Sperry Univac System 80

MANAGEMENT SUMMARY

The Sperry Univac System 80 is a medium-range, general-purpose computer system with primary emphasis on ease of use and interactive operation. The original System 80 models, Models 3 and 5, were introduced in April 1980. In June 1982, these models were replaced by the Model 4 and Model 6, which offer increased disk storage capacity and a disk cache feature designed to improve input/output operations. A new streaming tape drive for disk backup and a new workstation model were also introduced.

In October 1982, Sperry Univac announced the System 80 Model 8, an enhanced processor that offers twice the performance of the Model 6 and twice the memory capacity of the earlier models. The Model 8 also includes features designed to aid users of Univac's 90/25, 90/30, and 90/40 systems in migrating to the new system.

All System 80 models are object-code compatible. A Model 3 can be field upgraded to a Model 4 or 6, and a Model 4 or 5 can be field upgraded to a Model 6. Upgrades to a Model 8 require a processor exchange.

All System 80 models utilize state-of-the-art multiple-microprocessor architecture and emitter-coupled logic (ECL) circuits which promise high reliability and easy maintenance. The System 80 can be used effectively either as a standalone computer or as part of a distributed processing network. Moreover, it is designed for operation either in a computer room or in a controlled office environment. The basic processor complex requires only about 30 square feet of floor space.

The System 80 is a workstation-oriented computer system designed for ease of use in interactive, batch, distributed processing, and remote computing operations.

MODELS: Model 4, Model 6, and Model 8.
CONFIGURATION: From 512K to 8192K bytes of main memory plus a maximum of 120 workstations, 24 disk drives, 4 diskette drives, 8 magnetic tape units, 4 streaming tape units, 48 printers, 10 card reader/punches, and 28 communications lines. Additional disk and tape drives can be attached via independent control units.
COMPETITION: Burroughs B 1900; Hewlett-Packard 3000; Honeywell DPS 7; IBM System/38, 4321, and 4331; and NCR 8400.
PRICE: Basic processor complexes can be purchased for $66,082 to $123,900.

CHARACTERISTICS

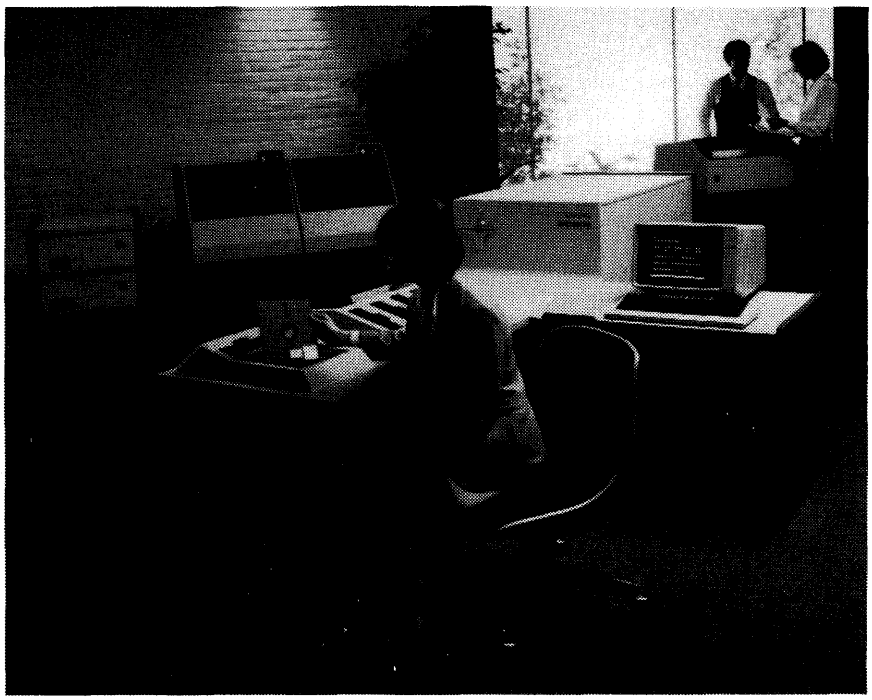
MANUFACTURER: Sperry Univac Division, Sperry Corporation, P.O. Box 500, Blue Bell, Pennsylvania 19424. Telephone (215) 542-4011.

MODELS: System 80 Model 4, Model 6, and Model 8.

PREVIOUS MODELS: Model 3 and Model 5.

DATE ANNOUNCED: See Table 1.

DATE OF FIRST DELIVERY: See Table 1.



A minimum System 80 Model 4 or 6 configuration consists of a central processor with 512K bytes of memory, a console workstation, an integrated 118-megabyte disk drive, a diskette drive, a printer, and associated control units. Magnetic tape drives, card reader/punches, and additional workstations, disk drives, diskette drives, and printers can be added.

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PROCESSORS

The minimum System 80 Model 4 or Model 6 configuration consists of a processor complex with four integrated peripheral controls, 512K bytes of MOS memory, an integrated 118.2-megabyte fixed disk drive, a diskette drive, a console workstation, and a free-standing line printer. The basic processor complex also includes provisions for up to two data communications lines, a magnetic tape subsystem, and one additional peripheral control. The system can be expanded by connecting additional peripheral devices to any or all of the integrated controls, and by adding the optional Input/Output Microprocessor (IOMP) or Extended Channel Functionality (ECF), which permit the connection of up to three additional peripheral controls and six additional data communications lines.

The Model 4 and Model 6 processors are distinguished by the bandwidths of their 180-nanosecond control storage units: one word (of 32 data bits plus 4 parity bits) for the Model 4 and two words for the Model 6. The High-Performance Control Storage (HPCOS) used in the Model 6 gives it a 55 percent speed advantage over the Model 4.

The main storage capacity on the Model 4 and Model 6 processors can be expanded to a maximum of 4096K bytes. The byte-addressable main storage is composed of 64K-bit MOS chips and has a cycle time of 400 nanoseconds per 4-byte access. Error correction code (ECC) logic provides automatic detection and correction of single-bit memory errors as well as detection of double-bit errors.

The minimum System 80 Model 8 configuration consists of a processor complex plus a line printer, a diskette subsystem, and a disk subsystem. The processor complex includes a central processor, 1024K bytes of main memory, a channel controller with one byte multiplexer channel and one selector channel, an IOMP with a workstation control and diskette control, and a system console with keyboard and two integral diskette drives for IMPL and system maintenance. The system can be expanded by connecting additional peripheral devices to the standard controls, adding more control units to the IOMP and the selector channels, and connecting additional selector channels to the channel controller. A second IOMP can also be added.

The control storage on the Model 8 processor has a 120-nanosecond cycle time per two-word access in parallel. Main memory can be expanded to 8192K bytes and has a cycle time of 480 nanoseconds per 8-byte access.

PERIPHERALS AND COMMUNICATIONS

All System 80 models support the following mass storage devices: the 8470, a 491-megabyte fixed-disk drive; the 8417, a 118.2-megabyte fixed-disk drive; and the 8419, a 72.3-megabyte removable disk drive. Certain carry-over drives from the Series 90/25, 90/30, and 90/40 can also be attached to the System 80 Model 8.

DATA FORMATS

BASIC UNIT: 8-bit byte. Each byte can represent 1 alphanumeric character, 2 decimal digits, or 8 binary bits. Two consecutive bytes form a 16-bit "halfword," four consecutive bytes form a 32-bit "word," and eight consecutive bytes form a 64-bit "doubleword."

FIXED-POINT OPERANDS: Can range from 1 to 16 bytes (1 to 31 digits plus sign) in decimal mode; 1 halfword (16 bits) or 1 word (32 bits) in binary mode. Certain operations use a doubleword (63-bit integer field plus sign) in binary mode.

FLOATING-POINT OPERANDS: Standard floating-point instructions provide for addition, subtraction, multiplication, division, loading, storing, and sign control of short or long format operands. The short format provides 24-bit precision and is represented by one word, which uses bit 0 for the sign, bits 1 through 7 for the exponent, and bits 8 through 31 for the fraction. Long format is represented with a doubleword which provides 56-bit precision; the long format is similar to the short format except that the fraction is contained in bit positions 8 through 63.

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

INTERNAL CODE: EBCDIC or ASCII, depending upon setting of a mode bit in the program status word by certain processor instructions. The processor is sensitive to zone fields and edit control characters.

MAIN STORAGE

STORAGE TYPE: MOS (metal oxide semiconductor), composed of 64K-bit chips.

CAPACITY: See Table 1.

CYCLE TIME: See Table 1.

CHECKING: Error correction code (ECC) logic provides automatic detection and correction of single-bit memory errors as well as detection of double-bit errors. Parity checking is also performed on both data and addresses.

STORAGE PROTECTION: The standard Storage Protect feature uses 15 keys to provide write or read/write protection for 1024-byte segments of main storage.

RESERVED STORAGE: The first (low-order) 640 bytes of main storage are reserved to hold specific operating information accessed by the hardware and the operating system.

CENTRAL PROCESSOR

The System 80 processor architecture incorporates multiple LSI microprocessors and utilizes emitter-coupled logic (ECL) for high speed and reliable operation. Reliability is further enhanced by means of automatic instruction retry, parity generation and checking, and control storage error correction.

On the *System 80 Model 4 and Model 6*, the processor complex contains two modular processors: a control processor with an associated control storage unit, and a main storage processor which controls the main storage unit. The control processor performs arithmetic computations and contains the control logic required for instruction execution, system control, and I/O channel support functions in conjunction with the microinstructions residing in control storage. The control processor has 8 interrupt levels and a 4-byte (32-bit) internal data path width.

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TABLE 1. CHARACTERISTICS OF THE SYSTEM 80

	Model 4	Model 6	Model 8
PROCESSORS			
Date of announcement	June 1982	June 1982	October 1982
Date of first delivery	July 1982	July 1982	1st Quarter 1984
Control Storage:			
Capacity, bytes	131,072	131,072	80,000
Cycle time, nanoseconds	180	180	120
Bytes fetched per cycle	4	8	4
Relative performance	1.0	1.5	3.0
MAIN STORAGE			
Type	MOS	MOS	MOS
Cycle time, nanoseconds	400	400	480
Bytes fetched per cycle	4	4	8
Minimum capacity, bytes	524,288	524,288	1,048,576
Maximum capacity, bytes	4,194,308	4,194,308	8,388,608
Increment size, bytes	262,144 or 524,288	262,144 or 524,288	1,048,576 or 2,097,152
PERIPHERALS			
Disk Drives	1 to 16	1 to 16	1 to 24*
Diskette drives	1 to 4	1 to 4	1 to 4
Workstations	1 to 40 (including console)	1 to 40 (including console)	1 to 120 (including console)
Magnetic tape units	0 to 8	0 to 8	0 to 8*
Streaming tape units	0 to 4	0 to 4	0 to 4
Printers	1 to 10	1 to 10	1 to 24 local, 1 to 24 remote
Card readers/punches	0 to 10	0 to 10	0 to 24
I/O CONTROL			
Multiplexer channels	3	3	1
Selector channels	0	0	1 to 5
Communications lines	0 to 8	0 to 8	0 to 28
Aggregate data rate, bytes/second	6,000,000	6,000,000	8,000,000

*Via integrated controls. Additional disk and tape drives can be attached by using independent control units.

The principal input/output devices in most System 80 configurations will be keyboard/display units called workstations. Designed for ease of use in dialog-oriented interactive applications, each workstation consists of a typewriter-style keyboard and a 12-inch CRT screen with a 1920-character capacity. The System 80 Models 4 and 6 support up to 39 local workstations, plus the console workstation, while the System 80 Model 8 supports up to 120 local workstations. Additional remote workstations can be connected via communications lines.

Other input/output devices available for the System 80 include: manual-load and autoload diskette drives; line printers rated at 180, 300, 640, and 1200 lines per minute; a 300-cpm reader and a 75-to-160-cpm punch for 80-column cards; the Uniservo 10 magnetic tape subsystem, which offers a maximum data transfer rate of 40,000 bytes per second; the Uniservo 22 magnetic tape subsystem (Model 8 only), which has a maximum data rate of 120,000 bytes per second; the Uniservo 24 magnetic tape subsystem (Model 8 only), which has a maximum data rate of 200,000 bytes per second; and a streaming tape unit with a maximum data rate of 40,000 or 160,000 bytes per second. The Model 8 processor also supports a number of Series 90 input/output devices.

A basic Model 4 or 6 processor can control one or two data communications lines, and a system equipped with the

The Model 4 and Model 6 processors feature a new disk cache capability designed to reduce the number of read operations performed on the disks. The disk cache facility consists of system microcode and a portion of main memory that is set aside for use as a cache buffer.

The Model 4 and Model 6 differ primarily in the bandwidths of their control storage units, which are described below.

The *System 80 Model 8* processor complex includes the central processing unit, control processor, main storage unit, and Input/Output Microprocessor (IOMP). The CPU executes and controls instructions and processes I/O interrupts, interval time activities, and general interrupts. The control processor is an independent unit that controls the console complex and control panels, system initialization, maintenance/diagnostic functions, system recovery, and remote maintenance interface. The IOMP provides an interface between main storage and the integrated peripheral controls and communications controls.

REGISTERS: The System 80 processor has the following register complement: 16 four-byte program registers, 16 four-byte supervisor registers, 16 four-byte control registers, and 4 eight-byte floating-point registers.

CONTROL STORAGE: The processor's operations are controlled by microprograms residing in a modular control storage element. The Model 4 control storage has a 180-nanosecond cycle time per one-word access and a capacity of 32,768 words, with each word consisting of 32 data bits plus 4 parity bits. The High-Performance Control Storage (HPCOS) used in the Model 6 processor has the same 180-nanosecond cycle time but accesses two words per cycle, has a

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Input/Output Microprocessor or Extended Channel Functionality can support a total of eight lines. Each line can handle a data rate of up to 56,000 bits per second and can accommodate either a single remote terminal or a multi-drop network configuration. Each IOMP on the Model 8 processor can control up to 14 communications lines, for a total of 28 lines.

A Single-Line Communications Adapter (SLCA) provides the appropriate interface between the System 80 and each line. SLCA's are currently available to support the following communications protocols: Binary Synchronous, Teletype (TTY), Univac UDLC, and Uniscope 100/200, UTS 4000, and BC-7.

Also available for the Model 8 processor is the Inter-Computer Control Unit (ICCU), which provides a fiber optic link between two OS/3 systems. The two systems can be two System 80s or a System 80 and a Series 90/25, 90/30, or 90/40. The connected systems can be up to 3300 feet apart, with line speeds up to 145K bytes per second.

SOFTWARE

The System 80 software is based upon the user-proven OS/3 operating system. Introduced in 1974 with the Univac 90/30, OS/3 has been extended and restructured to meet the varied information processing needs of the 1980s. The current release of OS/3 supports batch, interactive, remote communications, and distributed processing environments, and features dynamic resource management and the ability to control up to 14 simultaneous jobs in a multiprogramming environment on Models 4 and 6 and 48 simultaneous jobs on Model 8.

The Extended System Software, an optional extension of OS/3, adds six software tools that promise to enhance the ease and efficiency of System 80 operations. Especially noteworthy are the Screen Format Generator, which simplifies the programming of display screen formats for System 80 workstations, and the Dialog Specification Language, which facilitates the preparation of interactive dialogs between the system and its users.

Sperry Univac currently offers six programming languages for the System 80: Cobol 1974, Fortran IV, Basic, RPG II, Escort, and Basic Assembly Language (BAL). Transaction and data base management are facilitated by two major software tools. The System 80 Information Management System (IMS) is an interactive transaction processing system with integrated file management facilities. The Data Base Management System (DMS) is a Codasyl-compatible system that permits simultaneous access to shared data bases by multiple users. Data communications functions are controlled by the ICAM (Integrated Communications Access Method) Terminal Support Facility, which provides concurrent support for multiple user programs communicating with a variety of terminals and line types.

Sperry Univac also offers 10 applications software products, all designed to take advantage of the System 80's

capacity of 16,384 doublewords (i.e., 131,072 bytes), and yields a 55 percent increase in processing speed. The Model 8 control storage has a capacity of 80,000 bytes. The Model 8 accesses one word per cycle and has a cycle time of 120 nanoseconds. According to Sperry Univac, the Model 8 has twice the processing speed of the Model 6.

The control storage module also contains 1024 words of read-only storage, which provides the capability to perform initial microprogram loading and contains resident micro-diagnostics for the central processor.

INSTRUCTION REPERTOIRE: The standard System 80 instruction set is an "inclusive superset" of the Univac 90/30 instruction set. It consists of 128 instructions, including 44 floating-point arithmetic instructions as well as decimal arithmetic, fixed-point binary arithmetic, code conversion, logical operations, packing, unpacking, editing, shifting, testing, and branching. Instructions are two, four, or six bytes in length and use one of six formats: Register to Register (RR), Register to Indexed Storage (RX), Register to Storage (RS), Storage (S), Storage and Immediate Operand (SI), or Storage to Storage (SS).

CONFIGURATION RULES

MODELS 4 AND 6: The minimum system configuration consists of a processor complex plus a 0776 or 0789 free-standing printer and an 8420 or 8422 diskette drive. The processor complex, in turn, consists of a control processor, a main storage processor with 512K bytes of memory, a disk channel/control and one integrated 118.2-megabyte nonremovable disk drive, a diskette control, a workstation control and one console workstation, and a paper peripheral control which controls the printer.

The basic system can be expanded by connecting additional peripheral devices to any or all of the four integrated controls. The disk channel/control can control up to seven additional disk drives of the fixed or removable-media type. The diskette control can handle up to three additional drives. The workstation control accommodates up to seven additional local workstations. The paper peripheral control can handle a second printer and either two card readers or one card reader and one card punch. The basic processor complex also includes provisions for a magnetic tape control, one or two data communications lines, and one additional peripheral control.

A Model 4 or 6 system can be further expanded by adding field-installable modules that increase its storage capacity or I/O capabilities. Main memory can be expanded to four megabytes. The optional Extended Channel Functionality (ECF) feature permits the connection of up to three additional peripheral controls and six additional data communications lines. The optional Input/Output Microprocessor (IOMP) provides for up to three additional peripheral controls other than disk controls and up to six additional communications lines. The IOMP includes a dedicated microprocessor for peripheral operations control. Also available is the Micrologic Expansion feature, which provides additional channel functionality via microcode. The Model 6 processor requires one of these I/O features, which are mutually exclusive.

MODEL 8: A minimum configuration consists of a processor complex plus a line printer, a diskette subsystem, and a disk subsystem. The processor complex includes a central processor, 1024K bytes of main memory, a channel controller with one byte multiplexer channel and one selector channel, an IOMP with a workstation controller and diskette controller, and a system console with keyboard and two integral diskette drives for IMPL and system maintenance.

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orientation toward interactive processing. These include the UNIS 80 manufacturing control system, the Unifacs 80 financial accounting system, and the WAMS 80 wholesale distribution system.

COMPATIBILITY AND COMPETITION

The System 80 is fully compatible with Sperry Univac's earlier OS/3-oriented computers—the 90/25, 90/30, and 90/40. As such, it also offers a high degree of compatibility with the earlier Univac 9000 Series computers, the IBM System/360 and 370, and many of the other byte-oriented systems currently on the market.

The IBM System/3 and System/34 are primary marketing targets of the System 80, and the conversion process is facilitated by the availability of a compatible RPG II compiler, sort package (SORT3), disk access method (MIRAM), utility functions, and OCL processor. To bridge the remaining areas of incompatibility between the two systems, Sperry Univac also offers a disk data file conversion procedure and transcribers for source and proc libraries.

Other conversion aids, including language translators and file transcribers, are available to facilitate conversions to the System 80 from the Univac 9200 and 9300; the OS/4-oriented Univac 9400 and 9480; the IBM System/32; the Honeywell Series 100, 200, and 2000; and the Honeywell Series 60, Levels 62 and 64. Facilities are also provided for the System 80 Model 8 to facilitate transition from a 90/25, 90/30 or 90/40 system.

The System 80 competes directly against three formidable IBM computers, the System/38, the 4321, and the 4331, as well as against a host of other medium-range systems from vendors such as Burroughs, Hewlett-Packard, Honeywell, and NCR. The System/38 features interactive operation, virtual storage, and integrated data base support. The 4331 is a more conventional, batch-oriented system that uses the proven System/370 hardware and software concepts. The 4321, introduced by IBM in November 1981, is an entry-level, workstation-oriented system. The System 80 is said to be closely comparable in CPU performance to the System/38, 4321, and 4331. It also offers the capability to handle a broad range of both interactive and batch applications.

USER REACTION

In Datapro's 1982 survey of general-purpose computer users, 18 System 80 users reported on their experience with 18 systems, which had been in use for an average of 11.7 months. Of the eight users who specified the model number, six had installed a Model 3 and two were using a Model 5. All but two of the users had converted to the System 80 from another system, typically a Sperry Univac 9000 Series or an IBM System/3.

The users' ratings of the System 80 are summarized in the table below.

Main memory is expandable in 1024K-byte increments up to 4096K bytes, then in 2048K-byte increments up to the maximum of 8192K bytes.

A minimum Model 8 system requires a paper peripheral control with an 0789 or 0766 line printer, an 8420 or 8422 diskette subsystem, and an Integrated Disk Control Unit (IDCU) with one 8470 disk drive, two 8417 or 8419 disk drives, or two Series 90 8416 or 8418 disk drives. Alternatively, the printer requirement can be met by adding a byte multiplexer adapter and a Series 90 0770 or 0776 printer, and the disk requirement can be met by using a 5039 control unit and two 8430 or 8433 disk drives.

The byte multiplexer channel supports the system console and, via the byte adapter, up to four Series 90 printers or card readers. The selector channel is used to interface disk and tape units to the system. The Model 8 can have up to five selector channels, each of which can support up to three IDCUs. The maximum number of IDCU-supported disk drives is 24.

The IOMP supports up to eight low-speed peripheral controls, 14 communications lines, a Uniservo 10 tape subsystem, and an Inter-Computer Control Unit (ICCU). (The ICCU is described in the "Communications" section of this report.) Optional peripheral controls can be added in any combination of workstation controls, paper peripheral controls, and remote printer attachments. Additionally, one integrated tape control is available for Uniservo 22 and streaming tape drives. A second IOMP can be added to a System 80 Model 8 system.

INPUT/OUTPUT CONTROL

The *System 80 Model 4 and 6* processor complexes include three I/O channels. The interface between the I/O channels and the peripheral devices is through the peripheral controls described above. The standard disk channel/control provides a direct, microprocessor-controlled interface to main storage and accommodates a data transfer rate of up to 1.1 megabytes per second. The optional disk/channel control for the 8470 disk drives, which requires ECF, supports a data transfer rate of up to 2.1 megabytes per second. All other peripheral controls are interfaced to main storage through either the central processor or the ECF or IOMP. The maximum aggregate system data rate is 6.0 megabytes per second.

The *System 80 Model 8* processor complex includes one byte multiplexer channel and one selector channel as standard. The byte multiplexer channel supports the system console and has a maximum data rate of 70K bytes per second. The selector channel supports high-speed peripheral devices (disk and tape drives) and operates at 1.5 megabytes per second. In addition, the Input/Output Microprocessor (IOMP) handles low-speed peripheral devices such as printers and workstations. The System 80 Model 8 has an aggregate data rate of 8 megabytes per second.

MASS STORAGE

For disk and diskette drives supported on the System 80, please refer to Table 2.

INPUT/OUTPUT UNITS

WORKSTATIONS: The basic System 80 Model 4 or 6 configuration includes a console workstation and a microprocessor-based workstation control that can accommodate up to seven additional workstations. A system equipped with the Input/Output Microprocessor or Extended Channel Functionality can handle up to four additional workstation controls, each controlling a maximum of eight workstations. The workstations are cable-connected to the processor complex and can be located up to 5000 feet (1524 meters) away from it. The control unit contains

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TABLE 2. MASS STORAGE

Subsystems	8420/8422 Diskette	8416/8418 Disk	8417 Disk	8419 Disk	8430/8433 Disk	8470 Disk
Cabinets per subsystem	1	1 to 8	1 to 8	1 to 7	1 to 16	1 to 8
Disk packs/HDAs per cabinet	2 to 4	1	1 to 3 HDAs	1 removable	1 removable	1 HDA
Capacity, megabytes	0.5 to 1.0 per diskette	28.9/28.9 or 57.9	118.2	72.3	77.3/154.7	491.5
Tracks/segments per drive unit	77 per diskette	2877/2877 or 5705	7826	5705	7809/15,485	20,160
Average access time, milliseconds	35	30/27 or 33	35	33	27/30	23
Average rotational delay	—	10.7	8.8	10.7	8.3	8.3
Data transfer rate, bytes/second	31,000/62,000	625,000	1,130,000	784,000	806,000	2,097,000
Controller model	Integrated	Integrated	Integrated	Integrated	5039	Integrated
Comments	8420 is auto-load model capable of processing up to 20 diskettes	Series 90 drives supported on System 80 Model 8 only	Fixed-head option available		Series 90 drives supported on System 80 Model 8 only	Fixed-head option available; requires ECF on Models 4 and 6

	Excellent	Good	Fair	Poor	WA*
Ease of operation	10	7	1	0	3.50
Reliability of mainframe	7	8	3	0	3.22
Reliability of peripherals	6	8	4	0	3.11
Maintenance service:					
Responsiveness	10	4	4	0	3.33
Effectiveness	8	4	5	1	3.06
Technical support:					
Trouble-shooting	8	4	3	3	2.94
Education	3	7	6	2	2.61
Documentation	3	4	8	3	2.39
Manufacturer's software:					
Operating system	7	9	1	1	3.22
Compilers & assemblers	9	7	2	0	3.39
Application programs	2	8	4	0	2.86
Ease of programming	7	8	2	0	3.29
Ease of conversion	3	6	6	1	2.69
Overall satisfaction	7	8	3	0	3.22

*Weighted Average on a scale of 4.0 for Excellent.

In addition to answering the standard survey questions, one user wrote, "I've found the Sperry Univac (System 80) to be a more efficient machine than the IBM S/34, in that the JCL allows for more internal control than the OCL on the IBM. The Univac is quicker and has more efficient software."

In October, we contacted four of the survey respondents and asked them for their comments on the System 80. These four users represented a service bureau, a municipal government, and two retail businesses.

One of the users interviewed had installed a System 80 Model 3 in April 1981 as a replacement for a Honeywell 2020. The Model 3 has since been upgraded to a Model 5. This user said that the conversion from the Honeywell to the Univac system was "very easy," he had experienced no downtime, and Sperry Univac was "a super company to deal with." He added, however, that some of the software "eats up memory." He started out with 512K bytes of dedicated buffers for each workstation, allowing the workstations to transfer data concurrently through a serial interface at a data rate of 9600 bits per second.

The basic System 80 Model 8 configuration includes a system console that attaches to the byte multiplexer channel and a workstation control that supports up to eight workstations. Up to 120 local workstations can be connected to a System 80 Model 8.

Two System 80 workstation models are available: the Model 1 and the Model 2. Both models are keyboard/display units designed for ease of operation. A 12-inch CRT displays 24 lines of data plus a system status line, and each line can contain up to 80 characters. Three keyboard arrangements are available: standard typewriter, typewriter plus numeric and function pads, and foreign language. Each keyboard also contains 33 control keys that provide considerable operating flexibility, including cursor scanning, character insertion and deletion, protected characters, blinking, selective erasure, and reverse video.

The Model 1 Workstation supports an 80-column 80-character-per-second matrix printer and a 132-column 200-character-per-second matrix printer.

The Model 2 Workstation includes 32K to 64K bytes of memory for user programmability. A screen by-pass capability enables users to send output directly to a printer without first displaying it on the screen. The Model 2 workstation supports a variety of printer models: an 80-column 80-character-per-second matrix printer; a 132-column, 200-character-per-second matix printer; a 132-column correspondence-quality printer; a high-quality 40- or 160-character-per-second printer; and a 132-column, 180- or 300-line-per-minute line printer. In addition, one diskette drive can be attached to the Model 2 Workstation.

By pressing a function key, the operator can cause a System 80 workstation to operate in either of two modes. Workstation mode, the normal mode of operation, is used when communicating with application programs. System mode provides a direct interface to the OS/3 operating system, enabling the operator to make system inquiries, activate jobs, and perform other system functions.

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TABLE 3. INPUT/OUTPUT UNITS

Magnetic Tape Units	Number of Tracks	Recording Density, Bits/Inch	Encoding	Tape Speed, Inches/Sec.	Transfer Rate, Bytes/Sec.
Uniservo 10	7	200	NRZI	25	5,000
	7	556	NRZI	25	13,900
	7	800	NRZI	25	20,000
	9	800	NRZI	25	20,000
	9	1600	PE	25	40,000
Uniservo 12*	7	200	NRZI	42.7	8,540
	7	556	NRZI	42.7	23,740
	7	800	NRZI	42.7	34,160
	9	800	NRZI	42.7	34,160
	9	1600	PE	42.7	68,320
Uniservo 14*	7	200	NRZI	60	12,000
	7	556	NRZI	60	33,400
	7	800	NRZI	60	48,000
	9	800	NRZI	60	48,000
	9	1600	PE	60	96,000
Uniservo 16*	7	200	NRZI	120	24,000
	7	556	NRZI	120	66,720
	7	800	NRZI	120	96,000
	9	800	NRZI	120	96,000
	9	1600	PE	120	192,000
Uniservo 20*	9	1600	PE	200	320,000
Uniservo 22**	9	800	NRZI	75	60,000
	9	1600	PE	75	120,000
Uniservo 24**	9	800	NRZI	125	100,000
	9	1600	PE	125	200,000
F3782 Streaming Tape Unit	9	1600	PE	25 or 100	40,000 or 160,000

Printers	Printing Speed	Print Positions	Horizontal Spacing, Chars./Inch	Vertical Spacing, Chars./Inch	Form Size
0770-00*	800 lpm	132	10	6 or 8	3.5 to 22.0 in. wide, up to 24.0 in. long
0776-00*	760 lpm	136	10	6 or 8	4.0 to 18.75 in. wide, up to 24.0 in. long
0776-02*	900 lpm	136	10	6 or 8	
0776-04*	1200 lpm	136	10	6 or 8	
0776-99	1200 lpm	136	10	6 or 8	
0789-99	180 lpm	132	10	6 or 8	3.0 to 15.0 in. wide, up to 22.0 in. long
0789-96	300 lpm	132	10	6 or 8	
0789-93	640 lpm	132	10	6 or 8	
0798-68	200 cps	132	10 or 14	6 or 8	3.0 to 10.0 in. wide, continuous

Card Equipment	Columns	Speed, Cards/Min.	Input Hopper Capacity	Output Stacker Capacity	Options
0716-91 Card Reader*	80 and 96	600	2400	2000 (2)	51- and 66-column cards
0716-93* Card Reader	80 and 96	1000	2400	2000 (2)	51- and 66-column cards
0716-99* Card Reader	80	1000	2400	2000 (2)	51- and 66-column cards
0719-04 Card Reader	80	300	1000	1000	None
0608-03 Card Punch	80	75 to 160	700	700	Auxiliary 100-card stacker; card read/validity check

*Series 90 models supported on the System 80 Model 8 only. Require independent control units.
**System 80 Model 8 only. U24 requires independent control unit.

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memory and increased it to 1024K bytes within 8 months. He said that the Escort language, in particular, uses a lot of memory, but he likes Escort because it is "so easy for non-EDP people to use."

Another installation was using a Model 4 and planned to upgrade to a Model 6. The DP manager said he had originally converted from an IBM System/3 to a System 80 in 1980. He reported that the System 80 immediately ran out of memory, and he had to double the memory capacity. He said he thought "Sperry Univac made the same initial mistake with the System 80 that IBM made with the System/38—both systems were undersized because the vendors didn't fully understand the technology." However, he commented that the System 80 "is a good piece of hardware and is comparable to the System/38 in speed." He added that in a batch environment "you need a Model 4 or 6, not a Model 3 or 5." The cache facility in his model 4 "speeded up batch processing by 40 to 50 percent."

The third user had installed a System 80 Model 5 in November 1981 as a replacement for an IBM System/360. He said the conversion was still in progress and was "very poor." He also said there had been "excessive downtime" on the CPU and the service personnel were "not that competent." This user also reported problems with the peripherals, particularly the card reader.

The fourth user interviewed had converted from a Sperry Univac 9480 to a System 80 Model 3 in September 1981. He reported that he had experienced "many problems with the System 80 upon installation," but that the situation was better now and he would recommend the system to others.

Despite the negative comments quoted, 13 of the 18 survey respondents said they would recommend the System 80 to other users. One user said he would not recommend the system and four were undecided. However, at the time of our telephone interviews, two of these four said they would recommend the system.□

On the System 80 Models 4 and 6, the console workstation is a specially adapted workstation that can perform all the standard workstation functions, as described above, plus the additional functions required to control and maintain the system. It can be switched into any of three operating modes and can serve as a normal workstation, as a system control console, or as a maintenance console. The System 80 Model 8 console does not include workstation functionality. Two diskette drives are included for IMPL and system maintenance.

Magnetic tape drives, printers, and punched card equipment for the System 80 are listed in Table 3.

COMMUNICATIONS CONTROL

In addition to the directly connected workstations, a System 80 Model 4 or 6 can support up to 8 communications lines, while a System 80 Model 8 can support up to 28 communications lines. Data can be transmitted at up to 56,000 bits per second over each line. An appropriate Single-Line Communications Adapter (SLCA) provides the interface between the System 80 and each line. The SLCA performs integrity checking, special character recognition, and data transfer control. SLCAs are available to support the following communications protocols and Sperry Univac terminals:

- **Univac Uniscope 100/200, UTS 400, 4000, and BC-7; 2000 to 9600 bps data rate; half or full duplex, synchronous mode; RS-232C/X.21.BIS or MIL-188-100 interface; provides auto answer; requires external clock.**
- **Teletype or equivalent; up to 9600 bps data rate; half-duplex, asynchronous mode; RS-232C/X.21.BIS or MIL-188-100 interface; provides auto answer; has internal clock.**
- **Universal Data Link Control (UDLC); 2000 to 56,000 bps data rate; half or full duplex, synchronous mode; RS-232C/X.21.BIS interface; provides auto answer; requires external clock.**

INTER-COMPUTER CONTROL UNIT (ICCU): Available on all System 80 models, the ICCU provides a fiber optic link between two OS/3 systems for distributed processing applications. The connected systems can either be two System 80 systems or a System 80 and a Series 90/25, 90/30, or 90/40 system. The distance between systems can be up to 3300 feet, with speeds up to 145K bytes per second. The ICCU interfaces to the IOMP on the System 80 Model 8.

SOFTWARE

OPERATING SYSTEM: Software support for the System 80 is based upon Sperry Univac's proven *OS/3* operating system, extended and restructured to provide effective support for batch, interactive, remote communications, and distributed processing environments.

The OS/3 supervisor consists of memory-resident and disk-resident transient routines that provide the central control, coordination, and resource allocation required for efficient system utilization. Supervisor functions include interrupt servicing, task switching, physical I/O control, transient management, timer and day clock service management, console and workstation management, error logging and recovery, and memory management.

The OS/3 job control facilities on the System 80 Models 4 and 6 allow the definition, initiation, and control of up to 14 simultaneous jobs with up to 256 subtasks per job step. The System 80 Model 8 can handle up to 48 concurrent jobs. Jobs and tasks are scheduled in response to job control language (JCL) statements entered from the system console, workstations, or remote terminals. An interactive prompting facility simplifies the creation of JCL statements and job streams. Previously stored JCL procedures can be varied at run time. A new block loading capability provides faster execution of job control streams.

OS/3 includes a consolidated data management system that serves as the controlling interface between application programs, the system hardware, and OS/3. There are separate access methods for disks, diskette, workstation, magnetic tape, and unit record input/output. The logical input/output control system (IOCS) modules that control each access method are shareable subroutines that are dynamically loaded into main memory when required. Access to disk files is controlled by the Multiple Indexed Random Access Method (MIRAM), a single access method that provides four ways of accessing disk records: sequentially in order of placement, sequentially by ascending key, randomly by multiple keys, or randomly by relative record number. A shared file processing facility reduces the I/O overhead associated with disk file sharing. The diskette access method permits the records on a diskette file to be accessed

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sequentially in order of placement, randomly by relative record number, or by data set labels. Card, printer, and diskette subsystems can be accessed either directly or through the optional Spooling facility.

The basic OS/3 System Control Software (SCS) includes a number of bundled system service programs. Among these are two program librarians; a linkage editor; disk, diskette, and tape initialization routines; system and user dump routines; two print utilities; a catalog manipulation utility; a disk dump/restore utility; a system patch routine; system installation facilities; a security maintenance utility; and a system activity monitor.

EXTENDED SYSTEM SOFTWARE: This optional, separately priced extension of OS/3 provides six additional software components that significantly enhance the utilization and operation of the System 80. These components are described in the following paragraphs.

The *Screen Format Generator (SFG)* is designed to facilitate the programming of screen formats for System 80 workstations by enabling users to create, modify, and delete formats and maintain the files in which these formats are stored. Prompting at each step of the process is optional. Formats generated by the SFG are independent of user programs, and can be changed without necessitating recompilation of the programs. The stored formats can be either shared with other users or restricted.

The *Dialog Specification Language (DSL)* is a high-level language designed to facilitate the creation of interactive dialogs between the System 80 and its users. Each dialog is a series of questions to which the user at a workstation or remote terminal responds with appropriate information. DSL allows the programmer to specify the dialog structure, format and mapping rules, and record structure. The DSL translator processes the specifications and stores the resulting dialog. The OS/3 Dialog Processor responds to requests to display prefiled dialogs, extracts the data entered in response to the dialog queries, and routes the data to the appropriate user programs.

The *Data Utility* is a versatile utility program for reproducing and maintaining data files on cards, tape, disk, or diskette. Statements describing the files and the desired processing are entered either through a job control stream (in batch mode) or in response to screen prompts (interactively). The Data Utility can compare files, insert or delete records, edit records, transfer existing files to other types of devices, produce a printed copy of any file, etc.

SORT/MERGE can operate either as an independent sort/merge program defined and initiated by JCL statements, or as a modular sort/merge subroutine integrated into user programs. Input and output to the sort or merge may be on disk, diskette, or magnetic tape, and work files may be on either disk or tape. Blocked or unblocked records of fixed or variable length can be sorted in ascending or descending sequence. Up to 255 key fields can be specified, and the key fields can have any of 7 formats.

SORT3 is an IBM System/3 and System/34 compatible sort program that can sort and reformat selected records from as many as nine input files on cards, tape, disk, or diskette. SORT3 can perform full-record sorts, tag sorts, and summary sorts.

The *Spooling and Job Accounting* facility increases system throughput by transferring data between low-speed peripheral devices and disk storage independently of the programs that use the data. Both input spooling and output spooling are provided. Job accounting information for each job that runs on the system is generated as part of the spooling function. Special programs are provided to process this information and produce a detailed job accounting report.

PROGRAMMING LANGUAGES: System 80 users have a choice of six programming languages: Cobol, Fortran IV, Basic, RPG II, Escort, and BAL.

The OS/3 *Cobol* compiler conforms to the specifications of American National Standard Cobol X3.23-1974. The following standard Cobol language modules are implemented, all at Level 2: Nucleus, Table Handling, Sequential I/O, Relative I/O, Indexed I/O, Sort, Segmentation, Library, Debug, Inter-Program Communications, and Communications. In addition, the compiler contains a number of useful extensions, including a non-English language feature, an extended program test facility, workstation support, and transaction processing support.

The Cobol Editor is a separate program product that provides for the creation and updating of Cobol source programs at a workstation. The System 80 Editor is prerequisite.

The OS/3 *Fortran IV* compiler implements the ANS Fortran X3.9-1966 language, together with numerous extensions designed to provide compatibility with IBM DOS Fortran IV and Sperry Univac Series 70 Fortran. Direct-access files, formatted screen services, and debugging and diagnostic features are available.

OS/3 *Basic* is an interactive programming system that is compatible with Dartmouth Basic and with American National Standard Minimal Basic X3.60-1978, with extensions. Files, subprograms, string handling, chaining, and user-defined functions are supported. Basic source programs can be entered and compiled interactively, and syntax errors can be corrected immediately. During a single interactive Basic session, a user can enter, modify, execute, and save programs.

OS/3 *RPG II* is an industry-compatible report program generator with extensions designed to facilitate programming and maintenance. It can compile RPG II source statements written for the IBM System/3, System/34, System/360, and System/370 computers and for the Univac 9200, 9300, 9400, and 9480. Significant extensions include an Auto Report facility that simplifies RPG II programming, IMS "action program" support, workstation support, a formatted error analysis capability, and an RPG II Editor that facilitates the creation and editing of RPG II programs from a workstation or terminal. The System 80 Editor is a prerequisite to the utilization of the RPG II Editor facility.

Escort is a high-level language, introduced with the Univac BC/7 computers, that facilitates the preparation of programs for generating reports, entering data, processing transactions, making file inquiries, and maintaining data files. The Escort system features two modes of operation. In the Tutorial mode, the novice user is guided through the program development process by means of extensive prompting and diagnostics. The Program mode permits more experienced users to enter programs more rapidly, and they can revert to the Tutorial mode whenever problems are encountered.

Basic Assembly Language (BAL) is a versatile symbolic language that gives the user full control of the System 80 hardware facilities by providing a mnemonic code for each machine instruction. BAL also provides facilities for macro instructions, procedural directives, and operand expressions.

EDITOR: The System 80 Editor is an interactive facility for creating, copying, and merging files and for adding, deleting, and modifying text. It provides convenient commands for creating and updating records in data files, library files, and spool files. File protection facilities prevent a file being modified by the Editor from being destroyed or incorrectly altered either by direct user action or through a system failure.

MENU GENERATOR: The Menu Generator enables user programs to create and maintain menus of predefined actions

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for the workstation operator. Menus are stored and can be shared or restricted.

INFORMATION MANAGEMENT SYSTEM: The System 80 Information Management System (IMS) is an interactive transaction processing system with integrated file management facilities. It includes an inquiry/update language, UNIQUE, that is designed for general-purpose file processing and requires no programming knowledge. IMS also supports application programs written by the user in Cobol, RPG II, or BAL. Programming is simplified because IMS handles all the communications and file I/O functions.

IMS is transaction-oriented. Processing is triggered by a message from a workstation or remote terminal. Application programs, called "action programs," process the input message, access data files as necessary, and return the appropriate response to the terminal. IMS allocates the system resources, schedules the required action programs, and provides file protection through a record locking facility and both on-line and off-line recovery provisions.

IMS can access conventional files, specially defined files, or DMS data bases. It supports the processing of transactions in batch mode as well as in the normal interactive mode. Input to IMS can come from any interactive workstation or terminal. Terminals can either be dedicated to IMS or dynamically connected and disconnected during an on-line session. Messages can be sent from one IMS terminal to another. Extensive recovery facilities can be utilized without user programming. IMS is now available in both single-thread and multi-thread versions. Extended System Software is a prerequisite to IMS.

DATABASE MANAGEMENT SYSTEM: DMS is Sperry Univac's CODASYL-compatible data base management system for the System 80 computers. It consists of a collection of programs designed to handle the description, initialization, creation, accessing, maintenance, backup, and recovery of data bases.

DMS has four major components: the Data Description Language (DDL), Data Manipulation Language (DML), Data Base Management System (DBMS), and Data Base Utilities. The DDL enables users to define a data base and various "views" of the data base. The data base can be accessed by means of DML statements in the Procedure Division of Cobol application programs. The DBMS allows concurrent access to the shared data base by multiple users in any combination of batch, transaction, and time-sharing programs. The Data Base Utilities include routines for loading and dumping the data base, reporting, printing, initialization, and off-line recovery. A more detailed description of DMS can be found in Report 70E-877-01.

Interfacing between DMS and the IMS transaction processing system can be accomplished in several ways. DMS data bases can be accessed by Cobol-coded IMS action programs through DML statements embedded in the programs. Alternatively, DMS data bases can be used to build IMS "defined files" which are accessible via the UNIQUE inquiry/update language or via IMS action programs coded in Cobol, RPG II, or BAL. The Extended Systems Software and Cobol are prerequisites to DMS.

COMMUNICATIONS SOFTWARE: The *ICAM (Integrated Communications Access Method) Terminal Support Facility* is a modular component of OS/3 that provides concurrent support for multiple user programs communicating with a variety of terminals and line types. ICAM controls the physical input/output operations between the System 80 processor and the Single-Line Communications Adapters (SLCAs), and performs the following functions: message queuing, multiple destination routing, activity scheduling and priority control, timer service, checkpoint/restart procedures, journal control, and accumulation of message and error statistics.

The user can choose the required level of ICAM support at system generation time. There are four available interfaces between the user's message processing programs and the ICAM modules, and each interface contains its own unique set of macroinstructions. The Standard Interface is a conventional GET/PUT communications interface that automatically queues input and output messages in network buffers. The Transaction Control Interface is specifically designed for efficient processing of transaction programs in conjunction with IMS. The Direct Data Interface permits users' programs to interface directly with the ICAM remote device handlers. The Communications Physical Interface provides an interface between ICAM and users' programs at the physical I/O level, which may save main storage but shifts most of the communications programming effort to the user.

The *NTR (Nine Thousand Remote) System Utility* enables a System 80 to act as a remote batch terminal to a Sperry Univac 1100 Series computer system. NTR is controlled by macroinstructions and console directives, and it can run concurrently with other System 80 jobs. The ICAM Terminal Support Facility is a prerequisite.

The *Distributed Data Processing Transfer Facility* permits the distribution and cooperative processing of user jobs and files among multiple OS/3-supported computers in different locations. The user can view each node in his distributed processing network as an available resource for scheduling and executing his work. Using straightforward commands, he can initiate job distribution and file transfer operations without regard for the intricacies of the hardware, software, and communications protocols involved. The Extended System Software, ICAM Terminal Support Facility, and either the DCA Termination Systems or one of the Packet-Switched Public Data Network Systems are prerequisites to the Distributed Data Processing Transfer Facility.

The *Distributed Data Processing File Access Facility* enables user programs to access files resident on remote OS/3 systems via Sperry Univac's UDLC communications protocol. Program-to-program communications are also supported. The DDP File Access Facility requires the ICAM Terminal Support Facility and either the DCA Termination Systems or one of the Packet-Switched Public Data Network Systems.

The *Distributed Data Processing IMS Transaction Processor* enables transactions created by a workstation operator or IMS action program to be routed between OS/3-supported systems. IMS integrated recovery facilities are provided for system integrity control. Prerequisites are the IMS Multi-Thread system, ICAM Terminal Support Facility, and either the DCA Termination Systems or one of the Packet-Switched Public Data Network Systems.

The *Remote Terminal Processor* permits a System 80 processor to interface to an IBM system as a multileaving workstation using BSC protocol. The ICAM Terminal Support Facility and Extended System Software are required.

The *IBM 3270 Emulator* provides an interface that permits a System 80 to emulate a 3270 terminal. The ICAM Terminal Support Facility and Extended System Software are prerequisites.

The *DCA Termination Systems* are facilities that establish and control a DCA communications network and permit a communications program to establish a session with terminals or programs on other systems. The ICAM Terminal Support Facility and Extended System Software are required.

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Eight *Packet-Switched Public Data Network Programs* are available to provide an interface to the following foreign data networks: the Nordic X.21 network, United Kingdom X.25 network, German Datex-L and Datex-P networks, the French Transpac network, the Canadian Datapac network, and the Japanese DDX-C and DDX-P networks. All eight programs require the ICAM Terminal Support Facility.

A *UTS 400 Cobol Compiler, Edit Processor,* and *Load/Dump Facility* are provided to facilitate the use of the Sperry Univac UTS 400 Universal Terminal System with the System 80. These software products enable the System 80 to be used for efficient creation, maintenance, and loading of UTS 400 programs and data files.

The *UTS 4000 Loadable Character Set Generator* provides a means of generating user-defined character sets to be used with the loadable character set hardware feature on Sperry Univac UTS 40 single-station terminals. Users have the option of starting with an existing character set already defined for the UTS 40 or creating a new character set. The UTS Load/Dump Facility and ICAM Terminal Support Facility are required.

CONVERSION AIDS: Sperry Univac is marketing the System 80 as a replacement for a number of older small computer systems, and is offering appropriate software aids to simplify the conversion process.

For *Univac 90/25, 90/30, and 90/40* users migrating to a System 80 Model 8, the Cobol Conversion Group provides Cobol 1968 to Cobol 1974 conversion. The System 80 Model 8 also provides temporary support for the file access methods used on the Series 90 models.

For *Univac 9200/9300* users, the OS/3 RPG II compiler can be operated in a 9200/9300 mode that permits direct compilation of 9200/9300 RPG source programs, and 9200/9300 sequential tape files can be processed directly by OS/3 programs. To bridge the remaining areas of incompatibility, Sperry Univac offers a 9200/9300 data file transcriber, assembly language translator, Cobol and COPY translator, and library transcriber.

For *Univac 9400/9480* users operating under OS/4, OS/3 offers a high degree of compatibility. Most OS/4 RPG and Fortran source programs can be recompiled by the OS/3 compilers with little or no change. Available conversion aids include an OS/4 JCL translator, assembly language translator, Cobol and COPY translator, data file converter, and library transcriber.

For *IBM System/3* users, OS/3 provides a System/3 mode on the RPG II compiler that permits direct compilation of System/3 source programs, a System/3-compatible sort (SORT3), a disk access method (MIRAM) that is compatible with the System/3 disk access method, compatible utility functions, and an OCL processor that accepts System/3 OCL control streams. Available conversion aids include a System/3 disk data file conversion procedure, a Model 10 source and proc transcriber, and a Model 12/15 source and proc transcriber.

For *IBM System/32 and System/34* users, the OS/3 RPG II compiler provides a high degree of source-language compatibility. Conversion aids include procedures for transcribing System/32 and System/34 data files and source and proc libraries to OS/3 formats.

For *Honeywell 100 Series* users, Sperry Univac offers a Cobol translator and a data file transcriber.

For *Honeywell 200/2000 Series* users, available conversion aids include a Cobol translator, an Easycoder converter, and a data file transcriber.

For *Honeywell Level 62 and Level 64* users, conversion to a System 80 is facilitated by a Cobol translator and a program library and data file transcriber.

APPLICATION PROGRAMS. Sperry Univac currently offers 10 application software systems for the System 80 computers operating under OS/3.

Univac Industrial System 80 (UNIS 80) is a comprehensive production and inventory control system. It provides production engineering data management, product costing, customer order processing, inventory status and control, forecasting and analysis, master scheduling, materials requirement management, production planning, and work order management. The system provides both interactive and batch features and uses data base technology. It is available in both a ready-to-use version (UNIS 80) and in an extended, source-code version (UNIS 80-E) that provides additional functions.

Accounting Control System 80 (ACS 80) is a series of packaged applications written in RPG II for general business accounting functions. Four separate modules are available: Accounts Receivable, Accounts Payable, General Ledger, and Payroll. All four modules offer on-line data entry and inquiry capabilities. The on-line functions are performed by ICS 80 (below) and IMS/UNIQUE.

Unifacs 80 is a financial accounting system written in Cobol. IMS action programs accept screen input and perform editing, validation, and file updating. Files are also available for batch processing. Four separate modules are available: Accounts Payable, Accounts Receivable, Payroll/Personnel, and General Ledger/Budgeting.

Accounting Management System 80 (AMS 80) is an interactive system written in RPG II. Four modules are available: Accounts Payable, Accounts Receivable, Payroll, and General Ledger. AMS 80 is a basic accounting system for applications that do not require the extended functions offered by Unifacs 80.

Word Processing System 80 (WPS 80) provides for the creation, editing, formatting, and printing of documents and form letters. Documents can be stored, retrieved, or deleted from the document data base and OS/3 MIRAM file under operator control.

SUFICS 80 is a financial modeling system consisting of five modules: Financial Modeling, Decision Support System, Hierarchical Consolidation, Symbolic Editor and Renumbering Routine, and Risk Analysis.

Wholesale Applications Management System 80 (WAMS 80) is an interactive wholesale distribution system that includes four modules: Inventory/Sales Analysis, Order Entry/Billing, Credit Return, and Expanded Sales Analysis.

Information Collection System 80 (ICS 80) is an on-line data entry system designed to permit efficient collection of data through multiple display terminals. A broad range of data validation and field processing features is provided. ICS 80 can operate simultaneously with other jobs in a multiprogramming environment. ICAM and IMS are prerequisites.

Univac Distribution Information System—Wholesale (UNIDIS—Wholesale) is a comprehensive distribution control system that encompasses separate subsystems for order entry and processing, stock control, and inventory management. UNIDIS is an on-line, data base-oriented system, written in Cobol, that provides on-line or batch order entry, pre- and post-billing, picking lists, picking confirmation, shipping notices, invoicing, back orders, credit checking, purchase orders, warehouse receiving, demand forecasting, forecast model selection, suggested order quantities, safety stock control, and inventory management simulation.

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Apparel Information System provides on-line and batch facilities for the apparel industry. Functions include order entry, order allocation, inventory control, production planning, work-in-process reporting, raw material requirements planning, invoicing, sales and booking reports, pick slip registers, and management reports and screen formats.

PRICING

The System 80 can be purchased, rented on a one-year contract, or leased on a five-year contract.

SOFTWARE AND SUPPORT: The basic OS/3 System Control Software (SCS) is bundled with the System 80 hardware. All of the other System 80 software products are separately priced, and the monthly rental charges for these products are listed in the accompanying price list. In addition, Sperry Univac offers on-site resolution of SCS problems at a fixed monthly Extended Support Services (ESS) charge of $250. ESS for all System 80 Model 8 program products is now separately priced.

CONTRACT TERMS: The standard Sperry Univac use and service agreements allow unlimited use of the equipment (exclusive of the time required for remedial and preventive maintenance). There are no extra-use charges. The basic maintenance charge covers maintenance of the equipment for nine consecutive hours a day between the hours of 7 a.m. and 6 p.m., Monday through Friday. Extended periods of maintenance are available at premium rates. The premiums for additional coverage are a percentage of the base maintenance rate and are as follows:

	Hours of Coverage								
	4	8	9	10	12	16	18	20	24
Monday through Friday	—	—	100	105	110	115	120	125	130
Saturday	5	8	9	—	11	12	—	14	15
Sunday and Holidays	7	10	12	—	14	16	—	18	20

Maintenance service performed outside the contracted maintenance period is subject to the following rates:

	Saturday, Monday through Friday	Sunday, and Holidays
Min. charge per call	$264	$300
Each add'l. hour	132	150
Each add'l ¼ hour	33	38

In addition to its standard short-term rental and five-year lease agreements, Sperry Univac offers special five-year and seven-year leases to state and local government users.

EQUIPMENT: All necessary control units and adapters are included in the indicated prices for the following System 80 configurations. However, the quoted prices do not include separately priced software products, and the quoted monthly rental prices do not include equipment maintenance charges.

MINIMUM MODEL 4 SYSTEM: Consists of Model 4 Processor Complex (CPU with 512K bytes of main memory, 118.2-megabyte disk drive, console workstation, and controls for disk drive, console, diskette drive, and printer or card reader), plus Model A Console Keyboard, F2787-01 Head/Disk Assembly, 8422-00 Manual-Load Diskette Drive, and 180-lpm 0789-99 Printer with print band. The purchase price is $81,674, monthly maintenance is $533, and monthly rental on a one-year contract is $2,521.

8-WORKSTATION MODEL 6 SYSTEM: Consists of Model 6 Processor Complex (same components as Model 4) plus Extended Channel Functionality, additional memory modules for a total of 1.5 megabytes of main memory, 7 Model 2 Workstations, 8 Model B Keyboards, F2787-01 Head/Disk Assembly, 8420-00 Autoload Diskette Subsystem with manual-load expansion drive, 8470 Disk Drive (491 megabytes), 2413-99 Disk Channel/Control, 640-lpm 0789-93 Printer with print band, and two 200-cps 0798-96 workstation printers. The purchase price is $254,337, monthly maintenance is $1,577, and monthly rental on a one-year contract is $7,870.

12-WORKSTATION MODEL 8: Consists of a Model 8 Processor Complex (CPU with one megabyte of main memory, Channel Controller with one byte multiplexer and one selector channel, Input/Output Microprocessor with a workstation controller and diskette controller, and a system console with keyboard) plus additional memory modules for a total of four megabytes, one additional selector channel, an additional workstation controller and 12 Model 1 Workstations with Model B Keyboards, one 8420 Autoload Diskette Subsystem with add-on manual diskette drive, one Integrated Disk Control Unit and four 8470 Disk Drives (1.9 gigabytes), a Uniservo 22 Magnetic Tape Subsystem with controller and two drives, one Paper Peripheral Controller, and two 640-lpm 0789-03 Line Printers. The purchase price is $488,425, monthly maintenance is $2,404, and monthly rental on a one-year contract is $17,248.

EQUIPMENT PRICES

		Purchase	Monthly Maint.	Monthly Charges* 1-Year Lease	Monthly Charges* 5-Year Lease
PROCESSORS AND MEMORY					
3080-99	System 80 Model 4 Processor; includes 512K bytes of main storage, basic control storage, disk cache facility, disk channel/controller and disk drive, workstation controller and console workstation, diskette controller, and paper peripheral controller	$66,082	$416	$2,080	$1,650
3080-83	System 80 Model 4 Processor; same as 3080-99, but includes Extended Channel Functionality (ECF)	72,910	466	2,250	1,790
3080-95	System 80 Model 6 Processor; includes 512K bytes of main storage, High Performance Control Storage (HPCOS), disk cache facility, disk channel/controller and disk drive, workstation controller and console workstation, diskette controller, and paper peripheral controller	94,062	468	3,050	2,460
F2783-12	256K Storage Expansion; expands main storage from 512K to 768K bytes or from 768K to 1024K bytes	5,821	29	166	132
F2783-91	512K Storage Expansion; expands main storage in 0.5-megabyte increments from 1.5 to 2.0 megabytes or from 2.5 to 4.0 megabytes	11,642	58	332	265
F2783-90	512K Storage Expansion; expands main storage from 2.0 to 2.5 megabytes	11,642	58	332	265
F2783-92	512K Storage Expansion; expands main storage from 1.0 to 1.5 megabytes	11,642	58	332	265

*Rental prices do not include maintenance.

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EQUIPMENT PRICES

		Purchase	Monthly Maint.	Monthly Charges* 1-Year Lease	Monthly Charges* 5-Year Lease
PROCESSORS AND MEMORY (Continued)					
3076-99	System 80 Model 8 Processor; includes 1024K bytes of main storage, control storage, channel controller with one byte multiplexer and one selector channel, an IOMP with a workstation controller and a diskette controller, and a console with keyboard and two integral diskette drives	123,900	615	6,220	3,080
F3959-00	1024K Storage Expansion; expands main storage from 1.0 to 2.0 megabytes and from 2.0 to 3.0 megabytes; also expands storage from 3.0 to 4.0 megabytes if F3959-01 is already included in the system	14,400	90	575	370
F3959-01	2048K Storage Expansion; expands main storage from 1.0 to 3.0 megabytes and from 6.0 to 8.0 megabytes; also expands storage from 2.0 to 4.0 megabytes if F3959-00 is already included in the system	28,800	180	1,150	740
F3958-99	Second Main Storage Unit with 2.0 megabytes of main storage; expands main storage from 4.0 to 6.0 megabytes; requires F3964-01 power supply	45,000	290	1,550	1,160
PROCESSOR FEATURES					
For Models 4 and 6:					
F3358-99	System 80 Model 4 to Model 6 Upgrade; requires F3425-00 Micrologic Expansion, 1943-91 Model 6 ECF, 1943-99 I/O Microprocessor (IOMP), or F3367-97 Model 4 ECF Conversion	27,980	52	970	810
F3358-98	System 80 Model 4 ECF to Model 6 Upgrade; mutually exclusive with F3367-97	27,980	52	970	810
F3367-97	Model 4 ECF Conversion; converts ECF to IOMP equivalent; provides support for eight Single Line Communications Adapters (SLCAs) and seven integrated peripheral controllers	9,516	47	338	272
F3367-96	Model 6 ECF Conversion; same characteristics as F3367-97	9,516	47	338	272
1943-93	Model 4 Extended Channel Functionality (ECF); adds support for the 3rd through 7th SLCA and the 5th through 7th integrated peripheral control, or for the 3rd through 8th SLCA and the 5th and 6th peripheral control; requires Processor Power Expansion; mutually exclusive with IOMP	6,093	45	137	110
1943-91	Model 6 ECF; same characteristics as 1943-93; mutually exclusive with F3425-00 and IOMP	6,093	45	137	110
1943-99	I/O Microprocessor (IOMP); adds support for the 3rd through 8th SLCA and the 5th through 7th peripheral control; mutually exclusive with ECF, F3425-00, and F2829-00	16,344	97	510	408
F3425-00	Micrologic Expansion; provides I/O channel functionality via microcode; mutually exclusive with ECF and IOMP	3,675	21	111	88
F2829-00	Processor Power Expansion; provides +5V dc power expansion; required for 1943-91/-93; mutually exclusive with IOMP	735	5	35	27
F3921-99	System 80 Model 3 to Model 4 Upgrade; requires a minimum of 512K bytes of main storage	1,000	—	29	23
F3921-98	Model 3 to Model 4 Upgrade; same as F3921-99, but also expands memory from 256K to 512K bytes	6,000	29	195	155
F3921-97	Model 3 to Model 4 Upgrade; same as F3921-99, but also expands memory from 512K to 768K bytes or from 768K to 1024K bytes	6,000	29	195	155
F3921-86	System 80 Model 3 to Model 6 Upgrade; requires a minimum of 512K bytes of main storage; also requires F3425-00, 1943-91, 1943-99, or F3367-97	28,980	52	548	472
F3921-85	Model 3 to Model 6 Upgrade; same as F3921-86, but also expands memory from 256K to 512K bytes	30,159	81	714	604
F3921-84	Model 3 to Model 6 Upgrade; same as F3921-86, but also expands memory from 512K to 768K bytes or from 768K to 1024K bytes	30,159	81	714	604
F3921-60	System 80 Model 5 to Model 6 Upgrade; requires a minimum of 512K bytes of main storage	6,000	—	170	136
F3921-59	Model 5 to Model 6 Upgrade; same as F3921-60, but also expands memory from 256K to 512K bytes	7,000	29	336	268
F3921-58	Model 5 to Model 6 Upgrade; same as F3921-60, but also expands memory from 512K to 768K bytes or from 768K to 1024K bytes	7,000	29	336	268
F3619-02	Console Keyboard, Model A; provides a typewriter-style keyboard for the console workstation; choice of 8 character sets	403	2	13	9
F3620-02	Console Keyboard, Model B; provides a typewriter-style keyboard, 10-key numeric pad, and function pad; choice of 8 character sets	428	3	16	14
F2787-98	Head/Disk Assembly; 118.2 megabytes; for use in integrated disk drive only	2,912	19	85	68
F2787-99	Head/Disk Assembly with Fixed Heads; for use in integrated disk drive only	3,883	37	132	110
F2787-97	Head/Disk Assembly with Fixed Heads; provides 0.86 megabyte of fixed-head storage for field-upgrading an F2787-98	4,383	37	145	120
Features for Model 8:					
F3962-00	Integrated Selector Channel; supports up to 8 controllers; requires F3960-00 if 4th selector channel is configured	7,650	41	255	166
F3960-00	Channel Controller; supports up to 2 selector channels	26,250	114	1,050	571

*Rental prices do not include maintenance.

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EQUIPMENT PRICES

		Purchase	Monthly Maint.	Monthly Charges* 1-Year Lease	5-Year Lease
PROCESSOR FEATURES (Continued)					
1982-03	I/O Expansion Cabinet; provides housing for up to 3 additional IDCUs, 8 additional control units, or 14 SLCAs; required if 2nd IOMP or 4th IDCU is configured	18,838	57	754	410
F3367-95	Second Input/Output Microprocessor (IOMP); supports one Universo 10 tape subsystem and up to 8 control units or up to 14 SLCAs; requires 1982-03	10,800	50	475	285
F3961-00	Byte Adapter; supports up to 4 of the following Series 90 printers: 0716, 0770, and 0776	3,750	20	150	100
F3964-00	Power Supply for Model 8 Processor Complex; +5V; requirement depends on configuration	3,180	12	105	70
F3964-01	Power Supply; 3.8V; required if more than 4.0 megabytes are configured	3,180	12	105	70
F3964-02	Power Supply for I/O Expansion Cabinet; +5V; requirement depends on configuration	3,180	12	105	70
F3619-02	Console Keyboard, Model A; provides a typewriter-style keyboard for the console workstation; choice of 8 character sets	403	2	13	9
F3620-02	Console Keyboard, Model B; provides a typewriter-style keyboard, 10-key numeric pad, and function pad; choice of 8 character sets	428	3	16	14
DISK STORAGE					
8417-00	8417 Disk Drive Cabinet; houses up to three F2834-00 Fixed-Media Disk Drives	1,234	5	37	29
F2834-00	Fixed-Media Disk Drive; requires an 8417-00 Cabinet and one F2787-XX HDA per drive	5,525	30	205	164
F2787-00	Head/Disk Assembly with Fixed Heads; provides 118.2 megabytes of fixed-media storage and 0.86 megabyte of fixed-head storage	3,883	37	132	110
F2787-01	Head/Disk Assembly; provides 118.2 megabytes of fixed-media storage	2,912	19	85	68
F2787-02	Head/Disk Assembly with Fixed Heads; provides 0.86 megabyte of fixed-head storage for field-upgrading an F2787-01	4,383	37	145	120
8419-00	8419 Disk Drive; 72.3-megabyte removable-media disk drive and cabinet; maximum of 7 drives per system	19,340	98	531	429
F3542-00	8419 Removable Disk Pack; for 8419-00 drives; 72.3 megabytes; maintenance contract not available	446	—	27	22
8420-00	Autoload Diskette Subsystem; cabinet and one drive capable of processing up to 20 diskettes; maximum of two unless 8422-00 is installed	4,235	26	114	90
F2833-00	8420 Manual Diskette Expansion; adds one manual diskette drive within the 8420-00 cabinet	1,509	9	43	33
8422-00	Manual Diskette Subsystem; cabinet and one manual diskette drive (up to 1-megabyte capacity)	1,509	9	43	33
F2785-00	8422 Second Drive Expansion; adds a second drive to the 8422-00 cabinet	1,412	9	38	31
F2785-02	8422 Dual Drive; adds a third and fourth diskette drive to the 8422-00 cabinet	2,695	16	72	58
2413-99	Disk Channel/Controller, Additional; supports up to eight 8470 disk units; requires Model 4 or 6 processor with ECF; mutually exclusive with IOMP	29,359	190	960	765
F3734-00	Integrated Disk Control Unit (IDCU) for 8416/8418 disk drives; supports up to 8 drives; one per system (Model 8 processor only)	7,020	35	234	187
F3734-01	IDCU for 8417/8419 disk drives; supports up to 8 drives; one per system (Model 8 processor only)	7,020	35	234	187
F3734-02	IDCU for 8470 disk drives; supports up to 8 drives; a maximum of 24 drives of all types can be configured (Model 8 processor only)	12,573	40	416	330
8470-99	Disk Storage Unit; 491 megabytes of storage; requires 2413 DC/C or F3734-02 IDCU	33,600	120	992	735
WORKSTATIONS					
3560-79	System 80 Local Workstation, Model 1; free-standing, microprocessor-based CRT display station; requires F3619-00 or F3620-00 Keyboard	3,163	13	89	69
Features for Model 1 Workstation:					
F3619-00	Keyboard, Model A; typewriter-style keyboard; choice of 8 character sets	403	2	14	9
F3620-00	Keyboard, Model B; typewriter-style keyboard, 10-key numeric pad, and function pad; choice of 8 character sets	428	3	17	14
0797-99	Matrix Printer; 80 cps; 80 positions; choice of 8 character sets	1,900	27	84	63
F3563-00	Forms tractor; accommodates continuous forms ranging from 3 to 10 inches wide	152	1	6	5
F3564-00	Pin-Feed Platen; 9.5 inches	152	1	6	5
0798-68	Matrix Printer; 200 cps, bidirectional; 132 positions; requires 0789 or 0776 printer	6,650	64	188	156
F2919-00	Peripheral Table; for System 80 peripherals such as workstation and card reader	368	—	10	9
F3574-00	Tilt/Rotate Base for System 80 workstation	160	—	9	7
F2791-00	Workstation Control; provides control and interface facilities for configuring up to eight additional workstations; maximum of four	1,897	11	56	44
3561-66	System 80 Local Workstation, Model 2; free-standing, microprocessor-based CRT display station; requires F3619-00 or F3620-00 keyboard (see Model 1 above)	3,732	39	128	99

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EQUIPMENT PRICES

		Purchase	Monthly Maint.	Monthly Charges* 1-Year Lease	Monthly Charges* 5-Year Lease
WORKSTATIONS (Continued)					
Features for Model 2 Workstation:					
F3643-01	8-Bit Parallel Interface; provides for attachment of one 0798, 0797, or 0791 character printer	560	3	21	14
F3644-02	8-Bit Parallel Interface Expansion; for Model 2 workstations equipped with loadable character set; requires F3644-04	320	2	10	8
F3644-03	Loadable Character Set	320	2	10	8
F3644-04	Expansion Module; supports F3644-03 and F3644-02	480	2	15	12
F3642-00	32K RAM; provides 32K bytes of memory for user programmability	1,600	3	50	40
F3642-01	32K RAM, Additional; requires F3642-00	800	2	24	20
F3642-99	64K RAM; provides 64K bytes of memory for user programmability	1,800	5	60	45
F2929-00	Workstation Control; provides control and interface facilities for configuring up to eight additional workstations; maximum of four	1,897	11	56	44
8406-04	Diskette Drive; free-standing; one megabyte of storage; required for program load on Model 2 Workstation; requires F3643-01	3,600	22	103	79
0791-87	Correspondence-Quality Printer; 132 positions; friction platen; choice of 9 languages; requires F3643-01 in Model 2 Workstation	6,550	69	243	181
0791-85	Same as 0791-87, but also includes bottom feed assembly	6,742	71	250	188
F3313-00	Pin-Feed Platen; 9.0 inches	260	—	—	—
F3313-01	Pin-Feed Platen; 9.375 inches	260	—	—	—
F3564-00	Pin-Feed Platen; 9.5 inches; for applications that require immediate removal of forms after printing; not recommended for use with F3563-00	152	1	6	5
F3313-02	Pin-Feed Platen; 14.375 inches	260	—	—	—
F3316-00	Forms Tractor; requires friction platen	600	3	20	13
F3563-00	Forms Tractor; accommodates sprocketed forms from 3 to 10 inches wide	152	1	6	5
F3314-00	Printer Stand; for 0791-85	225	—	—	—
F3540-00	Cut Sheet Feeder; requires paper tray	1,769	13	58	45
F3692-00	Paper Tray; 8.5 x 11.0 inches	163	1	5	4
F3692-01	Paper Tray; 8.5 x 14.0 inches	163	1	5	4
0797-97	Matrix Printer; 80 cps; 80 positions; requires F3643-01 in Model 2 Workstation	1,900	27	84	63
0798-96	Matrix Printer; 200 cps, bidirectional; 132 positions; choice of 10 character sets; requires F3643-01 in Model 2 Workstation	6,650	64	188	156
F3582-00	Operator Selection of 6 or 8 lines per inch; mutually exclusive with F3583-00	152	1	4	3
F3583-00	9-Wire Printhead; requires 96-character ASCII character set	300	2	16	9
F2648-00	Document Parting Bar	114	1	3	2
F3587-00	Compressed Print; 14 characters per inch	185	1	6	5
0425-97	Data Processing Quality Printer; 160 cps, bidirectional; includes 8 operator-selectable character sets and interface to Model 2 Workstation	3,300	45	85	75
0425-96	High-Definition Printer; 160 cps bidirectional with 9 x 7 dot matrix characters; 40 cps unidirectional with 18 x 40 dot matrix characters; includes interface to Model 2 Workstation	3,600	50	92	82
F3864-00	High-Definition Conversion; converts 0425-97 to 0425-96	500	5	35	30
F3861-00	Forms Tractor	95	1	5	4
0789-63	Line Printer; 180 lpm; 132 positions; requires F2865-XX print band and F3643-01 in Model 2 Workstation	10,584	87	300	222
0789-60	Same as 0789-63, but 300 lpm	12,500	133	313	232
F2970-01	Upgrades 180-lpm printer to 300 lpm	1,916	46	12	9
F2865-06	Print Band; 48-character numeric scientific	184	—	—	—
F2865-09	Print Band; 48-character United Kingdom	184	—	—	—
F2865-05	Print Band; 96-character ASCII (Print bands are also available for languages other than English)	184	—	—	—
MAGNETIC TAPE					
0871-97	Uniservo 10 9-Track Phase-Encoded Prime Tape Unit and Controller; 40 KB/sec; supports up to 7 additional 0871-83 drives	31,805	174	1,051	772
0871-93	Uniservo 10 9-Track Phase-Encoded and NRZI Prime Tape Unit and Controller; 40/20 KB/sec; supports up to 7 additional 0871-83 or 0871-81 drives in any combination	34,023	210	1,155	847
0871-89	Uniservo 10 7-Track NRZI Prime Tape Unit and Controller; 20/13.9/5 KB/sec; supports up to 7 additional 0871-83, 0871-81, or 0871-79 drives in any combination	33,089	207	1,142	840
0871-85	Same as 0871-91, except it permits reading of IBM 7-track compatible tape	33,089	207	1,142	840
F3135-00	9-Track NRZI Capability for PE Controller; required for control of NRZI drives	788	25	60	46
F3133-99	7-Track NRZI Capability for 9-track PE/NRZI Controller; required for control of 7-track drives	446	5	24	17
F3133-98	7-Track NRZI Native-Mode Capability for 9-track PE/NRZI Controller	446	5	24	17
0871-83	Uniservo 10 9-Track Phase-Encoded Add-On Tape Unit; 40 KB/sec.	14,215	81	363	262
0871-81	Uniservo 10 9-Track Phase-Encoded and NRZI Add-On Tape Unit; 40/20 KB/sec.	15,612	89	402	287
0871-79	Uniservo 10 7-Track NRZI Add-On Tape Unit; 20/13.9/5 KB/sec.	14,215	81	363	262

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EQUIPMENT PRICES

		Purchase	Monthly Maint.	Monthly Charges* 1-Year Lease	Monthly Charges* 5-Year Lease
MAGNETIC TAPE (Continued)					
F3774-00	Integrated Tape Control Unit; interfaces up to four streaming tape drives; mutually exclusive with Uniservo 10	4,360	15	170	132
1978-99	Streaming Tape Drive and Cabinet; 9-track, 1600 bpi; 160/40 KB/sec.	9,280	91	280	232
F3782-00	Streaming Tape Drive; one may be installed in 1978-99 cabinet	8,600	87	260	215
5058-00	Uniservo 22 Subsystem; includes two Uniservo 22 tape drives and control for up to eight Uniservo 22 or Uniservo 24 drives (Model 8 processor only)	75,840	377	2,129	1,580
5058-02	Uniservo 22 Magnetic Tape Drives; includes two dual-density PE/NRZI drives; 1600/800 bpi, 9-track 75 ips	47,040	245	1,320	980
5058-06	Uniservo 24 Subsystem; includes two Uniservo 24 tape drives and control for up to eight Uniservo 24 or Uniservo 22 drives (Model 8 processor only)	83,520	417	2,349	1,740
5058-08	Uniservo 24 Magnetic Tape Drives; includes two dual-density PE/NRZI drives; 1600/800 bpi, 9-track, 125 ips	54,720	285	1,540	1,140
F0825-00	Dual Channel Feature; provides non-simultaneous operation on two channels of one processor or one channel on each of two processors	4,593	31	110	89
F2627-00	Translation Feature; translation is ASCII/EBCDIC, fieldata/EBCDIC, or fieldata/ASCII	2,064	14	52	36
F2627-01	Second Translation Feature	2,064	14	52	36
PRINTERS					
F2789-00	Paper Peripheral Control; allows connection of two printers (cannot exceed 1500 lpm total) and either two card readers or a card reader and a card punch	1,818	9	50	40
1955-99	Remote Printer Attachment; controls one remotely located 0789-XX or 0798-XX printer up to 5000 feet from the processor complex	3,743	20	108	86
0789-99	Printer; prints 48 characters at 180 lpm; 132 positions; requires F2865-XX Print Band	10,584	87	300	222
0789-96	Printer; prints 48 characters at 300 lpm; 132 positions, requires F2865-XX Print Band	12,500	133	313	232
F2970-00	Upgrades 180-lpm Printer to 300-lpm	1,916	46	12	9
Print Bands for 180-lpm and 300-lpm Printers:					
F2865-01	48-character business/commercial set	184	—	—	—
F2865-06	48-character scientific set	184	—	—	—
F2865-09	48-character set for United Kingdom	184	—	—	—
F2865-04	64-character modified Fortran set	184	—	—	—
F2865-00	64-character modified ASCII set	184	—	—	—
F2865-05	96-character ASCII set	184	—	—	—
F2865-07	128-character universal OCR-B (ISO) set	184	—	—	—
F2865-13	128-character universal OCR H-14 set	184	—	—	—
F2865-18	192-character Cobol-Fortran-business set	184	—	—	—
F2865-08	128-character universal OCR-B (ECMA-11) set	184	—	—	—
F2865-17	128-character universal Univac 77L set	184	—	—	—
F2865-15	128-character universal OCR-A set	184	—	—	—
F2865-19	52-character optimized Cobol/Fortran set	225	—	—	—
F2865-23	64-character set for United Kingdom (Print bands are also available for languages other than English.)	225	—	—	—
0789-93	Printer; prints 48 characters at 640 lpm; 132 positions; requires F3321-XX Print Band	15,650	156	397	298
F3321-XX	Print Band; for 640-lpm printer; available in all the same versions as the F2865-XX Print Band, above	225	—	—	—
0776-99	Printer; prints 48 characters at 1200 lpm; 136 positions; requires F2346-XX Print Cartridge	47,421	325	1,410	1,077
F2346-XX	Print Cartridge; for 1200-lpm printer; available in all the same versions as the F2865-XX Print Band, above	1,440	—	35	26
0798-99	Matrix Printer; 200 cps, bidirectional; 132 positions; choice of 10 character sets; used for off-line screen dumps under workstation control	6,650	64	188	156
F3582-00	Operator Selection of 6 or 8 lines per inch; mutually exclusive with F3583-00	152	1	4	3
F3583-00	9-Wire Printhead; requires 96-character ASCII character set	300	2	16	9
F2648-00	Document Parting Bar	114	1	3	2
F3587-00	Compressed Print; 14 characters per inch	185	1	6	5
CARD EQUIPMENT					
0719-04	Card Reader; 80-column, 300 cpm	6,363	43	171	122
0608-03	Card Punch; 80-column, 75-160 cpm	14,020	93	408	291
F2830-00	Reader Feature for 0608-03; does not provide capability to read and punch same card	648	5	15	13
COMMUNICATIONS					
F2799-XX	Single-Line Communications Adapter, Low-Speed Asynchronous; supports TTY and DCT 500 protocols; ASCII code, half duplex at up to 9600 bps; provides auto answer; choice of RS-232C/X.21.BIS or MIL-188A interface	1,885	11	52	41

*Rental prices do not include maintenance.

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EQUIPMENT PRICES

		Purchase	Monthly Maint.	Monthly Charges* 1-Year Lease	5-Year Lease
COMMUNICATIONS (Continued)					
F2788-XX	Single-Line Communications Adapter, Medium-Speed Synchronous; supports Uniservo 100/200 and UTS 400 protocols; half duplex to 9600 bps, full duplex to 4800 bps; requires external clock; provides auto answer; choice of RS-232C/X.21.BIS or MIL-188A interface	1,743	9	48	38
F2798-XX	Single-Line Communications Adapter, Medium-Speed Synchronous (UDLC); supports UDLC protocol; half duplex to 19,200 bps, full duplex to 9600 bps; requires external clock; provides auto answer; RS-232C/X.21.BIS interface	1,885	11	52	41
F3471-00	SLCA Power Cable; required if two SLCA's are used and 1943-99 I/O Microprocessor is not used	53	—	9	5
F3472-00	SLCA Baffle; required if one SLCA is used and 1943-99 I/O Microprocessor is not used	53	—	9	5
F3794-00	Auto-Dialer; provides adapter for up to three automatic dialing interfaces meeting RS-366 for V-series or circuit-switched public data networks	2,818	14	70	56

*Rental prices do not include maintenance.

SOFTWARE PRICES

		Monthly Rental
SYSTEMS SOFTWARE		
6211-XX	Extended System Software; consists of Screen Format Generator, Dialog Specification Language Translator, Data Utility, SORT/MERGE, SORT3, and Spooling and Job Accounting	$186
6212-XX	SORT/MERGE	67
6213-XX	SORT3	67
6219-XX	RPG II	67
6222-XX	Cobol-1974	94
6223-XX	Fortran IV	107
6224-XX	Basic	94
6225-XX	Escort	53
6233-XX	Assembler	200
6226-XX	Editor	53
6217-XX	Information Management System, Single Thread; requires 6211 (Models 4 and 6 only)	146
6232-XX	Information Management System, Multi-Thread; requires 6211	165
6218-XX	Data Management System; requires 6211 and 6222	233
6231-XX	ICAM Terminal Support Facility	120
6230-XX	NTR (Nine Thousand Remote) System Utility; requires 6231	33
6229-XX	Distributed Data Processing Transfer Facility; requires 6211, 6231, and either 6255 or 6248-XX	107
6229-XX	Distributed Data Processing File Access; requires 6231, and either 6255 or 6248-XX	165
6229-XX	Distributed Data Processing IMS Transaction Processor; requires 6232, 6231, and either 6255 or 6248-XX	165
6247-XX	IBM 3270 Emulator; requires 6231	22
6247-XX	Remote Terminal Processor; requires 6231 and 6211	83
6248-XX	Datex-L (Germany) Public Data Network Facility; requires 6231	275
6248-XX	Datex-P (Germany) Public Data Network Facility; requires 6231	275
6248-XX	Transpac (France) Public Data Network Facility; requires 6231	275
6248-XX	Datapac (Canada) Public Data Network Facility; requires 6231	154
6248-XX	DDX-C (Japan) Public Data Network Facility; requires 6231	275
6248-XX	DDX-P (Japan) Public Data Network Facility; requires 6231	275
6248-XX	Nordic X.21 Public Data Network Facility; requires 6231 and 6255	275
6248-XX	United Kingdom X.25 Packet-Switched Public Data Network Facility; requires 6231	275
6222-98	Cobol Editor	53
6254-XX	Menu Generator	22
6255-XX	DCA Termination Systems; requires 6231 and 6211	72
6130-XX	UTS 400 Cobol	41
6201-XX	UTS 400 Edit Processor; requires 6228 and 6231	42
6228-XX	UTS 400 Load/Dump Facility	41
6184-XX	UTS 4000 Loadable Character Set Generator	22

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SOFTWARE PRICES

APPLICATIONS SOFTWARE

		Monthly Rental
6563-XX	UNIS 80; ready-to-use version	550
6563-XX	UNIS 80-E; extended, source-code version	1,045
6557-XX	ACS 80 Accounts Receivable	69
6557-XX	ACS 80 Accounts Payable	69
6557-XX	ACS 80 General Ledger	69
6557-XX	ACS 80 Payroll	83
6591-XX	Unifacs 80 Accounts Payable	195
6591-XX	Unifacs 80 Accounts Receivable	195
6591-XX	Unifacs 80 Payroll/Personnel	260
6591-XX	Unifacs 80 General Ledger/Budgeting	225
6701-XX	Word Processing System 80 (WPS 80)	105
6617-XX	SUFICS 80 Financial Modeling	575
6617-XX	SUFICS 80 Decision Support System	340
6617-XX	SUFICS 80 Hierarchical Consolidation	176
6617-XX	SUFICS 80 Symbolic Editor and Renumbering Routine	176
6617-XX	SUFICS 80 Risk Analysis	176
6596-XX	AMS 80 Accounts Payable	100
6596-XX	AMS 80 General Ledger	105
6596-XX	AMS 80 Accounts Receivable	100
6596-XX	AMS 80 Payroll	130
6602-XX	WAMS 80 Inventory/Sales Analysis	130
6602-XX	WAMS 80 Order Entry/Billing	155
6602-XX	WAMS 80 Credit Return	95
6602-XX	WAMS 80 Expanded Sales Analysis	95
6558-XX	ICS 80 (Information Collection System)	158
6562-XX	UNIDIS—Wholesale; Order Entry and Stock Control	462
6562-XX	UNIDIS—Wholesale; Inventory Management	462
6562-XX	UNIDIS—Wholesale; Order Entry, Stock Control, and Inventory Management	924
6572-XX	Apparel Information System	1,500■