IOP is on one card and the IOAs are on one or more additional cards.**

**Those I/O controllers classified as I/O subsystem controllers directly attach I/O device units without using separate control units for I/O device control and data transfer. The I/O channel attaches I/O devices through separate control units.**

**The 9370 employs four principal types of I/O controllers:**

- **DASD/Tape Subsystem Controller**
- **Work Station Subsystem Controller**
- **System/370 Block Multiplexer Channel**
- **Communications Subsystem Controller**

**The *DASD/Tape Subsystem Controller* attaches IBM's 9332 and 9335 Direct Access Storage Device (DASD) disk products and 9347 magnetic tape units to the 9370 processor. This controller employs the IBM Intelligent Peripheral Interface (IPI) Level 3 standard interface, which conforms to the American National Standards Institute (ANSI) standard for IPI Level 3.**

**The DASD/Tape Subsystem Controller combines the IOP and IOA functions on a single card. It is supported by the VM/SP, VSE/SP, and IX/370 operating environments.**

**The *Work Station Subsystem Controller* allows attachment of IBM 3270-type devices (such as PCs, display stations,**

# IBM 9370 Information System

## CHART D. PRINTERS (Continued)

| MODEL | 4234 Model 1 | 4245 Model D12/D20 | 4245 Models 12/20 | 4248 Model 2 | 4250 | 5210 Models G1/G2 |
|---|---|---|---|---|---|---|
| Type | Dot band | Band | Band | Band | Nonimpact | Daisywheel |
| Speed | 410 lpm | 1200/2000 lpm | 1200/2000 lpm | 2200/3200/ 4000 lpm | Variable; 1 page each 1.5 to 2.5 min. is avg. | 40/60 cps |
| Bidirectional printing | Not applicable | Not applicable | Not applicable | Not applicable | Not applicable | Yes |
| Paper size | Up to 16 in. wide; 14 in. long | 3.5 in. wide; 6 to 24 in. long | 3.5 to 22 in. wide; 3 to 24 in. long | 3.5 to 22 in. wide | Up to 12.99 in. wide | Up to 15.4 in. wide |
| Character formation | Dot matrix | Full | Full | Full | Electro-erosion | Full |
| Horizontal character spacing (char./inch) | 10 or 15 | 10 | 10 | Variable | Variable | 10, 12, 15, or proportional |
| Vertical line spacing (char./inch) | 3, 4, 6, or 8 | 6 or 8 | 6 or 8 | Variable | Variable | 3.4 to 48 |
| Character set | — | 48 to 127 | 48 to 124 | Variable | Variable | 96 |
| Controller/Interface | Workstation Subsystem Controller | Workstation Subsystem Controller; 3274 Control Unit | System/370 Block Multiplexer Channel | System/370 Block Multiplexer Channel | Workstation Subsystem Controller | Workstation Subsystem Controller |
| No. of printers per controller/interface | — | — | — | — | — | — |
| Printer dimensions, in. (h x w x d) | 37.75 x 26.0 x 30.25 | — | — | — | — | — |
| Graphics capability | No | No | No | None | Yes | Not applicable |
| Comments | | OCR printing is a standard feature; 4 models available. | | OCR capability is standard. | Provides typeset-quality pages at 600-dpi addressable resolution. | |

*Note: A dash (—) in a column indicates that the information is unavailable from the vendor.*

remain competitive with the VAX systems in configurability and cost effectiveness. For example, the entry-level 9370 Model 20 offers greater expansion capabilities and is less expensive than the MicroVAX II. The 9370 Model 20 supports up to 6.5GB of disk storage and 64 workstations, whereas the MicroVAX II only accommodates 2GB of disk storage and 48 workstations. A 9370 Model 20 with 8MB of memory, 1.6GB of DASD storage, cartridge tape unit, associated DASD and tape controllers, 24 workstations, one 410-line-per-minute (lpm) printer, associated workstation and printer controllers, and the VM/IS system control package costs $151,755, or $6,323 per user. A similarly configured MicroVAX II, with the MicroVMS system control package, costs $181,360, or $7,566 per user, which is $1,243 more per user than the 9370 Model 20.

The high-end 9377 Model 90 is more cost effective than the VAX 8530. For example, the 9370 Model 90 featuring 16MB of memory, 5GB of DASD storage, a cartridge tape drive, a 1600-bpi tape subsystem, 128 display workstations, a 20-page-per-minute (ppm) laser printer, a 3,600-lpm printer, and the VM/IS system control package, costs $900,640, or $7,036 per user. A similarly configured Digital Equipment VAX 8530, with the VAX/VMS system control packages, costs $982,228, or $7,674 per user.

Although the 9370 provides IBM with a more competitive and highly functional product for office and departmental computing than previously available, one must question how much this machine will do to assist IBM in recapturing the medium-scale market share it has ceded to Digital Equipment.

A major advantage that the VAX 8000 systems have over the 9370 is that the VAX 8000s have been available for awhile. The Digital Equipment VAX systems are a proven

**and printers) and OEM devices for special-purpose applications, such as factory or laboratory automation, data acquisition, process control, and communications. Attachable 3270-type devices include the 3178, 3180, 3191, 3192, 3193, and 3278 Display Stations; 3179, 3279, and 3192 Color Display Stations; 3194 Advanced Function Color Display; 3290 Information Panel; 5150, 5160, 5170, 5371, and 5373 PC microcomputers; 8530, 8540, 8560, and 8580 PS/2 microcomputers; and 3262, 3268, 3287, 4224, 4234, 4245, and 4250 printers. Both the 3270-type and the OEM devices attach either directly or through 3299 Terminal Multiplexers.**

**OEM devices must be attached to the Work Station Subsystem Controller through an appropriate, customer-supplied OEM adapter; the adapter must perform control functions and protocol conversion between the Work Station Subsystem Controller and the appropriate industry standard. IBM's Serial OEM Interface (SOEMI), which supports Multibus and other devices, is an example of such an adapter.**

**The Work Station Subsystem Controller comprises two cards. One contains the Work Station Processor and the other contains the Work Station Adapter. Each installed Work Station Subsystem Controller requires two card slots.**

**The Work Station Adapter has six coaxial ports for the attachment of a workstation or an OEM adapter. Each port supports one workstation or OEM adapter.**

**For greater device attachment, terminal multiplexers like IBM's 3299 can be attached to four of the ports; each multiplexer can support up to eight stations or OEM adapters, allowing configuration of 32 devices per controller. However, if the multiplexers are attached to four of the ports, the other two ports on the Work Station Adapter cannot be used.**

**The Work Station Subsystem Controller is supported by the VM/SP and Virtual Storage Extended/System Package (VSE/SP) operating environments. The SOEMI is sup-**

# IBM 9370 Information System

## CHART E. MAGNETIC TAPE EQUIPMENT

| MODEL | 9347 | 1589 | 3420 Model 3 | 3420 Model 5 | 3420 Model 7 |
|---|---|---|---|---|---|
| TYPE | Streaming | Reel-to-reel | Reel-to-Reel | Reel-to-reel | Reel-to-reel |
| FORMAT | | | | | |
| Number of tracks | — | 9 | 7; 9 | 7; 9 | 7; 9 |
| Recording density, bits per inch | 1600 | 1600/6250 | 556/800; 1600/800 | 556/800; 1600/800 | 556/800; 1600/800 |
| Recording mode | PE | NRZI; PE | NRZI; PE/NRZI | NRZI; PE/NRZI | NRZI; PE/NRZI |
| CHARACTERISTICS | | | | | |
| Controller model | DASD/Tape Subsystem Controller | — | 3803 (per S/370 Block Mux Channel) | 3803 (per S/370 Block Mux Channel) | 3803 (per S/370 Block Mux Channel) |
| Drives per controller | 1 | — | 1-8 | 1-8 | 1-8 |
| Storage capacity, bytes | 44M | — | — | — | — |
| Tape speed, inches per second | 100 | 75 | 75 | 125 | 200 |
| Data transfer rate, units per second | 160KB streaming; 40KB non-streaming | 120KB at 1600-bpi; 468KB at 6250-bpi | 41.7KB at 556 bpi; 60KB at 800 bpi; 120KB at 1600 bpi | 69.5KB at 556 bpi; 100KB at 800 bpi; 200KB at 1600 bpi | 111KB at 556 bpi; 160KB at 800 bpi; 320KB at 1600 bpi |
| Streaming technology | Yes | No | No | No | No |
| Start/stop mode; speed | Yes 25 ips | Not applicable | Not applicable | Not applicable | Not applicable |
| Switch selectable | Not applicable | Yes | Yes | Yes | Yes |
| Comments | Contains integral device function controller. | | | | |

*Note: A dash (—) in a column indicates that the information is unavailable from the vendor.*

product for departmental and distributed processing. The 9370 systems, on the other hand, are not proven products. Since the 9370 has been shipping for only a few months, it is safe to say at this time that the units have not been on the market long enough to determine their effectiveness in departmental and distributed processing.

Because the Digital Equipment VAX 8000s have been around for awhile, these departmental and distributed processing systems have accumulated a substantial portion of the mid-range systems marketplace. Since the VAX 8000s are a proven product for departmental and distributed processing in either a Digital Equipment or IBM environment, IBM will have a difficult time replacing the VAX 8000s. Customers will not be willing to part with their VAXs just to acquire an IBM processor. Moreover, such a migration would be costly since hardware, software, and communications investments are lost. Most of IBM's sales will be in those IBM processing arenas that have yet to invest in Digital Equipment VAX 8000s—the software compatibility with certain IBM mainframe environments would be a definite attraction in this regard.

In addition to competing against Digital Equipment for sales within the medium-sized system marketplace, IBM is competing against itself. Sales of 9370 systems will be limited because IBM is selling against itself at both the low and high ends of the medium systems scale. That is, IBM is using both the System/36 and the 9370 Model 20 to address small-scale business, office, and departmental computing. Customers neither requiring nor anticipating 9370 performance and functionality will purchase the less expensive, the System/36, thus reducing 9370 sales revenue.

According to performance figures provided by IBM, the 9370 encroaches on the 4381's turf. The 9377 Model 90, the 4381 Model Group 11 (which serves as the entry-level 4381 at the present time), and the 4381 Model Group 21 (the entry-level 4381 which will replace the 4381 Model Group 11 in 1988) all function within the same performance range.

**ported by VM/SP and VSE/SP through the IBM/SOEMI Access Method software facility.**

**The *System/370 Block Multiplexer Channel (BMPX)* allows attachment of one to eight control units for both IBM and non-IBM DASD, tapes, displays, printers, and other devices. Attachable I/O subsystems include those such as the following:**

- **The 3880 Storage Control Unit, which controls IBM's 3370, 3375, and 3380 DASD**
- **The 3430 Model A1 Magnetic Tape Subsystem**
- **The 5080 Graphic System**
- **The IBM 3270 Information Display System**
- **The 3800 Printing Subsystem**

**The single-card BMPX allows several I/O devices to operate concurrently at high speeds. Devices attached to the BMPX that cannot employ block multiplexing (such as IBM's 3420 magnetic tape unit) will act as if they were attached to a selector channel. The BMPX can operate in data streaming mode for attaching high-speed DASD like the 3380. Data streaming permits a data rate of up to 3MB per second and cable lengths of up to 400 feet (122 meters) between the 9370 and the last control unit.**

**The System/370 BMPX allows the 9373 to attach devices with transfer rates of up to 1.5MB per second; the 9375 and 9377 can attach 1.5MB-, 1.9MB-, and 3MB-per-second devices.**

**The BMPX is supported by the VM/SP, VSE/SP, IX/370, and MVS/SP operating environments.**

**The *Communication Subsystem Controllers* handle remote workstation support, computer-to-computer linking, public data network connectivity, private network attachment, digital private branch exchange/computerized branch exchange (PBX/CBX) interfacing, ASCII device communications, and Ethernet and Token-Ring local area network (LAN) interfacing. A detailed discussion of the Communication Subsystem Controllers is found in the "COMMUNICATIONS CONTROL" subsection of this report.**

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Although the 9370 offers a better price/performance ratio than the 4381 Model Group 11 and outperforms the 4381 Model Group 21 in engineering/scientific computing and commercial processing, users will select the entry-level 4381s if they anticipate the need to expand computing and processing beyond the performance and functionality levels given by the 9377 Model 90. The entry-level 4381 models provide customers with entry points into IBM's high-performance computing realm. With the entry-level 4381s, customers are provided with a cost-effective migration path to higher performance systems within and beyond the 4381 family.

Furthermore, even though the 9370 Model 90 offers better price/performance than the entry-level 4381s, it does not provide a cost effective migration path to higher performance computing. The move from a 9370 Model 90 to a 4381 requires a processor box swap, a more costly move than an upgrade for an entry-level 4381.

## ADVANTAGES AND RESTRICTIONS

One of the most significant advantages of the 9370 is its communications and networking scheme. The 9370 delivers a much-improved communications architecture when compared to other IBM departmental offerings, such as the S/36 and S/38. Ethernet, Token-Ring Network, and SNA deliver the openness required in departmental processing. The Ethernet and the Token-Ring LANs provide the connectivity solutions that permit IBM and non-IBM systems and workstations to communicate and share resources with one another.

Of particular importance within the 9370's communication scheme is its Ethernet connectivity. Ethernet LANs are one of the most popular schemes for interconnecting information systems and workstations, especially at the department level; cases in point being Digital Equipment Corporation's Ethernet facilities for VAX minicomputers, MicroVAX, and VAX workstations and Data General's Ethernet facilities for Eclipse MV minicomputers.

The SNA networking facilities running on the 9370 permit the 9370 to serve as either a host or remote system within the SNA network. Permitting distributed IBM and non-IBM systems to gain access to MVS and VM resources is essential within the departmental and distributed processing scheme, where such systems are frequently called upon to access applications, files, and data residing on MVS- and VM-based hosts.

A significant component within SNA is the LU6.2 and PU2.1 support facility for peer-to-peer communications. This facility reduces the complexities and performance degradations experienced when interconnecting systems, when sharing resources, when uploading and downloading files, and when passing data between programs. It also reduces the application development effort for writing distributed processing applications.

## CONFIGURATION RULES

**The 9309 Rack Model 1 can hold 19 Electronic Industries Association (EIA) standard RS-310-B units; one EIA unit is equal to 1.75 inches (4.4 cm). Model 2 can accommodate 32 EIA units. The number of EIA units required by each rack-mountable 9370 device is shown in the following table.**

| Device | EIA Units |
|---|---|
| 9373 Processor | 8 |
| 9375 Processor | 16 |
| 9377 Processor | 16 |
| 9377 Processor I/O Card Unit | 8 |
| 9335 A01 DASD Controller | 3 |
| 9335 B01 DASD | 6 |
| 9332 DASD | 3 |
| 9347 Magnetic Tape Unit | 5 |

**The 9373 Processor has one card enclosure that holds the processor logic, storage, and I/O controller cards; the enclosure has seven slots for the I/O controller cards. The single I/O bus on the 9373 Processor can accommodate up to four I/O controllers. The maximum number of each controller supported is as follows:**

- **Up to two DASD/Subsystem Controllers**
- **Up to two Work Station Subsystem Controllers**
- **Up to two Communications Subsystem Controllers**
- **One System/370 Block Multiplexer Channel**

**The 9375 Processor employs two card enclosures. The basic enclosure holds the processor logic and storage cards and provides five slots for I/O controller cards; the expansion enclosure, positioned below the basic enclosure, has 12 slots for I/O controller cards.**

**The 9375 permits configuration of up to four I/O buses, to which 16 I/O controllers can be attached. The 9375 supports the following maximums for each controller:**

- **Up to four DASD/Tape Subsystem Controllers.**
- **Up to six Work Station Subsystem Controllers.**
- **Up to four Communications Subsystem Controllers.**
- **Up to two System/370 Block Multiplexer Channels.**

**The 9377 Processor has one enclosure. The lower half holds the processor logic module. The upper half holds the I/O card unit connection and storage cards. I/O controller cards are in separate I/O card units. I/O card units can be in the same rack as the processor, or in another rack. The 9377 Processor can have up to six I/O buses, to which a maximum of 16 I/O controllers can be attached. The number of each controller that can be supported is as follows:**

- **Up to 12 DASD/Tape Subsystem Controllers.**
- **Up to 12 Work Station Subsystem Controllers.**
- **Up to 12 Communications Subsystem Controllers.**

# IBM 9370 Information System

By employing this communications facility, distributed VM, VSE, and MVS systems can establish communications with each other without experiencing the complexities caused by host intervension. Furthermore, applications in VM, VSE, and MVS environments can establish communications with those LU6.2-based applications on IBM minicomputers, special-purpose processors, and microcomputers without incurring major interfacing difficulties.

Another advantage of the 9370 is its configurability. The 9370 delivers a flexible operating environment for commercial, office, engineering/scientific, and industrial computing. End users select the operating system that best suits application needs and task handling requirements. The VM/IS and VM/SP offerings are best suited for interactive processing in departmental and workgroup environments. IX/370, based on the UNIX System V operating system developed and licensed by AT&T, is employed where UNIX System V functionality is required. The VSE/SP offering is designed primarily for intensive batch and online transaction processing in either a centralized or distributed environment. The MVS/SP product is designed to handle the system control programming functions in a large user community.

Although the 9370 supports MVS/SP, the 9370 does not support MVS/XA, the MVS-based operating system designed for upper-ended S/370-type systems. Because the 9370 does not support MVS/XA, application portability between the 9370 and upper-ended S/370-architecture is limited.

Even though MVS/SP and MVS/XA are compatible, applications cannot be ported directly from one environment to another because of the differences between MVS/SP and MVS/XA. Applications being moved between the MVS/SP and MVS/XA environments must undergo modifications in order to run in the designated environment. Such a move requires additional expenditures in application development.

When required, more than one operating system can run on the 9370. The VM/SP offering contains the system programming controls that permit it to run IX/370, VSE/SP, MVS/SP, and VM/SP itself. Also, VM/SP can also accommodate SVS/VSE and OS/VS1, the primary operating systems of the old 4361; by accommodating the primary operating systems of the old 4361, VM/SP provides 4361 installations with a migration path to the 9370.

VM/SP runs the guest operating systems concurrently. By allowing the guest operating systems to run simultaneously, application processing or application development taking place under a particular environment is not disturbed; users under each operating environment have continual access to applications and services within that domain.

Installations configure more than one operating system on a 9370 to satisfy application development and execution requirements. The multiple operating system structure simplifies application system migration, preserves the life

**• Up to 16 System/370 Block Multiplexer Channels.**

**I/O card units with either one or two internal buses are available for the 9377. A card unit with one internal I/O bus can hold 11 DASD/Tape Subsystem Controller, Work Station Subsystem Controller, or Communications Subsystem Controller cards. A unit with two internal buses can hold 10 cards, supporting all of the aforementioned controller types, plus the System/370 Block Multiplexer Channel.**

**The maximum configuration of I/O card units for the 9377 Processor can be one of the following:**

- **One dual-bus unit and four single-bus units.**
- **Three dual-bus units.**
- **Two single-bus units and two dual-bus units.**

**The 9375 Model 40 can be upgraded in the field to the 9375 Model 60 processor through a simple card exchange. Either 9375 model can be converted to the 9377 Model 90; the conversion requires a processor cage swap, because a second rack must be added.**

**WORKSTATIONS: The 9370 supports the 3270 Information Display System and IBM's ASCII-oriented display stations. In addition, IBM PC, PS/2, and 75XX Industrial Computer microcomputers can be attached to the 9370. (Microcomputer connectivity requires the appropriate terminal emulation and microcomputer support software.)**

**The Work Station Subsystem Controller provides for local attachment of 3270-type devices, PC microcomputers, PS/2 microcomputers, and 75XX microcomputers. In addition, IBM terminal subsystem controllers such as the 3174 and 3274 provide for 3270-device and microcomputer connectivity. The IBM 3174 and 3274 connect to the 9370 through a port on the System/370 Block Multiplexer Channel, through a port on the Telecommunications Subsystem Controller, or through an IBM 37XX communication processor which attaches to the System/370 Block Multiplexer Channel or IBM 372X communication processor.**

**Besides supporting 3174, 3274, and 37XX-based terminal attachment, the Telecommunications Controller also supports the direct attachment of remote 3270-compatible workstations, ASCII devices, and IBM printer subsystems such as the 3800 and 3820.**

**The ASCII Subsystem Controller, a type of Communication Subsystem Controller, provides connectivity for ASCII devices. In addition, the 7171 ASCII Device Attachment Unit can be used for ASCII device attachment. A System/370 Block Multiplexer Channel is required to configure a 7171 on the 9370.**

**Furthermore, IBM Token-Ring and IEEE 802.3 Ethernet networks can be used to connect workstations to the 9370.**

**The primary support devices for 9370 workstations are the Work Station Subsystem Controller and the ASCII Subsystem Controller. As previously stated, the 9373 supports up to two Work Station Subsystem Controllers; the 9375 supports up to six and the 9377 supports up to 12. Up to two ASCII Subsystem Controllers can be configured on the 9373; up to four can be configured on the 9375; and 12 can be configured on the 9377.**

**IBM does not provide specific ranges for the number of simultaneously active users supported on each model of the 9370; that figure varies with the system's work load and**

# IBM 9370 Information System

of existing applications, widens the application base, and increases operational capabilities. For example, an installation would run IX/370 as a guest under VM/SP to gain access to UNIX application development tools and applications; run VSE/SP under VM/SP to meet transaction processing requirements; and, at the same time, run VM/SP itself to gain access to business professional producivity tools and office automation facilities. As another example, an installation would run OS/VS1 from the 4361 system under VM/SP until the OS/VS1 applications have been converted over to the formats needed for running under VM/SP.

IBM has reduced the level of data processing expertise needed to run a 9370 installation. The VM and VSE system offerings are bundled into packages that simplify operating environment software installation. The VM/IS version of VM/SP, for instance, includes all the functions of VM/SP, but reportedly does not require anywhere near the 44 hours of system programmer time that VM/SP requires in its nonintegrated version.

Additionally, the VM/IS and VSE/SP offerings incorporate tools which simplify system operation and maintenance. Facilities are available for reducing the amount of time required to perform problem diagnosis and service routines.

Furthermore, VSE/SP and VM/IS packages offer system interfaces that simplify system administrator, system operator, and end-user interaction with the system. These interfaces feature consistent access to system functions, menu- and prompt-driven dialogs, system-guided operations, and on-line help and referencing facilities. Such interfaces can reduce the learning times and skill levels required for system administrators, operators, and general users to manage and use the system.

As an option, customers can off-load system control programming to a remote site, thus eliminating system operations concerns. The remote system programming site performs system and application start-ups and shutdowns, system operations, performance monitoring, problem diagnosis, and corrective fixes.

The IBM-supplied customer/product support services also reduce system management complexities. For a fee, IBM will perform remote system programming for the VM/IS system; provide telephone consulting; provide remote on-line problem diagnosis and off-line analysis; apply microcode changes to the system from the remote site; and conduct pre-installation planning, installations, and post-installation support.

All these ease-of-use facilities and centralized system management features are of primary importance in the departmental processing environment, where lower overhead is a necessity.

Another advantage of the 9370 is its compatibility with System/370-based superminicomputers and mainframes.

**actual user activity levels. The company does state that the 9373 can support 20 continuously active users; 100 such users can be supported by the 9377. Assuming that some users are only sporadically active, the 9373 can support over 50 users and the 9377 over 200.**

**DISK STORAGE: The 9370 supports the 368MB 9332 and the 824MB 9335 DASD fixed disk drives through the DASD/Tape Subsystem Controller. The drives have physical capacities of 400.6MB and 855.8MB, respectively; because the 9370 processor reserves some of the disk for system use, 368MB and 824MB are the drives' respective usable capacities. The 9335 A1 Device Function Controller can support up to four 9335 B1 DASD.**

**At least one DASD/Tape Subsystem Controller must be configured on a 9370 when any I/O controller other than the System/370 Block Multiplexer Channel is used. As previously stated, the 9373 supports up to two DASD/Tape Subsystem Controllers, the 9375 supports up to four, and the 9377 supports up to 12. The configuration options on the DASD/Tape Subsystem Controller are as follows:**

- **One to four 9332-400 DASD**
- **One to four 9332-400 DASD and one 9347 magnetic tape unit**
- **One 9335 A1 and one to four 9335 B1 DASD**
- **One 9347 magnetic tape unit**

**The 9370s also support high-speed and -capacity disk drives and controllers through the System/370 Block Multiplexer Channel.**

**MAGNETIC TAPE: The 9370 supports the 9347 streaming tape drive through the DASD/Tape Subsystem Controller. Higher speed and higher capacity tape devices can be configured using the System/370 Block Multiplexer Channel.**

**PRINTERS: Printers can be attached to the 9370 through the Work Station Subsystem Controller, the Telecommunications Subsystem Controller, the System/370 Block Multiplexer Channel, ASCII Subsystem Controller, and IBM 3270 control devices.**

**OTHER: The 3737 Remote Channel-to-Channel Unit is a stand-alone control unit that allows System/370-type hosts to communicate over unlimited distances with each other via public or private T1 facilities at speeds up to 1.5M bits per second (bps). Communications between host systems is supported by the VTAM channel-to-channel program. The 3737 is transparent to the host, requiring no host modifications and allowing the hosts to communicate with each other as though they were channel-to-channel (CTC) connected. The MVS, VSE, and VM operating systems view the 3737 as a (local) channel-to-channel adapter (CTCA). The 3737 attaches to the 9370 and another System/370-type processor via a System/370-type block multiplexer channel.**

**The 9370 attachment to the IBM 3088 Multisystems Channel Communications Unit provides high-speed communications with 4300, 3080, and 3090 processors and other 9370 processors. The 3088, a stand-alone I/O controller, provides the capabilities for interconnecting up to eight processor channels.**

**The 9370 can be up to 800 feet from the 3088. The interprocessor cable attaches to the System/370 Block Multiplexer Channel and the interface on the 3088. The 3088 is compatible with CTCA's.**

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The 9370's hardware and software compatibility with the 4381, 3080, and 3090 systems makes it valuable as a departmental or distributed system. Because of the software compatibility between the 9370 and higher performance S/370-class machines, VM, MVS, VSE, and IX/370 applications can be moved to or down from the same environments on 370-based mainframes or 370-based superminicomputers.

Furthermore, the 9370 maintains hardware compatibility with the System/370-type mainframes and superminicomputers. The System/370 Block Multiplexer Channel-attached peripheral storage subsystems, workstations, printers, and specialized I/O systems; the 3270-type terminals and printers; and 37XX communication processors employed on the 9370 models can be moved over to higher performance S/370-based models, thus preserving investments in peripheral subsystems and devices.

Although the 9370 is compatible with IBM's more powerful 4381 and 30XX systems, it still lacks full compatibility with the S/36 and S/38—very significant players in the mid-range system marketplace. There is no direct software compatibility between the 9370 and S/3X systems. The problem of top-to-bottom compatibility will not begin to be solved until at least 1988, when IBM starts delivering products conforming to the company's Systems Application Architecture (SAA), which will permit applications conforming to a specific set of standards to run on any IBM system. It could take several years before fully functional, SAA-compatible facilities become generally available, and, even then, these overlay products will only help to bloat IBM's already heavy operating environments.

Although the 9370 and S/3X operating environments are incompatible, the 9370 does provide more of a bridge between the S/3X machines and the S/370-class systems than 4361, the previous entry-level S/370-based machine. S/3X users who want to move up to a S/370-class machine can now bring some of their peripherals with them, rather than start over with new storage devices and workstations in addition to new processors. For example, the 9332 and 9335 DASD devices and the 3178 display stations employed on the S/36 Model 5362 or 5360 can be carried over to the 9370 during a system migration. □

**The 3044 Fiber Optic Extender Link permits low- and medium-speed peripheral subsystem control units, switching units, and CTCAs to be positioned further "down the line" for the purpose of reducing central processing complex floor space requirements and reducing peripheral connectivity costs. With this link extender, I/O equipment such as terminals and printers can be placed further away from the host system without employing the costly communications equipment needed for connectivity to the host. Employing fiber optic cable for peripheral subsystem connectivity increases data throughput and improves communication channel reliability, availability, and integrity as compared to traditional peripheral subsystem connectivity cables and buses.**

**The 3044 Fiber Optic Extender Link consists of two units that are connected by up to 1.2 miles (or 2 km) of fiber optic cable. The 3044 Model C01 attaches the processor channel to one end of the fiber optic cable. The 3044 Model D01 connects the other end of the cable to the "remote I/O control unit".**

**The 9370 attachment to the 3814 Switching Management System permits the 9370 to share channel-attached devices with other System/370-type processors. The peripheral device sharing capabilities minimize the amount of I/O devices required for peak demand and critical device backup, reduce the impact from device failures, and minimize the complexities of data processing operation control by providing greater security of configurations.**

## MASS STORAGE

**Information on the available mass storage devices for the 9370 can be found in Chart B.**

## INPUT/OUTPUT UNITS

**For information on available input/output units, please refer to Chart C (Workstations), Chart D (Printers), and Chart E (Magnetic Tape Equipment).**

## COMMUNICATIONS CONTROL

**The 9370 employs four principal Communications Subsystems Controllers: the Telecommunications Subsystem Controller, the ASCII Subsystem Controller, the IBM Token-Ring Subsystem Controller, and the IEEE 802.3 Local Area Network Subsystem Controller. All four subsystems are based on the same communications processor card, plus one or more communications adapter cards and the appropriate microcode for the specific subsystem. As previously mentioned, the 9373 supports up to two of these controllers, the 9375 supports up to four, and the 9377 accommodates up to 12.**

**The *Telecommunications Subsystem Controller* allows attachment of local communications lines to the 9370 or allows the 9370 to be attached to public networks. The controller permits attachment of two types of adapters: the Multi-Protocol Two-Line Adapter and the Asynchronous Four-Line Adapter. The adapter configuration options for this controller are as follows:**

- **One to three Four-Line Adapters.**
- **One to three Two-Line Adapters.**
- **A combination of up to three Two-Line and Four-Line Adapters.**

**The Telecommunications Subsystem Controller supports the following types of line interfaces:**

- **EIA RS-232-C/CCITT V.24/V.28, supporting asynchronous, BSC, and SDLC protocols at line speeds from 75 bps to 19.2K bps.**
- **EIA RS-422-A/CCITT V.11, supporting asynchronous, BSC, BSC/SDLC, and SDLC protocols at line speeds from 75 bps to 64K bps.**
- **EIA RS-366/CCITT V.25, supporting asynchronous, BSC, and SDLC protocols at line speeds from 75 bps to 19.2K bps.**
- **CCITT V.35, supporting BSC and SDLC protocols at line speeds from 2.4K bps to 64K bps.**

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- CCITT X.21, supporting SDLC, HDLC, and X.25 protocols at line speeds from 600 bps to 64K bps.

The maximum number of lines supported by one Telecommunications Subsystem Controller depends on the combination of protocols and line speeds selected and the number of I/O slots available. The controller is supported by the VM/SP and VSE/SP operating environments.

The *ASCII Subsystem Controller* supports up to 16 ASCII devices operating at 50 bps to 19.2K bps in full-duplex mode either on local lines without modems or on switched and leased communications lines with modems. The controller comprises a Communications Processor and up to four Asynchronous Four-Line Adapter cards.

Three modes of operation—ASCII support, ASCII/3270 conversion, and ASCII/3270 transparent mode—are available. In ASCII mode, all attached ASCII devices appear to software as native devices; this mode is supported by the IX/370 operating system. In addition to IX/370, the Telecommunications Subsystem Controller is supported by the VM/SP and VSE/SP environments.

The ASCII Subsystem Controller's asynchronous adapter can be connected to a Rolm Computer Branch Exchange (CBX) through a Rolm DataCom Module (DCM) or Data Terminal Interface (DTI).

The *IBM Token-Ring Subsystem Controller* provides access to a 4M-bps baseband IBM Token-Ring Network compatible with the IEEE 802.5 standard for interconnecting information processing equipment. The network uses the IBM cabling system, including Type 3 (telephone twisted pair) specified media, for physical interconnection; it employs a token-ring access protocol for network traffic control. The two-card Token-Ring Subsystem Controller comprises a Communications Processor and a Token-Ring Adapter. The adapter provides both a physical link and access control to the IBM Token-Ring Network; programming support must be equivalent to the International Standards Organization's (OSI) Open Systems Interconnection (OSI) Layer 3 and above.

The IBM Token-Ring Subsystem Controller is supported by either the VM/SP or VSE operating system and the Transport Control Protocol/Internet Protocol (TCP/IP).

The *IEEE 802.3 Local Area Network (LAN) Subsystem Controller*—comprising a Communications Processor card and an IEEE 802.3 LAN Adapter card—is used for communicating with other 9370 Information Systems, other vendors' systems, and workstations using the IEEE 802.3 standard or the Ethernet LAN; it provides both a physical link and access control. This controller supports a network with a transmission speed of 10M bps using Carrier Sense Multiple Access with Collision Detection (CSMA/CD). Programming support for the LAN adapter must be equivalent to OSI Layer 3 and above.

The LAN Subsystem Controller is supported by VM/SP and TCP/IP.

The System/370 Block Multiplexer Channel, Telecommunications Subsystem Controller, and the 9370-based LAN controllers permit attachment of a range of other IBM communications devices, including the *3174 Subsystem Control Unit* and the *3274 Control Unit*; the *3299 Terminal Multiplexer*; and the *3720* and *3725 Communications Controllers*. For details on those devices, refer to DATAPRO REPORTS ON DATA COMMUNICATIONS.

## SOFTWARE

All 9370 systems run under IBM's VM/SP, VSE/SP, and IX/370 operating systems. The IX/370 is supported only under control of VM/SP. The MVS/SP operating system is supported only on the 9375 Model 60 and the 9377 Model 90; this support enables users to develop applications on a host system and transport them, without changes, to distributed workgroup locations.

*VM/Integrated System (VM/IS)* is IBM's preferred delivery vehicle for the interactive *VM/SP* operating environment in departments and end-user workgroups.

VM/IS comprises the following components:

- VM/SP. This function, for basic system control and data management, manages the real system resources of processor time, real storage, and I/O devices, making them available to all VM users at the same time. It provides an interactive computing environment for general problem solving and program development. An editor and an interpretive language are also included.

  VM/SP accommodates IBM guest operating systems, including VSE/SP, MVS/SP, other VM/SP releases, and IX/370, for purposes such as application testing and execution of applications restricted to specific environments.

- VM Batch Subsystem. This function controls background execution of user processes.

- VM Directory Maintenance. This utility provides interactive facilities that enable the system administrator to manage the VM system directory.

- VM Interactive Productivity Facility (IPF). This provides a simplified interface to the VM system and an interface that allows addition of user-written or IBM programs to the system.

- VM/IS Productivity Facility (VM/IS PF). This product provides end-user menus containing task-oriented, introductory, and navigational dialogs leading to the functions of other programs in VM/IS. VM/IS PF uses the functions of underlying products like IPF without duplicating or changing them.

- Interactive System Productivity Facility (ISPF). A dialog manager, this product controls the flow of the end-user interface provided by VM/IS. Programmers can use ISPF to produce interactive applications with menu-driven dialogs and dialog functions.

- VM File Storage Facility (FSF). This tool allows users to share data files with other VM users, store and retrieve files, send them to other users, and perform other file management functions.

- VM Real-Time Monitor (RTM). This provides performance monitoring and statistical analysis presented in realtime on any VM/IS-supported monitor.

- VM Performance Monitor Analysis Program (VM MAP). This utility provides reports and graphics on performance and use of a running VM system. VM MAP requires the general support routines contained in another integral product, PL/1 Transient Library.

# IBM 9370 Information System

- Document Composition Facility/Foreground Environment Feature (DCF/FEF). This is a facility for production of text documents. A document formatted by DCF can be printed, displayed, or used as input to other text documents.

- Graphical Data Display Manager (GDDM). This facility is a host system program for creating, showing, and storing pictures, including graphics, images, and numerics. GDDM drives displays, printers, plotters, and scanners. Another GDDM product included in VM/IS is GDDM/Graphics Presentation Function (GDDM/GPF), which provides methods for producing business and other charts.

Nine optional applications packages are available for VM/IS, providing 33 licensed programs. The packages are the following:

- Text Office Support (TXTO). This package includes IBM's Professional Office System (PROFS), which provides facilities for mail handling, appointment scheduling, and document, memo, graphics, business forms, and report preparation; IBM's DisplayWrite/370 document processing facility; and IBM's Application Support (AS), which provides facilities for business data access, data and text integration, exchange, and display management, mathematical and statistical analysis, business graphics, and business planning and modeling.

- Engineering/Scientific Problem Development Support (E/SPDS). This package includes VS Fortran language, debug, and utilities; ISPF/Program Development Facility (ISPF/PDF); Graphics Attachment Support Program (GASP); Graphical Data Query Facility (GDQF); ACRITH; and Elementary Math Library (EML).

- APL Language Support (ALS). This allows use of the APL2 language for development of mathematical and statistical applications.

- Problem-Solving Languages (PSL). This provides Basic and Pascal/VS for development of applications addressing business problems.

- Data Base Query (DBQ). This facility provides for creation and management of relational databases. It includes IBM's Structured Query Language/Data System (SQL/DS), Database Edit Facility (DBEDIT), and Query Management Facility/VM (QMF/VM).

- Intelligent Workstation Support (IWS). This product allows PC users to take advantage of VM/SP facilities, and to transfer files between the PC and the VM host. This product requires that the user obtain additional PC programs, such as PC/VM Bond, for the individual PCs.

- Networking Support (NTWK). This serves as an "operating system" for the data communications network. It is comprised of IBM's Advanced Communications Function/Virtual Telecommunications Access Method (ACF/VTAM), Remote Spooling Communications Subsystem (RSCS) Networking, VSE/Virtual Storage Access Method (VSE/VSAM), and NetView communications utility packages.

- Remote Communications Support. Comprised of Remote Spooling Communications Subsystem (RSCS) Networking, CVIEW, and PVM, this component provides computer interconnection support for sending and receiving information between sites, logging on to remote sites, and establishing teleconferencing sessions with other users. RSCS Networking controls the transfer of files, messages, and commands. PVM permits users to log on to their system from another system in the network. CVIEW permits VM/SP users to share the same interactive session.

- Communication Controller Support (COM). COM is comprised of the Advanced Communications Function/Network Control Program (ACF/NCP), ACF/System Support Program (ACF/SSP), and IBM 3725 Emulation Package (EP3725). It provides SNA networking to those customers with IBM 3725, 3270, and 3705 communications processors.

*VM/SP System Offering* is a VM package structured for installation and customization on larger 9370 systems. It consists of VM/SP and a set of optional feature program products. With only a few exceptions, all products supported by VM/IS are supported by VM/SP System Offering. However, VM/SP System Offering requires a higher level of data processing expertise than VM/IS.

Additional products available through VM/SP System Offering include the following:

- Application development systems such as Application Prototype Environment (APE), Cross System Product/Application Development (CSP/AD), CSP/Application Execution (CSP/AE), CSP/Query (CSP/Q), Interactive Instructional Presentation System (IIPS), and Development Management System/Conversational Monitor System (DMS/CMS)

- OS PL/1 and VS Cobol II compilers, debuggers, and libraries

- GDDM-Interactive Map Definition (GDDM-IMD), a tool for graphics processing

- VM Backup Management System (VMBACKUP-MS) and VM Tape Management System (VMTAPE-MS) system control support packages

- Contextual File Search/370 (CFSearch/370) data/file management tool

- Printer support packages including the Font Library Service Facility (FLSF), Overlay Generation Language (OGL), Page Printer Formatting Aids/VM (PPFA/VM), Printer Services Access Facility (PSAF), and Printer Services Facility

- Info Center/1 (IC/1) information management system

- Document Composition Facility, a text processing package

VSE/SP is a pregenerated, load-and-go operating system most desirable for departments and end-user workgroups with intensive batch and transaction processing requirements. It is IBM's primary production system for intermediate systems and the operating system base for distributed processing nodes. It replaces IBM's Small Systems Executive/VSE (SSX/VSE) as the VSE entry system for data centers and distributed environments.

VSE/SP includes task-oriented menus, including those to identify and correct on-line transaction failures; intelligent workstation support for IBM PCs and 3270 PCs; virtual address extension, providing up to three virtual address spaces for up to 40MB of virtual storage; and system start-up and remote operation control, allowing unattended operation of departmental systems.

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The VSE/SP product incorporates the following components:

- VSE/Advanced Functions (VSE/AF), for basic system control.
- ACF/VTAM and Basic Telecommunications Access Method-Extended Support (BTAM-ES), for workstation and network control. They support attachment of local and remote workstations and processors; VTAM also supports channel-to-channel attachment.
- VSE/Interactive Computing Control Facility (VSE/ICCF) and Customer Information Control System (CICS/DOS/VS) for interactive system control and transaction processing, respectively.
- VSE/Priority Output Writers, Execution Processors, and Input Readers (VSE/Power) for spooling, networking, and remote job entry control.
- VSE/VSAM and VSE/VSAM Space Management Feature, for data management; they control data storage and access to DASD, and also manage DASD space.
- Three utilities: VSE/VSAM Backup and Restore Feature; VSE/Fastcopy; and Data Interfile Transfer, Testing, and Operations Utility (Ditto).

Optional products for VSE/SP are available in the following areas:

- Business professional applications, including Distributed OfficeSupportSystem(DISOSS),DisplayWrite/370(DW/370), Personal Services/370 (PS/370), and Decision Support/VSE (DS/VSE).
- Application development, including DOS/VS Cobol, DOS PL/1, DOS/VS RPG II, and Cross System Product/Application Development (CSP/AD).
- Database management and query, including the hierarchical DBMS product Data Language/One DOS/VS (DL/1 DOS/VS), the relational SQL/DS, Query Management Facility/VSE (QMF/VSE), and DOS/VS Sort/Merge II.
- Systems networking and distributed data processing, including Distributed Systems Executive (DSX), ACF/VTAM, ACF/NCP, and Network Communications Control Facility (NCCF).

*IX/370* is IBM's implementation of AT&T's UNIX System V operating system. It is a multiuser, multitasking operating system that runs as a guest under VM/SP. IX/370 includes the Bourne Shell command language and provides virtual addressing, a hierarchical file system, file and logical record locking, full-screen file editing, and on-line reference documentation. The block size of IX/370 files is 4,096 bytes.

Another feature is multiple IX/370 system support, which allows several IX/370 subsystems to co-reside on the same processor. The subsystems operate independently of one another.

IX/370 provides the full set of UNIX programmer-productivity tools, such as the Source Code Control System (SCCS) and symbolic debugger. A full set of UNIX text processing tools is also provided. For message and file transfer, the mail and uucp (UNIX-to-UNIX copy) facilities are provided. Interactive Systems Corporation's INmail and INnet programs are provided as electronic mail facilities for communications among computers in a network.

The local/remote file transfer support facilities of IX/370 allow users to send files to and receive files from other users in a RSCS network. In particular, these facilities allow IX/370 users to receive files sent by an IBM Conversational Monitor System (CMS) user, an MVS/Time Sharing Option (MVS/TSO) user, or any other IX/370 user. Similarly, an IX/370 user can send files to any other user accessible through the RSCS network.

*MVS/SP* is used only on the 9375 Model 60 and the 9377 Model 90, primarily where operating system compatibility with a central computer is required for transporting program packages between the host and distributed systems. MVS/SP does not support fixed-block architecture DASD, such as the 9332 and 9335; it also lacks support for any of the 9370's integrated I/O controllers. All I/O devices must be attached through standard System/370 Block Multiplexer Channels and control units.

DATABASE MANAGEMENT SYSTEM: *Structured Query Language/Data System (SQL/DS)*, designed for use with VM/SP and VSE systems, is a relational DBMS with integrated query and report writing facilities. It is broadly compatible with IBM's DB2 product in MVS environments. In the VM environment, SQL/DS provides remote relational access support, allowing users on one CPU to access an SQL/DS database on another locally or remotely connected CPU. For VSE, SQL/DS provides an extract facility that enables users of IBM's DL/1 DOS VS to select portions of DL/1 DOS/VS data and copy them into SQL/DS tables.

*Data Language/1 (DL/1)* (also called DL/1 DOS/VS) is intended for the VSE environment, for applications with complex processing requirements and highly structured, fixed data relationships; it complements the relational SQL/DS product. An adjunct product, Query.DL/1, provides a simplified facility for making queries against DL/1 databases.

*Database 2 (DB2)*, for the MVS/SP environment, is intended for applications with dynamic requirements and data structures. Multiple users can concurrently access and change data within the same DB2 table; data remains consistent not only within the database, but also as it is perceived by each user. This product uses SQL for programming in either high-level language or interactive mode; the same syntax is used to define and control the system.

*Information Management System/VS Data Base Facility (IMS/VS-DB)* is a full-function database management system (DBMS) used to create an environment for complex applications like transaction processing; it runs under MVS operating systems. It is most often combined with either IMS/VS-DC or CICS/VS (see the "COMMUNICATIONS" subsection below) to achieve a complete database/data communications system. IMS/VS-DB executes as an application and interfaces between user application programs and databases.

LANGUAGES: Languages available for the VM, VSE, and MVS operating environments include VS Fortran, PL/1, Cobol, and RPG II. Available for the VM and MVS environments only are APL2, Pascal/VS, and Basic. Lisp/VM is available for VM only.

COMMUNICATIONS: IBM offers a wide range of communications products for the VM, VSE, and MVS environments. Key products are described in the following

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paragraphs; those provided as integral or optional facilities for specific operating systems are mentioned in this "SOFTWARE" section.

The 9370 participates in IBM's *Systems Network Architecture (SNA)*. The base for major communications subsystems in the VM, VSE, and MVS environments is ACF/VTAM. Together with ACF/NCP, when applicable, provides an operating system for the network. The functions of the network operating system are analogous to those of a host operating system for resource sharing and logical handling of user requests.

*ACF/VTAM* supports concurrent execution of multiple telecommunications applications and controls the sharing of telecommunications resources among the programs in one or more systems. It supports logically direct transmission of data between application programs and terminals in session and supports data transfer between two application programs residing in the same system or in distributed systems.

ACF/VTAM, working in conjunction with ACF/NCP, supports peer-to-peer communications among SNA nodes; that is, programs residing on distributed systems can communicate with one another without host application assistance.

Advanced Program-to-Program Communications (APPC) is provided by the VTAM Application Program Interface (API). The API allows S/370-type applications using LU6.2 sessions to communicate over an SNA network with APPC applications running on the following: S/370-architecture mainframes and intermediate-sized processors; IBM System/36, System/38, and Series/1 minicomputers; IBM System/88 fault-tolerant/on-line transaction processors; the IBM RT PC workstation; the IBM PC and PS/2 microcomputers; and other manufacturers' systems which support LU6.2 communications.

*ACF/NCP* resides in the IBM 372X Communication Controller and provides physical management of the communications network. It controls attached lines and terminals, performs error recovery, and routes data through the network. It communicates with the host through ACF/VTAM, or, in the case of a remote 372X, through another ACF/NCP.

The *Non-SNA Interconnection* network program allows the connection of BSC-oriented remote job entry (RJE) workstations to be connected to a 37XX communications processor. The *Network Terminal Option* allows non-SNA terminals to access ACF/VTAM-based applications.

The *X.25 NCP Packet Switching Interface (X.25 NPSI)* allows ACF/NCP users to communicate over packet-switched data networks that have interfaces complying with CCITT Recommendation X.25 (1980 and 1984). This product allows SNA host processors to communicate with either SNA or non-SNA equipment over such networks.

The *Distributed Systems Executive (DSX)*, a network program for VSE- and MVS-based host systems, helps the central site plan, schedule, and track the distribution of data and software among the nodes in an SNA network. It provides centralized support and control for resource distribution between the host and selected SNA nodes, maintains control over the maintenance of software at the remote site, allows the scheduled distribution of node software, distributes data between the host and nodes, initiates processing at the nodes and host, and provides wider security coverage.

The *VSE/Distributed Systems Node Executive (DSNX)*, a network program for VSE-based systems, provides support for the central site management of a network of distributed systems. VSE/DSNX is installed at the remote site to receive and to implement software and data objects received from the VSE- or MVS-based host which is running DSX.

Like VSE/DSNX, *VM/DSNX* provides support for the central site management of a network of distributed systems. VM/DSNX is installed at the remote site to receive and to implement software and data objects. It also provides limited function for distributing objects from the VM-based central site to distributed VM-based systems.

*NetView*, a product for VM, MVS, and VSE environments, is a network management program that provides a cohesive set of SNA host network management services. Fully compatible with IBM's SNA network management architecture, Netview performs the network management functions of NCCP, Network Logical Data Manager (NLDM), and Network Problem Determination Application (NPDA), and functions of the program offerings VTAM Node Control Application (VNCA) and Network Management Productivity Facility (NMPF).

NetView contains the following components:

- Command facility. This component provides command, messaging, and other capabilities for executing network management functions. The facility supports single-domain, multiple-domain, or interconnected SNA networks which allow system operations to be centralized at a single location or distributed at different points.
- Session monitor. This component gathers information on session activities for performance evaluation, system tuning, and system accounting.
- Hardware monitor. This component collects and displays alerts, events, and statistical data to assist in identifying failing resources in the network, determine probable cause, and recommend action for specific problems related to alerts and events.
- Status monitor. This component allows the operator to view the status of all domain resources.
- On-line help facility. This component provides operator information without requiring the use of the operation reference library.
- Help Desk Facility. This component is an on-line guide that provides problem diagnosis and network operation techniques.
- Network Log and Data Set Browse. This facility stores network messages and permits the operator to review the messages. Through user specification, messages being flagged by an "important message indicator" may be color coded or highlighted to designate severity, type, or source.

The *NCCF*, which operates as an application program under ACF/VTAM, provides the network operator with functions for controlling a communications network. It also provides services for IBM or user-written network management programs.

The *NLDM* and the *NPDA* are NCCF applications which collect session-related information that is useful for identifying and isolating network problems.

The *Network Performance Monitor (NPM)* aids network support personnel in managing the performance and growth of VTAM-based networks. The *Network Design and Analysis (NETDA)* is an interactive program product designed to

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assist customers in the definition, performance analysis, and optimization of SNA networks.

The *Routing Table Generator (RTG)* assists users in defining networks and routing tables. The *NetView Network Definer*, a NetView application, assists users in building and maintaining definition tables for VM-based SNA networks. The *Teleprocessing Network Simulator (TPNS)* tests on-line application programs, communications access methods, control programs, subsystems, and networks.

*VM/Conversational Monitor System (VM/CMS)*, in conjunction with the VM operating system, provides an interactive computing system; it can also be used as a base for interactive applications. It provides full timesharing in either a distributed system or a centralized environment with a dedicated processor, or in conjunction with other operating systems.

The *Customer Information Control System (CICS)* is a general-purpose data communications monitor for terminal-oriented transaction processing applications in VSE and MVS environments. It interfaces among user-written application programs, transaction processing access methods (such as ACF/VTAM), and database managers (such as DB2 in MVS). The user can generate a CICS/VS system configuration applicable to specific needs and define the environment in which the system is to execute.

*IMS/VS-Data Communications (IMS/VS-DC)* is a data communications management system that supports multiple terminal-oriented applications using a common database in the MVS environment. Among other features, it provides support for SNA and SDLC terminals, and allows simplified migration to SNA. IMS/VS-DC is generally used in conjunction with IMS/VS-DB (see the "DATABASE MANAGEMENT SYSTEM" subsection above).

UTILITIES: Utility and special functions for the 9370 systems are handled both through intrinsic operating system capabilities and through specialized software products supplied with the operating systems. Those adjunct facilities are listed in the "Operating System" subsection above.

OFFICE AUTOMATION: *Professional Office System (PROFS)*, for the VM/SP environment, provides distribution services, such as document transfer; library services, such as storage and retrieval of notes, documents, and statistics; personal services, such as calendaring and appointment scheduling; final-form and revisable-form document interchange with DISOSS users; and an integrated interface to DisplayWrite/370 as an additional document preparation facility.

*Distributed Office Support System (DISOSS)* runs under MVS or VSE in IBM's CICS environment. It allows users to exchange text, data, and images through electronic mail and central filing. A DISOSS-PROFS bridge supports the exchange of both final-form and revisable-form documents with VM-based systems. DISOSS provides distribution and library services, personal services, and an Application Program Interface (API) that interfaces DISOSS and user-written CICS applications. Together with DISOSS, *Personal Services/370 (PS/370)* provides office system functions on a 3270, 3270-PC, 3270-PC AT, or 3270-PC AT/G or /GX display termninal. Operating as a CICS/VS application, PS/370 supports DisplayWrite/370.

*DisplayWrite/370*, operating in the MVS and VSE environments, provides a full-screen text editor/formatter supporting the 3270 Information Display System and the 3270-PC display terminal.

APPLICATIONS: A range of proprietary commercial, office, engineering/scientific, and industrial applications is available for the VSE, VM, and MVS operating environments. The 9370 supports any S/370 applications program, provided that it is not time dependent; does not require the presence of system facilities (such as storage capacity, I/O equipment, or optional features) when the facilities are not included in the configuration; and does not require the absence of system facilities when the facilities are included in the configuration. (For example, the program must not depend on interruptions caused by invalid operation codes.)

With the announcement of the 9370, IBM began selling the *SolutionPac* series of software offerings. SolutionPacs are predefined software packages comprising predetermined combinations of the following elements:

- Integrated, pregenerated system and application software.
- Snap-on application software for standard operating environments.
- Customized or fixed pricing for the following services:
  —Application integration and customization services.
  —Design, installation, and education services.
  —Maintenance services, including a single point of contact for the total offering.
- Application competency center support.
- Customer support telephone service.

## PRICING

POLICY: The 9370 systems are available for sale or monthly rental. During the first six months following installation, 50 percent of the monthly rental charges may be applied as a credit toward the purchase of the machine, not to exceed 50 percent of the purchase price applicable at the time of purchase. Volume purchasing is available under the Volume Procurement Amendment (VPA) to Agreement for Purchase of IBM Machines. Term leases and installment payment plans are available through IBM Credit Corporation.

Discounts are available for purchasers aggregating required quantities of System/36, System/38, 9370, and 4300 processors.

A 25 percent educational allowance is available to qualifying institutions in accordance with IBM's Educational Allowance Amendment. The educational allowance may not be added to any other discount or allowance.

VM, VSE, and cross-system licensed software products are subject either to a onetime charge or to a monthly license charge. The one-time charge varies according to the processor group to which the target machine belongs. IBM has defined four processor groups—10, 20, 30, and 40—for 370-based machines; 9373 Model 20 and 9375 Model 40 belong to Processor Group 10, while 9375 Model 60 and 9377 Model 90 belong to Processor Group 20. Graduated group-to-group and version-to-version upgrade charges also apply. Volume discounts are available for onetime-charge products, starting with a quantity of three.

SUPPORT: The 9370 systems are covered by a one-year warranty, and are eligible for IBM On-Site Repair. Service is provided by IBM's National Service Division.

The 9370 processors are designated customer setup (CSU) equipment. Processors and rack-mountable devices or fea-

# IBM 9370 Information System

tures ordered with the IBM 9309 Rack Enclosure are installed in the rack enclosure at the factory. The customer is responsible for determining system configuration requirements, unpacking the processor or the rack assembly, positioning the processor or the rack enclosure in the prescribed location, setting up stabilizing hardware, routing power and signal cables, and performing a device operational checkout.

Step-by-step instructions lead the customer through setup of the processor console and rack-mounted units, as well as through connection to external units and communications facilities. Some system elements, such as S/370 channel-attached I/O devices, require installation by IBM service personnel.

IBM 9370 systems are in IBM's maintenance plan group D. The minimum period of maintenance service is nine consecutive hours between 7 a.m. and 6 p.m., Monday through Friday. Charges for maintenance coverage outside this period are based upon percentages of the minimum monthly maintenance charge (MMC) added to the MMC.

IBM also has a Corporate Service Amendment to the IBM Maintenance Agreement providing discounts on service for qualifying systems and network customers.

For users without a maintenance contract or requiring maintenance beyond contracted hours, the 9370 comes under IBM Hourly Service Rate Classification 2. The per-call charge during regular hours is $158 per hour; outside regular hours, the charge is $180 per hour.

IBM's Customer Assistance Group can be contacted to help determine and resolve system problems. This group provides step-by-step guidance through a problem determination activity requiring trained personnel to interpret results.

The SDLC communications adapter in the 9370 processor console allows attachment of an external modem to provide data link communications with a remote IBM service system. Remote IBM service personnel can perform on-line diagnosis of the system; logout data stored on the processor console can be transferred and saved at the remote IBM support site for later off-line analysis. IBM support personnel can also apply microcode corrections to the system from the remote site.

TRAINING: IBM offers a range of technically and conceptually oriented training programs covering a variety of subjects, from large-system operating environments to information systems use and management. Educational methods include classroom instruction, self-study, program offerings (computer-based training products running on the 9370 and other systems), and technical update videotapes. Courses are usually given at IBM Education Centers nationwide; some are held at IBM branch offices and, by special arrangement, at user sites.

IBM offers a range of systems, applications, and operations courses for the VSE/SP, MVS, and VM environments; courses on communications systems, database management systems, and distributed processing, among other subjects, are also offered.

TYPICAL CONFIGURATONS: The following are small, medium, and large 9370 system configurations. More detailed pricing of hardware components and available software is included in the price list that follows.

9373 Model 20:

| | |
|---|---|
| 9373 Model 20 CPU with 4MB of main memory | $ 31,000 |
| 4MB of additional memory | 10,000 |
| 9309 Rack Model 2 | 3,000 |
| Two DASD/Tape Subsystem Controllers | 6,000 |
| 9335 A1 Device Function Controller | 8,500 |
| 9335 B1 824MB DASD fixed disk drive | 21,250 |
| 9347 1600-bpi streaming tape drive | 7,900 |
| Work Station Subsystem Controller | 4,200 |
| Three 3299 terminal multiplexers | 2,385 |
| Eight 3179 Model G color display stations | 22,360 |
| 16 3191 Model A10 monochrome display stations | 20,720 |
| 4234 Model 1 410-lpm dot band printer | 8,800 |
| VM/IS Base (Release 5) | 28,200 |
| TOTAL PURCHASE PRICE: | $174,315 |

9375 Model 40:

| | |
|---|---|
| 9375 Model 40 CPU with 8MB of main memory | $ 65,000 |
| 8MB of additional memory | 20,000 |
| Two 9309 Racks Model 2 | 6,000 |
| Two DASD/Tape Subsystem Controllers | 6,000 |
| 9335 A1 Device Function Controller | 8,500 |
| Three 9335 B1 824MB DASD fixed disk drives | 63,750 |
| 9347 1600-bpi streaming tape drive | 7,900 |
| Two Work Station Subsystem Controllers | 8,400 |
| Six 3299 terminal multiplexers | 4,770 |
| 16 3179 Model G color display stations | 44,720 |
| 16 3191 Model A10 monochrome display stations | 20,720 |
| 16 3270 PC Model 5371 | 96,800 |
| 4245 Model D20 2000-lpm band printer | 35,000 |
| VM/IS Base (Release 5) | 28,200 |
| TOTAL PURCHASE PRICE: | $415,760 |

9377 Model 90:

| | |
|---|---|
| 9377 Model 90 CPU with 8MB of main memory | $ 190,000 |
| 8MB of additional memory | 20,000 |
| Two 9309 Rack Model 2 | 6,000 |
| I/O card unit adapter (#5000) | 4,200 |
| Two card units (#5010) | 15,400 |
| System/370 Block Multiplexer Channel | 6,000 |
| 3880 Model 3 storage controller | 60,270 |
| 3380 Model AE4 5.04GB DASD fixed disk drive | 122,480 |
| 3480 Model A22 tape control unit | 65,430 |
| 3480 Model B22 cartridge tape drive | 43,120 |
| Four Work Station Subsystem Controllers | 16,800 |
| 16 3299 terminal multiplexers | 12,720 |
| 48 3179 Model G color display stations | 134,160 |
| 48 3191 Model A10 monochrome display stations | 62,160 |
| 32 3270 PC Model 5371 | 193,600 |
| 3820 20-ppm laser printer | 28,350 |
| 4248 Model 1 3600-lpm band printer | 75,000 |
| VM/SP System Offering | 7,740 |
| TOTAL PURCHASE PRICE: | $1,063,430 |

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## EQUIPMENT PRICES

| | | Purchase Price ($) | Monthly Maint. ($) | Monthly Rental Charge* ($) | Monthly 2-Year Lease Charge ($)* |
|---|---|---|---|---|---|
| **9370 PROCESSORS** | | | | | |
| 9373-020 | Processor with 4MB of main memory | 31,000 | 225 | 3,100 | NA |
| 9375-040 | Processor with 8MB of main memory | 65,000 | 280 | 6,500 | NA |
| 9375-060 | Processor with 8MB of main memory | 93,000 | 350 | 9,300 | NA |
| 9377-090 | Processor with 8MB of main memory | 190,000 | 550 | 19,000 | NA |
| **CPU OPTIONS** | | | | | |
| 4000 | Automated Power Controls | 800 | NA | 80 | NA |
| **MEMORY OPTIONS** | | | | | |
| 4002 | 4MB Memory Addition for 9373 Processor | 10,000 | NA | 1,000 | NA |
| 4008 | 8MB Memory Addition for 9373 or 9375 Processor | 20,000 | NA | 2,000 | NA |
| 4108 | 8MB Memory Addition for 9377 Processor | 20,000 | NA | 2,000 | NA |
| **I/O OPTIONS** | | | | | |
| 5000 | I/O Card Unit Adapter | 4,200 | NA | 420 | NA |
| 5010 | I/O Card Unit | 7,700 | NA | 770 | NA |
| 5020 | I/O Card Unit | 11,300 | NA | 1,130 | NA |
| 6010 | 9370 DASD/Tape Subsystem Controller | 3,000 | NA | 300 | NA |
| 6001 | Channel Power Control | 1,600 | NA | 160 | NA |
| 6003 | System/370 Block Multiplexer Channel | 6,000 | NA | 600 | NA |
| 6020 | 9370 Work Station Subsystem Controller | 4,200 | NA | 420 | NA |
| **COMMUNICATIONS/NETWORKING OPTIONS** | | | | | |
| 6030 | Telecommunications Subsystem Controller | 2,400 | NA | 240 | NA |
| 6031 | Multi-Protocol Adapter for Telecommunications Subsystem Controller | 1,200 | NA | 120 | NA |
| 6032 | Asynchronous Adapter for Telecommunications Subsystem Controller | 825 | NA | 83 | NA |
| 6034 | IBM Token-Ring Adapter | 1,950 | NA | 195 | NA |
| 6035 | IEEE 802.3 Adapter | 2,700 | NA | 270 | NA |
| 3299 | Terminal Multiplexer | 795 | NA | NA | NA |
| 3720 | Communications Controller (a front-end communications processor) | | | | |
| | Model 1: Local Base | 36,500 | 2,605 | 2,090 | NA |
| | Model 2: Remote Base | 26,000 | 1,855 | 1,705 | NA |
| | Model 11: Local Base & TR | 42,500 | 3,305 | 2,135 | NA |
| | Model 12 | 33,000 | 2,285 | 1,750 | NA |
| 3721 | Expansion Unit | | | | |
| | Model 1 | 16,00 | NA | 1,145 | NA |
| | Model 2 | 22,500 | NA | 1,605 | NA |
| 3275 | Communications Controller (a front-end communications processor) | | | | |
| | Model 1 | 75,000 | **2,795 | 4,020 | NA |
| | Model 2 | 60,500 | **2,495 | 3,030 | NA |
| 3726 | Communications Control Console | 32,000 | 42 | 1,710 | 524 |
| 3227 | Operator Console | 2,390 | 27 | 196 | 336 |
| **HARDWARE OPTIONS** | | | | | |
| 9309 | Rack Enclosure | | | | |
| | Model 1; 1.0 Meter | 2,500 | 4 | 250 | NA |
| | Model 2; 1.6 Meter | 3,000 | 4 | 300 | NA |
| | 120V Power Supply for Model 1 | NC | NC | NC | NC |
| **MASS STORAGE** | | | | | |
| 3370 | Direct Access Storage Device | | | | |
| | Model A1; Single Disk Drive; 571.3MB | 35,480 | 173 | 1,851 | 1,575 |
| | Model B1; Add-on Single Disk Drive for attachment to Model A1 | 26,600 | 129 | 1,387 | 1,180 |
| | Model A12; 729.8MB; contains logic and power for up to three Model B2 units | 35,480 | 139 | 2,405 | NA |
| | Model B12; connects to a 3370 Model A2 | 26,600 | 105 | 1,800 | NA |
| | 8150 String Switch for 3370 A1 and A2; 2-year lease price applies to A1 string switch only | 3,830 | 2 | 181 | 154 |

**Rental/lease prices include equipment maintenance.*
***Annual maintenance fee.*
*NA—Not applicable.*
*NC—No charge.*

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| | | Purchase Price ($) | Monthly Maint. ($) | Monthly Rental Charge* ($) | Monthly 2-Year Lease Charge ($)* |
|---|---|---|---|---|---|
| 3375 | Direct Access Storage; 819.7MB per drive: | | | | |
| | Model A1; contains logic and power for up to three Model B1 units | 24,730 | 144 | 1,851 | 1,575 |
| | Model B1; connects to a 3375 Model A1 | 18,700 | 109 | 1,486 | 1,265 |
| | Model D1; provides dual controller function in a 3375 string; requires one Model A1 and two Model B1s | 23,590 | 133 | 1,763 | 1,500 |
| | 4951 Model D1 Attachment for Model A1 | 2,590 | 6 | 102 | 87 |
| | 4952 Model D1 Attachment for Model B1 | NC | NC | NC | NC |
| | 8150 String Switch Feature for 3375 A1 | 3,795 | 2 | 181 | 154 |
| 3380 | Direct Access Storage; 2.52 billion bytes per unit: | | | | |
| | Model AD4; 2.52GB Extended Capability drive; attaches to 3880 Model 3 or 23 storage directors | 88,780 | 295 | 5,105 | NA |
| | Model AE4; 5.04GB Extended Capability drive; attaches to 3880 Model 3 or 23 storage directors | 124,480 | 295 | 7,590 | NA |
| | Model BD4; 2.52GB Extended Capability drive; can be attached to AD4, AE4, BE4, or another BD4 | 64,440 | 215 | 3,715 | NA |
| | Model BE4; 5.04GB Extended Capability drive; can be attached to AD4, AE4, BD4, or another BE4 | 98,140 | 215 | 6,190 | NA |
| 3880 | Storage Control; includes two storage directors: | | | | |
| | Model 1; each storage director can attach up to four 3350 A2/A2F, 3370 A1, or 3375 A1 or D1 in any combination | 60,270 | 176 | 4,124 | 3,510 |
| | Model 2; provides one storage director for 3350, A2/A2F, 3370 A1, or 3375 storage and one for 3380 storage | 60,270 | 176 | 4,124 | 3,510 |
| | Model 3; provides two storage directors for 3380 storage | 60,270 | 176 | 4,124 | 3,510 |
| | Model 4; provides one storage director which can attach up to four 3375 Model A1s | 30,000 | 83 | 2,370 | NA |
| | Model E21; same as D21, but with 16 megabytes | 165,400 | 600 | 11,300 | NA |
| | Model G21; same as D21, but with 32 megabytes | 237,400 | 650 | 15,970 | NA |
| | Model H21; same as D21, but with 48 megabytes | 309,400 | 700 | 20,640 | NA |
| | Model J21; same as D21, but with 64 megabytes | 381,400 | 750 | 25,310 | NA |
| | Model D23; includes two cache storage directors for 3380; 8 megabytes | 129,400 | 575 | 8,965 | NA |
| | Model E23; same as D23, but 16 megabytes | 165,400 | 600 | 11,300 | NA |
| | Model G23; same as D23, but with 32 megabytes | 237,400 | 650 | 15,970 | NA |
| | Model H23; same as D23, but with 48 megabytes | 309,400 | 700 | 20,640 | NA |
| | Model J23; same as D23, but with 64 megabytes | 381,400 | 750 | 25,310 | NA |
| | 6148 Remote Switch Attachment | NC | NC | NC | NC |
| | 6149 Remote Switch Attachment, additional | NC | NC | NC | NC |
| | 6150 Remote Switch Attachment for Eight-Channel Switch | NC | NC | NC | NC |
| | 6550 Speed Matching Buffer for 3380 | 9,705 | 40 | 597 | 508 |
| | 6560 Speed Matching Buffer | 11,420 | 40 | 518 | 441 |
| | 8160 Two-channel switch | 3,850 | 5 | 241 | NA |
| | 8170 Two-Channel Switch Pair | 6,225 | 11 | 421 | 358 |
| | 8171 Two-Channel Switch Pair, additional | 16,610 | 39 | 1,136 | 967 |
| | 8172 Eight-Channel Switch | 22,850 | 54 | 1,563 | 1,330 |
| 9332 | 368MB Rack Mounted DASD | 14,000 | 27 | 1400 | NA |
| 9335 | 824MB DASD | 21,250 | 50 | 2,125 | NA |
| **MAGNETIC TAPE EQUIPMENT** | | | | | |
| 3420 | Magnetic Tape Units: | | | | |
| | Model 3; 120,000 bytes/sec. at 1600 bpi; 75 ips | 13,120 | 248 | 768 | 645 |
| | Model 4; 470,000 bytes/sec. at 6250 bpi; 75 ips | 16,870 | 248 | 1,075 | 903 |
| | Model 5; 200,000 bytes/sec. at 1600 bpi; 125 ips | 17,600 | 272 | 1,035 | 869 |
| | Model 6; 780,000 bytes/sec. at 6250 bpi; 125 ips | 19,710 | 272 | 1,235 | 1,037 |
| | Model 7; 320,000 bytes/sec. at 1600 bpi; 200 ips | 19,710 | 326 | 1,225 | 1,029 |
| | Model 8; 1250 bytes/sec. at 6250 bpi; 200 ips | 21,860 | 401 | 1,465 | 1,231 |
| | 6420 6250 bpi Density Feature (for 3420 Models 4, 6, and 8) | 1,760 | 68 | 95 | 80 |
| | 6425 6250/1600 bpi Density Feature (for 3420 Models 4, 6, and 8) | 2,425 | 90 | 138 | 116 |
| | 6631 Single Density Feature (for Models 3, 5, and 7) | 3,155 | 68 | 162 | 136 |
| | 3550 Dual Density Feature (for Models 3, 5, and 7) | 4,075 | 113 | 211 | 177 |
| | 6407 7-Track Feature (for Models 3, 5, and 7) | 3,155 | 98 | 162 | 136 |
| 3422 | Magnetic Tape Unit: | | | | |
| | A1 drive and control unit | 40,480 | 440 | 2,460 | NA |
| | B1 magnetic tape unit | 19,690 | 181 | 1,165 | NA |

**Rental/lease prices include equipment maintenance.*
***Annual maintenance fee.*
*NA—Not applicable.*
*NC—No charge.*

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| | | Purchase Price ($) | Monthly Maint. ($) | Monthly Rental Charge* ($) | Monthly 2-Year Lease Charge ($)* |
|---|---|---|---|---|---|
| | 3020 Data Streaming Feature | 1,730 | 32 | 111 | NA |
| | 3005 Two Channel Switch | 3,575 | 4 | 167 | NA |
| | 3010 Two Control Unit Switch (Communicator), primary | 8,085 | 19 | 387 | NA |
| | 3015 Same as 3010, but secondary | 5,775 | 19 | 282 | NA |
| 3430 | Magnetic Tape Subsystem: | | | | |
| | Model A1; Tape Unit and Control | 33,400 | 251 | 2,575 | NA |
| | Model B1; Tape Unit only | 16,900 | 176 | 1,365 | NA |
| | 4991 Multiple Drive Attachment | 600 | 5 | 42 | NA |
| 3480 | Magnetic Tape Subsystem: | | | | |
| | Model A22 Control Unit | 65,430 | 423 | 4,605 | NA |
| | Model B22 Magnetic Tape Unit | 43,120 | 264 | 3,015 | NA |
| | 1511 First Channel Attachment | 5,785 | 21 | 357 | NA |
| | 1512 Second Channel Attachment | 5,785 | 21 | 357 | NA |
| | 1513 Third Channel Attachment | 5,785 | 21 | 357 | NA |
| 3803 | Tape Controller: | | | | |
| | Model 1; for 3420 Models 3, 5, 7 | 22,740 | 158 | 1,335 | 1,121 |
| | Model 2; for 3420 Models 3 through 8 drives | 30,300 | 218 | 1,945 | 1,634 |
| | 5310 9-Track NRZI Feature (permits connection of 800-bpi drives to 3803-2) | 3,385 | 2 | 170 | 143 |
| | 6320 7-Track NRZI Feature (permits connection of 800-bpi drives to 3803-2; 5310 is prerequisite) | 1,665 | 2 | 85 | 71 |
| | Multiple Tape Control Switches (for switching up to sixteen 3420 tape drives among up to four 3803 control units): | | | | |
| | 1792 for 2 Tape Controls | 6,740 | 14 | 354 | 297 |
| | 1793 for 3 Tape Controls | 8,600 | 23 | 459 | 385 |
| | 1794 for 4 Tape Controls | 10,110 | 23 | 537 | 451 |
| | 6148 Remote Switch Attachment | 1,000 | NA | 51 | 43 |
| | 8100 Two-Channel Switch | 5,060 | 7 | 262 | 220 |
| 9347 | Magnetic Tape Unit-40,00 bytes/sec. at 100 ips; 1600 bpi or 160,000 bytes/sec at 25 ips; 1600 bpi. | 7,900 | 78 | 790 | NA |
| | 6010 DASD/Tape Controller | 3,000 | NA | 300 | NA |
| **PRINTERS** | | | | | |
| 3262 | Line Printer: | | | | |
| | Model 1; 650 lpm | 15,040 | 203 | 806 | 686 |
| | Model 3; 650 lpm (3274) | 15,040 | 203 | 806 | 686 |
| | Model 11; 325 lpm | 12,620 | 148 | 592 | 504 |
| | Model 13; 325 lpm (3274) | 12,620 | 148 | 592 | 504 |
| 3268 | Printer | | | | |
| | Model 2 | 7,500 | 76 | 498 | 424 |
| | Model 2C | 8,990 | 102 | 677 | NA |
| 3287 | Serial Printer: | | | | |
| | Model 1; 80 cps | 4,830 | 41 | 348 | 296 |
| | Model 2; 120 cps | 5,150 | 52 | 426 | 362 |
| | Model 1C; 4 colors; 80 cps | 5,210 | 46 | 431 | 367 |
| | Model 2C; 4 colors; 120 cps | 5,530 | 57 | 506 | 431 |
| | 1120 APL/Text | 165 | 1 | NA | NA |
| | 3610 Extended Character Set Adapter | 429 | 3 | NA | NA |
| | 3880 Extended Print Buffer | 198 | 1 | NA | NA |
| | 4110 Friction Feed Paper Handling | 151 | 1 | NA | NA |
| | 8330 3271/3272 Attachment for Models 1 and 2 | 860 | 3 | NA | NA |
| | 8331 3274/3276 Attachment for Models 1 and 2 | 165 | 1 | NA | NA |
| | 8700 Variable-Width Forms Tractor | 151 | 1 | NA | NA |
| 3812 | Nonimpact tabletop page printer Model 1 | 8235 | 126 | NA | NA |
| | 3060 bisync communication feature for VM attachment | 250 | NA | NA | NA |

**Rental/lease prices include equipment maintenance.*
***Annual maintenance fee.*
*NA—Not applicable.*
*NC—No charge.*

# IBM 9370 Information System

| | | Purchase Price ($) | Monthly Maint. ($) | Monthly Rental Charge* ($) | Monthly 2-Year Lease Charge ($)* |
|---|---|---|---|---|---|
| 3820 | Laser page printer | | | | |
| | Model 1 | 28,350 | 310 | 1,845 | NA |
| | 3005 pattern storage memory 256KB | 1,050 | 10 | 61 | NA |
| | 3010 pattern storage memory 512KB | 1,700 | 20 | 102 | NA |
| | 3020 pattern storage memory 1024KB | 3,000 | 40 | 184 | NA |
| | 3025 pattern storage memory 2048KB | 6,000 | 80 | 368 | NA |
| | 3030 pattern storage memory 3072KB | 9,000 | 120 | 552 | NA |
| | 3035 control storage memory 128KB | 750 | 10 | 46 | NA |
| | 3055 System/370 channel interface attachment | 2,600 | 40 | 164 | NA |
| 4224 | Printer | | | | |
| | Model 1C2 | 6,700 | 50 | NA | NA |
| | Model 1E2 | 6,500 | 45 | NA | NA |
| | Model 101 | 4,200 | 30 | NA | NA |
| | Model 102 | 6,000 | 40 | NA | NA |
| | 2C2-400 cps max.; expanded storage and color | 6,700 | 50 | NA | NA |
| | 2E2-400 cps max.; expanded storage | 6,500 | 45 | NA | NA |
| | 201-200 cps maximum | 4,200 | 30 | NA | NA |
| | 202-400 cps maximum | 6,000 | 40 | NA | NA |
| | 3C2-400 cps Color Printer | 6,700 | 50 | NA | NA |
| | 301-200 cps Printer | 4,200 | 30 | NA | NA |
| | 302-400 cps Printer | 6,000 | 40 | NA | NA |
| 4234 | Dot Band Printer | | | | |
| | Model 1 | 8,800 | 85 | NA | NA |
| 4245 | Band Printer | | | | |
| | Model 12; 1200 lpm | 31,000 | 250 | 2,050 | NA |
| | Model D12; 1200 lpm | 31,000 | 250 | 2,050 | NA |
| | Model 20; 2000 lpm | 35,000 | 400 | 2,340 | NA |
| | Model D20; 2000 lpm | 35,000 | 400 | 2,340 | NA |
| 4248 | Printer, Model 2; 2200/3200/4000 lpm; 132 print positions | 75,000 | 800 | 6,205 | NA |
| | 3751 Additional 36 Print Positions (plant installation) | 10,000 | 110 | 615 | NA |
| | 3753 Additional 36 Print Positions (field installation) | 15,000 | 110 | 615 | NA |
| 4250 | Nonimpact Printer, Model 1; 600 by 600 dots per square inch | 21,000 | 190 | 1,520 | NA |
| 5210 | Printer | | | | |
| | Model G1 | 5,420 | 63 | NA | NA |
| | Model G2 | 5,835 | 69 | NA | NA |

## WORKSTATIONS/TERMINALS

| | | | | | |
|---|---|---|---|---|---|
| 3178 | Monochrome Display Station: | | | | |
| | Model C10; 75-key keyboard | 1,040 | NA | NA | NA |
| | Model C20;87-key keyboard | 1,095 | NA | NA | NA |
| | Model C30; 87-key keyboard | 1,095 | NA | NA | NA |
| | Model C40 | 1,095 | NA | NA | NA |
| 3179 | Color Graphics Display Station | | | | |
| | Model G1 | 2,795 | NA | NA | NA |
| | Model G2 | 2,795 | NA | NA | NA |
| 3191 | Monochrome Display Station | | | | |
| | Model A10; 122-key keyboard, green display | 1,295 | NA | NA | NA |
| | Model A20; 102-key keyboard, green display | 1,295 | NA | NA | NA |
| | Model A30; 104-key keyboard, green display | 1,295 | NA | NA | NA |
| | Model B10; 122-key keyboard, amber-gold display | 1,295 | NA | NA | NA |
| | Model B20; 102-key keyboard, amber-gold display | 1,295 | NA | NA | NA |
| | Model B30; 104-key keyboard, amber-gold display | 1,295 | NA | NA | NA |
| 3192 | Color Display Station | | | | |
| | Model C10; 122-key keyboard | 1,895 | NA | NA | NA |
| | Model CD0; same as Model C10, except 3-year warranty | 2,045 | NA | NA | NA |
| | Model C20; 102-key keyboard | 1,895 | NA | NA | NA |
| | Model CE0; same as Model C20, except 3-year warranty | 2,045 | NA | NA | NA |
| | Model C30; 104-key keyboard | 1,895 | NA | NA | NA |

**Rental/lease prices include equipment maintenance.*
***Annual maintenance fee.*
*NA—Not applicable.*
*NC—No charge.*

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| | | Purchase Price ($) | Monthly Maint. ($) | Monthly Rental Charge* ($) | Monthly 2-Year Lease Charge ($)* |
|---|---|---|---|---|---|
| | Model CF0; same as C30, except 3-year warranty | 2,045 | NA | NA | NA |
| | Model D10; 122-key keyboard | 1,795 | NA | NA | NA |
| | Model DD0; same as D10, except 3-year warranty | 1,895 | NA | NA | NA |
| | Model D20; 102-key keyboard | 1,795 | NA | NA | NA |
| | Model DE0; same as D20, except 3-year warranty | 1,895 | NA | NA | NA |
| | Model D30; 104-key keyboard | 1,795 | NA | NA | NA |
| | Model DF0; same as D30, except 3-year warranty | 1,895 | NA | NA | NA |
| | Model G10; 122-key keyboard | 2,795 | NA | NA | NA |
| | Model GD0; same as G10, except 3-year warranty | 2,995 | NA | NA | NA |
| | Model G20; 122-key typewriter or APL2 keyboard | 2,795 | NA | NA | NA |
| | Model GE0; same as G20, except 3-year warranty | 2,995 | NA | NA | NA |
| | Model G30; 104-key keyboard | 2,795 | NA | NA | NA |
| | Model GF0; same as G30, except 3-year warranty | 2,995 | NA | NA | NA |
| | Model G40; 104-key typewriter or APL2 keyboard | 2,795 | NA | NA | NA |
| | Model GG0; same as G40, except 3-year warranty | 2,995 | NA | NA | NA |
| 3193 | Monochrome Display Station | | | | |
| | Model 1; 122-key keyboard | 2,495 | NA | NA | NA |
| | Model 2; 102-key keyboard | 2,495 | NA | NA | NA |
| 3194 | Color Display Station | | | | |
| | Model H20; 102-key keyboard | 2,895 | NA | NA | NA |
| | Model H50; 122-key keyboard | 2,895 | NA | NA | NA |
| 3278 | Monochrome Display Station | | | | |
| | Model 2 | 1,572 | 10 | 109 | 93 |
| | Model 3 | 1,716 | 11 | 133 | 113 |
| | Model 4 | 1,804 | 12 | 136 | 116 |
| | Model 5 | 2,060 | 13 | 160 | 136 |
| 3290 | Information Panel | | | | |
| | Model 220 | 6500 | **288 | NA | NA |
| | Model 230 | 6500 | **288 | NA | NA |
| | Model T30 | 9300 | **360 | NA | NA |
| | 3210-Display Panel | 3600 | NA | 184 | NA |
| | 4370-Data/Typewriter Keyboard | 440 | NA | 24 | NA |
| | 4731-APL Typewriter | 440 | NA | 24 | NA |
| | 4830-Numeric Keypad | 250 | NA | 12 | NA |
| | 4831-Program Function Keypad | 250 | NA | 12 | NA |

**Rental/lease prices include equipment maintenance.*
***Annual maintenance fee.*
*NA—Not applicable.*
*NC—No charge.*

## SOFTWARE PRICES

| | | Initial Charge | | Monthly Charge | | |
|---|---|---|---|---|---|---|
| | | Basic License Charge ($) | DSLO License Charge ($) | Basic License Charge ($) | DSLO Charge ($) | Licensed Program Support Charge ($) |
| Onetime charges are based on the processor group to which the system belongs. The 9373 Model 20 and the 9375 Model 40 belong to Processor Group 10. The 9375 Model 60 and the 9377 Model 90 belong to Processor Group 20. | | | | | | |
| 5664-167 | VM/SP | | | | | |
| | Group 10 | 7,740 | 5,805 | 500 | 375 | |
| | Group 20 | 13,540 | 10,155 | 500 | 375 | |
| | Upgrade-Group 10 to Group 20 | 5,800 | 4,350 | NA | NA | NA |
| 5664-280 | ACF/VTAM V3 (VM/SP) | | | | | |
| | Group 10 | 11,235 | 19,660 | 1,175 | 880 | 247 |
| | Group 20 | 19,60 | 14,725 | 1,175 | 880 | 247 |
| | Upgrade-Group 10 to Group 20 | 8,425 | 6,310 | NA | NA | NA |
| 5664-283 | VM/IS PF | | | | | |
| | Group 10 | 1,140 | 1,025 | 107 | NA | 16 |
| | Group 20 | 2,000 | 1,800 | 107 | NA | 16 |
| | Upgrade-Group 10 to Group 20 | 860 | 775 | NA | NA | NA |
| 5664-301 | VM/IS (Release 5) | | | | | |
| | Group 10 | 28,200 | 22,990 | 2,381 | NA | NA |
| | Group 20 | 49,365 | 40,243 | 2,381 | NA | NA |
| | Upgrade-Group 10 to Group 20 | 21,145 | 17,253 | NA | NA | NA |

**The figure to the right of the slash is a Monthly Multiple Licensed Support Charge.*
*NA—Not applicable*

# IBM 9370 Information System

| | | Initial Charge | | Monthly Charge | | |
|---|---|---|---|---|---|---|
| | | Basic License Charge ($) | DSLO License Charge ($) | Basic License Charge ($) | DSLO Charge ($) | Licensed Program Support Charge ($) |
| 5664-301 | System Base | | | | | |
| | Group 10 | 13,575 | 10,175 | 851 | NA | NA |
| | Group 20 | 23,765 | 17,805 | 851 | NA | NA |
| | Upgrade-Group 10 to Group 20 | 10, 190 | 7,760 | NA | NA | NA |
| | Real Time Monitor | | | | | |
| | Group 10 | 400 | 400 | 50 | NA | NA |
| | Group 20 | 700 | 700 | 50 | NA | NA |
| | Upgrade-Group 10 to Group 20 | 300 | 300 | NA | NA | NA |
| | VMMAP | | | | | |
| | Group 10 | 1,600 | 1,600 | 270 | NA | NA |
| | Group 20 | 2,800 | 2,800 | 270 | NA | NA |
| | Upgrade-Group 10 to Group 20 | 1,200 | 1,200 | NA | NA | NA |
| | PL1 | | | | | NA |
| | Group 10 | 440 | 320 | 37 | NA | NA |
| | Group 20 | 775 | 565 | 37 | NA | NA |
| | Upgrade-Group 10 to Group 20 | 335 | 245 | NA | NA | NA |
| | FSF | | | | | |
| | Group 10 | 440 | 440 | 44 | NA | NA |
| | Group 20 | 770 | 770 | 44 | NA | NA |
| | Upgrade-Group 10 to Group 20 | 330 | 330 | NA | NA | NA |
| | Batch | | | | | |
| | Group 10 | 440 | 440 | 44 | NA | NA |
| | Group 20 | 770 | 770 | 44 | NA | NA |
| | Upgrade-Group 10 to Group 20 | 330 | 330 | NA | NA | NA |
| | GDDM/PGF | | | | | |
| | Group 10 | 4,955 | 3,715 | 320 | NA | NA |
| | Group 20 | 8,670 | 6,505 | 320 | NA | NA |
| | Upgrade-Group 10 to Group 20 | 3,715 | 2,790 | NA | NA | NA |
| | DCF/FEF | | | | | |
| | Group 10 | 4,990 | 4,990 | 384 | NA | NA |
| | Group 20 | 8,735 | 8,735 | 384 | NA | NA |
| | Upgrade-Group 10 to Group 20 | 3,745 | 3,745 | NA | NA | NA |
| 5664-309 | PROFS V2 | | | | | |
| | Group 10 | 12,800 | 9,600 | 995 | 225 | NA |
| | Group 20 | 22,400 | 16,800 | 995 | 225 | NA |
| | Upgrade-Group 10 to Group 20 | 9,600 | 7,200 | NA | NA | NA |
| | Over 100 currently signed-on terminal users upgrade. | | | | | |
| | Group 10 | NC | NC | 200 | 150 | NA |
| | Group 20 | 400 | 300 | 200 | 150 | NA |
| | Upgrade-Group 10 to Group 20 | 400 | 300 | NA | NA | NA |
| 5664-370 | DW/370 (VM/SP) | | | | | |
| | Group 10 | 5,600 | 4,200 | 665 | 500 | 42 |
| | Group 20 | 9,800 | 7,350 | 665 | 500 | 42 |
| | Upgrade-Group 10 to Group 20 | 4,200 | 3,150 | NA | NA | NA |
| 5666-316 | VSE/SP Version 3 | | | | | |
| | Group 10 | 29,315 | NA | NA | NA | NA |
| | Group 20 | 51,305 | NA | NA | NA | NA |
| | Upgrade-Group 10 to Group 20 | 17,330 | 15,610 | NA | NA | NA |
| 5666-338 | DW 370 (VSE/CICS) | | | | | |
| | Group 10 | 2,400 | 1,800 | 535 | 400 | 71 |
| | Group 20 | 4,200 | 3,150 | 535 | 400 | 71 |
| | Upgrade-Group 10 to Group 20 | 1,800 | 1,350 | NA | NA | NA |
| 5668-805 | VS FORTRAN LIBRARY Version 2 | | | | | |
| | Group 10 | 2,400 | 1,800 | 200 | 150 | NA |
| | Group 20 | 4,200 | 3,150 | 200 | 150 | NA |
| | Upgrade-Group 10 to Group 20 | 1,800 | 1,350 | NA | NA | NA |
| 5668-806 | VS FORT COMP/LIB/IAD Version 2 | | | | | |
| | Group 10 | 9,000 | 6,755 | 750 | 563 | NA |
| | Group 20 | 15,750 | 11,820 | 750 | 563 | NA |
| | Upgrade-Group 10 to Group 20 | 6,750 | 5,065 | NA | NA | NA |
| 5668-813 | MVS | | | | | |
| | Group 10 | 6,800 | 6,120 | NA | NA | NA |
| | Group 20 | 11,900 | 10,710 | NA | NA | NA |
| | Upgrade-Group 10 to Group 20 | 5,100 | 4,590 | NA | NA | NA |
| 5668-814 | MVS | | | | | |
| | Group 10 | 5,200 | 4,680 | NA | NA | NA |
| | Group 20 | 9,100 | 8,190 | NA | NA | NA |
| | Upgrade-Group 10 to Group 20 | 3,900 | 3,510 | NA | NA | NA |
| 5668-899 | APL2 | | | | | |
| | Group 10 | 5,600 | 5,040 | 695 | 521 | 37 |
| | Group 20 | 9,800 | 8,820 | 695 | 521 | 37 |
| | Upgrade-Group 10 to Group 20 | 4,200 | 3,780 | NA | NA | NA |

**The figure to the right of the slash is a Monthly Multiple Licensed Support Charge.*
*NA—Not applicable.*

# IBM 9370 Information System

| | | Initial Charge | | Monthly Charge | | |
|---|---|---|---|---|---|---|
| | | Basic License Charge ($) | DSLO License Charge ($) | Basic License Charge ($) | DSLO Charge ($) | Licensed Program Support Charge ($) |
| 5668-903 | VS FORTRAN IAD | | | | | |
| | Group 10 | 4,475 | 3,345 | 320 | 240 | 26 |
| | Group 20 | 7,835 | 5,855 | 320 | 240 | 26 |
| | Upgrade-Group 10 to Group 20 | 3,360 | 2,510 | NA | NA | NA |
| 5668-918 | CICS/OS/VS | | | | | |
| | Group 10 | 5,100 | 3,820 | 584 | 408 | 15 |
| | Group 20 | 8,925 | 6,690 | 584 | 408 | 15 |
| | Update-Group 10 to Group 20 | 3,825 | 2,870 | NA | NA | NA |
| 5668-940 | VS COBOL II LIB | | | | | |
| | Group 10 | 5,945 | 4,450 | 425 | 318 | 53 |
| | Group 20 | 10, 410 | 7,790 | 426 | 318 | 53 |
| | Upgrade-Group 10 to Group 20 | 4,465 | 3,340 | NA | NA | NA |
| 5668-958 | VS COBOL COMP/LIB | | | | | |
| | Group 10 | 14,975 | 11,225 | 1,070 | 802 | 53 |
| | Group 20 | 26,210 | 19,645 | 1,070 | 802 | 53 |
| | Upgrade-Group 10 to Group 20 | 11,235 | 8,420 | NA | NA | NA |
| 5668-996 | BASIC (VM/SP) | | | | | |
| | Group 10 | 2,800 | 2,520 | 375 | 281 | 38 |
| | Group 20 | 4,900 | 4,410 | 375 | 281 | 38 |
| | Upgrade-Group 10 to Group 20 | 2,100 | 1,890 | NA | NA | NA |
| 5736-LM4 | DOS PL/1 RES LIB | | | | | |
| | Group 10 | 695 | 515 | 58 | 43 | 7 |
| | Group 20 | 1,215 | 900 | 58 | 43 | 7 |
| | Upgrade-Group 10 to 20 | 520 | 385 | NA | NA | NA |
| 5736-LM5 | DOS PL/1 TRAN LIB | | | | | |
| | Group 10 | 405 | 300 | 34 | 25 | 7 |
| | Group 20 | 710 | 525 | 34 | 25 | 7 |
| | Upgrade-Group 10 to Group 20 | 305 | 225 | NA | NA | NA |
| 5736-PL1 | DOS PL/1 OPT COMP | | | | | |
| | Group 10 | 3,010 | 2,255 | 251 | 188 | 39 |
| | Group 20 | 5,720 | 3,945 | 251 | 188 | 39 |
| | Upgrade-Group 10 to Group 20 | 2,260 | 1,690 | NA | NA | NA |
| 5736-PL3 | DOS PL/1 COMP & LIB | | | | | |
| | Group 10 | 4,125 | 3,095 | 344 | 258 | 53 |
| | Group 20 | 7,220 | 5,415 | 344 | 258 | 53 |
| | Upgrade-Group 10 to Group 20 | 3,095 | 2,320 | NA | NA | NA |
| 5748-FO3 | VS FORTRAN COMP, LIB | | | | | |
| | Group 10 | 3,235 | 2,415 | 247 | 186 | 18 |
| | Group 20 | 5,660 | 4,230 | 247 | 186 | 18 |
| | Upgrade-Group 10 to Group 20 | 2,425 | 1,815 | NA | NA | NA |
| 5748-LM3 | VS FORTRAN LIB | | | | | |
| | Group 10 | 945 | 700 | 73 | 54 | 7 |
| | Group 20 | 2,370 | 1,755 | 73 | 54 | 7 |
| | Upgrade-Group 10 to Group 20 | 715 | 525 | NA | NA | NA |
| 5748-XXJ | SQL/DS | | | | | |
| | Group 10 | 5,565 | 4,160 | 464 | 347 | 144 |
| | Group 20 | 9,740 | 7,285 | 464 | 347 | 144 |
| | Upgrade-Group 10 to Group 20 | 4,175 | 3,125 | NA | NA | NA |
| 5799-BWH | VSE/SP V2 | 4,990 | 4,495 | 502 | 452 | 433 |
| | Group 10 | 4,990 | 4,495 | 502 | 452 | 433 |
| | Group 20 | 8,740 | 7,865 | 502 | 452 | 433 |
| | Upgrade-Group 10 to Group 20 | 3,753 | 3,370 | NA | NA | NA |
| | CICS/DOS | | | | | |
| | Group 10 | 8,230 | 7,400 | 686 | 617 | NA |
| | Group 20 | 14,405 | 12,955 | 686 | 617 | NA |
| | Upgrade-Group 10 to Group 20 | 6,175 | 5,555 | NA | NA | NA |
| | ACF/VTAM Version 2 | | | | | |
| | Group 10 | 3,690 | 3,325 | 284 | 256 | NA |
| | Group 20 | 6,455 | 5,820 | 284 | 256 | NA |
| | Upgrade-Group 10 to Group 20 | 2,765 | 2,495 | NA | NA | NA |
| | VSE/ICCF Version 2 | | | | | |
| | Group 10 | 2,235 | 2,010 | 214 | 192 | NA |
| | Group 20 | 3,915 | 3,525 | 214 | 192 | NA |
| | Upgrade-Group 10 to Group 20 | 1,680 | 1,515 | NA | NA | NA |
| | VSE/POWER Version 2 | | | | | |
| | Group 10 | 1,550 | 1,395 | 166 | 149 | NA |
| | Group 20 | 2,710 | 2,440 | 166 | 149 | NA |
| | Upgrade-Group 10 to Group 20 | 1,160 | 1,045 | NA | NA | NA |

**The figure to the right of the slash is a Monthly Multiple Licensed Support Charge.*
*NA—Not applicable.*

# IBM 9370 Information System

| | | Initial Charge | | Monthly Charge | | |
|---|---|---|---|---|---|---|
| | | Basic License Charge ($) | DSLO License Charge ($) | Basic License Charge ($) | DSLO Charge ($) | Licensed Program Support Charge ($) |
| | VSE/VSAM | | | | | |
| | Group 10 | 695 | 625 | 33 | 30 | NA |
| | Group 20 | 1,215 | 1,095 | 33 | 30 | NA |
| | Upgrade-Group 10 to Group 20 | 520 | 470 | NA | NA | NA |
| | VSE/VSAM SPACE | | | | | |
| | Group 10 | 285 | 255 | 44 | 40 | NA |
| | Group 20 | 495 | 445 | 44 | 40 | NA |
| | Upgrade-Group 10 to Group 20 | 210 | 190 | NA | NA | NA |
| | DITTO V1 | | | | | |
| | Group 10 | 535 | 480 | 82 | 74 | NA |
| | Group 20 | 9351 | 840 | 82 | 74 | NA |
| | Upgrade-Group 10 to Group 20 | 400 | 360 | NA | NA | NA |
| | BTAM (VSE) | | | | | |
| | Group 10 | 525 | 480 | 44 | 40 | NA |
| | Group 20 | 920 | 840 | 44 | 40 | NA |
| | Upgrade-Group 10 to Group 20 | 395 | 360 | NA | NA | NA |
| | VSE/Fast Copy | | | | | |
| | Group 10 | 200 | 180 | 23 | 21 | NA |
| | Group 20 | 345 | 310 | 23 | 21 | NA |
| | Upgrade-Group 10 to Group 20 | 145 | 130 | NA | NA | NA |
| | VSE/VSAM BACKUP RESTORE | | | | | |
| | Group 10 | 175 | 155 | 33 | 30 | NA |
| | Group 20 | 305 | 275 | 33 | 30 | NA |
| | Upgrade-Group 10 to Group 20 | 130 | 120 | NA | NA | NA |
| 5667-126 | IX/370 | | | | | |
| | 4506 For maximum of 16 concurrently signed-on terminal users (CSTU) | 10,000 | NA | NA | NA | *495/792 |
| | 4507 For maximum of 32 CSTU; features are cumulative, so maximum license charge=$20,000 | 10,000 | NA | NA | NA | *495/792 |
| | 4508 For maximum of 64 CSTU; features are cumulative, so maximum license charge=$40,000 | 20,000 | NA | NA | NA | *495/792 |
| | 4509 For maximum of 65+ CSTU; features are cumulative, so maximum license charge=$75,000 | 35,000 | NA | NA | NA | *495/792 |

**The figure to the right of the slash is a Monthly Multiple Licensed Support Charge.*
*NA—Not applicable.* ■