Sperry Univac 1100/10, 1100/20, 1100/40, and 1100/80 Systems

MANAGEMENT SUMMARY

Sperry Univac's 1100 Series is a family of large-scale computer systems dating back to 1948. Over the years, the 1100 Series product line has offered progressively increasing power and flexibility. The early systems were designed for use in scientific and engineering applications, but succeeding 1100's were designed to support business data processing as well.

Sperry Univac has consolidated the 1100 Series by phasing out some of the earlier systems. The 1106, 1108, and 1110 are no longer manufactured. The 1100/10, 1100/20, and 1100/40 are current products, but the company is concentrating its efforts on enhancing the high-end 1100/80 and 1100/60 (Report 70C-877-12). During the past year, Sperry Univac has doubled the maximum memory capacity available for the 1100/80 systems and has introduced the Array Processor Subsystem, a powerful "number cruncher" designed for high-volume mathematical calculations.

Most recently, Sperry Univac has announced several new software packages that will aid users in migrating from the 90 Series to the 1100 Series.

PROCESSORS

The 1100/10 and 1100/20 systems, which replaced the 1106, are quite similar in central processor architecture and peripheral handling capabilities. Main memory sizes range from 128K to 512K words. The 1100/10 memory is available in three versions offering cycle times of 1125, 1000, or 875 nanoseconds. The 1100/20 has a cycle time of 875 nanoseconds.

Each 1100/10 or 1100/20 processor is equipped with 4 integrated input/output channels, and the total number of ▷

The 1100 Series is a family of large-scale computer systems available in a number of different configurations. The systems can perform effectively in a broad range of applications, including batch and interactive processing, engineering/scientific applications, and business data processing.

MODELS: 1100/10, 1100/20, 1100/40, and 1100/80.
CONFIGURATION: An 1100 Series system can include from 128K to 8192K words of main memory, from 1 to 4 CPU's, and from 4 to 104 I/O channels.
COMPETITION: Burroughs 6800/7800, Honeywell DPS 8, IBM 303X Series.
PRICE: Typical purchase prices range from $649,260 to $4,625,532.

CHARACTERISTICS

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

MODELS: 1100/10, 1100/12, 1100/20, 1100/40, 1100/80, 1100/80S, 1100/81, 1100/82, 1100/83, and 1100/84.

DATA FORMATS

BASIC UNIT: 36-bit word. In main storage, each word location includes two additional parity bits, one for each half-word.

FIXED-POINT OPERANDS: One 36-bit word. Addition and subtraction can also be performed upon 2-word (72-bit) operands and upon 18-bit half-words and 12-bit third-words; the leftmost bit holds the sign in each case. Moreover, partial words of 6, 9, 12, or 18 bits can be transferred into and out of the arithmetic and control registers. The 1100/40 and 1100/80 can also perform decimal addition and subtraction operations on 9-bit bytes, packed 4 to a word. ▶
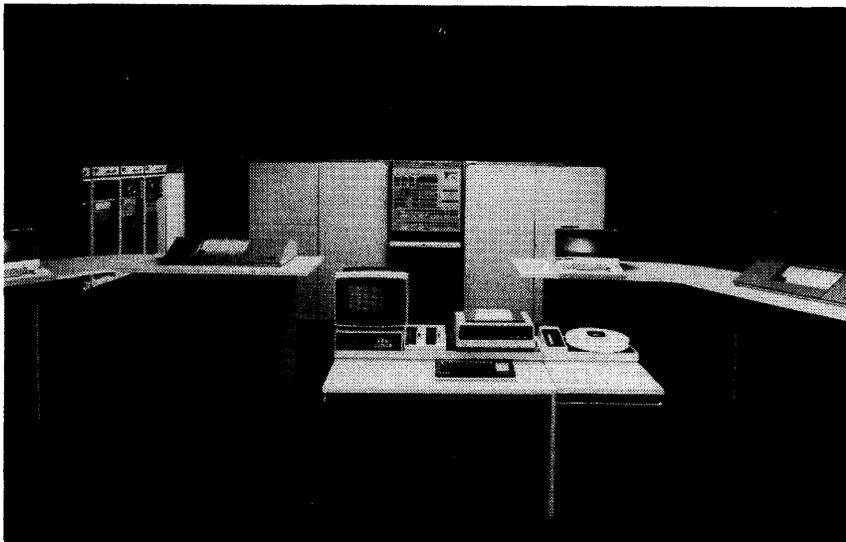
The Sperry Univac 1100/80 is the most powerful member of the 1100 Series family covered in this report. It is available in five distinct models: the low-end 1100/80, the single-processor 1100/81, the dual-processor 1100/82, the three-processor 1100/83, and the four-processor 1100/84.

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▷ channels can be expanded to 16 in 4-channel increments. Both single-processor and dual-processor 1100/10 systems are available. An Availability Control Unit for multiprocessor configurations permits manual separation of an 1100/10 or 1100/20 system into two independent systems.

The 1100/40 is an enhanced version of the earlier 1110. Each 1100/40 includes a Command/Arithmetic Unit (central processor) and an Input/Output Access Unit (IOAU) with eight channels. Primary memory is available in capacities of 192K to 512K words, while extended storage is available in 128K- to 1024K-word capacities. The extended storage features single-bit error correction and double-bit error detection capabilities.

The 1100/80 systems have twice the power of comparably-configured 1100/40 systems. Featuring multi-layer printed circuit boards, emitter-coupled logic (ECL), and a buffer memory, the 1100/80 systems can have up to 8 million words (32 million bytes) of real memory and are available in either uniprocessor or multiprocessor configurations.

In the 1100/80 systems, a large backing store of moderate speed has been combined with a high-speed buffer to support the processing components. In this way, more real memory is available to the user. Either four or eight words at a time are fetched from the backing store into the buffer. All programs and data are loaded into the buffer for execution. Buffer storage ranges from 4K to 32K words. Backing storage ranges from 512K to 8192K words.

The 1100/80 systems are available in five basic models: the 1100/80, 1100/81, 1100/82, 1100/83, and 1100/84. The 1100/80 and 1100/81 are uniprocessor models, and the 1100/82, 1100/83, and 1100/84 have two, three, and four processors, respectively. All five models are also available in a second version that includes the Scientific Accelerator Module (SAM), which is optional on the basic systems. SAM increases the execution speeds of floating-point and extended fixed-point arithmetic functions. According to Sperry Univac, SAM provides performance increases of up to 15 percent.

A third group of 1100/81 through 1100/84 processors includes SAM and also provides support for Sperry Univac's new Array Processor Subsystem (APS). Introduced for the energy industry, the APS is a powerful special-purpose computer designed to process large quantities of numerical data.

PERIPHERAL AND COMMUNICATIONS EQUIPMENT

Sperry Univac has offered an unusually broad array of mass storage equipment for the 1100 Series computers, including fixed-head drums, moving-head drums (Fastrand), and disk pack drives. The company's early emphasis on drums has shifted to interchangeable disk pack drives, although the high-performance FH-432 drum units are still used for operating system residence and program swapping in some 1100 Series systems. ▷

► FLOATING-POINT OPERANDS: One word, consisting of 27-bit-plus-sign fraction and 8-bit exponent; or two words, consisting of 60-bit-plus-sign fraction and 11-bit exponent.

INSTRUCTIONS: One word, consisting of 6-bit Function Code, 4-bit Partial-Word or Immediate-Operand Designator, 4-bit Control Register Designator, 4-bit Index Register Designator, 1-bit Index Modification Designator, 1-bit Indirect Address Designator, and 16-bit Address Field.

INTERNAL CODE: Sperry Univac communications terminals and other I/O units can employ either a 6-bit Fieldata code or standard ASCII code. The 1100 processors are not code-sensitive and can manipulate data in 6-bit, 9-bit, 12-bit, or 18-bit codes.

MAIN STORAGE/PRIMARY STORAGE

STORAGE TYPE: Metal oxide semiconductor (MOS) in the 1100/10, 1100/20, and 1100/80; and bipolar primary memory and MOS extended memory in the 1100/40.

CAPACITY: 1100/10—131,072 to 524,288 words, consisting of one 131,072-word or 262,144-word module per cabinet, with a maximum of four cabinets.

1100/20—131,072, 196,608, 262,144, or 524,288 words, consisting of one 65,536-word or one 131,072-word module per cabinet, with a maximum of four cabinets.

1100/40—196,608 to 524,288 words, in 65,536-word storage units. Each storage unit contains four simultaneously accessible 16,384-word modules, with odd-even interleaved addressing of each pair of adjacent modules. A basic 64K storage unit can service up to four requestors (CAU or IOAU) simultaneously, while a fully expanded 128K-word storage unit can service up to eight requestors simultaneously.

1100/80—524,288 to 8,388,608 words, in 524,288-word banks. Two banks can be housed in one cabinet, with a maximum of four cabinets.

CYCLE TIME: See table. Each storage module operates independently, permitting overlapped accessing of instructions and data when they are located in different modules.

CHECKING: In all 1100 Series computer systems, a parity bit with each half-word is checked whenever storage is referenced and on all I/O transfers. In 1100/40 systems, parity is initially checked on all addresses presented to Multi-Module Access units, Memory Access Interfaces, Primary Storage Units, and Extended Storage Units to associate any errors with the malfunctioning component. A parity bit with each half-word is also checked at the component level for each read and write operation.

In 1100/10, 1100/20, and 1100/80 main storage, a 7-bit error correction code is generated for each word for all read and write operations. Single-bit errors are corrected automatically, and multiple-bit errors cause a data parity interrupt.

STORAGE PROTECTION: The Storage Limits Register, loaded by the Operating System, defines the upper and lower boundaries of both the instruction areas and data areas that may be referenced by the currently active user program. Any attempt to reference an address beyond these limits causes an interrupt. The setting of a bit in the Processor State Register determines whether the protection is against write operations only or against all reads, writes, and jumps. In 1100/10 and 1100/20 systems, the I-Bank and D-Bank Write Protection bits in the Processor State Register provide read, write, and storage protection for data in both banks.

EXTENDED STORAGE (for 1100/40 only)

STORAGE TYPE: Metal oxide semiconductor (MOS). ►

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CHARACTERISTICS OF THE UNIVAC 1100 SERIES SYSTEMS

	1100/10 (1100/10, /12)	1100/20	1100/40	1100/80 (1100/80 to /84)
SYSTEM CHARACTERISTICS				
No. of central processors	1 or 2	1	1	1 to 4
No. of I/O controllers	None	None	1 to 4	1 to 4
Date of introduction	Oct. 1975	March 1975	March 1975	Nov. 1976
Date of first delivery	April 1976	July 1975	Sept. 1975	March 1977
Relative performance level (approximate)	1.3	2.0	4 to 15	6.6 to 34
Storage characteristics	1-level	1-level	Primary/extended	Cache/main
MAIN STORAGE				
Type	MOS	MOS	Bipolar	MOS
Cycle time, nanoseconds	1125, 1000, or 875	875	280/380	1250 per 8 words
Interleaving	Standard	Standard	Standard	Standard
Minimum capacity, words	131,072	131,072	196,608	524,288
Maximum capacity, words	524,288	524,288	524,288	8,388,608
Error correcting	Yes	Yes	No	Yes
BUFFER STORAGE (CACHE)				
Type	None	None	None	ECL
Cycle time, nanoseconds	—	—	—	100
Capacity, words	—	—	—	4K to 32K
EXTENDED STORAGE				
Type	None	None	MOS	None
Cycle time, nanoseconds	—	—	1800	—
Minimum capacity, words	—	—	131,072	—
Maximum capacity, words	—	—	1,048,576	—
PROCESSING UNIT				
Integer add time, nanoseconds	1125	875	300	200
Scientific accelerator module	No	No	No	Yes
No. of instructions	146	146	199	219
Byte handling instructions	24	24	24	24
General registers	2 x 48	2 x 48	2 x 48	128
Instruction lookahead stack	4 inst.	4 inst.	4 inst.	—
Accelerated addressing	No	No	Yes	Yes
Segment descriptor registers	4	4	4	4
494 emulation mode	No	No	No	Yes
INPUT/OUTPUT CONTROL				
Number of I/O channels:				
Per central processor	4 to 16	4 to 16	—	—
Per I/O controller	—	—	8 to 24	2 to 26
Per system	4 to 32	4 to 32	8 to 96	2 to 104
Max. I/O data rate:				
Per I/O channel or channel module	444,000	571,000	500,000	2,000,000
Per central processor	888,000	1,142,000	—	—
Per I/O controller	—	—	4,000,000	—

▷ Mass storage devices currently available for the 1100 systems include the 8405 fixed-head disk drive, the 8430, 8433, and 8434 removable disk drives, and the 8450 and 8470 fixed-disk drives. The 8405 and the 8430 and 8433 can be intermixed on a single 5039 microprogrammed control unit. The two versions of the 8405 Fixed-Head Disk provide either 3 million or 6 million bytes of fixed-head storage per unit, or 24 or 48 million bytes per subsystem, with a very fast average access time of 8.3 milliseconds. The 8430 Disk Drive has a capacity of 17 million 36-bit words (or 100 million bytes) per unit, while the "double density" 8433 Disk Drive contains 34 million 36-bit words (or 200 million bytes) of storage per drive. All three mass storage units support state-of-the-art ▷

CAPACITY: 131,072 to 1,048,576 words, in 131,072-word modules. One- or two-way address interleaving is optional. Extended storage is connected to the system by Multiple Access Interface (MAI) units. Each MAI, with appropriate optional features, can interface two 128K-word modules of extended storage with up to four CAU's and four IOAU's.

1100 Series extended storage is directly addressable.

CYCLE TIME: 800 nanoseconds per word.

CHECKING: A 7-bit error correction code is generated for each word during each read and write operation. Single-bit errors are corrected automatically, and double-bit errors cause a parity interrupt.

STORAGE PROTECTION: Same as for primary storage, above. ▶

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➢ features such as Command Retry, Rotational Position Sensing, and error detection and correction. The 5039 Control Unit can handle combinations of up to sixteen 8430 and/or 8433 disk units, or a combination of up to eight 8405 fixed-head drives and eight 8430 and/or 8433 removable disk drives.

The 8434 Disk Storage Subsystem increases the on-line disk storage capacity for the 1100 systems to 1.7 billion words in fixed record formats. The 8434 subsystem consists of a 5046 Storage Control Unit and from 2 to 16 8434, 8430, or 8433 disk drives in any combination. Up to 16 additional drives can be added. In addition to the 8430, 8433, and 8434 disk drives, 8405 Fixed-Head Disks can also be used.

The 8450 Disk Storage Subsystem includes both moving head and optional fixed-head access and provides up to 67 million words of storage. The optional fixed-head capability provides an additional 241,920 words of fast-access storage per non-removable disk pack. The 8450 disk drives attach to the 1100 systems through the 5046 control unit, which can control up to 16 drives. An additional 16 drives can also be controlled through an optional expansion feature. An 8450 subsystem can also include the earlier 8430 and 8433 disk drives and can be adapted for dual-access operation.

The 8470 Disk Subsystem, which is available for 1100/80 systems only, provides up to 89.6 million words of non-removable storage. The 5056-83 Controller supports up to 8 disk drives or, optionally, up to 32 disk drives. An 8470 subsystem can also include the 8430, 8433, and 8450 disk drives.

Univac also offers a variety of magnetic tape drives, in both 7-track and 9-track models, with data transfer rates ranging from 12,000 to 1,250,000 bytes per second.

Data base/data communications capabilities are strongly emphasized for all 1100 Series processors. The General Communications Subsystem supports communications networks of up to 32 half- or full-duplex lines. The GCS has a total throughput capacity of 250,000 bits per second.

Sperry Univac's Communications/Symbiont Processor (C/SP) is a programmable front-end communications processor that can be equipped with up to eight Uniservo 16 Magnetic Tape Units, for use in message staging, audit trail preparation, and store-and-forward message switching applications. Important reliability features added to the C/SP include the capability for stand-alone operation in the event of a host processor malfunction, the ability to share a C/SP between two host processors or to configure a fully redundant dual-host-processor/dual-C/SP configuration, and the ability to dynamically reconfigure the communications network through a DCT 500-based C/SP console. Full-duplex transmission capabilities are designed to improve remote batch processing capabilities using either a Sperry Univac DCT 1000 or UTS 700 as a remote batch terminal. Binary synchronous transmission capabilities also have been added to allow transfer of data between Sperry Univac 1100 Series systems and IBM System/360 and System/ ➢

➤ **BUFFER STORAGE (for 1100/80 only)**

STORAGE TYPE: IC semiconductor.

CAPACITY: 4,096 to 32,768 words, in 4,096-word modules. Buffer storage is located in the Storage Interface Unit (SIU). The basic SIU contains 4K words of buffer storage and can be expanded by the addition of a 4K-buffer expansion for a total of 8K words. In addition, a second 4K-word buffer can be added, and this can also be expanded to 8K words, giving a maximum buffer size of 16K words in the SIU. The second buffer is functionally independent of the first. An additional SIU must be added to systems with three or four processors, providing a maximum of 32K words per system. The 1100/80 series systems that support the Array Processor Subsystem have a minimum of 8K words of buffer storage in one module.

ACCESS TIME: 100 nanoseconds per word.

CENTRAL PROCESSORS

REGISTERS: In 1100/10 and 1100/20 systems, each central processor has 128 program-addressable control registers. Each integrated-circuit register is 36 bits long and has a cycle time of 125 nanoseconds. User programs can make use of 15 index registers, 16 accumulators (4 of which also serve as index registers), 17 unassigned registers (which can be used for fast-access temporary storage), a Repeat Count Register, a Mask Register, and a Processor State Register. In the 1100/10 and 1100/20 systems, a Breakpoint Register is operational on all instruction addresses and read/write and I/O references to main memory, and is available as a debugging aid. Accessible only to the Operating System are 32 I/O access control registers, duplicate sets of 15 index registers and 16 accumulators, 17 unassigned registers, a Repeat Count Register, a Mask Register, and a Real-Time Clock Register which is decremented every 200 microseconds.

In 1100/40 systems, each Command/Arithmetic Unit (CAU) has a General Register Stack consisting of 112 integrated-circuit control registers, each 36 bits long and program-addressable. Register cycle time is 90 nanoseconds. Users' programs can make use of 15 index registers, 16 accumulators (4 of which also serve as index registers), a Repeat Register, a Mask Register, a Real-Time Clock, and a number of unassigned registers that can be used for fast-access temporary storage. Accessible only to the Operating System are duplicate sets of index registers and accumulators, plus a variety of special-purpose registers.

In the 1100/80 system, the General Register Stack (GRS) includes 128 program-addressable control registers, which are 36-bit integrated-circuit registers with a basic cycle time of 50 nanoseconds. Effective use of multiple accumulators and index registers for the development and use of constants, index values, and operands substantially improves CPU performance. Four of the accumulators (A registers) overlap four of the index registers (X registers); this means they can be used as either A or X registers, providing additional versatility in their use. User programs can make use of 15 index registers, 16 accumulators, 16 special registers, and 4 unassigned registers that are available as temporary storage locations.

INDEXING: Operand addresses can be modified by the contents of any of the 15 index registers. If desired, the contents of the index register can be automatically incremented by any specified value each time the register is referenced.

INDIRECT ADDRESSING: Possible to any desired number of levels, with full indexing capabilities at each level.

INSTRUCTION REPERTOIRE: The 1100/10 and 1100/20 have 146 instructions, all one word in length. Most ➤ instructions specify the address of one operand in main ➤

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INSTRUCTION EXECUTION TIMES FOR THE 1100 SERIES PROCESSORS

	1100/10 and 1100/20*	1100/40	1100/80**
Load/store (36, 18, 12, 9, or 6 bits)	1.13/ 1.00/ 0.88	0.30	0.20/0.20
Load/store (72 bits)	2.25/ 2.00/ 1.75	0.60	0.40/0.40
Fixed-point add/subtract (36 bits)	1.13/ 1.00/ 0.88	0.30	0.20/0.20
Fixed-point add/subtract (72 bits)	2.38/ 2.13/ 1.88	0.60	0.45/0.45
Fixed-point multiply (36 bits)	2.75/ 2.63/ 2.50	1.50	1.40/0.60
Fixed-point divide (36 bits)	10.50/10.38/10.25	6.40	5.55/2.30
Floating-point add/subtract (single)	2.25/ 2.13/ 2.00	0.90	0.70/0.40
Floating-point multiply (single)	3.00/ 2.88/ 2.75	1.65	1.70/0.70
Floating-point divide (single)	8.63/ 8.50/ 8.33	5.30	4.85/2.10
Floating-point add/subtract (double)	3.38/ 3.13/ 2.88	0.75	0.95/0.70
Floating-point multiply (double)	5.00/ 4.75/ 4.50	2.40	2.35/1.40
Floating-point divide (double)	18.00/17.75/17.50	10.30	9.85/3.90

*Dependent on memory speed employed.
**Without/with scientific accelerator feature.

▷ 370 computers as well as binary synchronous batch terminals.

The Distributed Communications Architecture (DCA), introduced concurrently with the 1100/80, is designed to ensure continued compatibility of present and future products by specifying interfaces and functions of all components and providing guidelines for the building of communications networks. DCA can accommodate a broad range of host processors and terminal attachments, including other manufacturers' equipment. Adaptable to both simple and complex networks, DCA is said to permit the design of networks that fulfill many specialized requirements, such as maximum-security, ultra-resilient, and low-overhead systems.

A DCA-compatible remote concentrator can be used to mix old and new terminals, all using their own protocols. Remote concentrators, as part of a DCA network, will provide the user with many advantages, such as structured networks or bit-oriented protocols, without impacting his current investment in terminals.

Concurrently with the DCA announcement, Sperry Univac also introduced the Telcon communications system. Telcon provides not only front-end processing for the 1100 Series, but network capability for communications with other 1100 systems, other Sperry Univac systems such as the Series 90, and other vendors' host systems or networks. The basic hardware of a Telcon system is made up of a Distributed Communications Processor (DCP), which can have disks, diskettes, or tapes attached, as well as a communications scanner for up to 128 full-duplex or 256 half-duplex lines.

In Telcon, the network control software resides in all DCP's within the network and is capable of being configured as a front-end processor, nodal processor, or remote concentrator. This software provides the necessary message control, routing, and network control to communicate between DCP's and/or host processors. Placing control of the communications network within the DCP's provides the host processor with communications independence. ▷

▶ storage and one of the 16 accumulators. Complete binary arithmetic facilities are provided for single-precision fixed-point and both single and double-precision floating-point operands. Addition and subtraction can also be performed on double-precision fixed-point operands and on 18-bit half-words and 12-bit third-words. Also included are extensive facilities for testing, shifting, searching, and logical operations. Not available, however, are instructions for decimal arithmetic, radix conversion, code translation, or editing.

The 1100/40 CAU's have 199 instructions, including all of the facilities of the smaller systems plus a group of character-oriented instructions that permit the following operations upon byte strings: move, move with translate, compare, edit, decimal add, decimal subtract, pack, unpack, radix conversion, and format conversions.

The 1100/80 has 219 instructions. To a great extent, the instruction repertoire is identical with that of the other 1100 Series systems in order to maintain compatibility. To utilize the full capabilities of the 1100/80 system, character manipulation instructions and additional privileged instructions are included.

INSTRUCTION TIMES: See Table. All times are in microseconds and are for instructions and data located in different modules of main storage, with no storage conflicts due to I/O activity. For same-bank accessing, execution time for each instruction is increased by one main storage cycle.

Instruction timings given for 1100/80 family processors are measured both with and without the Scientific Accelerator Module. Significantly faster execution times for fixed-point multiply and divide as well as floating point arithmetic instructions are obtainable through the accelerator module.

PROCESSOR MODES: When a processor is operating in Guard Mode, as denoted by the setting of a bit in the Processor State Register, no accesses to the Executive control registers are permitted, and the Storage Limits Register defines the main storage areas that can be accessed. When the Guard Mode bit is turned off, all registers and storage locations can be freely accessed. The Guard Mode is normally enabled for user programs and disabled for Executive functions.

INTERRUPTS: A program interrupt facility causes storage of the Processor State Register's current contents and a transfer of control to the Operating System whenever one of the following conditions occurs: completion of an I/O operation, abnormal condition in an I/O subsystem, ▶

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▷ The DCP/40, an enhanced version of the DCP, was introduced in June 1979. The DPC/40 offers increased memory capacity and performance over the original DCP.

SOFTWARE

The 1100 Operating System (formerly called EXEC 8) is the standard operating system for all members of the 1100 Series, and furnishes comprehensive supervisory and control facilities for three distinct modes of multi-programmed operation: batch, demand (or time-sharing), and real-time (or communications). It provides virtually the full gamut of desirable operating facilities, including dynamic storage allocation, reentrancy, multiprocessing, dynamic reconfiguration, automatic recovery, multi-level prioritization, system optimization, and two types of program segmentation (one of which provides, in effect, a software-controlled virtual storage capability).

The 1100 Operating System formerly required the presence of high-performance (and expensive) fixed-head drum units, but Sperry Univac now offers a Disk-Resident System that uses disk pack drives instead of drums for all systems functions. The Disk-Resident version provides all the facilities of the full 1100 Operating System, at some sacrifice in performance because of the slower disk access times.

Software facilities that operate under the control of the 1100 Operating System include processors for the COBOL, FORTRAN, ALGOL, BASIC, JOVIAL, PL/1, APL, RPG, and Assembly languages, plus a variety of utility routines and application packages.

Sperry Univac, like most other mainframe manufacturers, is now placing a strong marketing emphasis on data base/data communications software. DMS 1100, a powerful data base management system, is one of the major components of Sperry Univac's impressive Total Information Management System (TIMS), which also includes a Communications Management System (CMS), a Transaction Interface Package (TIP), and a Conversational Time-Sharing System (CTS). Two end-user-oriented software systems, which are aimed at facilitating the development of transaction processing and management information systems, are the Remote Processing System (RPS 1100), which allows nonprogrammers to interactively develop and use their own file management applications from remote CRT terminals, and the Query Language Processor (QLP 1100), an English-language batch or interactive interface to DMS 1100.

Recent additions to the 1100 Series software product line include the Interactive Processing Facility (IPF), Mapper 1100, the Display Processing System (DPS) 1100, the Information Management System (IMS) 1100, and Edit 1100.

IPF supports time-sharing on 1100/40 and 1100/80 systems, and effectively supersedes the Conversational Time-Sharing System. Mapper 1100 is a real-time report processing system for multiple terminal systems, and DPS 1100 provides for screen handling and the management of screen-oriented transactions in an on-line environment. IMS 1100, available for the 1100/80 systems only, is a new ▷

▶ processor or storage fault, program error, or program-requested interrupt. In 1100/40 systems, each IOAU contains a 2-bit pointer register that determines which CAU receives I/O interrupt signals. If desired, each I/O interrupt can be directed to the CAU that initiated the I/O operation on the channel involved.

AVAILABILITY CONTROL UNIT (ACU): A component of 1100/10 and 1100/20 multiprocessor configurations that permits the system to be configured into two independent systems, permits individual units to be taken off-line for preventive maintenance, monitors the status of system components, and initiates automatic recovery procedures when failures occur.

SYSTEM PARTITIONING UNIT (SPU): Permits manual separation of an 1100/40 system into two or three logically independent smaller systems, permits individual units to be taken off-line for maintenance, and initiates automatic recovery procedures when failures occur. The SPU also monitors the status of system components and performs the initial system load. The SPU is required in every 3-processor or larger system and is optional in smaller systems. When all optional features are included, the SPU can interface with 4 CAU's, 4 IOAU's, 512K words of main storage, 1024K words of extended storage, and 48 multi-access peripheral subsystems.

SYSTEM TRANSITION UNIT (STU): Contains the controls and indicators required for control and assignment of the system units in an 1100/80 system. Power sequencing, manual control of the CPU's and IOU's, initial load, automatic recovery, and partitioning are controlled by the STU.

The initial load function provides the ability to set module select register (MSR) values, select initial load paths, and initiate the initial load operation for either one of two applications. The MSR selects the section of main storage in which the fixed interrupt addresses are located, and the location in main storage where the instruction execution sequence is initiated on an initial load.

The partitioning function provides the ability to assign individual central-complex units of a system to either one of two independent smaller systems, or to isolate a unit from either application for off-line concurrent maintenance. Included in this function is the control for the automatic expansion or compression of main storage address range for both applications. This operation provides main storage ranges for either or both applications for any combination of main storage unit assignments. The partitioning function also indicates the operational status of each central-complex unit. These status conditions are available to system software for configuration control. The ability to partition peripheral subsystems is provided by the Subsystem Availability Unit (SAU) and the Byte Channel Transfer Switch (BCTS) or by controls located on the individual subsystems.

SYSTEM MAINTENANCE UNIT (SMU): In an 1100/80 system, the SMU provides for diagnostic checkout and fault isolation of the CPU and IOU by the automatic comparison of internal logic status against known correct data. The SMU includes a maintenance processor, card tester, communications capability, and a Uniscope 200 CRT workstation.

ARRAY PROCESSING SUBSYSTEM (APS): A special-purpose scientific processor that enables appropriately configured 1100/80 systems to process large quantities of numeric data. The APS consists of an array processor control unit and an array processing unit with 8K words of instruction memory and 64K words of data scratchpad memory. The APS can perform floating-point arithmetic operations at a maximum burst rate of 120 million operations per second and a sustainable rate of 80 million operations per second. A ▶

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▷ implementation of IMS 90, the transaction processing system used on Series 90 systems. Edit 1100 is a full-screen text editor for 1100/40 and 1100/80 systems. It provides a functional superset of the VS/9 EDT editor used on 90 Series systems.

COMPATIBILITY

Within the 1100 Series, Sperry Univac has maintained a high degree of program and data compatibility. The 1106, 1100/10, and 1100/20 models use essentially the same instruction repertoire, which is a compatible subset of the expanded 1110, 1100/40, and 1100/80 repertoire. Thus, object programs can be freely interchanged between an 1106 and an 1100/20 or 1100/10, and programs written for an 1106, an 1100/10, or an 1100/20 can be executed without alteration on an 1110, 1100/40, or 1100/80.

There is no direct program compatibility, at the machine or assembly-language level, between the 1100 Series and any other line of Sperry Univac or competitive computers. The 1100 Series implementations of the COBOL, FORTRAN, ALGOL, BASIC, PL/1, and JOVIAL languages, however, are generally in accordance with the accepted standards for these languages. The 1100 Series systems originally used the 6-bit Fieldata code, but in an effort to resolve the resulting compatibility problems, Sperry Univac has gradually revised most of the hardware and software to make use of ASCII. Thus, for most practical purposes, an 1100 Series computer can now be considered a byte-oriented ASCII machine.

Sperry Univac has developed an imposing collection of software aids to simplify the conversion process for current users of Sperry Univac (ex-RCA) Series 70 equipment and IBM System/360 and System/370 computers. These include an 1100 COBOL Source Translator to convert System/360 and System/370, Series 70, or Sperry Univac 494 COBOL programs to Sperry Univac ASCII COBOL; a FORTRAN Source Translator for System 360/370, Series 70, or 494 FORTRAN programs; and an 1100 Data File Converter to convert IBM, Series 70, or Sperry Univac COBOL files to ASCII COBOL format. Conversion aids specifically for Series 70 users, in addition to the COBOL and FORTRAN Translators, include an assembly language translator (BALT), a generalized data translator for converting Series 70 EBCDIC data to Sperry Univac Fieldata and ASCII format, an upward-compatible RPG compiler, and a new standalone Sort/Merge program that accepts Series 70 parameter cards as input. Job control language manuals are also available that illustrate comparable 1100 Series job streams for conversion from the Series 70 TDOS and DOS operating systems.

COMPETITIVE POSITION

System rentals for practical 1100 Series configurations span a broad range, from approximately $14,000 to over $300,000 per month. Thus, the 1100 Series competes with such impressive performers as the IBM System/370 ▷

▶ direct interface to main storage and a high-speed cache memory are provided to increase the data transfer rate. Data can be transferred between the host computer and APS at 35 to 40 million words per second. Real memory problems as large as 8 million words can be executed in a single vector operation. All arithmetic operations are fully compatible with the 1100/80 series host. The 1100/80 series processors that support the APS also include a Scientific Accelerator Module (SAM), a feature designed to improve the execution times of arithmetic instructions.

CONSOLE: The Sperry Univac 4013 System Console, used in the 1100/10, 1100/20, 1100/40, and 1100/80 systems, consists of a Uniscope 100 or Uniscope 200 CRT display, a typewriter-style keyboard and control panel, and a 30-cps incremental printer for hard-copy output. Up to five additional printers can be connected to a console. A 200-cps console printer is also available for the 1100/80 systems. The CRT displays 16 lines of 64 characters each and uses a 7-bit ASCII character set. The System Console also includes a fault indicator, which indicates fault conditions in major system components, and an interface for the Total Remote Assistance Center (TRACE) remote diagnostic capability. An 1100/10 or 1100/20 processor has one System Console and can have one auxiliary console per processor. An 1100/80 processor can have any number required.

INPUT/OUTPUT CONTROL

I/O CHANNELS: The basic 1100/10 and 1100/20 Processors have 4 I/O channels, expandable in 4-channel increments to a maximum of 16 channels.

The basic 1100/40 Input/Output Access unit (IOAU) contains 8 channels, expandable in 8-channel increments to a maximum of 24. (There are no I/O channels in the 1100/40 Command/Arithmetic Units.) Since up to 4 IOAU's can be configured in a system, the maximum total number of I/O channels is 96.

The basic 1100/80 Input/Output Unit includes space for four channel modules; three are standard—a byte multiplexer channel, a block multiplexer channel, and a word channel module (four word channels)—and one more is optional. Up to 8 channel modules including byte multiplexer, block multiplexer, and/or word channel modules, can be accommodated per input/output unit for a total of 32 per 1100/80 system. Each byte or block multiplexer channel has eight shared subchannels and is capable of controlling up to eight subsystems. Four word channels share one word channel module, so an IOU may have as many as 24 word channels. Two of the four word channels in each module may be externally specified index (ESI) channels. An ESI word channel can handle up to 32 full-duplex lines, making possible a total of 46 full-duplex lines on the two optional ESI channels in the word channel module.

All channels on an 1100/80 system can run simultaneously, and they are independent, not interfering with each other or the CPU. Each channel interfaces with main storage through the IOU control section, which resolves storage request and interrupt conflicts, by priority, and synchronizes channel operations with storage access timing.

CONFIGURATION RULES: An 1100/10 or 1100/20 Unit Processor System consists of a Processor with 4 to 16 I/O Channels, System Console, associated peripheral subsystems, and from 128K to 512K words of 1125, 1000, or 875-nanosecond MOS main memory.

An 1100/12 Multi-Processor System consists of two processors (each with System Console), 4 to 16 I/O channels, and associated peripheral subsystems. The system can have 256K to 512K words of main memory. A Shared Peripheral Interface (SPI) is required for each peripheral subsystem to be ▶

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▷ Models 138 through 158, and the 303X Series processors; the Honeywell Series 60 Level 66/DPS and DPS8 Series systems; the Burroughs B 6800 and B 7800 systems; and the Control Data Cyber 170 Series.

The 1100/80 systems are directly competitive with the Honeywell DPS8/70 and the IBM 303X Series processors. The 1100/82 Multiprocessor offers slightly better performance than the IBM 3032, and the 1100/83, with three processors, offers slightly better performance than the IBM 3033N. The 1100/82 and 1100/83 also offer the advantages of multiprocessing and hardware redundancy.

USER REACTION

Datapro's 1981 survey of general-purpose computer users yielded responses from thirty-six 1100 Series users, who had a total of 40 systems installed. This sample consisted of ten 1106/1108 systems, six 1100/40 systems, and sixteen 1100/80 systems. The average life of these systems was 41.1 months.

All but one of the respondents developed applications programs in-house. Forty-two percent also obtained programs from the manufacturer, and 36 percent used proprietary software packages. The most frequently used programming language was COBOL (94 percent).

Summarized in the following table are the users' ratings of the 1100 Series hardware, software, and support.

	Excellent	Good	Fair	Poor	WA*
Ease of operation	14	18	2	0	3.4
Reliability of mainframe	20	11	4	1	3.4
Reliability of peripherals	3	23	8	1	2.8
Maintenance service:					
Responsiveness	15	17	2	0	3.4
Effectiveness	8	23	3	0	3.1
Technical support:					
Trouble-shooting	2	18	8	5	2.5
Education	1	23	12	0	2.7
Documentation	0	23	12	1	2.6
Manufacturer's software:					
Operating system	18	12	5	1	3.3
Compilers and assemblers	11	18	7	0	3.1
Applications programs	2	14	9	2	2.6
Ease of programming	12	20	4	0	3.2
Ease of conversion	10	12	8	3	2.9
Overall satisfaction	6	24	5	0	3.0

*Weighted Average on a scale of 4.0 for Excellent.

We asked the users to check off, from lists provided, the significant problems and advantages of their computer systems. The 1100 Series received 123 specific mentions of advantages, and 32 mentions of problems. Eighty-three percent of the respondents said they would recommend the 1100 systems to other users.

We interviewed three users to gain additional insight into their experiences with the 1100 Series.

The first user interviewed was a Southern building supply firm that had been using an 1100/20 system for accounting ▷

▶ accessed by two processors, and a Multi-Module Access is required for each 64K- or 128K-word main storage unit.

An 1100/40 System consists of a Command/Arithmetic Unit, 1 to 4 Input/Output Access Units (each with 8 to 24 channels), System Console, System Partitioning Unit, 192K to 512K words of Primary Storage, 128K to 1024K words of Extended Storage, and associated peripheral subsystems.

An 1100/80 System is a limited-configurability version of the 1100/81 (below) that includes 4K words of buffer storage and one of two main memory configurations: 512K or 1024K words. The 1100/80 is fully compatible with the 1100/81 and can be upgraded to 1100/81 status. The 1100/80S is an 1100/80 processor with a Scientific Accelerator Module.

A basic 1100/81 System consists of one Central Processor Unit, one or two Input/Output Units, one to any number of System Consoles, 512K to 8192K words of main storage, one Storage Interface Unit with from 8K to 16K words of buffer storage, one System Transition Unit, one System Maintenance Unit, one motor/alternator, and associated peripheral subsystems.

A basic 1100/82 System consists of two Central Processor Units, one or two Input/Output Units, one to any number of System Consoles, 1024K to 8192K words of main storage in a minimum of two Main Storage Units, one or two Storage Interface Units with 16K to 32K words of buffer storage, one System Transition Unit, one System Maintenance Unit, one or more motor/alternators, and associated peripheral subsystems.

A basic 1100/83 System consists of three Central Processor Units, two to four Input/Output Units, two or more System Consoles, three to four MSU's capable of controlling 1536K to 8192K words of main memory, 24K to 32K words of buffer storage, one System Transition Unit, two System Maintenance Units, two or more motor/alternator units, and associated peripheral subsystems.

A basic 1100/84 System consists of four Central Processor Units, two or four Input/Output Units, two or more System Consoles, four MSU's capable of controlling 2048K to 8192K words of main memory, 32K words of buffer storage, one System Transition Unit, two System Maintenance Units, two or more motor/alternator units, and associated peripheral subsystems.

Sperry Univac offers two additional versions of the 1100/81, 1100/82, 1100/83, and 1100/84 processors. One version includes a Scientific Accelerator Module as a standard feature. (The accelerator feature is available as an option on the basic systems described above.) The second version includes both the Scientific Accelerator Module and support for the Array Processor Subsystem.

Each peripheral subsystem fully occupies one I/O channel. Additional channels may be connected. (See the descriptions of specific Mass Storage and Input/Output Units below.)

SIMULTANEOUS OPERATIONS: One input or output operation on each I/O channel can occur simultaneously with computation in each processor (or CPU). Moreover, the Externally Specified Index (ESI) mode permits multiple remote communications devices to transmit data to and from main storage in multiplexed fashion over a single I/O channel. All installed processors and IOU's can operate simultaneously and independently, with interference occurring only when two or more of these units simultaneously attempt to access the same storage module.

MAXIMUM I/O DATA RATES: See table. ▶

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▷ and payroll applications since 1979. On the day we called, the company was in the process of installing a new 1100/82 system. This user said he was very pleased with the 1100 Series equipment and had experienced no problems with the 1100/20, but his firm needed the additional memory and processing power offered by the 1100/82. In addition to the new processors, the company was adding a DCP/40 communications system.

A Southeastern university had installed an 1100/81 system that was used for a variety of different applications, including accounting, educational, medical, and scientific applications. The 1100/81 was used in a distributed processing environment with 170 terminals. This installation had started out with an 1108, which was "made to look like an 1106." The company then went to the 1100/81. The user said he had experienced no problems with the 1100/81, which had been installed since 1979.

The third user interviewed represented a national food distribution company that had recently purchased the 1100/82 system it had been leasing since 1978. The system included 1.02 million words of main storage, 1.8 billion words of disk storage, 10 magnetic tape units, 2 printers, and 60 terminals. Principal applications were accounting, manufacturing, payroll/personnel, transportation, and on-line order processing. This user said that he was very well satisfied with the system and that Sperry Univac "provides good equipment and good service."□

▶ MASS STORAGE

FH-432 MAGNETIC DRUM: Provides fast random access to fairly small quantities of data. Stores 262,144 words (1,572,864 characters) in 384 data tracks, each served by a fixed read/write head. Data is read and written on 3 tracks in parallel, and each 3-track group holds 2,048 words. Average access time is 4.3 milliseconds. Data transfer rate ranges from 1,440,000 down to 90,000 characters per second, depending upon the degree of interlacing employed. An FH-432 subsystem consists of a control unit and one to eight drums. FH-432 and FH-1782 drums can be intermixed in the same subsystem, and dual-channel access to a subsystem is possible through the use of two control units and appropriate special features.

FH-1782 MAGNETIC DRUM: Provides eight times the storage capacity of the FH-432 Drum with an access time four times as long. Stores 2,097,152 words (12,582,912 characters) in 1536 data tracks, each served by a fixed read/write head. Average access time is 17 milliseconds. Data transfer rate (as in the FH-432) ranges from 1,440,000 down to 90,000 characters per second, depending upon the degree of interlacing employed. An FH-1782 subsystem consists of a control unit and one to eight drums. FH-432 and FH-1782 drums can be intermixed in the same subsystem, and dual-channel access to a subsystem is possible through the use of two control units and appropriate special features.

8405 FIXED-HEAD DISK SUBSYSTEM: Provides rapid access to up to 11 million 36-bit words per subsystem stored in nonremovable head-per-track disks. The average latency time is 8.34 milliseconds. The 8405 drives are available for all 1100 Series systems in two versions. The 8405-04 Fixed-Head Disk provides six recording surfaces and up to 688,128 36-bit words (3.1 million bytes) per disk drive, and the 8405-00 provides 12 recording surfaces and up to 1,376,256 36-bit words (6.2 million bytes) per disk drive. Each recording

surface contains 64 tracks plus 8 spares, each of which can contain up to 16 records of 112 36-bit words each. The data transfer rate is 138,222 36-bit words (622K bytes) per second.

An 8405 Disk Subsystem consists of a 5039 Control Unit with an F2076 8405 Fixed-Head Disk attachment and from one to eight 8405 Disk Drives. From two to eight 8433 and/or 8430 Disk Storage Drives also can be intermixed on the 5039 Control Unit. A Dual Access feature on each 8405 Disk Drive provides dual access when two 5039 Control Units are present.

8430 DISK SUBSYSTEM: Provides large-capacity random-access storage in interchangeable 11-disk packs with storage capacities comparable to the standard-density (100-million-byte) IBM 3330 Disk Storage Subsystem. Each disk pack stores up to 17,194,240 36-bit words (77 million bytes) of data. Data is recorded on 404 tracks per surface (plus 7 spares) in 20 records of 112 words each per track. There are 19 read/write heads (one for each recording surface) in each comb-type access mechanism. Average head movement time is 27 milliseconds, average rotational delay is 8.3 milliseconds, and the data transfer rate is 179,111 36-bit words (806K bytes) per second.

From two to eight 8430 Disk Pack Drives can be attached to a 5039 Control Unit in combination with up to eight 8405 Fixed-Head Disk Drives. The 8430 Disk Pack Drives can also be intermixed with 8433 Disk Storage Drives on the 5039 Control Unit. A Sixteen-Drive Expansion Feature expands the capability of the 5039 Control Unit to up to sixteen 8430 and/or 8433 Disk Storage Drives. A dual-access feature and a second 5039 Control Unit permit simultaneous read and write operations on any two 8430 Disk Drives. The 8430 features a command retry facility and error correction coding circuitry.

8433 DISK SUBSYSTEM: Provides random access to very large quantities of data stored on removable "double-density 3330-type" disk packs. Each industry-standard disk pack contains 200 million bytes in Free Format recording mode. When the data is stored in records of 112 words each, it has a capacity of 34,388,340 36-bit words. There are 20 records per track and 808 tracks (plus 7 spares) on each of the 19 recording surfaces. The average head positioning time is 30 milliseconds, and the average rotational delay is 8.3 milliseconds. Data transfer rate is 179,111 36-bit words (806,000 bytes) per second.

From two to eight 8433 Disk Pack Drives can be connected to a 5039 Control Unit for a total of 275 million words per subsystem. A Sixteen-Drive Expansion Feature expands the capability of the 5039 Control Unit to up to 16 drives, or 550 million 36-bit words. The 8433 and 8430 Disk Pack Drives can be intermixed on one 5039 Control Unit up to the maximum of 8 or 16 drives. In addition, 8433 and 8430 Disk Pack Drives can be intermixed with 8405 Fixed-Head Disk Drives. A second 5039 Control Unit and the dual access feature permit simultaneous read/write operations to be performed on any two devices. The 8433 includes a command retry facility and error correction coding circuitry.

8434 DISK SUBSYSTEM: Consists of a 5046 Storage Control Unit and from 2 to 16 (in any combination) 8430, 8433, or 8434 disk drives. Up to 16 additional disk drives can be added to the 5046. Optionally, the controller can also handle the 8405 Fixed-Head Disk in addition to the 8430, 8433, and 8434 drives. When 8405's are used, the maximum configuration is from 1 to 8 8405 FHD's and from 2 to 16 8430, 8433, and/or 8434 drives.

The 5046 is a word-oriented, microprogrammed control unit that offers on-line diagnostic capability for more effective trouble-shooting. The microprogram is loaded from a diskette. ▶

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▶ The 8434 disk drive contains a fixed disk stack consisting of 10 platters with 19 recording surfaces. The twentieth surface is used for servo positioning information. When necessary, the disk stack can be removed for servicing, and in the event of drive failure, the pack can be moved to another drive to facilitate data recovery.

Each 8434 disk drive stores up to 307 million bytes or 67 million words in software-supported formats. Average head positioning time is 30 milliseconds, and average rotational delay is 8.3 milliseconds. Data transfer rate is 1,260,000 bytes per second.

8450 DISK SUBSYSTEM: The 8450 disk drive, introduced in October 1977, provides up to 67 million words of storage. The non-removable disks provide 15 recording surfaces, each having 555 tracks (plus 5 spares) and serviced by 2 read-write heads. Up to 242K words of fixed-head storage can be added to each unit. The average head-positioning time is 23 milliseconds, and the average rotational delay is 8.3 milliseconds (3600 rpm). Data transfer rate is 280,000 words per second.

The 8450 disk drives connect to a word channel through the 5046 Storage Control Unit (SCU), which permits the drives to be intermixed with 8430 and 8433 disk drives. The 5046 SCU can control up to 16 drives, and can be expanded to provide control for up to 16 additional drives through the F2837-00 Power Control Expansion. Disk drives are attached to the 5046 SCU in groups of four. Each group can consist of either 8430/8433 drives or 8450 drives. The 8450 disk drives can also be adapted for dual access by addition of the F2718-99 Dual Access Feature, which permits simultaneous Read/Write, Read/Read, Write/Read, and Write/Write access on any two drives. Additional features of the 5046/8450 subsystem include rotational position sensing, error correction facilities, and enhanced command retry.

8470 DISK SUBSYSTEM: Available for 1100/80 systems only, the 8470 subsystem consists of the 5056-83 controller and the 8470 Disk Drive. This drive, an enhanced version of the 8450, provides up to 89,600,000 words (403,200,000 bytes) of storage. The HDA consists of nine platters with 16 surfaces used for data and one surface of the remaining platter used for servo control.

Minimum, average, and maximum head movement times are 4, 23, and 46 milliseconds, respectively. The drive has a rotational speed of 3600 rpm and a rotational delay of 8.3 milliseconds. Transfer rate for the drive is 466,666 words (2,097,000 bytes) per second.

The 5056-83 controller can attach up to eight 8470 Disk Drives. The F3192-02 feature allows for the attachment of eight additional 8470 drives to the 5056-83. Up to three F3192-02 features are allowed per controller, thus providing for a maximum of 32 8470 drives per 5056-83. The F3192-00 and F3192-01 features allow for the attachment of up to eight 8430/8433 and 8450 Disk Drives, respectively. Dual access may be added to the 8470 with feature F2718-00.

INPUT/OUTPUT UNITS

UNISERVO 14 MAGNETIC TAPE UNIT: A medium-speed tape drive that reads and records data on standard ½-inch tape in IBM-compatible phase-encoded or NRZI formats. Available in both 9-track and 7-track versions. Tape speed is 60 inches per second, forward or backward. The standard 9-track version has a recording density of 1600 bpi (in phase-encoded mode) and a data rate of 96,000 bytes per second. The optional Dual Density feature permits operation at 800 bpi (in NRZI mode) at a data rate of 48,000 bytes per second, while the 7-track NRZI version operates at 200, 556, or 800 bpi, with data rates of 12,000, 33,400, or 48,000 characters per second.

The Uniservo 14 Magnetic Tape Units use the 5045 Control Unit, which includes the controller and housing for two magnetic tape units. A maximum of eight tape units can be attached to each 5045 Control Unit. Features available with the Uniservo 14 include automatic tape loading, dustproof wraparound tape cartridges, single-capstan drive, and a dual-channel option that permits non-simultaneous operation on two channels on a single processor or shared operation between two central processors.

UNISERVO 16 MAGNETIC TAPE UNIT: A high-speed tape drive that reads and records data on standard ½-inch tape in IBM-compatible formats. Available in both 9-track and 7-track versions. Tape speed is 120 inches per second, forward or backward. The standard 9-track version has a recording density of 1600 bpi (in phase-encoded mode) and a data rate of 192,000 bytes (or 256,000 six-bit characters) per second; the optional Dual Density feature permits operation at 800 bpi (in NRZI mode) at a data rate of 96,000 bytes per second. The 7-track operates at 200, 556, or 800 bpi, with corresponding data rates of 24,000, 66,720, or 96,000 characters per second. A Uniservo 16 subsystem consists of up to 16 tape units connected to a single- or dual-channel control unit. On all systems except the 1100/80, the Multi-Subsystem Adapter is a prerequisite.

UNISERVO 22/24 MAGNETIC TAPE UNITS: High-performance tape drives that match the performance of the IBM 3420 Model 7. Both models are 9-track, 800/1600-bpi tape drives designed for NRZI and PE recording. The Uniservo 22 has a transfer rate of 120,000 bytes per second at 1600 bpi and 60,000 bytes per second at 800 bpi. The Uniservo 24 transfers data at 200,000 bytes per second at 1600 bpi and 100,000 bytes per second at 800 bpi. Tape speed is 75 ips on the Uniservo 22 and 125 ips on the Uniservo 24. Operational conveniences include a power window, automatic tape threading, and wrap-around tape cartridge loading. The Uniservo 22 subsystem consists of 1 to 8 Uniservo 22 or 24 drives with at least one Uniservo 22 drive. The Uniservo 24 subsystem consists of 1 to 8 Uniservo 22 or 24 drives with at least one Uniservo 24 drive. A dual-access subsystem can be configured by adding a second control unit and installing the Dual Access feature in each tape unit.

UNISERVO 30 SERIES TAPE UNITS: High-performance units that record data on ½-inch tape in IBM-compatible formats. There are five models in the series, three of which use Group Coded Recording (GCR) at a density of 6250 bits per inch. All five models use the Uniservo 5042 Control Unit, and Uniservo 30 series tape units can be intermixed in any combination on the same subsystem, provided the proper control unit is included to accommodate the various tape unit types. The basic control unit can handle one to eight Uniservo 30 series tape units. Optional features in the control unit and the addition of a second control unit, also with appropriate features, permit communication with up to 16 tapes in a dual-access mode. The five models in the Uniservo 30 series and their characteristics are as follows:

Uniservo 30 (7-track)—a conventional NRZI unit with a transfer rate of 160,000 bytes/second at 800 bpi, 111,200 bytes/second at 556 bpi, or 40,000 bytes/second at 200 bpi. Tape speed is 200 inches/second.

Uniservo 30 (9-track)—a unit designed for NRZI and PE (phase encoded) recording. The transfer rate is 320,000 bytes/second at 1600 bpi or 160,000 bytes/second at 800 bpi. Tape speed is 200 inches/second.

Uniservo 32—a 9-track unit designed for GCR and PE recording. The transfer rate is 470,000 bytes/second at 6250 bpi or 120,000 bytes/second at 1600 bpi. Tape speed is 75 inches/second. ▶

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▶ Uniservo 34—a 9-track unit designed for GCR and PE recording. The transfer rate is 780,000 bytes per second at 6250 bpi or 200,000 bytes per second at 1600 bpi. Tape speed is 125 inches/second.

Uniservo 36—a 9-track unit designed for GCR and PE recording. The transfer rate is 1,250,000 bytes/second at 6250 bpi or 320,000 bytes/second at 1600 bpi. Tape speed is 200 inches/second.

TYPE 0716-02 CARD READER AND CONTROL: Reads 80-column cards serially by column at 1000 cpm. Has a 2400-card input hopper and two 2000-card stackers. Can read data in EBCDIC, ASCII, Compressed Code, or card image mode. Optional features permit reading of 51- or 66-column cards. Connects to an 1100 Series system via the Multiplexer Channel of an on-site Sperry Univac 9300 or 9300 II Computer System, Communications/Symbiont Processor (C/SP), the Multi-Subsystem Adapter (MSA), or directly to the byte multiplexer channel of an 1100/80 CPU.

TYPE 0604-99 CARD PUNCH: Punches 80-column cards in row-by-row fashion at 250 cards per minute. Has a 1000-card input hopper and two 1000-card output stackers. Punched cards are directed to one of the two stackers under program control. Punching is in card-image mode or compressed code translation. Contains an integrated controller and connects to an 1100 Series system via the Multiplexer Channel of an on-site Sperry Univac 9300 or 9300 II, Communications Symbiont Processor (C/SP), the Multi-Subsystem Adapter (MSA), or directly to the byte multiplexer channel of an 1100/80 CPU.

0770 PRINTERS: Announced in April 1973, these printers employ a horizontally moving print band and combine various convenience, maintenance, and availability features. The three models differ only in their speeds, offering 48-character printing rates of 800, 1400, or 2000 lines per minute. They can be connected to 1100 Series systems via the multiplexer channel of a 9200/9300 subsystem or Communications/Symbiont Processor (C/SP). The printers, each of which contains an integral control unit, can also be connected to an 1100 system via a Multi-Subsystem Adapter (MSA), or directly to the byte multiplexer channel of an 1100/80 CPU.

The three 0770 printers have the following features in common: all use interchangeable print band cartridges; all can identify the cartridge type under program interrogation to ensure that the operator has placed the proper band in the printer for that run; all use a program-loaded vertical format buffer in place of a paper tape format loop; and all have swing-out print carriages, easy ribbon replacement without rewinding, simplified line finding, lighted print areas, automatic print gap (forms thickness) adjustment, powered, program-controlled top covers, automatic power forms stackers, and enhanced acoustical covers to reduce operating noise.

Printing speeds for 48-character sets are 800 lines per minute for Model 0770-00, 1400 lines per minute for Model 0770-02, and 2000 lines per minute for Model 0770-04. The respective skipping speeds for the three models are 50, 75, and 100 inches per second. All can have character sets from 24 to 384 characters in size, and all have 132 print positions as standard. An optional feature for all models can increase the number of print positions to 160 without affecting the print speed. All have a single-space print time of 8.75 milliseconds, line spacings that are operator-selectable at 6 or 8 lines per inch, and forms dimensions from 3.5 to 22 inches wide and up to 24 inches long.

0776 PRINTER SUBSYSTEM: An impact printer subsystem that offers a choice of three line speeds: the Model 0776-00 prints a 48-character set at 760 lines per minute, the Model 0776-02 at 900 lines per minute, and the Model 0776-04 at 1200 lines per minute. Skipping speed for all models is 22 inches per second. Vertical spacing is operator-selectable at either 6 or 8 lines per inch. All models can have character sets ranging from 24 to 384 characters in size, and all have 136 print positions as standard equipment. The 0776 printers have a single-space print time of 14.2 milliseconds and accommodate forms ranging from 4 to 18.75 inches wide and up to 24 inches long.

Printing is accomplished by the use of etched characters on a continuous metal band that travels horizontally across the paper. Each metal band contains 384 characters, which are usually grouped in repeating arrays. For example, a 48-character set array is repeated eight times on the band. The expanded character set control feature allows the use of character sets that contain more than 64 characters. This feature makes it possible to print upper/lower case text or to improve throughput in certain applications by designing character set arrays in which heavy-usage characters appear more frequently. The cartridge type can be identified under program interrogation to ensure that the operator has placed the proper band in the printer.

The 0776 Printer Subsystems also feature a program-loaded vertical format buffer in place of a paper tape format loop, swing-out print carriages, easy ribbon replacement without rewinding, simplified line finding, lighted print areas, automatic print gap (forms thickness) adjustment, powered, program-controlled top covers, automatic power forms stackers, and enhanced acoustical covers to reduce operating noise.

COMMUNICATIONS EQUIPMENT

TELCON: Introduced in November 1976, Telcon is an intelligent communications system that provides basic hardware, software, and peripherals for users with large communications networks. The system can operate as a front-end processor for 1100 host processors, as a network nodal processor, or as a remote concentrator. As such, it provides networks that support real-time, time-sharing, remote job entry, and message switching applications. The major components of Telcon are the Distributed Communications Processor (DCP) and the Telcon network software. Multiple DCP's can be combined to form a node of high throughput and processing capability.

The DCP can consist of a processor, remote I/O controller (RIOC), diskette, cartridge disk, magnetic tape, Scanner II communication controller, and the remote control module.

The processor is a 16-bit computer with 8-bit addressability. It includes a storage interface, 32 general and 6 special registers, a read-only memory, an arithmetic section, and function control sections. Internal data transfers are communicated by means of a single parallel bus which connects all logical units and the general registers. The RIOC provides 16 parallel I/O channels that can be operated in 8-bit or 16-bit mode; 32-bit parallel operation is provided via strap selection. The RIOC interfaces an 1100 Series Internally Specified Index (ISI) I/O channel, peripheral subsystems, or transfers information between Dual Communications Controllers. The RIOC is physically installed in the DCP and obtains its operating power from the DCP.

A Sperry Univac cartridge disk subsystem provides mass storage on the DCP for network data base storage and other storage associated with distributed communications and distributed processing applications. The subsystem has a 10-million-byte capacity, 5 million bytes on a fixed disk and 5 million bytes on a removable disk. Recording is on four surfaces in each unit, two on each disk. The disk rotates at 2400 rpm and has an average rotational delay time of 12.5 milliseconds. The average head movement time is 50 milliseconds and the data transfer rate is 267,000 bytes per second. ▶

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▶ A Sperry Univac diskette subsystem is provided on the DCP for loading the operating system and diagnostic programs, for statistics logging of network operations, for error logging, and as a recording medium for receiving various down-line load functions. In cases where a cartridge disk is not available on the DCP, the diskette will retain various network control tables. The basic diskette subsystem contains one diskette drive, expandable to two drives in the same housing. Each disk can store up to 256,000 bytes of data. The disk rotates at 360 rpm and has an average rotational delay time of 83 milliseconds. Head load and seek time can overlap. Track-to-track seek time is 10 milliseconds, and head load time is 50 milliseconds. Data transfer rate is 31,250 bytes per second.

The Scanner II is a communications multiplexer that provides communications line termination and multiplexing for the DCP. The DCP with the Scanner II expansion provides up to 128 half-duplex or 64 full-duplex lines. The Scanner II is located in its own cabinet with its own power supply. Up to two Scanner II's can be attached to the DCP, supporting up to 256 half-duplex or 128 full-duplex communications lines for each DCP.

The DCP/40, announced in June 1979, represents a significant increase in performance and throughput over the original DCP, primarily through the introduction of multiple microprocessors and microcoded message handlers.

Main memory ranges from a minimum of 32K words (128K bytes) to over 512K words (2 million bytes), expandable in 128K-byte increments. A maximum DCP/40 may include up to 16 I/O processors, each of which provides program control for up to 16 communications channels. Each can handle a mixture of remote lines, parallel interfaces and host channel connections. Each I/O processor is programmed separately using a set of over 60 microinstructions and each handles, in addition to data transmission and receipt, remote terminal polling, error checking and recovery, dynamic buffer allocation, reporting of line status, and recording of error and traffic statistics.

The increased memory permits larger and more complex user applications to be included in a single DCP. In addition, the DCP/40 may front end either 1100 Series or 90 Series mainframes, and supports up to 255 half- or full-duplex communications lines.

Additional details and pricing for the DCP/40 can be found in Report 70C-877-12.

COMMUNICATIONS/SYMBIONT PROCESSOR (C/SP):
An independently programmed computer designed to relieve the 1100 Series central processors of the processing functions associated with the control of data communication and card and printer I/O operations. The C/SP's internal architecture is quite similar to that of the Sperry Univac 9400 Processor. It offers 32K, 48K, 64K, 96K, or 128K bytes of MOS storage with a cycle time of 630 nanoseconds per 2-byte access. A set of 52 two-byte and four-byte instructions includes binary arithmetic on 16-bit and 32-bit operands; no decimal arithmetic facilities are provided. There are eight or sixteen 32-bit general registers.

A minimum C/SP configuration includes a processor with 32K to 128K bytes of storage, 1100 Series Channel Adapter, Maintenance Panel, Interval Timer, Power Failure Interrupt Feature, Storage Protection Feature, Special Device Channel, and an 80-cpm card reader. Optional features include a Multiplexer Channel, Selector Channel, one or two General-Purpose Communications Channels, and one additional 1100 Series Channel Adapter.

The 1100 Series Channel Adapter provides an interface for direct connection of the C/SP to an I/O channel of an 1100 Series computer; data can be transferred at rates in excess of 100,000 36-bit words per second. The Special Device Channel is used mainly for local program loading and maintenance of the C/SP by means of an 80-cpm serial card reader. The optional Multiplexer Channel permits attachment of up to eight byte-oriented peripheral subsystems. The optional Selector Channel permits the attachment of one tape controller with up to 16 Uniservo 16 7-track and/or 9-track magnetic tape units.

In addition, an operator console, consisting of a DCT500 Data Communication Terminal with keyboard send/receive, can be attached to the Special Device Channel. Dual ICA channels are also available to permit a C/SP to be shared by two host central processors or two channels of the same host processor. When the C/SP is being shared by two hosts, the communications and symbiont facilities of the C/SP can be dynamically partitioned by user directives between the two hosts.

Each of the two optional General-Purpose Communications Channels (GPCC's) permits connection of up to 32 full-duplex or 64 half-duplex communications lines to the C/SP. The GPCC multiplexes the data to and from the various lines, recognizes special characters and character sequences, checks character parity, and performs other essential coordination functions. A Communications Line Terminal (CLT) forms the interface between the GPCC and each line. Various CLT's are available to handle a wide range of communications facilities and transmission speeds.

The number and types of CLT's must be selected so that the total data rate on each GPCC will not exceed 50,000 bytes per second. Software considerations will further restrict the total communications data rate of each C/SP to approximately 20,000 bytes per second.

GENERAL COMMUNICATION SUBSYSTEM (GCS): Announced in March 1975, the GCS replaced the earlier CTMC for all 1100 Series configurations. The GCS can accommodate up to 32 half- and/or full-duplex communications lines at speeds of up to 50,000 bits per second, under direct program control of the central processor. The GCS consists of a Communications Terminal Controller that connects to a processor ESI I/O channel and acts as a multiplexer to from 1 to 32 Communications Terminals and Communications Interfaces. Each Communications Terminal/Communications Interface combination can accommodate one half-duplex or one full-duplex line. Transmission is in asynchronous or synchronous bit-serial mode, using codes of 5, 6, 7, or 8 levels. The asynchronous interfaces can handle speeds ranging from 45.45 to 2400 bits per second, while the synchronous interfaces can handle line speeds of up to 50,000 bits per second. In addition to the bit-serial interfaces, an automatic dial interface is available.

TERMINALS: The following Sperry Univac devices, most of which are described elsewhere in DATAPRO 70, are supported for use as remote terminals with the 1100 Series systems: the Series 600 Tape Cassette System (for the Uniscope 100 or Uniscope 200), UTS 400 (Report 70D1-877-06), and the 1900 Computer Aided Data Entry System (Report 70D4-877-31). Support for IBM's binary synchronous communications protocol also permits transfer of data between IBM System/360 and System/370 and Sperry Univac 1100 Series systems and the use of some IBM-compatible remote batch terminals.

SOFTWARE

OPERATING SYSTEM: All 1100 Series systems utilize the 1100 Operating System, which was originally released ▶

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▶ as EXEC 8 for the third-generation 1108 system and has been extended to support the 1100/10, 1100/20, 1100/40, and 1100/80 systems as well.

The 1100 Operating System supports multiprogrammed batch, real-time and time-sharing operations on systems with single or multiple central processors.

Batch processing jobs can be submitted either locally or remotely. A scheduling routine selects the runs to be initiated in accordance with user-assigned priorities and deadlines.

The demand processing facilities of the 1100 Operating System permit interactive use of the system by multiple users at remote terminals. By means of the Executive Control Language, demand-mode users can compile and execute programs, use library facilities, and communicate with the computer center and with other terminals. (More comprehensive facilities for interactive operations are provided by the Conversational Time-Sharing system, described later in this report.)

A Terminal Security System (TSS) permits each installation to establish a file of valid remote system users through the use of user identification codes, passwords, and other pertinent information. The system allows installation passwords to be changed dynamically, and enables users to be selected as masters or submasters to allow delegation of authority in creating and updating identifications and passwords in the TSS file. Each installation can define the action to be taken in the event of an attempted security violation.

Real-time and communications programs, which are subject to specific time constraints, receive top-priority handling by the 1100 Operating System. Real-time programs receive privileged access to system resources such as central processors, memory, and input/output channels, and have a priority higher than any other processing except for EXEC interrupt processing. Interrupt processing routines can be defined for each real-time communications line; they execute at a higher priority than all other processing. Communications control facilities for transaction processing are provided by the Communications Management System and the Transaction Interface Package, described later in this report.

The minimum equipment configuration for the full 1100 Operating System is an 1100/10, 1100/20, or 1100/80 system with 128K words of main storage (or an 1100/40 with 32K words of primary storage and 128K words of extended storage), approximately 786K words of direct-access storage, two magnetic tape units, a card reader, and printer. Once the operating system has been loaded from tape, it is fully drum- or disk-oriented, and the tape units are available for other functions. Drum or disk storage is used for permanent storage of the operating system and its system library, for segments of all active programs (to facilitate "swapping"), for user programs in both absolute and relocatable form, for users' data files, and for buffering of remote terminals and on-line card readers, punches, and printers.

Operating system functions typically occupy about 40K to 60K words of storage in 1100/10, 1100/20, or 1100/80 systems; in an 1100/40, the typical residence requirements are 20K to 30K words of primary storage and a similar amount of extended storage.

A single set of symbolic programs comprises the 1100 Operating System for 1100 Series systems of all sizes. A Symbolic Stream Generator (SSG) tailors the system to the specific 1100 system, its configuration, and the requirements of each user. A complete system generation typically takes from three to six hours of computer time and produces an initial load tape for the Operating System.

The 1100 EXEC Supervisor controls the sequencing, setup, and initiation of all runs. It performs three levels of scheduling: Coarse Scheduling, Dynamic Allocation, and CPU Dispatching.

The Coarse Scheduler analyzes control-card information about priorities and equipment requirements to determine the basic job schedule. Scheduling is based on the type of job, programmer-assigned priority, time of submission, and resource requirements. A deadline scheduling facility permits jobs to be given special scheduling in order to achieve completion by a specified time. Demand jobs are initiated immediately, while batch jobs are queued in the backlog queue for initiation according to priority and the availability of resources. Jobs are held in a facilities hold queue until all required resources are available; after a job has been passed over an installation-specified number of times, a message is displayed on the system console for operator action.

The Dynamic Allocator allots main memory according to the needs of each individual task within a run. Dynamic storage allocation is a key feature of the 1100 Operating System. Allocation is done in 512-word granules and is based on the current space requirements of all tasks; programs can expand and contract dynamically. Allocation of memory is based both on the type of task and the response times and priorities within each task type, and is performed for both primary storage and extended storage in 1100/40 systems. In allocating main storage, the Dynamic Allocator attempts to locate I-banks and D-banks in different main memory modules in order to reduce main storage reference conflicts, and to load programs at the extreme ends of available main memory to reduce memory fragmentation.

Storage swaps between main memory and random-access storage are performed when necessary in order to allocate memory to higher-priority tasks, except that real-time tasks are not subject to swapping. Demand (conversational) programs are given priority for storage allocation over batch programs, and batch programs can be swapped to allow the system to accommodate other batch jobs approaching a scheduled deadline. Tasks become eligible for swapping upon reaching a voluntary wait state or when their first memory quantum has been exceeded. When tasks are to be swapped out to make room for higher-priority tasks, the swapping decisions are based upon criteria such as the best fit, relative priorities, number and sizes of tasks to be swapped out, and distance from the "edges" of storage. The system monitors resource usage by individual tasks and classes of tasks, and adjusts task priorities in order to optimize both batch and demand throughput.

In 1100/40 systems, programs can be executed in either primary or extended storage and can even be split between the two types of storage. The EXEC Supervisor monitors the execution characteristics of all programs and attempts to place computational code in primary (high-speed) storage and I/O-oriented or low-frequency code in extended storage.

The Quota System has been added to the 1100 Operating System to enable 1100 Series installations to control the use of system resources by both batch and demand users. Quota includes a Quota Input Processor (QUIP), which can be used by each installation to establish account and individual limits through user identification codes for use of system resources. With the Quota System, installations can prevent users from requesting the use of system resources beyond an account budget or a preassigned limit, control the number of concurrent demand and batch runs executing in the system, and define limits to be applied to resources available to demand and/or batch jobs at specified times. ▶

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► The CPU Dispatcher controls switching of the processor from one currently active task to another. The 1100 EXEC uses a "pure preemptive" algorithm for controlling CPU usage; that is, low-priority tasks surrender CPU utilization to those of higher priority. Real-time and EXEC activities are given unlimited quantums of CPU time, while demand and batch jobs are switched according to an algorithm that allots high priorities for short periods to activities requesting I/O services and lower priorities for longer periods to computer-oriented activities. Periodic time-slices can be allotted to demand-mode routines.

The 1100 Operating System supports two types of program segmentation. The first is the conventional overlay method, in which one part of a program physically replaces another in main storage. The second type, which Sperry Univac calls the "program bank" concept, effectively provides 1100 Series programmers with a software-controlled virtual storage mechanism. The system currently supports a virtual storage space of up to 250 program banks (available to the programmer for his individual program) and 4095 library banks (used for common routines which are sharable by all programs.) Each program or library bank can be up to 64K words in size, and data banks can be even larger if desired. Moreover, each bank can be specified as either static (resident in memory whenever the program is active) or dynamic (loaded upon request).

The number of banks that can be directly accessed at any one time is four in 1100/40 and 1100/80 systems and two in the 1100/10 and 1100/20 systems. Bank referencing instructions effectively replace one of the accessible banks with a new bank; these instructions are direct hardware functions in the 1100/40 and 1100/80 and are simulated by software in the 1100/10 and 1100/20.

Re-entrant processing is another featured capability of the 1100 Operating System. Processors such as the Assembler, Conversational FORTRAN, and Text Editor are re-entrant and can be saved by any number of concurrent jobs. The COBOL and FORTRAN compilers produce re-entrant code, and the COBOL, FORTRAN, and ALGOL libraries consist of re-entrant modules. Moreover, programs and data areas which are not re-entrant can be safely shared through a combination of hardware (the Test and Set instruction) and software (automatic conflict resolution).

Dynamic reconfiguration and auto recovery facilities of the 1100 EXEC help to minimize the impact of hardware failures upon user operations. Recoverable Error Edit (EDTERR/RECERR) programs produce reports on all recoverable errors logged by the operating system, identified by system unit, peripheral subsystem, and the time of occurrence. On-line diagnostic programs execute under control of the operating system for exercising peripheral devices and system components. Dynamic reconfiguration capabilities permit system components to be taken off-line through an operator console key-in, while allowing uninterrupted operation of the remainder of the system in most cases. The auto recovery sequence is initiated automatically in 1100 systems which include an STU, SPU, or ACU when a critical component fails. The EXEC is reloaded from random-access storage, the catalogued file directory is verified and corrected, and executive system files are reestablished. Sperry Univac states that the system will normally be back on the air within 15 to 60 seconds after recognition of a failure. Systems that are not equipped with an STU, SPU, or ACU require the recovery sequence to be initiated manually.

Multiprocessing is handled as a logical extension of the 1100 EXEC's multiprogramming capabilities. The system maintains a list of processor activities currently waiting to be performed. Each processor inspects this list, selects a task, and executes it. One processor can interlock the others while referencing critical areas of common data, and various other techniques are employed to guard against inter-processor interference.

The File Control System is an 1100 EXEC component that handles the creation and maintenance of program and data files and maintains a master directory of all catalogued files and all available mass storage areas. Data handling routines permit device-independent processing of files at either the item or block level. Mass storage files can be accessed either sequentially or randomly and can be allocated across multiple direct-access storage devices of varying types. Sequential files can be processed from magnetic tape units or direct-access storage without program modification. Catalogued files can be rolled out to magnetic tape storage when additional mass storage space is required.

A File Administration Processor (SECURE) produces periodic tape backup for catalogued files on mass storage, with the exception of transient files, system files, or highly classified files. The set of file backup tapes, along with a tape checkpoint of the master file directory, are used to restore files that have been inadvertently destroyed or purposely removed to tape storage backup. SECURE allows inactive files to be stored on magnetic tape as archives and removed from the Master File Directory, but retains sufficient data to restore the files if required. For magnetic tape handling, the EXEC includes a tape labeling facility that handles user-written ANS-standard tape labels and automatically creates first file header labels for unlabeled tapes.

The Software Instrumentation Package and Performance Analysis Reports (SIP/PAR) consist of a set of data collection routines that execute under the 1100 EXEC and a set of user-level data reduction programs. SIP/PAR collects statistics on central processor, storage, and I/O channel utilization, file placement and accesses, and other operational parameters. This information, after processing by the data reduction programs, can aid the user in making hardware, software, or scheduling modifications to improve the system's throughput. An 1100 Series Communications Simulator (CS-1100) permits some or all of the communications lines in an 1100 communications network to be placed in a simulation mode to evaluate performance without requiring that the actual communications terminal be placed on-line. A Transaction Control Language is also provided to enable users to test a variety of applications programs under the Remote Terminal Simulator.

Accounting statistics are provided by the Quota System, a replacement for an earlier accounting system, which now also has facilities to limit each user's access to system resources. Totals for each run are accumulated on CPU and peripheral utilization. Total resource utilization can be computed in the form of Standard Units of Processing (SUP's) which, in turn, can be equated to a dollars-and-cents figure for each account. Individual users may obtain data concerning their own system utilization and quota sets, but a security arrangement prevents them from inquiring into the summary account file containing data on other accounts associated with the system.

TOTAL INFORMATION MANAGEMENT SYSTEM: This comprehensive software system, designed to integrate and satisfy all the management information needs of a company, consists of six functional modules: the Communications Management System (CMS), Transaction Interface Package (TIP), Conversational Time-Sharing (CTS), Data Management System (DMS), Query Language Processor (QLP), and Remote Processing System (RPS). These modules are described in the paragraphs that follow. All operate under control of the 1100 Operating System.

COMMUNICATIONS MANAGEMENT SYSTEM: 1100 CMS is a data communications monitor that has cognizance of all terminals in an 1100 Series computer network. It acts as the communications "front end" to the Transaction Interface ►

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➤ Package (TIP), and handles polling, parity checking, data blocking, data packing and unpacking, message envelope formatting, message acknowledgement, message queuing, and other message control procedures. The message queue can be maintained in main, extended, and/or auxiliary storage; this common data pool is then accessed by the Transaction Interface Package. A Protocol function determines what the current activity on each circuit should be in terms of overall system loading, availability of facilities, user-specified priorities, type of circuit or device, and activity response level from the terminal.

CMS handles the standard Sperry Univac terminals as well as "alien" terminal devices. For alien devices the user must supply a skeletal communications control routine which interfaces into the device-control master service routine of CMS. Typical main storage residence requirements for CMS are 10K to 12K words.

TRANSACTION INTERFACE PACKAGE: TIP serves as the "middleman" between the 1100 Operating System and the user's application programs in a transaction-oriented on-line data processing system. TIP's functions are stimulated by the incoming transaction message stored in the common data pool maintained by CMS. The TIP transaction scanner, TRANSCAN, analyzes each message, determines which application program is required to process it, and arranges for the Executive to load and execute that program. One application program can also call another application program via TIP, through program action based on data parameters. The application programs can be written in COBOL, FORTRAN, Assembly Language, or PL/1 and can be re-entrant. TIP's features include on-line debugging aids, a batch-mode checkout capability, interprogram protection facilities, and comprehensive system recovery provisions. User-written routines can be accommodated by TIP to perform installation-specified functions such as prioritizing messages and other special message manipulation.

CONVERSATIONAL TIME-SHARING: CTS is a modular software system that provides users at remote terminals with an efficient man-machine interface. The system consists of the CTS control module, interactive syntax analyzers for BASIC, FORTRAN, and COBOL; and access to the compilers for BASIC, FORTRAN, COBOL, ALGOL, and APL. CTS provides the user with a simplified command language editor. For the support of a greater number of simultaneous users, an option called High-Volume Time-Sharing (HVTS) is provided. HVTS features an even more simplified command language (a subset of CTS) and can handle 50 to 2000 terminals concurrently.

The design of CTS is particularly oriented toward facilitating the development and debugging of programs. CTS facilities enable users to: (1) enter and debug source programs in line-by-line fashion; (2) compile programs; (3) edit source programs and data; (4) collect and execute programs; (5) save programs and data; (6) retrieve saved programs and data; (7) create files; (8) access the DMS data base; (9) format the output of data; (10) scan files and produce selective printouts; (11) write interactive procedures in CTS control language; and (12) perform calculations in desk calculator mode.

CTS has effectively been superseded by the recently announced Interactive Processing Facility.

INTERACTIVE PROCESSING FACILITY: IPF supports time-sharing and batch processing on 1100/40 and 1100/80 systems. IPF includes a new command language, an ease-of-use response and help feature, and a procedural capability. It supports Edit 1100 and other 1100 Series applications.

DATA MANAGEMENT SYSTEM: DMS 1100 is a comprehensive data base management system developed under the guiding principles of the CODASYL Data Base

Task Group. It is designed to satisfy the need for standardized data management techniques that provide: (1) separation of the data definition and data manipulation functions, (2) an acceptable degree of data independence, (3) data base protection and integrity, and (4) alternate data access methods. DMS has four principal components: a Data Description Language, a Data Manipulation Language, a Data Management Routine, and a Data Recognition Utility.

The Data Description Language (DDL) is a stand-alone language whose record descriptions are compatible with those of COBOL. The DDL input provided by the data manager completely defines the data base. The data base description, or "schema," is composed of areas, records, and sets. A DDL Translator converts the DDL syntax into a series of tables which are maintained in a catalogued file in mass storage for later interpretation by the Data Management Routine.

The concept of "areas" in DDL provides the means for associating the data base with the physical mass storage devices in which it resides. A "set" is simply a named collection of records. The records in a set can be ordered in first-in, first-out fashion or on the basis of one or more keys. The ordering can be done through a chain, an index, or a calc (randomizing) procedure. A given record can be both an "owner record" of one or more sets and a "member record" of one or more sets, and a different ordering procedure can be used in each set. DMS 1100 also permits records in a set to be arranged in an indexed-sequential fashion and retrieved through the index using the key value or accessed directly using the data base key. It also allows pointer arrays to be defined in which an owner record references an array of pointers that point to the member records for that owner, which normally share some common characteristics with the owner.

In addition to the DDL for the schema, there is a Subschema Data Definition Language (SDDL) which provides for specification of subsets of the areas, records, and sets of the schema.

The Data Manipulation Language (DML) consists of commands embedded in COBOL, FORTRAN, and PL/1 to allow these host languages to manipulate the data base via DMS 1100. The DML is the procedural language used by individual programmers to access the data base. It is used in connection with a host language—COBOL, FORTRAN, or PL/1—which describes the procedures for processing the data once it has been accessed. The functions of DML can be generally described by listing its commands: OPEN, CLOSE, FIND, GET, MODIFY, STORE, DELETE, INSERT, REMOVE, IF, ON-ERROR, PRIVACY, LOG, and DEPART. The programmer inserts the appropriate DML commands into the syntax of his COBOL source program. A DML Preprocessor then converts the DML commands into a COBOL-compatible format and adds the necessary record descriptions and communication areas. The altered syntax is passed on to the COBOL compiler, which produces an executable program called a "run unit."

The Data Management Routine (DMR), the key operational component of DMS, maintains the data base and preserves its integrity. No run unit is allowed direct access to the data base; instead, all DML commands are funneled through the Data Management Routine. DMR itself is re-entrant and allows up to 64 active run units to access the data base concurrently. These run units can represent any combination of batch, demand, and real-time activities. In addition to its storage and retrieval functions, DMR includes save data, rollback, and recovery routines that prevent loss of data through hardware failures, software bugs, or erroneous input.

The Data Reorganization Utility (DRU) provides for optimization of the physical placement of records within an existing data base without the need for tailored unload and ➤

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▶ reload programs. The DRU consists of two modules: a Reorganization Syntax Analysis (RSA) Module, which accepts reorganization specifications and the data base scheme as input; and a Reorganization Module (REORG), which accomplishes the reorganization directly against the data base in an optimized manner.

Sperry Univac has added a Data Dictionary to DMS 1100. The Data Dictionary is designed to aid in the administration and management of data bases and contains definitions, descriptions, and established data relationships.

PROCESSOR COMMON INPUT/OUTPUT SYSTEM: PCIOS is designed to assure compatible data file formats. It supports sequential, indexed sequential, and multi-keyed sequential access methods for PL/1, ASCII COBOL, ASCII FORTRAN, RPG, and Sort.

QUERY LANGUAGE PROCESSOR: QLP 1100 is an English-language inquiry system that allows inquiries to be made to data bases generated under DMS 1100. It uses a command language designed around a simplified English syntax and requires a minimum knowledge of the DMS 1100 data base structure. QLP can operate either in demand or batch mode, although the primary mode is interactive. Its two major component modules, the Scan Parser, which analyzes incoming commands, and the Task Translator, which accesses the data base, are both re-entrant. Through the use of the QLP command language, users can inquire into the data base, update records, add new records, or delete records. QLP 1100 uses a Subschema Data Definition Language (QLPSDDL) that is similar to the DMS 1100 DDL. Access to the data base via QLP is regulated by the Data Base Administrator through use of SDDL. QLP also provides a report writer and procedural facilities.

REMOTE PROCESSING SYSTEM: RPS 1100 is an interactive data management and file processing system. It is one element of Sperry Univac's Total Information Management System (TIMS) and provides access to system resources by a nonprogramming-oriented user interface through a Uniscope 100 or Uniscope 200 CRT display terminal. RPS 1100 data base files are created and maintained under DMS 1100, and the system interfaces with TIP for transaction interfacing and control. RPS 1100 provides a set of generalized system functions which can be invoked by the user via the terminal. These include commands to ENTER, BUILD, DESTROY, or FORM a file; to process a file through SEARCH, MATCH, or SORT; to build an INDEX structure to line item data and data fields for faster access; to perform computations on specified fields; and to request printing of reports in user-specified formats. RPS 1100 provides tutorial assistance to end users by displaying a choice of functions for user selection and utilizing "fill in the blanks" techniques to permit users to enter commands.

A Tutorial Processor can also be invoked to guide the user through a user-defined sequence of functions that represents a processing procedure, such as inventory updating. No familiarity with job control language or DMS 1100 file structures is required of the end user.

Both private and shared files can be defined. Shared files may be assigned to multiple groups of users, and each user within a group can be restricted to access only certain files and to perform limited functions.

File security is provided by passwords that can be specified as part of the File-ID or as a reply to a password request from the system in the case of a file update. A facility interlock feature permits shared files to be updated concurrently by multiple users. RPS 1100 operates in conjunction with TIP and DMS 1100.

MAPPER 1100: A real-time report processing system for multiple Uniscope 100/200 or UTS 400/4000 terminal systems. Data is collected and updated via the CRT display units in free-form or prescribed report formats. Functions such as record and page display, update, search, sort, and report generation can be developed into saved programs for on-line applications development. A forms generation capability allows implementation of data bases and related report processing and generating services without applications programming.

DISPLAY PROCESSING SYSTEM: DPS 1100 provides for screen handling and the management of display-oriented transactions in an on-line environment. The system operates in conjunction with the Transaction Interface Package or the Conversational Timesharing System. DPS 1100 includes an interactive screen generator and a screen handler. Additional functions are provided for data editing and validation, applying passwords to screens or separate fields of screens, and controlling access to multi-page screens.

INFORMATION MANAGEMENT SYSTEM: IMS 1100 is an interactive transaction processing system compatible with the IMS 90 used on the Sperry Univac 90 Series computers. IMS 1100 is available for the 1100/80 series only. It provides defined record management and access to both data base and conventional files.

EDIT 1100: A text editor for 1100/40 and 1100/80 systems. Features are provided for full screen editing, line editing, operation on text data, and use as a stand-alone or program-callable routine.

C/SP SOFTWARE: Software support for the independently programmed Communications/Symbiont Processor consists of a group of resident programs, which run on the C/SP itself, and a second group of programs that run on the host 1100 Series system under control of the 1100 Operating System.

The C/SP-resident programs include an operating system, diagnostic routines, and an intercomputer adapter handler. The C/SP Operating System, in turn, consists of a Terminal Management Supervisor, Message Control Program, Terminal Management Control Routines, and Symbiont Control Program. These routines control program switching, I/O queuing, interrupt handling, call initiation, message routing, message translation and editing, initiation of polling, dynamic buffering, and a variety of other standard communications control functions.

Sperry Univac will supply standard Communication Control Routines for the following remote devices: Uniscope 100 and Uniscope 200 Display Terminals; DCT 475, DCT 500, DCT 524, DCT 1000, and UTS 400 Data Communications Terminals; and Binary Synchronous Communications (BSC) devices.

C/SP programs that run on the host 1100 Series system include an Assembler, Element Collector, and Simulator. The C/SP Assembler is a two-pass assembler that translates C/SP programs from symbolic assembly language into relative binary elements. The C/SP Element Collector combines a group of these elements into a relocatable object program that can be executed by the C/SP. The C/SP Simulator accepts C/SP object code, simulates its execution, and provides diagnostic printouts to aid in program debugging. The C/SP Symbionts accommodate the specific capabilities of the C/SP and handle communications between the C/SP and the 1100 Operating System.

The most recent enhancements enable the C/SP to operate in a stand-alone mode in the event of a central processor failure, to perform store-and-forward message switching, to dynamically reconfigure line and terminal assignments in the communications network, to create audit trails on disk or ▶

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► tape, and to initiate automatic recovery procedures for the C/SP using the audit files.

COBOL: The newest and most powerful COBOL compiler offered by Sperry Univac is 1100 Series ASCII COBOL. This compiler implements the modules of the 1974 American National Standard COBOL. Numerous extensions are also included. The ASCII COBOL compiler is re-entrant and produces re-entrant code.

ASCII COBOL recognizes ASCII characters as the standard data code at both source and object time, with 6-bit Fieldata character code handling facilities available as an option. In addition to the character modes, binary and floating-point data forms are supported. Some of the 1974 American National Standard COBOL facilities implemented include: Debugging, Report Writer, Communications (via TIP or Message Control System), and the INSPECT, STRING, and UNSTRING verbs. Principal language extensions based on CODASYL development efforts include: data base management (via DMS), interprogram communication, and asynchronous processing. Additional nonstandard extensions include: debugging features (including MONITOR and EXHIBIT), a TRANSFORM verb to develop one character string from another, expanded forms control facilities including 160-character print line and variable print density control, indexed sequential file handling including generic START and conditional START facilities, and numerous compatibility features for upgrading from earlier 1100 COBOLs or other vendors' COBOLs.

Sperry Univac also offers a conversational COBOL Processor (BCOB) that permits time-sharing users to construct, edit, and debug COBOL programs from demand terminals. BCOB executes as a fully re-entrant submodule of the Conversational Time-Sharing System (CTS) and supports the full CRT command set. Its syntax analysis facilities are compatible with both ASCII COBOL and an earlier Fieldata COBOL compiler. Syntax analysis is performed either statement-by-statement as the program is entered from the terminal or in blocks as the program is called from the file system.

ASCII FORTRAN: ASCII FORTRAN is a re-entrant FORTRAN compiler that handles ASCII data codes and contains useful extensions for the manipulation of both numeric and non-numeric data. The ASCII FORTRAN language is an extension of the previous UNIVAC FORTRAN V language and implements the FORTRAN 77 Standard. It contains features specified by the standard as well as many language extensions, including the following ASCII extensions. A CHARACTER type statement allows handling of character variables, character scalars, and character arrays. A set of character operations is provided, including concatenation of strings, relational comparisons of strings, character-valued functions, and a string function that permits character variables to be extracted from or assigned to substrings of character variables. ASCII FORTRAN provides the double-precision complex data type, in which complex numbers are represented internally as a pair of double-precision floating-point numbers. This data type supports a precision of approximately 17 significant decimal digits and an exponent range of 10^{308} to 10^{308} for both real and imaginary components of a complex number. ASCII FORTRAN also expands the use of expressions by permitting expressions to be used in positions that previously (in FORTRAN V only) allowed simple variables or array elements.

ASCII FORTRAN is a four-pass, re-entrant, common-banked compiler that provides for extensive optimization, generates re-entrant programs, and contains facilities designed to fully utilize 1100 Series hardware features and the operating system. Some of these features are I/O data format compatibility, interlanguage communication with COBOL

and PL/1, sort/merge capability, and an interface with DMS 1100. In addition, the ASCII FORTRAN compiler contains a checkout option that provides for direct execution of FORTRAN programs and subroutines, with interactive debugging also provided.

Sperry Univac also offers a re-entrant ASCII FORTRAN Syntax Analyzer (BTFN), which is used in conjunction with the Conversational Time-Sharing software. BFTN aids the time-sharing user in constructing, editing, and debugging the syntax of ASCII FORTRAN programs from a demand terminal.

ALGOL: The NU ALGOL language is based upon ALGOL 60, extended through the provision of input/output logic, facilities for complex and double-precision arithmetic, and the ability to name strings. Procedures written in FORTRAN V or Assembler language can be included. The ALGOL compiler runs under 1100 Operating System control.

UBASIC: Sperry Univac's BASIC compiler is an interactive processor that accepts source-language statements from remote users, checks their syntax, and issues diagnostics immediately whenever it detects an error. After the whole program has been checked, a RUN command causes it to be compiled and executed. A file controller package permits manipulation of saved program files, and re-entrant capability enables multiple time-sharing terminals to use the compiler simultaneously. The system need not be dedicated exclusively to BASIC operations.

JOVIAL: Sperry Univac offers an 1100 Series compiler for JOVIAL, a general-purpose procedure-oriented language that is used mainly in military command and control applications.

PL/1: The 1100 Series PL/1 compiler is Sperry Univac's implementation of the multipurpose programming language which has been proposed for standardization by ANSI and the European Computer Manufacturers Association (ECMA). Compilations can be performed with or without optimization. An extensive library of re-entrant run-time support routines complements the re-entrant code generated by the compiler with arithmetic computations, service subroutines such as input/output functions, dynamic program and storage management, and error and interrupt processing.

RPG: The 1100 Series RPG is upward-compatible with Sperry Univac Series 70 RPG. It supports sequential, indexed sequential, and table files and provides common report-writing features such as input data selection, editing, calculation, multiple report files, summarizing, control breaks, and file updating. During program generation, storage areas are automatically assigned, constant factors are included, and linkages are produced to routines for input/output operations and calculations. Indexed sequential files are processed through an interface with the Index Sequential File Management System (ISFMS).

RPG II: The RPG II Group is a new software package for 1100/80 systems that includes an RPG II compiler, auto report feature, and RPG II editor. The compiler is compatible with the Sperry Univac VS/9 and OS/3 operating systems used on the 90 Series computers.

ASSEMBLER: The 1100 Series Meta-Assembler (MASM) is capable of generating code for any binary machine, but is tailored to be especially efficient for the 1100 Series instruction set. MASM provides all the conventional features of an assembler: code and data generation, symbol definition, space definition, and external communication with separately constructed elements. As an assembler, MASM is highly compatible with (and a replacement for) the 1100 Series Assembler (ASM). ►

Sperry Univac 1100/10, 1100/20, 1100/40, and 1100/80 Systems

► UTILITY ROUTINES: Both a Sort/Merge Processor and a user subroutine are available. The processor is a completely self-contained parameter-driven program which is capable of ordering and/or merging data sets having a wide variety of keys and characteristics. The subroutine, which is an integral part of the processor, uses a replacement selection technique for internal sorting, writes strings on either magnetic tape or drum, and permits insertion of the user's own coding. Either fixed or variable-length items can be handled. Multiple sort keys and user-defined collating sequences can be used.

The 1100 Operating System includes an ample complement of utility routines to perform common functions such as I/O control, data transcription, file maintenance, editing, snapshots, and dumps.

MATH-PACK and STAT-PACK are large collections of FORTRAN-coded subroutines that can be integrated into users' FORTRAN V programs to handle a broad range of mathematical and statistical functions.

Sperry Univac also offers a variety of conversion routines designed to facilitate the conversion to 1100 Series formats of programs and data files written for the Sperry Univac Series 70, IBM System/360 and 370, and several other computer families.

APPLICATION PROGRAMS: The 1100 Series application packages currently available from Sperry Univac include:

APT (Automatically Programmed Tools)
ASET (Author System for Education and Training)
FMPS (Functional Mathematical Programming System)
GIFTS (Graphics-Oriented Interactive Finite-Element
  Time-Sharing System)
OPTIMA 1100 (Project Management System)
SIMULA (Simulation Language)
SIMSCRIPT 1.5 (Simulation Programming Language)
UNIFACS 1100 (Univac Financial Systems)
UNIS 1100 (Univac Industrial Systems); includes Bill of
  Materials Processor, Inventory Control, and Planning
  and Scheduling.

PRICING

EQUIPMENT: The following systems illustrate the wide range of configurations that are possible within the Sperry Univac 1100 Series. All can use the 1100 Operating System. All necessary control units and adapters are included in the indicated prices.

SMALL 1100/10 SYSTEM: Consists of one 1100/10 Processor with 128K words of MOS main memory and four I/O channels, system console, real-time maintenance communications interface, two multi-subsystem adapters, two 8430 Disk Drives, four 9-track Uniservo 14 Magnetic Tape Units (96KB), one 1000-cpm Card Reader, and one 760-lpm Printer. Purchase price is $649,260.

LARGE 1100/20 SYSTEM: Consists of one 1100/20 Processor with 256K words of MOS main memory and eight I/O channels, Display Console, three FH-432 Drums (4.7 million characters), three 8433 Disk Drives and buffered 5039 Controller (600 million bytes), six 9-track Uniservo 16 Magnetic Tape Units (96KB), and Communications/Symbiont Processor (with 96K bytes of storage, 1000-cpm Card Reader, 800-lpm Printer, 250-cpm Card Punch, General Purpose Communication Channel, and four synchronous and four asynchronous communications lines). Purchase price is $1,736,111.

SMALL 1100/40 SYSTEM: Consists of one CAU, one IOAU and eight channels, 192K words of Primary Storage, 128K words of Extended Storage, System Console, three 8433 Disk Drives (600 million bytes) and buffered 5039

Controller, six 9-track Uniservo 16 Magnetic Tape Units (192KB), one 1000-cpm Card Reader, one 250-cpm Card Punch, and one 800-lpm Printer. Purchase price is $2,235,932.

LARGE 1100/80 SYSTEM: Consists of two 1100/82 Processors, two IOU's, two word channel modules, two system consoles, 16K words of buffer storage, 1024K words of backing store, one Scientific Accelerator Module, one Array Processor Subsystem, twelve 8434 Disk Drives, two 8433 Disk Drives, two 8405 Disk Drives, four 9-track Uniservo 30 Tape Units, four Uniservo 34 Tape Units, four Uniservo 36 Tape Units, and one 2000-lpm printer. Purchase price is approximately $4,625,532.

TERMS, SOFTWARE, and SUPPORT: The 1100 Series is available for purchase or lease. All software except the operating system is unbundled. On-site service for operating system support can be obtained for a flat monthly fee of $500 or by an hourly rate. Support for unbundled software is included in the license fee.

TRACE: Sperry Univac has initiated a remote hardware maintenance concept through its facility in Roseville, Minnesota. The Total Remote Assistance Center (TRACE) is available to the 1100/40, 1100/80, and, to a limited extent, 1100/10 and 1100/20 System customers via a dedicated WATS line number 24 hours per day, 7 days per week. Via TRACE, a user's system may be monitored and controlled using on-site and remote library testing programs. TRACE also provides support for a wide range of Sperry Univac terminals connected to dial-up lines. Various data files in Roseville contain information on approved hardware changes, references to solutions for problems encountered with diagnostic test software in field use, and operating system enhancements and problems. Other files contain a history of how the system should operate. These files can be utilized for comparison purposes during diagnostic testing.

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

Hours of Coverage

	4	8	9	10	12	16	18	20	24
Monday through Friday	—	—	0	10	20	25	35	40	45
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:

	Monday through Saturday	Sunday and Holidays
Min. charge per call	$112	$132
Each add'l. hour	56	66
Max. charge per call	280	330

For users who elect not to contract for maintenance with Sperry Univac, the following per-call rates apply:

	Monday through Friday	Overtime and Saturday	Sunday and Holidays
Min. charge	$100	$112	$132
Each add'l. hour	50	56	66

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Sperry Univac 1100/10, 1100/20, 1100/40, and 1100/80 Systems

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
1100/40 EXTENDED STORAGE				
7033-99	Extended Storage, 128K words; requires one 0963-00 MAI or one F1394-00 MAI expansion and 512K words of 7030 storage	249,600	828	6,300
0963-00	Multiple Access Interface; provides four access interfaces and control modules for 128K words of 7033-99 extended storage	52,416	193	1,323
F1394-00	MAI Expansion; adds a second MAI control module to 0963-00 MAI to provide access to a 7033-99 extended storage	23,808	122	599
F1393-00	MAI Interface Expansion; provides three access interfaces to 0963-00 MAI	14,064	31	357
F1393-01	MAI Interface Expansion; provides second set of three access interfaces to 0963-00 MAI; requires F1393-00 expansion	14,064	31	357
F2080-99	MMA Expansion; provides one additional interface for 7033-99 extended storage	3,936	15	100
1100/80 PROCESSORS AND I/O CONTROL				
3032-67	1100/80 Processor; includes full 1100 floating-point and byte instruction set, one I/O processing unit (IOU) with one byte and one block multiplexer channel, 4K words of buffer storage in one buffer module, 512K words of backing store in one cabinet, system maintenance unit, transition unit, system console, and motor alternator; expandable to 1024K words of backing store; any further expansion requires addition of F2335-99 performance enhancement, or must be expanded as a standard 1100/81 processor	1,389,628	3,076	35,431
3032-65	1100/81 Processor; includes same equipment as 3032-67 except provides space for an additional channel module and 8K words of buffer storage in one module; expandable to four processors, four IOU's, 32K words of buffer storage, and 8192K words of backing store	1,554,557	3,273	39,647
3032-63	1100/82 Multiprocessor; includes two processors in a tightly coupled configuration with 8K words of buffer storage and 1024K words of backing store in two cabinets, one IOU, a system maintenance unit, a transition unit, a system console, and a motor alternator	2,414,475	5,143	60,129
3032-61	Same as 3032-63 but backing store is in one cabinet	2,293,736	4,888	57,123
3032-29	1100/82 Dual Cluster Multiprocessor; includes two processors each with 12K words of buffer storage, a system maintenance unit, motor alternator, IOU, and system console. Each IOU contains one byte multiplexer, one block multiplexer, and one word channel module; includes 1536K words of backing store in three cabinets	3,617,644	—	—
3032-27	1100/83 Cluster Multiprocessor; same as 3032-29 but three processors	4,242,872	8,893	105,609
3032-25	1100/84 Cluster Multiprocessor; same as 3032-29 but four processors in two clusters; each cluster has 16K words of buffer storage; includes 2048K words of backing store in four cabinets	5,414,871	11,156	134,791
	Features for 3032 Processors:			
3022-53	Processor Expansion; provides a second processing unit; requires 8K words of buffer storage and 1024K words of backing store	641,256	1,233	15,974
3032-89	Cluster Expansion for 1100/81 single cluster processor; includes one CPU, 8K words of buffer storage, one system maintenance unit (SMU)	823,946	1,563	20,374
F2335-99	Performance Enhancement; upgrades a 3032-67 or 3022-43 processor to a standard 1100/81 processor with 8K words of buffer storage	182,721	197	8,336
3033-98	IOU Expansion; provides an additional IOU; includes system console	368,366	871	8,951
K2883-00	Scientific Accelerator Module (SAM)	130,447	222	3,252
F1653-00	Emulator for 494; requires 494 word channel module and/or 494 block multiplexer channel; mutually exclusive with F2883-00 and 3022 processors	187,425	356	4,669
3022-43	1100/80S Processor; same as 3032-67 but includes Scientific Accelerator Module; may be expanded as a standard 1100/81 with SAM	1,447,690	3,298	36,841
3022-97	1100/81 Processor; same as 3032-65 but includes Scientific Accelerator Module	1,685,003	3,496	42,897
3022-95	1100/82 Multiprocessor; same as 3032-63 but includes Scientific Accelerator Module	2,675,369	5,586	66,632
3022-93	1100/82 Multiprocessor; same as 3032-61 but includes Scientific Accelerator Module	2,554,629	5,332	63,626
3022-91	1100/82 Dual Cluster Multiprocessor; same as 3032-29 but includes Scientific Accelerator Module	3,878,537	8,040	96,426
3022-89	1100/83 Multiprocessor; same as 3032-27 but includes Scientific Accelerator Module	4,634,212	9,559	115,362
3022-87	1100/84 Multiprocessor; same as 3032-25 but includes Scientific Accelerator Module	5,936,658	12,045	147,796
	Features for 3022-43 and 3022-9X Processors:			
3022-52	Processor Expansion; provides a second processing unit with a Scientific Accelerator Module; requires 8K words of buffer storage and 1024K words of backing store	771,703	1,455	19,225
3022-51	Cluster Expansion; expands a standard 1100/81 single cluster to two clusters; includes processor with SAM, 8K words of buffer storage, and a system maintenance unit	954,392	1,785	23,625
3022-49	1100/81 Processor; includes Scientific Accelerator Module, standard 1100 instruction set, one IOU space for one additional channel module, 8K words of buffer storage in one module, 1024K words of backing store in two cabinets, a system maintenance unit, a transition unit, a system console, and a motor alternator; supports Array Processor Subsystem; expandable to up to four processors, two Array Processor Subsystems, four IOU's, 32K words of buffer storage, and 8192K words of backing store	2,079,194	4,179	54,235
3022-48	1100/82 Multiprocessor; same as 3022-49 but includes two processors; expandable by addition of Array Processor Subsystems	2,753,069	5,634	71,716
3022-47	1100/82 Dual Cluster Multiprocessor; includes two processors in two clusters; same equipment as 3022-48 but includes 16K words of buffer storage in each cluster and 2048K words of backing store in four cabinets	4,607,353	8,837	119,526
3022-46	1100/83 Multiprocessor; same as 3022-47 but includes three processors in two clusters	5,361,977	10,356	139,198
3022-45	1100/84 Multiprocessor; same as 3022-47 but includes four processors in two clusters	6,128,808	12,206	159,738
	Features for 3022-49 through 3022-45 Processors:			
3022-44	Cluster Expansion; expands a 3022-49 or 3022-48 to two clusters; includes a processor with SAM, 16K words of buffer storage, and a system maintenance unit	1,212,808	2,267	31,049

*Rental prices do not include maintenance.

Sperry Univac 1100/10, 1100/20, 1100/40, and 1100/80 Systems

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
1100/80 PROCESSORS AND I/O CONTROL (Continued)				
3063-99	Array Processor Subsystem; includes array processor control unit and array processor unit with 8K words of instruction memory and 64K words of data scratchpad memory, maximum of one per system	997,500	3,292	43,202
3063-98	Second Array Processor Subsystem; maximum of one may be added to dual cluster systems, 3022-47 through 3022-45; requires 3063-99	997,500	3,292	43,202
	Features for all 1100/80 Series Processors:			
1923-00	I/O Channel Expansion; includes housing for four additional channel modules	11,067	19	277
F1656-00	Byte Multiplexer Channel Module; transfer rate up to 200 KBS	49,061	95	1,230
F1657-00	494 Block Multiplexer Channel Module; transfer rate up to one megabyte/second	49,061	95	1,230
F1658-00	494 Word Channel Module; transfer rate up to 500K bytes per second	56,779	108	1,413
F1658-01	1100 Word Channel Module; four independent word channels	56,779	108	1,413
F1654-00	1100 Word Channel Definition; provides word channel capability to accept 36-bit ESI communications; requires F1658-01	1,103	5	27
F2141-00	1100 Block Multiplexer Channel Module; transfer rate up to 1.5 MBS	56,779	108	1,413
4013-97	System Console	83,815	422	1,842
0769-10	Console Printer; 30 cps; up to five can be added	16,800	75	369
0786-37	Console Printer; 200 cps; bidirectional	7,222	65	204
8508-08	Motor Alternator	23,100	64	690
F3137-00	Remote Control Panel	1,071	3	27
2525-00	Subsystem Availability Unit; interfaces 2 word channels, 24 MAS's	83,328	159	2,396
F2824-00	24 Additional MAS Interfaces	10,752	19	303
F2825-00	Two additional IOU word channel interfaces to SAU	13,440	25	384
F2826-00	Remote CTS Interface	3,224	5	93
F2826-01	Second Remote CTS Interface	3,224	5	93
2521-00	Channel Transfer Switch for block multiplexer channels; free-standing cabinet contains operator controls for manual switching of four subsystem strings, a primary module with a 2 x 1 switch, and power and space for 4 x 8 switching	19,781	74	466
2521-02	Channel Transfer Switch for remote operation	19,781	74	466
2522-00	Transfer Switch; allows system maintenance unit to communicate with an alternate system console; two required in systems with two IOU's; four required in systems with three or four IOU's	1,108	0	27
F2600-00	Primary Module Expansion; adds a switch for one subsystem string; maximum of three per 2521, F2601-00, or F2601-02; maximum of one per F2601-01 or F2601-03	586	0	14
F2601-00	Additional Primary Module; adds a second 2 x 1 primary module and operator control for switching up to four subsystem strings	10,476	40	260
F2601-02	Additional Primary Module for remote operation	10,476	40	260
F2601-01	Secondary Module; for applications requiring independent 2 by switching capability when up to four switchable strings can be configured among independent 2 by switches	10,476	40	260
F2601-03	Secondary Module for remote operation	10,476	40	260
F2602-00	Secondary Module; expands primary module from 2 x 1 to 4 x 1	7,127	31	176
F2602-01	Same as F2602-00 but for remote operation	7,127	31	176
F2603-00	Secondary Module; expands F2600-00 to 4 by capability	586	0	14
F2604-00	DC Power Redundancy; adds back up DC supplies for hot standby dynamic power redundancy	2,680	12	66
1100/80 MEMORY				
F2336-00	Storage Interface Unit (SIU) Expansion; provides 4K words of buffer storage to expand SIU's from 8K to 12K words	218,558	420	6,270
F2335-00	SIU Expansion; provides 4K words of buffer storage to expand SIU's from 12K to 16K words	102,958	197	2,958
7037-99	Backing Store; includes storage cabinet with 512K words in two banks and power supplies	330,750	635	9,499
F2350-99	Backing Store Expansion; expands 7037-99 storage unit to 1048K words; also expands the backing store included in the 3032-67, 3032-65, and 3022-99, -97, and -43 processors	210,000	382	6,026
F2350-98	Backing Store Expansion; expands backing store from 4194K to 6291K words or from 6291K to 8388K words; not available for 3022-49 through 3022-44 processors	630,000	892	18,078
F2336-99	Buffer Storage, 8K; expands buffer storage of single cluster Array Processing Systems from 8K to 16K words	347,765	609	8,690
7050-99	Backing Store; includes two storage cabinets each with 512K words in two banks and power supplies; for use on 3022-49 through 3022-44 only; requires F2336-99	707,700	1,254	17,741
F2913-99	Backing Store Expansion; expands 7050-99 storage unit or processor backing store by 1048K words; for use on 3022-49 through 3022-44 only	448,875	752	11,260
F3570-00	Instruction Memory Expansion; provides additional 8K words of instruction memory for Array Processor Subsystem; maximum of one expansion per Array Processing unit	149,100	262	6,425
F3571-00	Data Store Expansion; provides additional 64K words of data scratchpad memory for Array Processor Subsystem; maximum of three expansions per Array Processing unit	149,100	262	6,425
MASS STORAGE				
5012-99	FH-432/FH-1782 Drum Control; controls one to eight 6016-00 or 6015-00 drums in any combination	102,720	509	2,247
F0929-00	Write Lockout Feature for 5012-99 drum control	1,392	5	32
F0930-99	Shared Peripheral Interface for 5012-99 drum control; for MSA applications	22,608	48	495
6016-00	FH-432 Drum; 262K words	52,848	210	1,271
6015-00	FH-1782 Drum; 2048K words	146,064	585	3,512
F0786-01	Dual Channel Feature for 6016-00 drum	3,024	28	72
F0767-00	Dual Channel Feature for 6015-00 drum	3,024	32	69
5039-99	8433/8430 Control for up to eight 8433 and/or 8430 disk drives; includes one I/O interface and 1024 words of buffer storage; minimum two disk drives per subsystem	101,760	660	2,445
5039-91	8433/8430 Control; same as 5039-99 control (1100/80 only)	54,000	374	1,825
5039-93	8433/8430 Control for up to eight 8433 and/or 8430 disk drives; unbuffered; includes one I/O interface; minimum of two required	92,160	598	2,215

*Rental prices do not include maintenance.

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Sperry Univac 1100/10, 1100/20, 1100/40, and 1100/80 Systems

EQUIPMENT PRICES

MASS STORAGE (Continued)

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
F2870-00	5039 Channel Adapter; required to operate a 5039-99, -95, or -93 with an 1100/80 system via a block multiplexer channel	1,560	0	0
F2046-00	Dual Channel Feature (1100/80 only)	3,460	21	90
F2047-00	16-Drive Expansion; provides the capability to attach up to 16 8433 and/or 8430 disk drives to a 5039-99/91 control; excludes use of F2076-00 expansion	5,760	51	195
F2041-00	Shared Peripheral Interface; provides an additional I/O interface for the 5039-99 control	6,600	37	136
F2042-02	EBCDIC Translator; translates Fieldata code to and from a 64-character subset of EBCDIC; may be connected to up to four I/O interfaces (5039-99 control only)	2,064	12	43
F2042-01	ASCII Translator; translates Fieldata code to and from a 64-character subset of ASCII; may be connected to up to four I/O interfaces (5039-99 control only)	2,064	12	43
5039-95	8433/8430 Control; same characteristics as 5039-99 except without I/O channel interface; requires 5039-99 control; maximum one per control	57,600	374	1,385
8430-99	8430 Disk Storage; provides a single 8430 disk drive; minimum two required	18,720	162	633
F2342-00	Disk Drive Upgrade; converts an 8430-99 to an 8433-00	8,640	75	290
8433-00	8433 Disk Storage; provides a single 8433 disk drive; minimum two required	27,360	237	923
F2021-00	8433/8430 Dual Access; provides simultaneous read/read, read/write, write/read, write/write operation on any two 8433-00 or 8430-99 disk drives; required in each 8433-00 and 8430-99 disk drive in the subsystem; requires two 5039 controls	1,630	5	55
F1230-00	Disk Pack; provides up to 100 million bytes or 17 million 36-bit words of removable storage	1,440	0	49
F1223-00	Disk Pack; provides up to 200 million bytes or 34 million 36-bit words of removable storage	1,820	0	61
8405-00	8405 Fixed-Head Disk; provides a single 8405 disk with a storage capacity of 6,193,152 bytes or 1,376,256 36-bit words; requires F2076-00 or F2258-00 capability	38,400	555	976
8405-04	8405 Fixed-Head Disk; provides a single 8405 disk with a storage capacity of 3,096,576 bytes or 688,128 36-bit words; requires F2076-00 or F2258-00 capability	23,040	332	586
F1664-00	8405 Dual Access; provides simultaneous read/read, read/write, write/read, and write/write operation on any two 8405 fixed-head disk drives; prerequisite for each 8405 fixed-head disk in subsystem; requires two 5039 controls	2,160	5	55
F2076-00	8405 Capability; provides capability to attach up to eight 8405-00/04 fixed-head disk drives to the 5039 control; excludes the use of F2047-00 16-drive expansion	2,160	5	55
5046-99	8430/8433/8434 Control; controls up to sixteen 8430, 8433, and/or 8434 disk drives; maximum 866 megabytes of storage; requires minimum of two disk drives	102,000	509	2,922
5046-97	8430/8433/8434 Dual Control; for dual-access subsystem operation; requires two channels	176,448	889	5,291
8434-99	8434 Disk Storage; provides two single-spindle disk drives with non-removable pack	66,600	288	2,258
F2561-00	32-Device Capability; allows up to 32 8430, 8433, or 8434 disk drives to be intermixed on one 5046-99 control; two required for 5046-97 dual control	7,680	51	195
F2558-00	8405 Fixed-Head Disk Capability; allows up to eight 8405 fixed-head disk drives to be attached to 5046-99 control; two required for 5046-97 control (precludes use of F2561-00 32-device capability)	2,160	5	55
F2021-99	8434 Dual Access; provides simultaneous read/write, read/read, write/read, and write/write on any two 8434 disk drives; requires 5046-97 dual control or two 5046-99 controls	2,688	17	59
F2021-98	8434 Dual Access; two required for 8434-99 disk storage on 1100/10 systems only	1,344	7	28
F2555-00	Shared Peripheral Interface; provides an additional I/O interface for the 5046 controls; two required for 5046-97 or -93	6,600	37	146
5046-95	8430/8433/8450 Control; controls up to 16 8450 disk drives and power for up to four sets of four drives of any type (i.e., 8430/8433 or 8450); requires minimum of two disk drives	102,000	509	2,849
5046-93	8430/8433/8450 Dual Control; two control units, each with the same characteristics and restrictions as the 5046-95 control; requires two 2838-00 8450 capability expansions or two F2720-00 8430/8433 capability expansions	176,448	889	5,291
F2838-00	8450 Capability Expansion; allows 5046-95 control to handle up to 32 8450 disk drives, requires 2837-00 power control expansion (excludes use of F2720-00 8430/8433 capability)	6,000	57	158
F2720-00	8430/8433 Capability Expansion; allows 5046-95 control to handle up to 16 8430 and/or 8433 disk drives (excludes use of F2838-00 8450 capability)	2,400	12	63
F2837-00	Power Control Expansion; required when total number of disk drives exceeds 16; two required for 5046-93 dual control	7,680	51	195
8450-99	8450 Disk Storage; provides two 8450 disk drives using non-interchangeable data modules included as part of each drive	66,600	288	2,258
8450-97	8450 Disk Storage; provides two 8450 disk drives using non-interchangeable data modules with fixed and movable heads	74,600	318	2,521
F2717-99	8450 Fixed-Head Conversion; converts 8450-99 disk storage unit to an 8450-97 disk storage unit	13,600	31	264
F2718-99	8450 Dual Access Feature; provides dual access and simultaneous read/write, read/read, write/read, and write/write on any two 8450 disk drives; requires two 5046 controls	2,688	17	59

The following equipment is available for 1100/80 systems only:

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
5056-99	8470 Disk Subsystem; includes 5056-83 controller for up to eight 8470 drives and one 8470 drive	87,200	327	2,473
5056-95	8470 Disk Subsystem; includes two 5056-83 controllers each having capacity for up to eight 8470 drives and two 8470 drives; each drive has dual access feature	162,000	610	4,594
5056-91	8470 Disk Subsystem; same as 5056-95 but with four drives	224,000	844	6,353
5056-87	8470 Disk Subsystem; same as 5056-95 but with eight drives	328,600	1,310	9,314
5056-83	8470 Disk Control; interfaces up to two word channels	102,000	467	2,835
F2994-00	Four Channel Capability for 5056-83	8,090	34	179
F3192-00	8430/8433 Attachment; allows up to eight 8430/8433 drives on 5056-83; up to three F3192-00 per 5056-83 are allowed	9,840	53	290
F3192-01	8450 Attachment; allows up to eight 8450 drives on 5056-83; up to three F3192-01 per 5056-83 are allowed	11,680	53	290
F3192-02	8470 Attachment; allows up to eight additional 8470 drives on 5056-83; up to three F3192-02 per 5056-83 are allowed	4,000	19	100
F3193-00	Controller Enhancement for up to 32 drives; required on 5056-83 when over 16 drives are configured	1,600	4	36
F2837-00	Power Control Expansion; required on 5056-83 when over 16 drives are configured	7,680	51	195
8470-99	8470 Disk Drive	33,600	109	992
F2718-00	8470 Dual Access Feature; provides dual access and simultaneous read/write, read/read, write/read, and write/write; requires two controls	2,688	16	56

*Rental prices do not include maintenance.

Sperry Univac 1100/10, 1100/20, 1100/40, and 1100/80 Systems

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
MAGNETIC TAPE UNITS				
5045-99	Uniservo 14 Control; consists of a control and cabinet with space for two Uniservo 14 tape units. Controls up to eight 9-track phase-encoded tape units. Additional Uniservo 14 tape units are housed in the 5045-02 auxiliary cabinet. Up to three auxiliary units may be attached to the 5045-99 allowing the total of eight tape units. Must be connected via one Multi-Subsystem Adapter module 0961-99 or F1321-99 (not for 1100/80)	21,168	153	463
5045-93	Uniservo 14 Control; same as 5045-99 except that connection is via a block multiplexer channel (1100/80 only)	28,320	183	654
5045-02	Uniservo Auxiliary Cabinet; consists of a Uniservo control cabinet with power distribution and space to mount one or two Uniservo 14 Tape Units	1,296	5	30
F0823-88	7-Track NRZI capability for 5045-99 control	5,544	28	126
F0823-95	7-Track NRZI capability for 5045-93 control; includes ASCII to BCD translation and data con- version	5,760	26	133
F0823-94	Same as F0823-95 except that translation is Fieldata to BCD	5,760	26	133
F0823-93	Same as F0823-95 except that translation is ASCII to Fieldata	5,760	26	133
F0826-01	9-Track NRZI capability for 5045 control	5,760	31	133
F2627-00	9-Track Translation; provides the ability to translate data to and from 9-track tape units (1100/80 only)	2,064	14	52
F2627-01	Second 9-Track Translation feature	2,064	14	52
F1028-16	7-Track Addition; adds 7-track NRZI plus data conversion to F0826-01 feature	4,176	19	96
F1028-90	7-Track Addition; adds 7-track NRZI with ASCII/BCD translation and data conversion to F0826-01 (1100/80 only)	4,175	14	96
F1028-89	Same as F1028-90 except that translation is ASCII to Fieldata (1100/80 only)	4,175	14	96
F1028-15	9-Track Addition; adds 9-track NRZI to F0823-88 feature	4,176	14	96
F1028-18	9-Track Addition; adds 9-track NRZI to F0823-95, -94, or -93, one of which is prerequisite (1100/80 only)	4,175	14	96
F0825-00	Dual Channel Capability (1100/80 only)	4,416	31	102
0870-03	Uniservo 14; 9-track phase-encoded tape unit; 96 KB per second at 1600 bpi	14,880	110	344
0870-04	Uniservo 14; 9-track phase-encoded and NRZI tape unit; 96 KB per second at 1600 bpi and 48 KB at 800 bpi	16,080	120	371
0870-05	Uniservo 14; 7-track NRZI tape unit; 48/33.4/12 KB per second at 800/556/200 bpi	14,880	110	344
F2194-00	U14 Dual Density; adds 9-track NRZI to a Uniservo 14 phase-encoded tape unit Type 0870-03	1,200	7	27
F2194-02	U14 7 to 9 Conversion; converts a Type 0870-05 Uniservo 14 7-track NRZI tape unit into a 9- track phase-encoded unit	0	0	0
F2194-03	U14 7 to 9 Dual Density; converts a Type 0870-05 Uniservo 14 7-track NRZI tape unit into a 9-track phase-encoded and NRZI unit; requires F0826-00 or equivalent in the control	1,200	7	27
5017-00	Uniservo 16 Magnetic Tape Control; up to sixteen 9-track, 1600-bpi non-simultaneous Uniservo 16 Tape Units	28,560	205	726
F0899-99	Simultaneous Operation for 5017-00 control; permits simultaneous read/read, read/write, write/read, and write/write on any two Uniservo 16 drives with dual access feature F1319-00	21,312	131	543
F0825-00	Dual Channel Capability; permits non-simultaneous operation on two block multiplexer channels; if F0899-99 is present, two F0825-00 features are required (1100/80 only)	4,416	31	102
F0823-99	7-Track NRZI 800 bpi capability for 5017-00; includes data conversion	5,760	31	133
F0823-96	7-Track NRZI; includes data conversion and BCD/EBCDIC translation	5,760	31	133
F0826-00	9-Track NRZI Capability for 5017-00	5,760	31	133
F1028-96	Adds 9-track NRZI to F0823-99 or F0823-96	4,176	19	96
F1028-95	Adds 7-track NRZI and Data Conversion to F0826-00	4,176	19	96
0862-04	Uniservo 16 Tape Unit; 9-track, PE, 1600 bpi, 120 ips	22,032	213	559
0862-06	Uniservo 16 Tape Unit; 7-track, NRZI, 200/556/800 bpi, 120 ips	22,032	213	559
F0937-01	Dual Density Feature for the 0862-04; adds 9-track, 800 bpi	2,448	0	54
F1319-00	Dual Access Feature; requires 5017-00 control and F0899-99 simultaneous operation feature	2,448	16	54
0876-99	Uniservo 22 Subsystem; includes control for up to eight Uniservo 22 and/or Uniservo 24 drives and a Uniservo 22 Magnetic Tape Drive	44,710	222	1,192
0876-97	Uniservo 22 Magnetic Tape Drive; dual density PE/NRZI, 1600/800 bpi, 9-track, 75 ips	19,190	110	525
0876-95	Uniservo 24 Subsystem; includes control for up to eight Uniservo 24 and/or Uniservo 22 drives and a Uniservo 24 Magnetic Tape Drive	46,735	233	1,244
0876-93	Uniservo 24 Magnetic Tape Drive; dual density PE/NRZI, 1600/800 bpi, 9-track, 125 ips	21,215	121	694
F2800-99	Adds PE/NRZI Control Unit to Uniservo 22 or 24 for dual access operation	25,520	111	667
F3116-01	Dual Access Feature for the Uniservo 22 and 24; also provides simultaneous r/r, r/w, w/r, and w/w when added to two or more Uniservo 22 and/or 24 drives	2,450	15	53
F3132-00	Dual Channel; permits non-simultaneous operation of the 0876-99 or 0876-95	4,415	28	95
F3136-04	Translation Feature for Uniservo 22 or 24 controls; provides ASCII (processor) to EBCDIC (tape) and Fieldata (processor) to EBCDIC (tape); maximum of one per control	2,065	11	47
F3136-05	Provides ASCII (processor) to EBCDIC (tape) and Fieldata (processor) to ASCII translation	2,065	11	47
F3136-06	Provides Fieldata (processor) to EBCDIC (tape) and Fieldata (processor) to ASCII translation	2,065	11	47
5042-00	Uniservo 30 Control for up to eight 9-track, dual-density (GCR/PE) Uniservo 30, 32, 34, and/or 36 drives; main control for 1100/80; auxiliary control for other 1100 Series systems, which require 5042-99 as main control	48,143	366	1,290
F2131-00	Adds 9-track NRZI to 5042-00; prerequisite for all 7-track NRZI features	3,171	24	84
F2585-00	Translation Feature for 9-track drives on 5042 control; translation is in both directions involving, ASCII/EBCDIC, Fieldata/EBCDIC, and Fieldata/ASCII (1100/80 only)	1,785	14	47
F2585-01	Second 9-track Translator; F2585-00 required (1100/80 only)	1,785	14	47
F2584-99	Adds 7-track NRZI to 5042-00; includes ASCII to BCD translator and data conversion (1100/ 80 only)	1,617	12	42
F2584-98	Translator is ASCII to Fieldata (1100/80 only)	1,617	12	42
F2584-97	Translator is Fieldata to BCD (1100/80 only)	1,617	12	42
F2135-00	Dual Channel Feature for the 5042-00; provides non-simultaneous access to the control from two block multiplexer channels; not software supported (1100/80 only)	5,229	40	138
F2137-00	Drive Expansion Feature for the 5042-00; provides for up to 16 Uniservo 30, 32, 34, and/or 36 drives to be attached to the 5042-00	835	5	22
5042-99	Uniservo 30 Control for up to eight Uniservo 30, 32, 34, and/or 36 drives; 5042-00 control can be added to provide support for up to 16 tape drives on one channel (for 1100/10, 1100/20, and 1100/40 systems)	75,953	479	1,681

*Rental prices do not include maintenance.

Sperry Univac 1100/10, 1100/20, 1100/40, and 1100/80 Systems

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
MAGNETIC TAPE UNITS (Continued)				
5042-97	Uniservo 30 Control for control of up to eight Uniservo 30 or 32 drives only	69,653	438	1,538
F2041-00	Shared Peripheral Interface for 5042-99 control	6,600	37	136
F2042-01	Translation Feature for drives on 5042-99 control; translation is Fieldata to and from ASCII	2,064	12	43
F2042-02	Same as F2042-01 but translation is Fieldata to and from EBCDIC	2,064	12	43
F2127-00	Buffer Expansion for 5042-99 control; expands buffer capacity from 1024K to 2048K words	4,536	21	100
F1324-02	Shared Peripheral Interface for 5042-97 control	6,600	41	136
F2233-00	Translation Feature for 5042-97 control; translation is Fieldata to and from ASCII	2,064	12	43
F2233-01	Same as F2233-00 but translation is Fieldata to and from EBCDIC	2,064	12	43
F2131-00	9-Track NRZI Capability; required on all control units used with Uniservo 30 tape drives	3,171	24	84
F2133-99	7-Track NRZI Capability; includes BCD/Fieldata translator and data conversion; requires F2131-00 (for 1100/10, 1100/20, and 1100/40 systems)	1,915	12	42
F2133-98	7-Track NRZI Capability; same as F2133-99 but translation is BCD/Fieldata Version 2	1,915	12	42
0872-00	Uniservo 30 Magnetic Tape Drive; 9-track, dual density PE/NRZI, 1600/800 bpi, 200 ips	30,335	230	860
0872-02	Uniservo 30 Magnetic Tape Drive; 7-track, NRZI, 800/556, 200 bpi, 200 ips	30,335	230	860
F2123-00	Conversion Feature; converts 0872-02 to 0872-00	3,287	0	87
0873-00	Uniservo 32 Magnetic Tape Drive; 9-track, dual density GCR/PE, 6250/1600 bpi, 75 ips	27,552	208	799
0873-02	Uniservo 34 Magnetic Tape Drive; 9-track, dual density GCR/PE, 6250/1600 bpi, 125 ips	31,448	239	916
F2125-00	Conversion Feature; converts 0873-00 to 0873-02	4,011	31	106
0874-00	Uniservo 36 Magnetic Tape Drive; 9-track, dual density GCR/PE, 6250/1600 bpi, 200 ips	33,674	256	982
PRINTERS				
0770-00	Line Printer and Control; 800 lpm with 48 character set	56,304	341	1,300
0770-02	1400 lpm	64,896	447	1,498
0770-04	2000 lpm	86,686	681	2,951
F1533-00	160 Print Positions for 0770 Series Printers	4,416	24	102
F1534-00	Expanded Character Set Control, required for other than 48-character print cartridges	2,880	5	66
F2230-00	Printer Upgrade; 0770-00 to 0770-02	8,592	106	198
F2230-01	Printer Upgrade; 0770-00 to 0770-04	30,382	228	1,159
F2230-02	Printer Upgrade; 0770-02 to 0770-04	21,790	122	961
F2822-00	Dynamic Advance Control; reduces slew rate by 50 percent to optimize stacking of light forms	300	0	8
	Print Cartridges for 0770 Series Printers			
F1536-00	48-character Alphanumeric Business/Commercial	462	0	24
F1536-01	48-character Alphanumeric Scientific	462	0	24
F1536-03	48-character Alphanumeric for United Kingdom	462	0	24
F1536-04	48-character Alphanumeric for Denmark and Norway	462	0	24
F1536-05	46-character Alphanumeric for Finland and Sweden	462	0	24
F1536-06	48-character ANSI standard OCR	462	0	24
F1537-00	94-character ASCII Graphic (ANSI X3.4-1968)	462	0	24
F1537-01	63-character Alphanumeric for Denmark and Norway	462	0	24
F1537-02	63-character Alphanumeric for Finland and Sweden	462	0	24
F1537-03	68-character ISO Universal OCR-B	462	0	24
F1537-04	68-character OCR H-14 Universal	462	0	24
F1537-05	58-character COBOL/FORTRAN/Business	462	0	24
F1537-06	177-character International	462	0	24
F1537-07	95-character Alphanumeric for Finland and Sweden	462	0	24
F1537-08	128-character Alphanumeric/Katakama for Japan	462	0	24
F1537-09	24-character Numeric	462	0	24
F1537-10	114-character Alphanumeric/Katakama for Japan	462	0	24
F1537-11	68-character Universal OCR-A	462	0	24
F1537-12	68-character Universal ECMA-11 OCR-B	462	0	24
F1537-13	68-character Universal Univac 77L OCR-B	462	0	24
F1537-14	63-character Modified FORTRAN	462	0	24
F1537-15	63-character Modified ASCII	462	0	24
F1537-19	384-character American Library Association	462	0	24
F1537-20	192-character Farsi/English	462	0	24
F1537-21	128-character OCR-A	462	0	24
F1537-23	94-character Optimized ASCII	462	0	24
F1537-24	68-character Optimized ISO Universal OCR-B	462	0	24
0776-00	Line Printer and Control; 760 lpm with 48 character set	36,570	261	958
0776-02	900 lpm	41,340	312	1,080
0776-04	1200 lpm	52,150	356	1,363
F2217-00	Printer Upgrade; 0776-00 to 0776-02	4,770	51	122
F2245-00	Expanded Character Set Control; required for character sets with more than 64 characters	1,910	5	50
	Print Cartridges for 0776 Series Printers			
F2216-00	48-character Alphanumeric Business/Commercial	1,270	0	34
F2216-01	48-character Alphanumeric Scientific	1,270	0	34
F2216-07	24-character Numeric	1,270	0	34
F2216-08	63-character Modified FORTRAN	1,270	0	34
F2216-09	63-character Modified ASCII	1,270	0	34
F2216-10	48-character OCR-A	1,270	0	34
F2215-00	94-character ASCII	1,270	0	34
F2215-03	68-character ISO Universal OCR-B	1,270	0	34
F2215-04	68-character OCR H-14 Universal	1,270	0	34
F2215-05	58-character COBOL/FORTRAN/Business	1,270	0	34
F2215-06	177-character International	1,270	0	34
F2215-11	68-character Universal OCR-A	1,270	0	34
F2215-12	68-character Universal ECMA-11 OCR-B	1,270	0	34
F2215-13	68-character Universal Univac 77L OCR-B	1,270	0	34
F2215-20	94-character Optimized ASCII	1,270	0	34
F2215-21	68-character Optimized ISO Universal OCR-B	1,270	0	34
F2215-23	128-character OCR-A	1,270	0	34

*Rental prices do not include maintenance.

Sperry Univac 1100/10, 1100/20, 1100/40, and 1100/80 Systems

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
PUNCHED CARD EQUIPMENT				
0604-99	Card Punch and Control; 250 cpm	26,640	230	615
0716-02	Card Reader and Control; 1000 cpm; comes with code translator EBCDIC, ASCII, compressed code, or Fieldata code	15,504	154	358
F1487-00	51-Column Card Read Feature	1,968	16	45
F1487-01	68-Column Card Read Feature	1,968	16	45
F1488-00	Validity Check	816	0	18
F1498-00	Stacker Feature; permits the alternate filling of stackers one and two when in the stop-on-errors mode	528	0	12
F1468-00	Translate Mode Conversion; from EBCDIC to ASCII	105	0	0
F1486-01	Compressed Code to ASCII	105	0	0
F1486-02	ASCII to EBCDIC	105	0	0
F1486-03	Compressed Code to EBCDIC	105	0	0
F1486-04	ASCII to Compressed Code	105	0	0
F1486-05	EBCDIC to Compressed Code	105	0	0
F1486-06	To Fieldata Code	100	0	0
F1530-00	Adds a second translator to translate mode under program control	1,104	5	25
COMMUNICATIONS/SYMBIONT SUBSYSTEM				
3021-99	Communications/Symbiont Processor; includes arithmetic/control unit, 16 general-purpose registers, and interval timer; requires card reader, F1276 channel adapter, 8542-00 general-purpose communications channel, and 32K words of storage	22,176	93	474
F1276-99	1100 Channel Adapter	5,544	31	119
F1418-00	Special Device Channel for addition of 0708-27 card reader	1,512	5	33
F1273-00	Selector Channel; requires F1577-00 I/O expansion and console; maximum 1 per 3021-99 processor	6,500	31	140
F1274-00	Multiplexer Channel; requires 48K words storage and F1577-00 I/O expansion	6,300	31	135
F1577-00	I/O Expansion; provides two additional I/O features	1,764	0	38
8541-88	C/SP Console; provides keyboard input and printer output console capability for the C/SP; required with use of F1273-00 selector channel	5,440	36	143
Storage for C/SP:				
7026-99	Storage; 32,768 bytes	42,840	195	915
7026-98	Storage; 49,152 bytes	64,260	293	1,373
7026-97	Storage; 65,536 bytes	85,680	379	1,830
7026-96	Storage; 98,304 bytes	128,520	533	2,745
7026-95	Storage; 131,072 bytes	171,360	688	3,660
F1775-94	Storage Expansion; 16,384 bytes; expands 32K storage to 48K	21,420	98	458
F1775-93	Storage Expansion; 16,384 bytes; expands 48K storage to 64K	21,420	84	458
F1784-98	Storage Expansion; 32,768 bytes; expands 64K storage to 96K	42,840	156	915
F1775-92	Storage Expansion; 32,768 bytes; expands 96K storage to 128K	42,840	154	915
0708-27	80-Column Card Reader with control; requires F1418-00 special device channel	2,268	26	51
8542-00	General-Purpose Communications Channel (GPCC); includes data transfer control, processor interface logic, multiplexer with 8 positions (4 communications line terminals), and one asynchronous timing source; accommodates 64 positions or 32 communications line terminals; maximum two GPCC's per Communications/Symbiont Processor	11,592	48	248
F1367-00	Multiplexer Expansion; adds 8 positions to 8542-00 GPCC; maximum 7 per GPCC	1,008	5	21
F1286-00	CLT Expansion Module	3,528	23	76
F1287-00	Active Line Indicators for lines 1 to 16 (32 indicators and 16 lines)	504	0	11
F1287-08	Active Line Indicators for lines 1 to 32 (64 indicators and 32 lines)	1,008	0	22
F1287-09	Active Line Indicators for lines 1 to 48 (96 indicators and 48 lines)	1,512	0	33
F1287-10	Active Line Indicators for lines 1 to 64 (128 indicators and 64 lines)	2,016	0	43
F1287-11	Active Line Indicators for lines 1 to 80 (160 indicators and 80 lines)	2,520	0	54
F1287-12	Active Line Indicators for lines 1 to 96 (192 indicators and 96 lines)	3,024	0	65
F1287-13	Active Line Indicators for lines 1 to 112 (224 indicators and 112 lines)	3,528	0	76
F1287-14	Active Line Indicators for lines 1 to 128 (256 indicators and 128 lines)	4,032	0	87
F1287-01	Line Indicator Expansion for lines 17 to 32	504	0	11
F1287-02	Line Indicator Expansion for lines 33 to 48	504	0	11
F1287-03	Line Indicator Expansion for lines 49 to 64	504	0	11
F1287-04	Line Indicator Expansion for lines 65 to 80	504	0	11
F1287-05	Line Indicator Expansion for lines 81 to 96	504	0	11
F1287-06	Line Indicator Expansion for lines 97 to 112	504	0	11
F1287-07	Line Indicator Expansion for lines 113 to 128	504	0	11
F1365-99	Asynchronous Timing Assembly (ATA); provides up to 3 timing sources for asynchronous communications line terminals; maximum two per GPCC	768	5	22
F1290-00	Asynchronous CLT; EIA RS-232B	352	5	7
F1290-01	Asynchronous CLT; Mil. Std. 188B	352	5	7
F1290-02	Asynchronous CLT; CCITT	352	5	7
F1290-03	Asynchronous CLT; Telegraph I	352	5	7
F1290-04	Asynchronous CLT; Telegraph II	352	5	7
F1291-00	Synchronous CLT; EIA RS-232B	1,764	14	38
F1291-01	Synchronous CLT; Mil. Std. 188B	1,764	14	38
F1291-02	Synchronous CLT; CCITT	1,764	14	38
F1291-04	Synchronous CLT; Telpak	2,268	14	49
F1292-00	Dialing Adapter, Single	768	5	17
F1292-01	Dialing Adapter, Double	1,512	5	33

*Rental prices do not include maintenance.

AUGUST 1981

Sperry Univac 1100/10, 1100/20, 1100/40, and 1100/80 Systems

		Purchase Price	Monthly Maint.	Rental (1-year lease)*

GENERAL COMMUNICATIONS SUBSYSTEM

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
8583-00	General Communications Subsystem (GCS); houses maximum of 32 communications terminals with interfaces and/or communication terminal dialers	14,640	74	511
F1971-00	Expansion Power Supply; required when 24 or more terminals are included in the GCS configuration	1,630	5	57
F1972-00	Spare CTC for controlling up to 32 lines in ESI mode on an I/O channel	7,200	44	248
F1973-00	Communication Terminal Asynchronous; up to 2400 bps, asynchronous bit serial transmission	1,250	10	43
F1973-01	Communications Terminal Asynchronous; same as F1973-02, but with external interrupt capability	2,880	17	101
F1973-02	Communication Terminal Asynchronous—VII; provides for block parity generation and checking	2,590	17	91
F1974-00	Communication Terminal Synchronous—Standard; up to 50,000 bps, synchronous bit serial transmission	1,820	14	63
F1974-01	Communications Terminal Synchronous; same as F1974-02, but with external interrupt capability	3,410	22	120
F1974-02	Communication Terminal Synchronous VII; provides for block parity and checking	3,070	22	108
F1975-00	Communications Terminal Synchronous; up to 56,000 bps, bit serial transmission	2,880	21	114
F1976-00	High-level Communications Terminal; provides capability to handle bit-oriented Data Link Control, up to 56,000 bps	3,600	23	127
F1977-99	Communication Terminal Dialer	530	3	18
F1978-00	Communication Interface—Telegraph	190	1	6
F1979-00	Communication Interface—Modem	335	2	12
F1979-01	Identical to CI—Modem (1979-00) except permits use of a modem not having a receive clock	530	3	18
F1980-00	Communication Interface—High-Speed (allows connection of a CTS—Std. or CTS—VII to the CCITT V.35 interface)	670	4	23
F1980-01	Communication Interface (allows connection of a CTS—Std. or CTS—VII to the ATT 303 modem or equivalent)	670	4	23
F1983-00	Spare Basic Clock	190	1	6
F1984-00	Expansion Clock (provides asynchronous timing rates not included in the basic clock)	190	1	6
F2072-00	Allows connection to a CTS—Std. or a MIL 188C synchronous interface	530	3	18
F2074-00	Communications Interface—automatic inbound bit rate detection	1,100	3	38

DISTRIBUTED COMMUNICATIONS PROCESSOR

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
8579-83	Distributed Communications Processor (DCP); free-standing unit including processor, real-time clock, power-protect, storage parity, breakpoint, unary shift, power supplies, control, and 32K bytes of storage; requires either an F2223-00 single port or an F2223-01 multi-port feature, an 8406 flexible diskette or an 8408 cartridge disk subsystem, and a 1928-03 Type II Scanner	40,668	238	1,017
F2224-00	I/C Storage Expansion for DCP; provides 16K bytes of additional storage to expand capacity from 32K to 48K bytes, 64K to 80K bytes, and 96K to 112K bytes	3,600	29	90
F2224-01	I/C Storage Expansion for DCP; provides 16K bytes of additional storage to expand capacity from 48K to 64K, 80K to 96K, and 112K to 128K bytes	1,800	29	45
F2268-00	I/O Controller; provides a programmable interface between DCP and parallel I/O channel	3,200	17	80
F1795-00	Parallel I/O Channel; supports four channels; requires F2268-00 I/O controller	2,400	12	60
F2691-00	Remote I/O Controller; provides a programmable controller with 16 parallel I/O channels; requires F2223-01 multi-port storage	18,000	95	450
F1791-99	Host Channel Interface, Single; provides connection of a DCP to an 1100/80 byte multiplexer channel	3,136	16	78
F1800-99	Host Channel Interface, Dual; provides connection to switch between two byte multiplexer channels of a single 1100/80 or two separate 1100/80's	4,832	25	120
F2223-01	Multi-Port Storage; provides four access ports to I/C storage; required whenever a 1928-03 Type II scanner or an F2691-00 remote I/O controller is used	4,040	32	101
8406-99	Diskette Drive; 256K bytes	5,000	25	125
F2338-00	Drive Expansion; provides for an additional diskette drive for DCP; 256K bytes	1,040	11	31
8408-02	Cartridge Disk Control; provides cabinet, control, and housing for up to two F2380-04 disk drives; requires either an F1795-01 parallel I/O channel or an F2691-00 remote I/O controller	5,564	29	139
F2380-04	Disk Drive, 10 million bytes; requires 8408-02 control	17,750	114	439
F2187-00	Cartridge Disk, Dual; provides a second I/O interface for dual DCP configurations; requires 8408-02 control	1,568	8	39
8590-99	Remote Control Module	6,148	49	154
3542-93	DCP Console			
0774-90	Console Printer; 300 cps	2,630	24	71
0786-56	Console Printer; 200 cps	5,250	36	140
0786-54	Console Printer; 200 cps, bidirectional	6,960	60	180
1928-03	Type II Scanner; provides the capability to control data between the DCP and up to 128 half-duplex or 64 full-duplex communications lines	23,000	72	575
F2263-00	Line Adapter Chassis; expands the number of line adapter positions by 32; 32 to 64 or 96 to 128; up to two per 1928-03 allowed; requires F1801-01	2,360	11	59
F2263-02	Expansion; expands number of line adapter positions from 64 to 96	1,120	4	28
F1801-01	Line Base II; provides the interface and control for up to 16 ports in 1928-03; maximum of eight per scanner	600	3	15
F2381-00	Allows operation of up to 128 1928-03 line adapter positions with bit oriented line control procedures such as UDLC, SDLC, etc.	1,720	8	43
F1869-01	Auto Line Speed Detection; provides 1928-03 with the capability to automatically determine operation characteristics such as character length; one per 1928-03	452	3	11
F1825-02	Line Indicator Type II; provides a visual display of line activity on up to 16 half-duplex or 8 full-duplex communications lines on 1928-03; maximum of eight per 1928-03	440	2	11
F1826-00	Synchronous Line Adapter for 1928-03; provides full duplex interface to data sets conforming to RS-232-C and CCITT V.24 and V.28	760	8	19
F1826-01	With supervisory channel up to 150 bps asynchronous; requires two line adapter positions	1,160	10	29
F1827-00	With modem interface conforming to MIL-STD-188C and MIL-STD-188C and MIL-STD-188-100 low level	760	8	19

*Rental prices do not include maintenance.

Sperry Univac 1100/10, 1100/20, 1100/40, and 1100/80 Systems

		Purchase Price	Monthly Maint.	Rental (1-year lease)*

DISTRIBUTED COMMUNICATIONS PROCESSOR (Continued)

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
F3357-00	Synchronous Line Adapter for 1928-03; provides full-duplex interface to data sets conforming to CCITT X.21	1,020	5	30
F1828-00	Asynchronous Line Adapter for 1928-03; provides full-duplex interface to data sets conforming to RS-232-C and CCITT V.24 and V.28	600	7	15
F1828-01	With reverse channel up to five bps for Bell 202 type modems	760	8	19
F1828-02	With a supervisory channel up to 150 bps asynchronous; requires two line adapter positions	920	10	23
F1829-00	With interface conforming to MIL-STD 188C and MIL-STD-188-100 low level	600	7	15
F1830-00	Wideband Line Adapter for 1928-03; provides capability to connect one synchronous full duplex line for operation at 19.2, 40.8, or 50K bps for use with AT&T 300 Series Data Set	920	10	23
F1831-00	Dial Adapter for 1928-03; provides interface for attachment to one Bell 801 Automatic Calling Unit; requires F1828, F1826, or F1835	600	7	15
F1832-00	Asynchronous Relay Line Adapter for 1928-03; full-duplex interface optionally compatible with either 20 to 75 mA neutral or 10 to 40 mA polar telegraph lines	600	7	15
F1834-00	Wideband Line Adapter; similar to F1830-00 except the modem interface conforms to CCITT V.35	920	10	23
F1835-00	TWX Line Adapter for 1928-03; interfaces the US TWX Network	600	7	15
F1836-00	Telex Line Adapter for 1928-03; interfaces the Western Union Telex in the US	600	7	15
F2519-00	Full Duplex Interface to Asynchronous Data Sets for 1928-03; conforms to RS-232-C and CCITT V.24 and V.28; contains clocking logic that can be strapped for 300, 600, 1200, 1800 bps and 7 or 8 level code on ports 0 to 63 or 300, 600, or 1200 bps on ports 64-127	760	8	19
F2521-00	Interface for 1928-03; provides input of paralle data from touch tone telephone sets via Bell 407A/B Data Station	1,000	11	25

TERMINALS**

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
3536-89	Uniscope 100 Display Terminal 960 or 1024 characters; 64 character set	3,175	65	81
F1241-04	Expands Uniscope 100 character set to 96 characters	680	0	17
3542-99	Uniscope 200 Display Terminal; 1536 or 1920 characters; 64 character set	4,252	65	112
F2044-01	Expands Uniscope 200 character set to 96 characters	701	0	17
3542-98	Uniscope 200 with international 64 character set	4,252	65	112
F2044-03	Expands Uniscope 200 international character set to 96 characters for Uniscope 100 and 200	701	0	17
F1844-00	Uniscope 100/200 Numeric Keyboard	270	2	7
F1844-01	Uniscope 100/200 Upper Case Alpha Keyboard	300	2	13
F1844-02	Uniscope 100/200 Upper/Lower Case Alpha Keyboard	300	2	13
F1844-03	Uniscope 100/200 Upper Case Alpha Typewriter and Numeric Keyboard	490	2	20
F1844-04	Uniscope 100/200 Upper/Lower Case Alpha Typewriter and Numeric Keyboard	490	2	20
F1844-05	Same as F1844-01 but with protected format keys	300	2	13
F1844-06	Same as F1844-02 but with protected format keys	300	2	13
F1844-07	Same as F1844-03 but with protected format keys	490	2	20
F1844-08	Same as F1844-04 but with protected format keys	490	2	20
F1466-00	Special Function keyset for automatic disconnect	108	1	3
F1245-00	Direct Interface; 2400, 4800, or 9600 bps	470	5	12
F1245-01	Synchronous Interface to a modem or terminal multiplexer	470	5	12
F1245-02	Asynchronous Interface to a modem or terminal multiplexer; 300, 600, 1200, 1600, 1800, or 2400 bps	470	5	12
F1245-13	Synchronous Interface to an IBM 2701 and SDAII or 2703 and synchronous base 1 via modem or terminal multiplexer	470	5	12
F1245-14	Asynchronous Interface to an IBM 2701 and Terminal Adapter III; 300, 600, 1200, 1600, 1800, or 2400 bps	470	5	12
F1247-00	Auxiliary Peripheral Interface for Uniscope 100	327	0	11
F1247-01	Auxiliary Peripheral Interface for Uniscope 200	327	0	11
8538-99	Terminal Multiplexer; for up to eight terminals	1,781	7	53
F1264-00	Multiplexer Expansion; expands number of terminals to 16	356	0	13
8538-97	Same as 8538-99 but for modems F 1970-00 and F 1970-01	1,680	7	51
F1266-00	Synchronous/Asynchronous Interface to a modem terminal multiplexer	356	0	13
F1266-02	Direct Interface with clock for connection to a CTMC or DCS without modem; 2400, 4800, 9600 bps	320	0	12
0786-00	Unidirectional Matrix Printer; 200 cps	4,540	38	133
0786-02	Bidirectional Maxtrix Printer; 200 cps	6,594	64	177
F2656-01	Printer Interface to Uniscope	422	0	11
F2696-00	Converts 0786-00 to 0786-02	1,710	25	44
F2648-00	Document Parting Bar; for removal of single forms	114	1	3
F2646-00	Option for 6 or 8 lines per inch	152	1	4
F2647-00	Vertical Form Unit; 6 lines per inch	228	1	6
F2647-02	Vertical Form Unit; 6 lines per inch	228	1	6
8541-06	Printwheel Printer; 30 cps	2,596	39	82
F1780-00	Variable Forms Length Feature	195	1	6
0774-96	300 cps terminal printer	2,320	28	64
0866-99	Dual Drive Magnetic Tape Cassette for Uniscope 100; 700K characters each; requires F1247-00	1,947	40	65
F1666-99	Feature Group A for 0866-99; provides read-after-write, write protect formats, off-line cassette-to-cassette copying, and off-line cassette-to-printer transfer	312	0	8
F1666-98	Feature Group B for 0866-99; same capabilities as F1666-99 plus search by identifier and writing of ASCII record separators	584	0	17
F1666-97	Feature Group C for 0866-99; converts F1666-99 to F1666-98	272	0	7
0866-97	Dual-Drive Magnetic Tape Cassette for Uniscope 100 or 200; 700K characters each; requires F1247-01	1,947	40	65
F2142-00	Feature Group D for 0866-97; same capabilities as F1666-99	577	0	16
F2142-01	Feature Group E for 0866-97; provides same capabilities of Feature Group D plus search by identifier, writing of ASCII record separators, and copy to address	906	0	27

*Rental prices do not include maintenance.
**For pricing on the UTS 400 see Report 70D2-877-06.

AUGUST 1981

Sperry Univac 1100/10, 1100/20, 1100/40, and 1100/80 Systems

SOFTWARE PRICES

		Monthly Lease Charge
6107-11	Optima 1100 Project Management System	$660
6503-00	Aset-1100 Author System for Education and Training	375
6510-00	Unis-1100 ASCII Master Data Processor (MDP)	600
6510-01	Unis-1100 ASCII Inventory Management (IM)	600
6510-02	Unis-1100 ASCII Planning and Scheduling/Work Order Management (PSWOM)	300
6510-97	Unis-1100 MDP/IM Combination	1,200
6510-98	Unis-1100 IM/PSWOM Combination	900
6510-99	Unis-1100 MDP/IM/PSWOM Combination	1,500
6523-00	Unidas Information Storage and Retrieval System	660
6547-00	Sperry Univac Financial Integrated Control System (SUFICS) 1100	770
6547-01	SUFICS 1100 Risk Analysis	66
6547-02	SUFICS 1100 Hierarchical Consolidate	110
6547-03	SUFICS 1100 Symbolic Editor and Renumbering Routine	198
6548-00	Graphics-Oriented Interactive Finite-Element Time-Sharing System (GIFTS) 1100	385
6575-00	UNIFACS 1100 Accounts Payable	300
6575-01	UNIFACS 1100 Accounts Receivable	300
6575-02	UNIFACS 1100 Payroll/Personnel	500
6575-03	UNIFACS 1100 General Ledger/Budgeting	500
6162-00	Checkpoint/Restart	126
6133-00	Data Processor	62
6175-00	Integrated Recovery Utility	383
6161-00	Performance Analysis Routines	252
6158-00	Quota Input Processor	189
6167-00	Sentry	635
6166-00	Simulation Library (1100/80 only)	63
6135-00	Sort/Merge	126
6163-00	Terminal Security System	189
6148-00	Communications Management System (CMS)	446
6169-01	CMS 1100 General Communications System	446
6169-00	CMS 1100 DCP	635
6170-01	Conversational Time Sharing System	275
6177-00	Define File Processor	63
6155-00	Data Management System (DMS) 1100	956
6176-00	Data Dictionary	383
6244-00	Information Management System (IMS) 1100 (1100/80 only)	195
6245-00	Edit 1100 (1100/40 and 1100/80 only)	315
6241-00	Interactive Processing Facility 1100 (1100/40 and 1100/80 only)	945
6174-00	Functional Mathematical Programming System (FMPS)	635
6174-01	FMPS—Gamma	252
6147-00	High Volume Time Sharing	635
6168-00	Comprehensive Mathematical and Statistical Library (Mathpack/Statpack)	252
6159-00	Processor Common Communications System	126
6152-00	Processor Common Input/Output System (PCIOS)	63
6157-00	Query Language Processor (QLP) 1100	383
6157-01	QLP 1100 with PCIOS Interface	446
6157-02	PCIOS/QLP 1000 Interface	116
6156-00	Remote Processing System	252
6179-00	Universal Terminal System 400	126
6143-00	Univac Automatic Document System	509
6143-01	IICOMP-80 Device Handler (Information International Comp 80 Micro-File Recording System)	63
6143-02	APS 4 Device Handler (Autologic Inc. APS4 CRT Phototype Setting System)	63
6146-00	Mapper 1100	978
6203-00	Fault Location by Interpretive Testing (FLIT)	116
6205-00	Promega 494 Capability	550
6237-00	Display Processing System (DPS) 1100	289
6172-00	APL 1100	509
6134-00	APT 1100	352
6134-01	APT 1100 with lathe capabilities	446
6171-00	UBASIC	126
6178-00	BBASIC Syntax Analyzer for UBASIC	63
6153-00	COBOL, ASCII character recognition	252
6149-00	BCOB Syntax Analyzer for ASCII COBOL and DMS 1100	126
6130-02	COBOL, UTS 400 or UTS 4000	121
6154-00	FORTRAN, ASCII character recognition	383
6150-00	Syntax Analyzer for ASCII FORTRAN	126
6165-00	General Syntax Analyzer (GSA) 1100	110
6160-00	Macro	126
6151-00	PL/1	252
6164-00	RPG 1100	126
6243-99	RPG II Group	130■

Sperry Univac 1100/10, 1100/20, 1100/40, and 1100/80 Systems

➤ On-call maintenance is also subject to travel time and expense charges.

Sperry Univac offers reduced maintenance rates for multiple-processor installations. The percent premiums listed below apply to installations containing two or more processors or systems of the same type and located at the same address.

	Two-Processor Installation Hours of Coverage		
	9	16	24
Monday through Friday	0	15	27.5
Saturday	6	8	10
Sunday and Holidays	7.5	10	12.5

	Three or More Processors Hours of Coverage		
	9	16	24
Monday through Friday	0	12	22
Saturday	5	6.5	8
Sunday and Holidays	6	8	10

LONG-TERM LEASES: In addition to the basic 1-year agreement, Sperry Univac offers an extended-term 5-year lease at significantly lower monthly rates. Under the 5-year "level-payment" agreement, the monthly equipment charge is approximately 75 percent of the 1-year rental rate shown in the accompanying price list.

Sperry Univac also offers a 7-year lease to state and local governments and to educational institutions. Educational institutions are eligible for an additional 10 percent discount. The discount does not apply to maintenance service charges.

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
1100/10 PROCESSORS AND MAIN STORAGE				
3051-99	1100/10 Processor with 128K-word control memory; double-precision floating point, four I/O channels, power distribution center, control console with CRT display and entry keyboard, hard-copy printer, real-time maintenance communication (RTMCS) interface, and 128K words of main storage	$ 320,540	$ 2,858	$ 7,716
3051-97	1100/10 Processor; same as 3051-99 processor, but includes 192K words of main storage, 5046-95 disk control, and 8450 disk drive	343,110	3,784	11,034
3051-95	1100/10 Processor; same as 3051-97 processor, but includes 256K words of main storage	407,630	4,041	12,851
3051-93	1100/10 Processor; same as 3051-95 processor, but includes two main storage units with 256K words of main storage	428,560	4,207	13,417
3051-91	1100/10 Processor; same as 3051-93 processor, but includes two main storage units with 512K words of main storage and two 8450 disk drives	690,000	5,379	21,806
3051-89	1100/10 Processor; same as 3051-99 processor, but includes fast 192K words of main storage, 5046-95 disk control, and 8450 disk drive	366,285	3,972	11,692
3051-87	1100/10 Processor; same as 3051-89 processor, but includes 256K words of main storage	434,000	4,246	13,598
3051-85	1100/10 Processor; same as 3051-89 processor, but includes two main storage units with 256K words of main storage	455,940	4,476	14,191
3051-83	1100/10 Processor; same as 3051-89 processor, but includes two main storage units with 512K words of main storage	730,500	5,660	23,000
3011-55	1100/12 Multiprocessor; two 110/10 processors with F1053-98, two main storage units with 512K words of storage, and two MMA's	1,127,890	8,177	34,798
	Processor Features:			
3011-79	Processor Expansion; provides a processor and system console for expansion of an 1100/10 system to a multiprocessor; prerequisite is an 1100/10 processor with 256K words of storage in two storage units; also requires two F1053-98 multiprocessor capability features plus two F2249-00 MMA's	256,752	2,180	5,616
3011-53	Processor Expansion; same as 3011-79, but includes two F1053-98 multiprocessor capability features and two F2249-00 MMA's	368,112	2,381	10,849
F0680-99	I/O Channel Expansion; four additional I/O channels; maximum of three expansions per 1100/10 processor	25,200	110	551
F1053-98	Multiprocessor Capability for 3011-55 processor; one required per processor	10,368	0	227
0769-10	Console Printer; 132-column, 30-cps free-standing printer for use as an additional hard-copy device on the 1100/10 processor console; up to five printers permitted per 1100/10 processor	16,800	75	369
7036-99	Storage Expansion, 128K; provides cabinet with 131,072 words of storage and space for one additional 128K expansion module via feature F2248-99; maximum of three type 7036-99 storage units per 3051-99, -97, -95, -93, or -91 processor	170,000	679	4,846
F2248-99	Storage Expansion, 128K; provides 131,072 words of additional storage for 1100/10 processor or 7036-99 storage unit; maximum of two F2248-99 storage expansions is allowed	134,000	512	3,633
7036-93	Fast Storage Expansion for 3051-89, -87, -85, and -83 processors; 128K; provides 131,072 words of storage and space for additional 128K expansion module via feature F2248-93, maximum of four storage units per system	170,000	679	4,846
F2248-93	Fast Storage Expansion; same as F2248-99, but for 3051-89, -87, -85, and -83 processors and 7036-93 expansion unit	134,000	512	3,633
F2248-02	Fast Storage Expansion; 64K	67,000	256	1,817
F2249-00	Multi-Module Access (MMA) for multiprocessor applications only; allows a maximum of two 1100/10 processors to access a main storage unit	45,312	100	991
1100/20 PROCESSORS AND MAIN STORAGE				
3051-81	1100/20 Processor with 128K-word channel memory; double-precision floating point, four I/O channels, power distribution center, control console with CRT display and entry keyboard, hard-copy printer, real-time maintenance communication (RTMCS) interface; requires 128K words of main storage	324,685	2,288	7,802
F0680-99	I/O Channel Expansion; provides four additional I/O channels; maximum three expansions per 1100/20 processor	25,200	110	551

*Rental prices do not include maintenance.

Sperry Univac 1100/10, 1100/20, 1100/40, and 1100/80 Systems

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*

1100/20 PROCESSORS AND MAIN STORAGE (Continued)

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
0769-10	Incremental Printer; provides a 132-column, 30-cps, free-standing printer for use as an additional hard-copy device on the 1100/20 processor console; up to five printers permitted per processor	16,800	75	369
7033-97	Storage, 65,536 words; includes a cabinet with space for an additional 64K words via F2079 expansion; maximum four 7033-97 storage units per processor	162,240	539	4,095
F2079-99	Storage Expansion, 65,536 words	87,360	288	2,205
F2080-97	Multi-Module Access (MMA) for multiprocessor application only; allows a maximum of two 1100/20 processors to access a 7033 storage unit	45,312	100	991
2506-04	Availability Control Unit (ACU); required for multiprocessor applications	62,256	176	1,381
F0874-00	ACU Expansion; expands the SPI Access capability of the ACU by six SPI's; maximum of three expansions may be added	3,552	17	78
0961-99	Multi-Subsystem Adapter (MSA); includes cabinet, I/O interface, one MSA module to adapt from one to eight byte-oriented subsystems, and space for one F1321-99 MSA module	26,976	86	590
	MSA Features for 1100/20 and 1100/40:			
F1321-99	MSA Expansion; provides second MSA module with power supply to expand 0961-99 MSA; includes one I/O interface	21,504	66	470
F1324-02	Shared Peripheral Interface (SPI); provides one I/O interface for 0961-99 MSA or F1321 MSA expansion	6,600	41	136
F1323-00	Function Buffer Expansion; adds six function registers to an MSA Function Buffer for expanding command chaining capability; required for disk operation	2,208	12	48
F1325-00	ASCII Translator; translates Fieldata code to and from a 64-character subset of ASCII; maximum two per MSA module	2,064	15	45
F1325-01	EBCDIC Translator; same as F1325-00 except translates Fieldata to and from a 64-character subset of EBCDIC	2,064	15	45
F1322-00	Search Identifier Register (SIR); provides storage for up to 12 bytes of parameter (search) data; required for disk operations	2,208	12	48
0955-99/-04	SPI; provides control of a peripheral subsystem as a Multi-Access Subsystem	24,528	40	567
0955-98/-05	SPI; although functionally independent, shares cabinet with and has the same characteristics as 0955-04 or -99 SPI	21,840	31	510
F1095-99	1100/9000 Inter-Computer Control Unit (ICCU); permits a 9300 Series system to communicate on-site in 36-bit word format	11,184	73	245

1100/40 PROCESSORS AND I/O CONTROL

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
3023-87	1100/40 Processor; includes one CAU and one IOAU with eight channels; requires 192K words of main storage, and console	457,790	3,749	12,968
3025-99	IOAU Expansion; includes control, 8 I/O channels, and 2 control channels to interface to 2 CAU's; maximum of 3 per 1100/40 processor	191,520	1,152	4,830
F1387-00	I/O Channel Expansion; Channels 8-15	20,160	64	509
F1387-01	I/O Channel Expansion; Channels 16-23	20,160	64	509
4013-99	System Console; includes CRT display with entry keyboard, hard-copy printer, and real-time maintenance communication (RTMCS) interface; requires one I/O channel; up to five additional free-standing hard-copy printers may be added	79,824	433	1,746
0769-10	Console Printer for use as an additional hard-copy device on the 1100/40 processor console; 132 columns, 30-cps; up to five printers permitted per console	16,800	75	350
2516-00	System Partitioning Unit; includes interfaces for two CAU's, two IOAU's, two MSU's, four MAI's, and six MAS's	60,720	202	1,533
F1448-00	CAU Interface Expansion	6,240	15	158
F1449-00/01	IOAU Interface Expansion for third and fourth IOAU's	6,240	15	158
F1450-00/01	MSU Interface Expansion for third and fourth main storage unit	4,080	15	103
F1451-00 to 03	MAI Interface Expansion for fifth through eighth MAI, respectively	3,552	15	89
F1441-00 to 06	MAS Interface Expansion; each accommodates six additional Multi-Access Subsystems, for up to 48 total	3,024	6	76
F0789-99	SPI Expansion; adds third interface	4,176	6	96
F0789-98	SPI Expansion; adds fourth interface	2,880	6	66
F1095-99	1100/9000 Inter-Computer Control Unit for on-line connection of a Univac 9000 Series computer	11,184	73	245
0961-99	Multi-Subsystem Adapter (MSA); includes cabinet, I/O channel, one MSA module to adapt from one to eight byte-oriented subsystems, and space for one F1321-99 MSA module	26,976	86	590
	For MSA features, see 1100/20 Multiprocessor System Components			

1100/40 MAIN STORAGE

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
7030-93	192K Words Main Storage for 1100/40 processor; includes basic MMA with eight interfaces; expandable to 512K words	984,000	3,053	33,217
2407-98	Storage Expansion; 64K words; requires 7030-93 expansion	328,000	1,018	11,072
7030-98	Storage Expansion; 64K words; requires 2407-98 expansion	282,000	825	9,450
2407-97	Storage Expansion; 64K words; requires 7030-98 expansion	282,000	825	9,450
7030-97	Storage Expansion; 64K words; requires 2407-97 expansion	282,000	825	9,450
2407-96	Storage Expansion; 64K words; requires 7030-97 expansion	282,000	825	9,450
F1953-00	MMA Expansion for 7030 storage units from 8 to 12 interfaces	8,592	12	221
F1953-01	MMA Expansion for 2407 storage units from 8 to 12 interfaces	8,592	12	221
F1953-02	MMA Expansion for 7030 storage units from 12 to 16 interfaces	8,592	12	221
F1953-99	MMA Expansion for 2407 storage units from 12 to 16 interfaces	8,592	12	221

*Rental prices do not include maintenance.