Sperry System 80

MANAGEMENT SUMMARY

UPDATE: *Sperry continues to support the System 80 line of minicomputers, even though there have been no major new products added to the line for some time. The only significant addition to the System 80 in the last year was the announcement of two new Uniservo tape drives and a new tape controller.*

The Uniservo 26 and 28 tape drives perform the reading and writing functions of ANSI standard 0.5-inch magnetic tape. These tape units provide automatic tape loading, which is facilitated by ANSI standard dustproof Easy I and II cartridges. The Uniservo 26 performs at a speed of 75 ips (inches per second), with a data transfer rate of up to 470KB per second. The Uniservo 28 performs at a speed of 125 ips with a data transfer rate of up to 780KB per second.

The Model 5055 tape controller can support up to four Uniservo 22, 24, 26, or 28 tape drives in any combination; the maximum tape configuration for a System 80 setup is two 5055 controllers and eight tape drives.

The systems themselves remain unchanged. The Models 4 and 6 have identical capabilities and features. Model 6, however, is configured with high-performance control storage (HPCOS), which, according to Sperry, increases central processor speed by 55 percent. The HPCOS facility can be added to Model 4 to upgrade it to a Model 6. (Conversion from either model to a Model 8 requires a processor swap.)

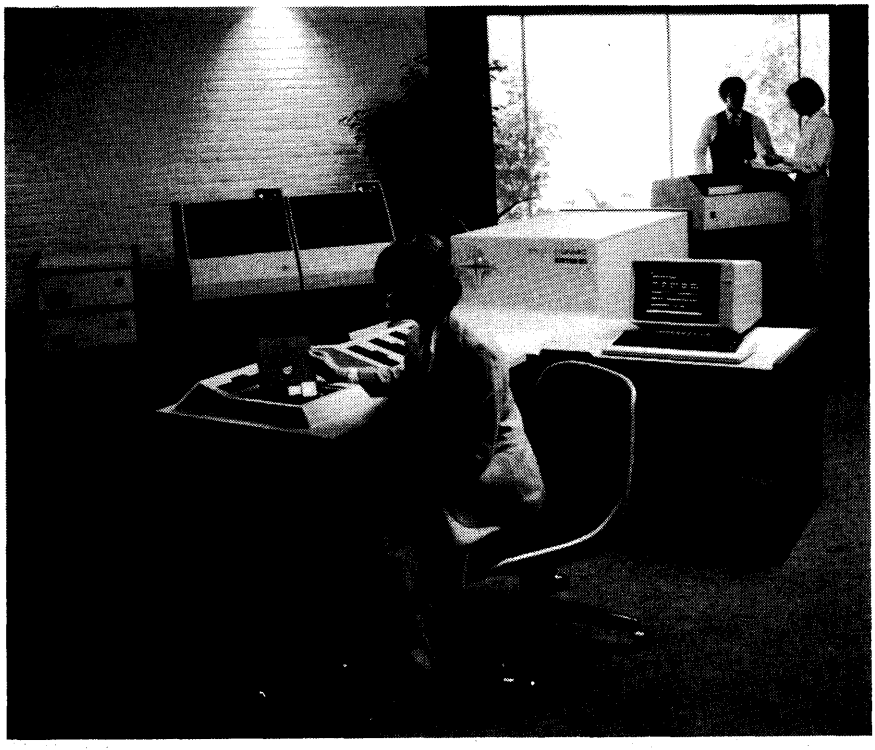
Sperry System 80 computers feature interactive programming, transaction processing, multijobbing, communications and distributed processing capabilities, and capacity for integrated database management. The System 80 comprises three general-purpose data processing systems: Models 4 and 6 and the top-of-the-line Model 8. The System 80 Model 8 provides an upward migration path for older Sperry systems. All three System 80 models run on Sperry's OS/3 operating system.

MODELS: Model 4, Model 6, and Model 8.
MEMORY: 524KB to 8MB.
DISK CAPACITY: 128MB to 12GB.
WORKSTATIONS: Up to 40 (including console) on Models 4 and 6; up to 120 on Model 8.
PRICE: $66,082 to $123,900 (processor complex prices).

CHARACTERISTICS

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

CANADIAN ADDRESS: 55 City Centre Drive, Mississauga, Ontario L5B 1M4. Telephone (416) 270-3030.



The Sperry System 80 is Sperry's general-purpose mid range system. The Models 4 and 6, shown here, provide up to 4MB of main memory and up to 1.3GB of disk storage; the Model 6 features High Performance Control Storage (HPCOS) for increased central processor speed. The top of the line Model 8 can support up to 8MB of main memory and 12GB of disk storage.

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TABLE 1. SYSTEM COMPARISON

MODEL	Model 4	Model 6	Model 8
SYSTEM CHARACTERISTICS			
Date announced	June 1982	June 1982	October 1982
Date first delivered	July 1982	July 1982	December 1982
Field upgradable to	Model 6	Not applicable	Not applicable
Relative performance*	1.0	1.5	3.0
Number of processors	1	1	1
Cycle time, nanoseconds	180	180	180
Word size, bits	32	32	32
Operating systems	OS/3	OS/3	OS/3
MAIN MEMORY			
Type	MOS	MOS	MOS
Minimum capacity, bytes	524K	524K	524K
Maximum capacity, bytes	4M	4M	88M
Increment size	262KB to 2MB	262KB to 2MB	1MB to 2MB
Cycle time, nanoseconds	400/4 bytes	400/4 bytes	496/64-bit word
BUFFER STORAGE			
Minimum capacity	None	None	None
Maximum capacity	—	—	—
Increment size	—	—	—
INPUT/OUTPUT CONTROL			
Number of channels:	3	3	6
Byte multiplexer	—	—	—
Block multiplexer	—	—	—
Word	—	—	—
Other	—	—	—

**Relative performance is based on a rating of 1.0 for Model 4.*

The processor complexes for Model 4 and Model 6 contain two modular processors and associated storage units: a control processor with control storage, and a main storage processor with main storage unit. The control processor features an integral floating point; the main storage processor features 524KB of main memory, which can be expanded to 4MB.

Models 4 and 6 also feature the Disk Cache Facility (DCF) for input/output processing. The DCF manages a portion of main storage as a special cache memory area. The size of the disk cache is 16KB, expandable to 1MB.

The basic, or minimum, System 80 Model 4 or Model 6 configuration consists of a processor complex and a printer. The processor complex includes 524KB of main memory, a console workstation, 118.2MB integrated disk subsystem, diskette drive, and three integrated input/output controllers. The basic Model 4 or Model 6 system can be expanded in two ways: through attachment of I/O devices to existing subsystem controllers or through the addition of special I/O features: the Input/Output Microprocessor (IOMP) or Extended Channel Functionality microcode (ECF). The IOMP permits Models 4 and 6 to support up to eight peripheral subsystem controller interfaces and up to eight communications lines. With ECF, Models 4 and 6 can support either eight peripheral controllers and seven communications lines or seven peripheral controllers and eight communications lines.

The System 80 Model 8, according to Sperry, demonstrates three times the performance of the Model 4 and twice the performance of the Model 6. The processor complex of the Model 8 includes: a CPU that controls instruction execu-

DATA FORMATS

BASIC UNIT: 8-bit byte. Each byte can represent one alphanumeric character, two decimal digits, or eight 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; one halfword (16 bits) or one 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 that 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

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

CYCLE TIME: 400 nanoseconds in Models 4 and 6; 480 nanoseconds in Model 8.

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tion, system activity, and I/O support; a main storage processor with Main Storage Unit (MSU) containing 1MB of memory (expandable to 8MB); a system control processor with 10K words of control storage; and an Input/Output Microprocessor (IOMP) that supports up to eight peripheral controllers. Another IOMP may be added. Additional input/output control for the Model 8 is provided by up to five selector channels for disk and magnetic tape drives and a byte adapter channel for the system console, printers, and card readers. Like Models 4 and 6, Model 8 also uses the Disk Cache Facility.

The basic Model 8 system includes a processor complex with 1MB of main memory, a diskette controller and workstation controller attached to the IOMP, one diskette drive, a system console, and either a paper peripheral controller and line printer or a line printer attached to the byte adapter.

When expanded, the Model 8 can support up to 12GB of on-line disk storage; it can support up to 24 nonremovable disk drives and additional removable drives. The Model 8 can also support up to four diskette drives and 120 locally connected workstations. In addition, the Model 8 can be configured with numerous peripherals in a wide range of combinations; those peripherals include magnetic tape subsystems for on-line storage and backup of nonremovable disk storage and paper peripherals including printers, card readers, and card punches. A number of the peripherals developed for Sperry's older Series 90 computers can be attached to the Model 8.

All three System 80 models support Sperry's proprietary OS/3 operating system. OS/3 provides the central control, coordination, and resource allocation required for system operation. 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. OS/3 supports six languages: Cobol, Fortran IV, Basic, RPG II, Escort, and Basic Assembly Language (BAL). Other software available for the System 80 includes the DMS database management system, communications software and a number of application programs.

COMPETITIVE POSITION

As a general-purpose mid-range computer system, the System 80 competes with the IBM System/38, Honeywell's DPS 6, and Hewlett-Packard's HP 3000 series.

The IBM System/38 is the System 80's biggest competitor in the general-purpose commercial applications market. The three model groups that make up the System/38 minicomputer family, the Model 4XX, Model 6XX, and Model 8XX, range in main memory size from 1MB to 8MB; the System 80 models provide a range of from 512KB to 8MB. All of the System/38 models can support up to 128 workstations; the System 80 Models 4 and 6 will only support 40 workstations with integrated controls, although

CAPACITY: Memory ranges from 524K bytes to 8M bytes. See CHART A for capacities of individual models.

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.

CACHE MEMORY: System 80 does not feature cache memory in the conventional sense. However, System 80 computers use the Disk Cache Facility (DCF) to load data stored on disk into memory. The amount of memory to be used (up to one megabyte) is determined by the user.

CENTRAL PROCESSOR

GENERAL: The System 80 processor architecture incorporates multiple LSI microprocessors and uses 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 four-byte (32-bit) internal data path width.

The Model 4 and Model 6 processors feature a 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.

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 capacity of 16,384 doublewords (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

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TABLE 2. MASS STORAGE

MODEL	8416	8417	8418	8419
Cabinets per subsystem	8	8	8	8
Disk packs/HDAs per cabinet	—	—	—	—
Capacity	29MB	118.2MB	29 or 58MB	72.3MB
Tracks/segments per drive unit	—	—	—	—
Average seek time, msec.	16.3	26.2	24.2	21.3
Average access time, msec.	27	35	33	33
Average rotational delay, msec.	10.7	8.8	8.8	10.7
Data transfer rate	625KB/sec.	1.1MB/sec.	625KB/sec.	0.78MB/sec.
Controller model	Integral	Integral	Integral	Integral
Comments	Supported by system Model 8	Supported by system Models 4, 6, 8	Supported by system Model 8	Supported by system Model 4, 6, 8

TABLE 2. MASS STORAGE

MODEL	8430	8433	8470
Cabinets per subsystem	16	16	8
Disk packs/HDAs per cabinet	—	—	—
Capacity	100MB	200MB	491MB
Tracks/segments per drive unit	—	—	—
Average seek time, msec.	18.7	21.7	14.7
Average access time, msec.	27	30	23
Average rotational delay, msec.	8.3	8.3	8.3
Data transfer rate	806KB/sec.	806KB/sec.	2.1MB/sec.
Controller model	5039	5039	Integral
Comments	Supported by system Model 8	Supported by system Model 8	Supported by system Models 4, 6, 8. Requires ECF on Models 4 and 6.

Sperry claims that more workstation support can be provided by attachment of independent control units. The Model 8 can support 120 workstations. Disk capacity on the System/38's Model 4XX and 6XX is 3.3GB; the System/38 Model 8XX can support up to 6.225GB of disk storage. On the System 80, the Models 4 and 6 will support up to 1.3GB; the Model 8 supports 12GB of disk storage.

One important difference that should be noted between these two systems is their upgradability, or lack thereof. The System/38 provides an upgrade path from the Model 4XX to the Model 6XX, and from the Model 6XX to the Model 8XX. On the Sperry System 80, however, only the Model 4 is upgradable, and it is only upgradable to a Model 6.

ADVANTAGES AND RESTRICTIONS

The last significant enhancement that Sperry made to the system was the addition of the high-end Model 8, announced in October 1982; there has not been a major hardware or software announcement since then. However, Sperry continues to fully support the system in terms of repair and maintenance. It should be made clear that the official company stance is that the System 80 is still an active part of the Sperry product line.

A disadvantage of the System 80 is its limited upgradability. A user of the System 80 Model 4 can convert to a Model 6, but that will not increase memory or disk capacity. Users of the Model 6 and Model 8 have nowhere to go in terms of upgrading to add power and configurability beyond their own model's set limits.

accesses one word per cycle and has a cycle time of 120 nanoseconds. According to Sperry, 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 permits it to perform initial microprogram loading and contains resident microdiagnostics for the central processor.

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 four 8-byte floating-point registers.

ADDRESSING: All models feature 24-bit addressing.

INTERRUPTS: Through the OS/3 operating system, System 80 computers recognize eight types of interrupts in the following six categories: supervisor call, exigent machine check, repressible machine check, program check, program event recording (PER), and input/output.

Supervisor call occurs in response to the SUPERVISOR CALL (SVC) machine instruction. Although it is handled as an interrupt, the supervisor call is routinely used by programs to request supervisor services.

Exigent machine check indicates a malfunction in or around the processor from which the supervisor cannot recover.

Repressible machine check indicates a malfunction in or around the processor from which recovery is possible.

Program check occurs when the processor attempts either to execute a nonexistent instruction or to execute an existing instruction in an illegal manner.

Program event recording (PER) provides dynamic monitoring of executing programs by storing information about the current instruction when a specified event occurs.

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In 1984, Sperry introduced a number of new products based on the popular Unix operating system. Intended as a family of products that will encompass a wide range of memory size and processing power, these products include the Series 7000/40 superminicomputer, the Unix System V-based 5000 Series of supermicrocomputers, Xenix support for the Sperry Personal Computer and the SX1100 operating system, an implementation of Unix System V for 1100 Series mainframes. Currently, the System 80 does not support any type of Unix environment. If Sperry is moving toward a total commitment to Unix, System 80 users may find themselves left out in the cold.

USER REACTION

A total of 58 users of the Sperry System 80 responded to the 1984 Datapro Computer Users Survey, representing industries such as manufacturing (33.9 percent), retail/wholesale (18.6 percent), government (10.1 percent), and education (8.4 percent). The average life of the systems was 35.1 months. These users reported that their systems were utilized for accounting (89.8 percent), payroll (72.9 percent), order processing (69.4 percent), sales (49.1 percent), purchasing (45.8 percent), and manufacturing (32.2 percent).

Main memory capacities ranged from 512KB to 8MB, with most of the users (47.5 percent) reporting that their systems had between 1MB and 2MB of main storage. The majority of the users surveyed (50.9 percent) reported that they had between 100MB and 600MB of disk storage. Most of these users (62.7 percent) said that their systems were supporting between 6 and 15 local terminals; the majority (60.0 percent) reported that they did not have any remote terminals on their systems.

The majority of the users surveyed (93.2 percent) relied on an in-house programming staff for application software. The most popular language used was Cobol (47.5 percent), followed by RPG (45.8 percent). Most users (62.7 percent) did not employ a database management system. The majority (52.6 percent) had a disaster recovery plan.

User ratings are given in the following table:

	Excellent	Good	Fair	Poor	WA*
Ease of operation	24	31	4	0	3.3
Reliability of mainframe	29	24	6	0	3.4
Reliability of peripherals	22	28	7	2	3.2
Maintenance service:					
Responsiveness	32	20	7	0	3.4
Effectiveness	27	23	5	2	3.3
Technical support:					
Troubleshooting	13	26	15	5	2.8
Education	5	23	23	7	2.5
Documentation	4	26	18	9	2.4
Manufacturers software:					
Operating system	22	27	9	1	3.2
Compiler & assemblers	21	29	8	0	3.2
Application programs	7	23	18	2	2.7
Ease of programming	17	36	5	1	3.2
Ease of conversion	11	30	10	7	2.8
Overall satisfaction	10	38	9	1	2.9

*Weighted Average on a scale of 4.0 for Excellent.

Input/output interrupts occur in response to signals from I/O channels.

Some interrupts, like supervisor call and input/output, are routinely encountered; others, like program and machine checks, represent errors that the supervisor must handle with minimal system interruption.

OPERATING ENVIRONMENT: For power, Models 4 and 6 require 200, 208, or 240 VAC, single-phase, with two wires and ground, 60 Hz. Model 8 requires 208 or 240 VAC, three-phase, with three wires and ground, 60 Hz. Operating temperatures for Models 4 and 6 range from 54 to 90 degrees Fahrenheit (12 to 32 degrees Celcius) at 25 to 85 percent humidity. Model 8 operates at temperatures between 54 and 93 degrees Fahrenheit (12 and 34 degrees Celcius) at 20 to 85 percent humidity. Heat dissipation for all System 80 processors is 9600 Btu/hour.

INPUT/OUTPUT CONTROL

The System 80 Models 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 (DC/C) provides a direct, microprocessor-controlled interface to main storage, and accommodates a data transfer rate of up to 1.1MB per second. The optional DC/C for the 8470 disk drives, which requires Extended Channel Functionality (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 six 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 eight megabytes per second.

Models 4 and 6 can execute up to 14 jobs concurrently; Model 8 can execute up to 48 jobs concurrently.

CONFIGURATION RULES

GENERAL: For Models 4 and 6, the minimum system configuration consists of a processor complex plus a 0776 or 0789 freestanding 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 (DC/C) and one integrated 118.2-megabyte nonremovable disk drive, a diskette control, a workstation control and one console workstation, and a paper peripheral controller that controls the printer.

The basic system can be expanded by connecting additional peripheral devices to any or all of the four integrated controls. The initial Disk Channel/Controller can support seven additional drives; another DC/C can be used to support eight additional fixed- or removable-disk drives. The diskette control can handle up to three additional drives. The workstation control accommodates up to seven additional local workstations. The paper peripheral controller 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.

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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:					
0871-97	9	1600	PE	25	40K
0871-93	9	1600	PE	25	40K
	9	1800	NRZI	25	20K
0871-77	7	800	NRZI	25	20K
	7	556	NRZI	25	13.9K
	7	200	NRZI	25	5K
Uniservo 14:					
0871-03	9	1600	PE	25	96K
0870-04	9	1600	PE	25	96K
	9	1800	NRZI	25	48K
Uniservo 24:					
5058-06	9	1600	PE	125	200K
	9	800	NRZI	125	100K
Uniservo 26:					
0884-00	9	—	GCR	75	470K
	9	—	PE	75	120K
Uniservo 28:					
0884-02	9	—	GCR	125	780K
	9	—	PE	125	200K
1978-99	9	1600	PE	100	160K
	9	1600	PE	25	40K

Printers	Printing Speed	Print Positions	Horizontal Spacing, Chars./Inch	Vertical Spacing, Lines/Inch	Form Size, Inches
0770-00	800 lpm	—	10	6 or 8	3.5 to 22″ by 24″
0776-00	760 lpm	—	10	6 or 8	4 to 18.75″ by 24″
0776-02	900 lpm	—	10	6 or 8	4 to 18.75″ by 24″
0776-04	1200 lpm	—	10	6 or 8	4 to 18.75″ by 24″
0776-99	1200 lpm	—	10	6 or 8	4 to 18.75″ by 24″
0789-99	180 lpm	—	10	6 or 8	3 to 16″ by 1 to 22″
0789-96	300 lpm	—	10	6 or 8	3 to 16″ by 1 to 22″
0789-93	640 lpm	—	10	6 or 8	3 to 16″ by 1 to 22″
0798-68	200 lpm	—	10/14	6 or 8	3 to 10″ continuous

In order to enhance these survey findings, Datapro contacted three of the respondents in January 1985 to get more detailed information about their experiences with their systems.

We spoke to the director of the computer center of an educational institution in the Southeast. The Sperry System 80 Model 4 there was installed in February 1983. The system has 2MB of main memory, and 545MB of disk storage. There are four communications terminals and 10 direct connect terminals attached to the system. The director told us that this institution has had a very good experience with the system. She said that they receive prompt attention whenever they call for the service. If the system is down completely, there is someone there to correct the problem within two hours; lesser problems are taken care of the next day. She said that software maintenance is not as good, but is still sufficient and significantly better than that provided by other vendors with whom the institution

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 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 through microcode. The Model 6 processor requires one of these I/O features, which are mutually exclusive.

For the 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, 1024KB 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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deals. When asked if there was any room for improvement in the system, the only comment she made was that the documentation could be better.

The second user we spoke to was the director of EDP for a retail outlet in the Northeast. He, too, said that he was very pleased with the performance of his installation's System 80. This system has 2.5MB of main memory and 1.1GB of disk storage, and has 19 terminals connected to it. He said he was pleased especially with the interactivity of the system and the way in which it handles communications. On the negative side, he reported that users at this site occasionally have problems with memory management, in that the system doesn't seem to be able to consolidate memory properly during high-volume periods. As a result, large jobs are often unable to run at those peak periods, even though there is sufficient memory for them. He also said that users had had some problems with Sperry's printers. He voiced concern that Sperry is not offering enough training courses on the System 80. He said that when the system was first installed, there were a number of courses offered for System 80 users which he had attended and benefitted greatly from. Now, however, most of the courses Sperry offers involve the System 1100 and Mapper, according to this user.

The third user we spoke to was in the systems and operations analysis department of a food distributor in the Midwest. This system had 1.5MB of main memory and 826MB of disk storage; there were 16 terminals attached to the system. This user said that his facility had not been at all pleased with the Sperry System 80 that was installed in April 1980 to replace an IBM System/3. Among his major complaints was the claim that every new release of the operating system uses up as much as 15 to 20 percent more memory than the previous release had. He also claimed that new operating system releases caused system files to use up more disk space, as well. He said that he is continually receiving patches for bugs in the operating system. He also reported that they had had a great deal of trouble with disk drives going down, which they eventually discovered was the result of inadequate cooling in the disk cabinets. The cabinets had to be reengineered, with people from both the local Sperry support office and personnel from this facility doing the work. When asked what advice he would give to someone who was considering buying a System 80, this user said he would tell them to look at the IBM System/38.

Overall, the majority of the users surveyed (81.36 percent) said that their Sperry System 80 had done what they had expected it to do when they acquired it. When asked if they would recommend the system to another user, the majority (76.27 percent) answered "Yes," several (13.56 percent) were undecided, and a few (10.17 percent) said "No." □

Main memory on the Model 8 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 controller with a Model 0789 or 0766 line printer, a Model 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, through 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 supporting up to six 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.

On the System 80 Models 4 and 6, the console workstation is a specially adapted workstation that can perform all standard workstation functions, 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.

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 5,000 feet (1524 meters) away from it. The control unit contains 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.

DISK STORAGE: Models 4 and 6 can have two DC/Cs supporting up to eight disk drives each. The DC/C can control a mixture of 8417 fixed and 8419 removable disk drives; it can also support 8470 fixed disk drives, which cannot be mixed with other drives.

Model 8 can control up to 24 type 8416, 8417, 8418, 8419, and 8470 disk drives through a maximum of six Integrated Disk Control Units (IDCUs) supported through five selector channels. Additional 8430 and 8433 drives can also be supported through the selector channels on the Model 8. These drives are interfaced to the selector channel through external controllers, each of which can support 16 drives. The number of 8430 and 8433 drives the system can support is limited only by the number of available selector channel positions.

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TABLE 4. TERMINALS

MODEL	3560-79	3561-66
DISPLAY PARAMETERS		
Max. chars./screen	1920	1920
Screen size (lines x chars.)	24 x 80	24 x 80
Symbol formation	—	—
Character phosphor	—	—
Total colors/no. simult. displayed	None	None
KEYBOARD PARAMETERS		
Style	Typewriter	Typewriter
Character/code set	—	—
Detachable	Yes	Yes
Program function keys	—	—
OTHER FEATURES		
Buffer capacity	—	—
Tilt/swivel	No	No
Graphics capability	—	—
TERMINAL INTERFACE	F2791 Workstation Controller	F2791 Workstation Controller

MAGNETIC TAPE: On Models 4 and 6, the magnetic tape subsystem attachment can support a subsystem controller and up to eight Uniservo 10 or 22 tape drives, or a streaming magnetic tape controller and up to four streaming tape drives. Streaming tape drives and Uniservo tape drives cannot be configured on the same system.

On Model 8, Uniservo 10, 12, 14, 16, 20, 22, 24, 26, or 28 drives are supported through a maximum of five selector channels. Up to eight magnetic tape drives can be controlled by an integrated tape controller attached to the IOMP. Those eight drives can be configured in the following combinations: up to four streaming tape drives; up to eight Uniservo 22 tape drives; or any combination of streaming tape and Uniservo 22 drives not exceeding four streaming tape drives or eight total drives. Up to eight Uniservo 10 (type 0871) tape drives can be controlled through a dedicated tape controller channel on the IOMP.

PRINTERS: On Models 4 and 6, printers are connected through a paper peripheral controller or a remote printer controller. Two local printers can operate from a single paper peripheral controller if their combined printing capacity does not exceed 1500 lines per minute. One printer can be operated from a remote printer controller; this printer can be located up to 5,000 cable feet away from the system. A high-performance (1200 lpm) line printer can be connected to the system only through a paper peripheral controller. Lower performance line printers (180, 300, and 640 lpm) can be connected to the system through either a paper peripheral controller or a remote printer controller.

On the Model 8, local printers are controlled either through a paper peripheral controller attached to the IOMP or through the byte adapter channel. The Model 8 can support up to 12 paper peripheral controllers. Each of the 12 controllers can support up to two local printers; the aggregrate print mixture cannot exceed 1500 lines per minute. Printer types 0776, 0789, and 0798 are controlled by paper peripheral controllers. Two Sperry Series 90 printers, types 0770 and 0776, can be connected to the Model 8 through the byte adapter channel.

Remote printers on the Model 8 are handled through the remote printer controller attached to the IOMP. Type 0789 and 0798 printers can be placed as far as 5,000 feet (1524 meters) from the system.

OTHER PERIPHERALS: Models 4 and 6 support the 0719 80-column card reader and the 0608 card punch. On Models 4 and 6, card readers and card punch equipment are supported through the paper peripheral controller. The controller can support two card readers or one card reader and one card punch.

The Model 8 supports the 0719 card reader and the 0608 card punch, as well as three card readers designed for the Sperry Series 90: 0716-91 (80- and 96-column); 0716-93 (80- and 96-column); and 0716-99 (80-column). Card processors can be connected to the Model 8 either through the paper peripheral controller or through the byte adapter channel. Each paper peripheral controller can support either two type 0719 card readers or one card reader and one type 0608 card punch; as an alternative, one 0719 card reader can be configured with one type 0776, 0789, or 0798 printer. Type 0716 card readers can be attached to the Model 8 through the byte adapter channel.

MASS STORAGE

See Chart B.

INPUT/OUTPUT UNITS

See Chart C for workstations, Chart D for printers, and Chart E for magnetic tape equipment.

COMMUNICATIONS CONTROL

GENERAL: In addition to the directly connected workstations, a System 80 Model 4 or 6 can support up to eight 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 terminals:

- Sperry Uniscope 100/200, UTS 400, 4000, and BC-7; 2000 to 9600 bps data rate; half- or full-duplex, synchronous mode; RS-232-C/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-232-C/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-232-C/X.21.BIS interface; provides auto answer; requires external clock.

The *Inter-Computer Control Unit (ICCU)*, available on all System 80 models, provides a fiber-optic link between two OS/3 systems for distributed processing applications. The

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connected systems can either be two System 80 systems or a System 80 and a Series 90 system. The distance between systems can be up to 3,300 feet (1000 meters), 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's *OS/3* operating system, which supports 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 system operation. 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 block loading capability provides faster execution of job control streams.

OS/3 includes a consolidated data management system that serves as the controlling interface among application programs, the system hardware, and OS/3. There are separate access methods for disk, 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 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, an optional, separately priced extension of OS/3, provides six software components that enhance use and operation of the System 80. These components are described in the following paragraphs.

The Screen Format Generator (SFG) enables users of System 80 workstations to create, modify, and delete screen 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 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 that permits 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 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, and produce a printed copy of any file.

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 seven formats.

Sort3 is an IBM 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.

DATA BASE MANAGEMENT SYSTEM: *DMS* is Sperry's Codasyl-compatible database management system for System 80 computers. It consists of a collection of programs that handle description, initialization, creation, accessing, maintenance, backup, and recovery of databases.

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 database and various views of the database. The database can be accessed by means of DML statements in the Procedure Division of Cobol application programs. The DBMS allows concurrent access to the shared database by multiple users in any combination of batch, transaction, and time-sharing programs. The Data Base Utilities include routines for loading and dumping the database, reporting, printing, initialization, and off-line recovery.

Interface between DMS and the IMS (Information Management System) transaction processing system can be accomplished in several ways. DMS databases can be accessed by Cobol-coded IMS action programs through DML statements embedded in the programs. Alternatively, DMS

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databases can be used to build IMS defined files, which are accessible through the Unique inquiry/update language or through IMS action programs coded in Cobol, RPG II, or Basic Assembly Language (BAL).

Other features of DMS include indexed sequential file access, quick recovery file allocation, and DML preprocessor validation. The Extended Systems Software and Cobol are prerequisites to DMS.

LANGUAGES: System 80 users have a choice of six programming languages: Cobol, Fortran IV, Basic, RPG II, Escort, and Basic Assembly Language (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 extensions that include 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 a prerequisite.

The *OS/3 Fortran IV* compiler implements the ANSI Fortran X3.9-1966 language with extensions that provide compatibility with IBM DOS Fortran IV. 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 for programming and maintenance. It can compile RPG II source statements written for a variety of IBM and Sperry systems. 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 for creation and editing of RPG II programs from a workstation or terminal. The System 80 Editor is a prerequisite for using the RPG II Editor facility.

Escort is a high-level language that permits technical and nontechnical personnel to create 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; users can revert to the Tutorial mode whenever problems are encountered.

Escort permits the records in a file to be accessed in multiple sequences without being copied or sorted, and Escort permits users to access uncatalogued files. In addition, multiple records in a file can be displayed on a single screen without multiple transmissions, and files can be manipulated into tabular reports.

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

COMMUNICATIONS: 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 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 saves 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 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 the distributed processing network as an available resource for scheduling and executing work. Using straightforward commands, the user can initiate job distribution and file transfer operations. 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'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

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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.

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.

UTILITIES: The System 80 *Editor* is an interactive facility for creating, copying, and merging files and for adding, deleting, and modifying text. It provides commands for creating and updating records in data files, library files, and spool files. File protection facilities ensure that a file being modified by the Editor is not destroyed or incorrectly altered either by direct user action or by system failure.

The *Menu Generator* enables user programs to create and maintain menus of predefined actions for the workstation operator. Menus are stored and can be shared or restricted.

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. For programming, IMS handles all 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 system resources, schedules 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 databases. 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 multithread versions. Extended System Software is a prerequisite to IMS.

Sperry also offers *Conversion Aids* that permit users of other computer systems to migrate to the System 80. For Sperry Series 90 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 support for the file access methods used on the Series 90 models.

For IBM System/34 users, the OS/3 RPG II compiler provides source-language compatibility. Conversion aids include procedures for transcribing System/34 data files and source and proc libraries to OS/3 formats. A screen design conversion program is also included.

A *UTS 400 Cobol Compiler, Edit Processor,* and *Load/Dump Facility* are provided to facilitate 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 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.

OFFICE AUTOMATION: *Sperrylink*, a comprehensive office automation system, can be used on System 80 computers in a standalone mode. That mode permits a desk station to function as a terminal on the System 80, as a personal computer, or as an office automation desk station.

APPLICATIONS: Sperry currently offers a number of application software systems for the System 80 computers operating under OS/3.

Sperry *Mapper 80* is an interactive processing system that permits non-data processing personnel to control information. The product uses an integrated relational database that is organized like a traditional filing system. Mapper 80 system software is a realtime processing system for multiple devices like Uniscope 100/200 or UTS 400/4000 terminals and local workstations. Data is collected and updated through the terminal devices in free-form or prescribed formats. Functions like record and page display, update, search, sort, and report generation can be developed into saved programs for on-line application development. Mapper 80 is supported by DMS, Sperry's database management system.

The *Univac Industrial System 80 (Unis 80)* is a 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. 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 (discussed below) and IMS/Unique.

Unifacs 80 is a financial accounting system written in Cobol. 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.

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Word Processing System 80 (WPS 80) permits creation, editing, formatting, and printing of documents and form letters. Documents can be stored, retrieved, or deleted from the document database 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. 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 distribution control system that encompasses separate subsystems for order entry and processing, stock control, and inventory management.

Apparel Information System provides on-line and batch facilities for the apparel industry.

PRICING

POLICY: The System 80 can be purchased, rented on a one-year contract, or leased on a five-year contract. In addition to its standard short-term rental and five-year lease agreements, Sperry offers special five-year and seven-year leases to state and local government users. Quantity discounts are available.

The standard Sperry 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:

	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

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 offers on-site resolution of SCS problems at a fixed monthly Extended Support Services (ESS) charge. ESS for all System 80 Model 8 program products is now separately priced.

TRAINING: Courses are offered at Sperry training centers worldwide. Contact the local Sperry marketing office for lists of classes and dates.

TYPICAL CONFIGURATIONS: The following is a typical Model 4 configuration:

3080-99 Model 4 Processor Complex; 524KB memory; 118.2MB disk drive; console workstation	$66,082
F2787-01 Head/Disk Assembly	2,912
8422-00 Manual-load diskette drive	1,509
F3643-01 Eight-bit parallel interface	560
0789-99 180 lpm impact printer	10,584
F2865-XX Print band	225
Two 3561-66 Model 2 workstations	6,608
Three F3619-00 Model A keyboards	1,209
Total Price	$89,689

The following is a typical Model 6 configuration:

3080-95 Model 6 Processor Complex; 524KB memory; 118.2MB disk drive; console workstation	$ 85,905
1943-91 Model 6 Extended Channel Functionality (ECF)	6,093
Two F2783-12 262MB memory expansion units	11,642
F2783-92 524MB memory expansion unit	9,314
F2787-01 Head/Disk Assembly	2,912
8420-00 Autoload diskette subsystem	4,235
2413-99 Disk Channel/Controller	25,290
8470-99 491MB Disk storage unit	27,360
0789-93 640 lpm band printer	15,650
F3321-XX Print band	225
Two F3643-01 Eight-bit parallel interfaces	1,120
Two 0798-96 200-cps matrix printers	8,000
Seven 3561-66 Model 2 workstations	23,128
Eight F3620-00 Model B keyboards	3,424
Total Price	$224,298

The following is a typical Model 8 configuration:

3076-99 Model 8 Processor; 1MB memory	$123,900
K3959-00 1MB Memory expansion unit	14,400
K3962-00 Selector channel	7,650
8422-00 Manual-load diskette drive	1,509
F3734-02 Integrated Disk Control Unit	12,573
Four 8470-99 491MB Disk storage units	109,440
5058-00 Uniservo 22 magnetic tape subsystem; control and two drives	75,840
0776-99 1200 lpm Band printer	45,050
F2346-XX Print band	225
Four 0798-99 200-cps matrix printers	16,000
Two F2791-04 Workstation controls	6,196
Twenty 3560-79 Model 1 workstations	54,700
Twenty F3620-00 Model B keyboards	8,560
Total price	$476,043

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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 524K 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 524K 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	85,905	468	2,705	2,145
F2783-12	262K Storage Expansion; expands main storage from 524K to 786K bytes or from 786K to 1048K bytes	5,821	29	166	132
F2783-91	524K 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	9,314	58	266	212
F2783-90	524K Storage Expansion; expands main storage from 2.0 to 2.5 megabytes	9,314	58	266	212
F2783-92	524K Storage Expansion; expands main storage from 1.0 to 1.5 megabytes	9,314	58	266	212
3076-99	System 80 Model 8 Processor; includes 1MB of main storage, control storage, channel controller with one byte multiplexer and one selector channel, an Input/Output Microprocessor (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
K3959-00	1MB 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 K3959-01 is already included in the system	14,400	90	575	370
K3959-01	2MB 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 K3959-00 is already included in the system	28,800	180	1,150	740
K3958-99	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	19,823	52	625	495
F3358-98	System 80 Model 4 ECF to Model 6 Upgrade; mutually exclusive with F3367-97	19,823	52	625	495
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 1943-99 IOMP	6,093	45	135	113
1943-91	Model 6 ECF; same characteristics as 1943-93; mutually exclusive with F3425-00 and 1943-99 IOMP	6,093	45	135	113
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 +5 VDC 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 524K 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 262K to 524K bytes	6,000	29	172	136
F3921-97	Model 3 to Model 4 Upgrade; same as F3921-99, but also expands memory from 524K to 786K bytes or from 786K to 1048K bytes	6,000	29	172	136

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		Purchase ($)	Monthly Maint. ($)	Monthly Charges* 1-Year Lease ($)	Monthly Charges* 5-Year Lease ($)
PROCESSORS FEATURES (Continued)					
F3921-86	System 80 Model 3 to 6 Upgrade; requires a minimum of 524K bytes of main storage; also requires F3425-00, 1943-91, 1943-99, or F3367-97	20,002	52	631	499
F3921-85	Model 3 to Model 6 Upgrade; same as F3921-86, but also expands memory from 262K to 524K bytes	25,823	81	797	631
F3921-84	Model 3 to Model 6 Upgrade; same as F3921-86, but also expands memory from 524K to 786K bytes or from 786K to 1048K bytes	25,823	81	797	631
F3921-60	System 80 Model 5 to Model 6 Upgrade; requires a minimum of 524K bytes of main storage	1,000	—	29	23
F3921-59	Model 5 to Model 6 Upgrade; same as F3921-60, but also expands memory from 262K to 524K bytes	6,000	29	172	136
F3921-58	Model 5 to Model 6 Upgrade; same as F3921-60, but also expands memory from 524K to 786K bytes or from 786K to 1048K bytes	6,000	29	172	136
F3619-02	Console Keyboard, Model A; provides a typewriter-style keyboard for the console/workstation; choice of 8 character sets	403	2	18	12
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	20	13
F2787-98	Head/Disk Assembly; 118.2 megabytes; for use in integrated disk drive only	2,912	19	89	71
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:					
K3962-00	Integrated Selector Channel; supports up to 8 controllers; requires K3960-00 if 4th selector channel is configured	7,650	41	255	166
K3960-00	Channel Controller; supports up to 2 selector channels; required if 4th selector channel is configured.	26,250	114	1,050	571
1982-03	I/O Expansion Cabinet; provides housing for up to 3 additional Integrated Disk Control Units (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 Uniservo 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 paper peripherals: 0716, 0770, and 0776	3,750	20	150	100
F3964-00	Power Supply for Model 8 Processor Complex; +5 V; requirement depends on configuration	3,180	12	105	70
F3964-01	Power supply; −2.8 V; required if more than 4.0 megabytes are configured	3,180	12	105	70
F3964-02	Power Supply for I/O Expansion Cabinet; +5 V; requirement depends on configuration	3,180	12	105	70
F3619-00	Console Keyboard, Model A; provides a typewriter-style keyboard for the console workstation; choice of 8 character sets	403	2	14	9
F3620-00	Console Keyboard, Model B; provides a typewriter-style keyboard, 10-key numeric pad, and function pad; choice of 8 character sets	428	3	17	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 megabytes 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	89	71
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-disk drive and cabinet; maximum of 7 drives per system	19,340	98	558	450
F3542-00	8419 Removable Disk Pack; for 8419-00 drives; 72.3 megabytes; maintenance contract not available	446	—	27	22
8420-00	Autoload Diskette Subsysem; cabinet and one drive capable of processing up to 20 diskettes; maximum of two unless 8422-00 is installed	4,235	26	120	95
F2833-00	8420 Manual Diskette Expansion; adds one manual diskette drive within the 8420-00 cabinet	1,509	9	45	35
8422-00	Manual Diskette Subsystem; cabinet and one manual diskette drive (up to 1-megabyte capacity)	1,509	9	45	35
F2785-00	8422 Second Drive Expansion; adds a second drive to the 8422-00 cabinet	1,412	9	40	33

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		Purchase ($)	Monthly Charges* Monthly Maint. ($)	1-Year Lease ($)	5-Year Lease ($)
DISK STORAGE (Continued)					
F2785-02	8422 Dual Drive; adds a third and fourth diskette drive to the 8422-00 cabinet	2,695	16	76	61
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	25,290	190	810	600
F3734-00	Integrated Disk Control Unit (IDCU) for 8416/8418 disk drives; support up to 8 drives; one per system (Model 8 processor only)	7,020	45	234	187
F3734-01	IDCU for 8417/8419 disk drives; supports up to 8 drives; one per system (Model 8 processor only)	7,020	45	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	65	416	330
8470-99	Disk Storage Unit; 491 megabytes of storage; requires 2413 DC/C or F3734-02 IDCU	27,360	119	809	599
WORKSTATIONS					
3560-79	System 80 Local Workstation, Model 1; freestanding, microprocessor-based; 12-inch CRT display station; requires F3619-00 or F3620-00 Keyboard	2,735	14	73	59
Features for Model 1 Workstation:					
F3619-00	Keyboard, Model A; typewriter-style keyboard; choice of 8 character sets	403	2	18	12
F3620-00	Keyboard, Model B; typewriter-style keyboard, 10-key numeric pad, and function pad; choice of 8 character sets	428	3	20	13
0797-99	Matrix Printer; 80 cps; 80 positions; choice of 8 character sets; use limited to off-line screen dump facility under workstation operator control	1,500	29	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 wide	152	1	6	5
0798-68	Matrix Printer; 200 cps, bidirectional; 132 positions; requires 0789 or 0776 printer to satisfy minimum system requirements	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	—	8	5
F2791-00	Workstation Control; provides control and interface facilities for configuring up to eight additional workstations; maximum of four	1,897	12	56	44
F2791-04	Workstation Control; provides control and interface facilities for configuring up to eight additional Model 1 or Model 2 workstations. System 80 Model 8 only	3,098	17	124	67
3561-66	System 80 Local Workstation, Model 2; freestanding, microprocessor-based; 12-inch CRT display station; requires F3619-00 or F3620-00 keyboard (see Mode above)	3,304	39	108	86
Features for Model 2 Workstation:					
F3643-01	8-Bit Parallel Interface; provides for attachment of one 0798, 0797, or 0791 printer (also supports 0789 printer on Model 8)	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; requires F3644-04	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
F2791-00	Workstation Control; provides control and interface facilities for configuring up to eight additional workstations; maximum of four	1,897	12	56	44
8406-04	Diskette Drive; freestanding; one megabyte of storage; required for program load on Model 2 Workstation; requires F3643-01	2,700	22	120	80
0791-87	Correspondence-Quality Printer; 132 positions; friction platen; choice of 9 languages; requires F3643-01 in Model 2 Workstation	4,995	69	222	148
0791-85	Same as 0791-87, but also includes bottom feed assembly	5,144	7	229	152
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	1,200	13	53	36

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			Monthly Charges*		
WORKSTATIONS (Continued)		Purchase ($)	Monthly Maint. ($)	1-Year Lease ($)	5-Year Lease ($)
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	1,500	29	84	63
0798-96	Matrix Printer; 200 cps, bidirectional; 132 positions; choice of 10 character sets; requires F3643-01 in Model 2 Workstation	4,000	70	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	1,875	49	55	45
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	2,125	50	60	50
F3864-00	High-Definition Conversion; converts 0425-97 to 160/40 cps	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	95	315	233
0789-60	Same as 0789-63, but 300 lpm	12,500	145	329	244
F2970-01	Upgrades 180 lpm printer to 300 lpm	1,916	50	14	11
F2865-06	Print Band; 48-character numeric scientific	225	—	—	—
F2865-09	Print Band; 48-character United Kingdom	225	—	—	—
F2865-05	Print Band; 96-character ASCII (Print bands are also available for languages other than English)	225	—	—	—
MAGNETIC TAPE					
0871-97	Uniservo 10 9-Track Phase-Encoded Prime Tape Unit and Controller; 40KB/sec; supports up to 7 additional 0871-83 drives	30,165	174	935	683
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	32,320	210	1,030	756
0871-77	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	31,435	207	1,020	750
0871-75	Same as 0871-77, except it permits reading of IBM 7-track compatible tape	31,435	207	1,020	750
F3135-00	9-Track NRZI Capability for PE Controller; required for control of NRZI drives	788	25	60	46
F3133-98	7-Track NRZI Capability for 9-track PE/NRZI Controller; required for control of 7-track NRZI drives	446	5	24	17
0871-83	Uniservo 10 9-Track Phase-Encoded Add-On Tape Unit; 40 KB/sec.	12,575	81	381	275
0871-81	Uniservo 10 9-Track Phase-Encoded and NRZI Add-On Tape Unit; 40/20 KB/sec.	13,810	89	422	301
0871-79	Uniservo 10 7-Track NRZI Add-On Tape Unit; 20/13.9/5 KB/sec.	12,575	81	381	275
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
K3782-00	Streaming-Tape Drive; one may be installed in 1978-99 cabinet	8,600	87	260	215
5058-00	Uniservo 22 Subsystem; includes two dual-density PE/NRZI 9-track 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	267	1,320	980
5058-06	Uniservo 24 Subsystem; includes two dual-density PE/NRZI 9-track Uniservo 24 tape drives and control for up to eight Uniservo 24 or Uniservo 22 drives (Model 8 processor only)	83,520	455	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	311	1,540	1,140
F0825-00	Dual Channel Feature; provides nonsimultaneous tape operation on two channels of one processor or one channel on each of two processors	4,593	34	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
5055-99	Tape Controller	22,750	140	635	470
F2451-00	9-track NRZI feature	3,170	16	82	63
F3738-00	Dual channel	1,000	4	34	25
0884-00	Uniservo 26 tape drive	22,000	180	595	440
0884-02	Uniservo 28 tape drive	24,750	190	675	500
F3737-00	Dual Access	900	5	27	20
0876-97	Uniservo 22 tape drive	19,190	110	525	389
0876-93	Uniservo 24 tape drive	21,215	121	694	532
F3116-01	Dual Access	2,450	15	53	42

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		Purchase ($)	Monthly Maint. ($)	Monthly Charges* 1-Year Lease ($)	Monthly Charges* 5-Year Lease ($)
PRINTERS					
F2789-00	Paper Peripheral Control; allows connection to two printers (cannot exceed 1500 lpm total) and either two card readers or a card reader and a card punch	1,818	10	53	42
1955-99	Remote Printer Attachment; controls one remotely located 0789-XX or 0798-XX printer up to 5,000 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	315	233
0789-96	Printer; prints 48 characters at 300 lpm; 132 positions, requires F2865-XX Print Band	12,500	133	329	244
F2970-00	Upgrades 180-lpm Printer to 300 lpm	1,916	50	14	11
Print Bands for 180-lpm and 300-lpm Printers:					
F2865-01	48-character business/commercial set	225	—	—	—
F2865-06	48-character scientific set	225	—	—	—
F2865-09	48-character set for United Kingdom	225	—	—	—
F2865-04	64-character modified Fortran set	225	—	—	—
F2865-00	64-character modified ASCII set	225	—	—	—
F2865-05	96-character ASCII set	225	—	—	—
F2865-07	128-character universal OCR-B (ISO) set	225	—	—	—
F2865-13	128-character universal OCR H-14 set	225	—	—	—
F2865-18	192-character Cobol-Fortran-business set	225	—	—	—
F2865-08	128-character universal OCR-B (ECMA-11) set	225	—	—	—
F2865-17	128-character universal Univac 77L set	225	—	—	—
F2865-15	128-character universal OCR-A set	225	—	—	—
F2865-19	52-character optimized Cobol/Fortran set	225	—	—	—
F2865-23	64-character set for United Kingdom	225	—	—	—
	(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	417	313
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	45,050	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	4,000	70	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	180	128
0608-03	Card Punch; 80-column, 75-160 cpm	14,020	101	428	306
F2830-00	Reader Feature for 0608-03; does not provide capability to read and punch same card	648	5	16	14
COMMUNICATIONS					
F2799-XX	Single-Line Communications Adapter (SLCA), Low-Speed Asynchronous; supports TTY and DCT 500 protocols; ASCII code, half duplex at up to 9600 bps; provide auto answer; choice of RS-232C/X.21 BIS or MIL-188A interface	1,885	11	55	43
F2788-XX	Single-Line Communications Adapter (SLCA), 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	50	40
F2798-XX	Single-Line Communications Adapter (SLCA), 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	55	43
F3471-00	SLCA Power Cable; required if two SLCA's are 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	74	59

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SOFTWARE PRICES

		Monthly Rental ($)
SYSTEM SOFTWARE MODELS, 4 AND 6		
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 (IMS), Single-Thread; requires 6211	146
6232-XX	Information Management System (IMS), Multi-Thread; requires 6211	165
6218-XX	Data Management System (DMS); 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 Handler; 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-XX	Cobol Editor; requires 6226	53
6254-XX	Menu Generator	22
6255-XX	DCA Termination Systems; require 6231 and 6211	72
6130-XX	UTS 4000 Cobol	45
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
APPLICATIONS SOFTWARE, MODELS 4 AND 6		
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/Stock Control	462
6562-XX	Unidis—Wholesale; Inventory Management	462
6562-XX	Unidis—Wholesale; Order Entry, Stock Control, and Inventory Management	924
6622-XX	Unidis Equipment	750
6622-XX	Unidis Waybill	1,500
6572-XX	Apparel Information System	1,500

**WPS 80 is also subject to a Single Extended Term charge of $3,500.*

Sperry System 80

		Monthly Extended Support Charge ($)	Monthly Charge ($)
SYSTEM SOFTWARE, MODEL 8			
6211-XX	Extended System Software	40	210
6226-XX	Editor	10	65
6233-XX	Assembler	30	220
6224-XX	Basic	10	84
6222-XX	Cobol-1974	10	110
6222-XX	Cobol Editor	5	28
6222-XX	Cobol 68-74 Transition	15	170
6223-XX	Fortran IV	10	97
6219-XX	RPG II; requires 6226	5	62
6225-XX	Escort; requires 6211	10	65
6218-XX	Data Management System (DMS); requires 6222 and 6211	35	198
6231-XX	ICAM Terminal Support Facility	25	150
6232-XX	Information Management System (IMS), Multi-Thread; requires 6211	25	225
6212-XX	Sort/Merge	5	62
6213-XX	Sort 3	5	62
6254-XX	Menu Generator	5	17
6230-XX	NTR (Nine Thousand Remote) System Utility; requires 6231	5	28
6229-XX	Distributed Data Processing Transfer Facility; requires 6211, 6231, and either 6255 or 6248	15	92
6229-XX	Distributed Data Processing File Access Facility; requires 6231 and either 6255 or 6248	25	140
6229-XX	Distributed Data Processing IMS Transaction Processor; 6232, 6231, and either 6255 or 6248 are required	25	140
6255-XX	DCA Termination Systems; requires 6231 and 6211	10	62
6248-XX	Datapac (Canada) Packet Switched Public Data Network Facility; requires 6231	15	139
6248-XX	Datex-L (Germany) Circuit Switched Public Data Network Facility; requires 6231	30	245
6248-XX	Datex-P (Germany) Packet Switched Public Data Network Facility; requires 6231	30	245
6248-XX	Nordic X.21 Circuit Switched Public Data Network Interface; requires 6231 and 6255	30	245
6248-XX	Transpac (French) Packet Switched Public Data Network Facility; requires 6231	30	245
6248-XX	United Kingdom X.25 Packet Switched Public Data Network Interface; requires 6231	30	245
6247-XX	IBM 3270 Emulator; requires 6231	5	17
6247-XX	Remote Terminal Handler; requires 6231	5	22
6247-XX	Remote Terminal Processor; requires 6231 and 6211	10	73
6181-XX	Model 2 Workstation Diskette Utility Program; requires 32K bytes (F3642-00) and diskette subsystem (8406-XX); separate utility required for each workstation	5	16
6183-XX	Model 2 Workstation Edit Processor; requires 32K bytes (F3642-00) and diskette subsystem (8406-XX); separate edit processor required for each workstation	5	31
6185-XX	Model 2 Workstation Text Processing Utility; requires expanded keyboard (F3620-XX), 64K bytes (F3642-XX), and diskette subsystem (8406-XX); separate text processing utility required for each workstation	5	23
6228-XX	UTS Load/Dump Facility; for UTS 400/4000 terminals and Model 2 workstations	5	36
6130-XX	UTS Cobol; for UTS 4000 terminals and Model 2 workstations; requires 6228	5	42
APPLICATIONS SOFTWARE, MODEL 8			
6596-XX	AMS 80 Accounts Payable	10	90
6596-XX	AMS 80 General Ledger	10	95
6596-XX	AMS 80 Accounts Receivable	10	90
6596-XX	AMS 80 Payroll	15	115
6558-XX	ICS 80 (Information Collection System)	15	143
6617-XX	Sufics 80 Financial Modeling	60	515
6617-XX	Sufics 80 Decision Support System	35	305
6617-XX	Sufics 80 Hierarchical Consolidation	20	156
6617-XX	Sufics 80 Symbolic Editor and Renumbering Routine	20	156
6617-XX	Sufics 80 Risk Analysis	20	156
6562-XX	Unidis-Wholesale; Order Entry/Stock Control	70	392
6562-XX	Unidis-Wholesale; Inventory Management	70	392
6562-XX	Unidis-Wholesale; Order Entry/Stock Control and Inventory Management	140	784
6591-XX	Unifacs 80 Accounts Payable	20	175
6591-XX	Unifacs 80 Accounts Receivable	20	175
6591-XX	Unifacs 80 Payroll/Personnel	25	235
6591-XX	Unifacs 80 General Ledger	25	205
6563-XX	Unis 80; ready-to-use version	80	470
6563-XX	Unis 80-E (Extended); source-code version	115	930
6602-XX	WAMS 80 Inventory/Sales Analysis	15	115
6602-XX	WAMS 80 Order Entry/Billing	15	140
6602-XX	WAMS 80 Credit Return	10	85
6602-XX	WAMS 80 Expanded Sales Analysis	10	85
6602-XX	WPS 80 (Word Processing System)	10	95 ■

**Rental prices do not include maintenance.*