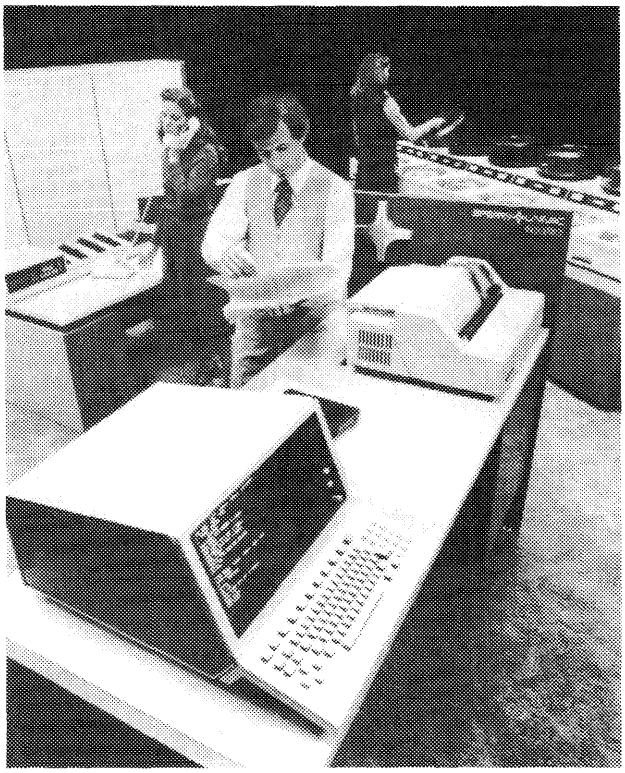
UNIVAC 1100/60 System



The 1100/60 system employs many peripherals announced for the original 1100 series. Included in this category are the Uniscope 200 and the terminal printer that are part of the systems console. The system support processor (SSP), a standard feature of the 1100/60 systems can support up to four consoles in a single processor configuration, or with the addition of a second SSP in a dual processor configuration, up to seven consoles.

The 1100/60 processor is a multi-microprocessor implementation of the 1100 Series architecture offering improved price/performance over the 1100/10, 1100/20, and 1100/40 systems, with strong emphasis on availability, reliability, and maintainability. The processor is the central feature in the six models announced, ranging from the low end 1100/61 Model C1 to the tightly coupled dual processor 1100/62 Model H2.

MANAGEMENT SUMMARY

The Sperry Univac 1100/60 System announcement clearly displayed the fact that IBM does not hold an exclusive license on technical innovations. Although not designed to counter the IBM 4300 Series, the timeliness of the 1100/60 announcement shows that IBM does not have an exclusive right to being first with an advanced idea.

The 1100/60, available in six configurations, is the first mainframe to make use of multi-microprocessor architecture. The arithmetic and logic portions of the 1100/60 employ sets of nine Motorola 10800 microprocessors (4-bit slice) combined with ECL circuitry and multilayer packaging. Univac terms these sets microexecution units, which concurrently execute parts of the same micro-instructions for improved throughput.

A fundamental consideration in the 1100/60 system design was the provision of high availability, reliability, and maintainability (ARM). Sperry Univac has implemented ARM through such techniques as duplicate microexecution units, and duplicates of the shifter, logic function, and control store address generator. Further, an instruction retry mechanism is included that allows the system ➢

CHARACTERISTICS

MANUFACTURER: Sperry Univac Division, Sperry Corporation, P.O. Box 500, Blue Bell, Pennsylvania 19422. Telephone (215) 542-4011.

DATE ANNOUNCED: June 1979.

DATE OF FIRST DELIVERY: January 1980.

MODELS: Sperry Univac 1100/61 C1, C2, H1, and H2; 1100/62 H1MP and H2MP.

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 single precision word. Addition and subtraction can also be performed upon 2-word (72-bit) double precision 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 1100/61 C2, 1100/61 H2, and the 1100/62 H2MP can perform decimal addition and subtraction operations on 9-bit bytes, packed 4 to a word.

FLOATING-POINT OPERANDS: One word, consisting of 27-bit-plus-sign fraction and 8-bit exponent for single precision; or two words, consisting of 60-bit-plus-sign fraction and 11-bit exponent for double precision. The range for single precision is from 10 to the 38th power to 10 to the minus 38th power with 8-digit precision; for double precision, the range is 10 to the 307th power to 10 to the minus 308th power with 18-digit precision. The sign is the most significant bit in single precision (bit 35) and double precision (bit 71). Negative floating point numbers are represented by the ones complement of the entire corresponding positive floating point number. Single precision negative exponents are biased by 128 while double precision negative exponents are biased by 1024.

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 Deignator, 1-bit Indirect Address Designator, and 16-bit Address Field.

INTERNAL CODE: Univac communications terminals and other I/O units can employ either a 6-bit Fieldata code, EBCDIC, compressed 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. ➢

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to recover from most transient faults, transparent to the operating environment.

TRACE, the Total Remote Assistance Center, is another step Sperry Univac has taken to implement ARM. TRACE provides remote hardware maintenance from Roseville, Minnesota via phone lines. Software maintenance is still being handled from local offices.

Designed to replace the 1100/10, 1100/20, and 1100/40, the 1100/60 is packaged in a box occupying a space 5 feet by 2.5 feet and has a 116-nanosecond basic cycle time.

Memory in the 1100/60 processor is composed of 16K-bit dynamic MOS chips. Memory access time is 580 nanoseconds with a 24-nanosecond refresh. Univac intends to convert to 64K-bit chips when "reliable" ones are available. Error detection and correction is a standard feature.

The Extended Instruction Set (EIS), an extension to the standard 1100 instruction set, is designed to enhance the performance of high level languages and system software processors. The system support processor provides systems management, support for diagnostics and maintenance, and console handling. Each basic I/O unit consists of one block multiplexer channel card and four 36-bit word channels. An I/O unit can be expanded to include either three block multiplexer channels and eight word channels or two block multiplexer channels and 12 word channels.

Word channels operate in internally or externally specified index transfer modes. Parity generation/checking is standard on word channels in internally specified index (ISI) transfer mode.

PERIPHERAL AND COMMUNICATIONS EQUIPMENT

Univac offers a broad array of mass storage equipment for the 1100/60 systems, including fixed-head drums, moving-head drums (Fastrand), disk pack drives, and fixed disk drives. The company's earlier emphasis on drums and interchangeable disk pack drives has shifted to fixed disk drives, although the high-performance FH drum units are still used for operating system residence and program swapping in some 1100 Series systems.

Concurrent with the announcement of the 1100/60 system came the 8470 Disk Subsystem, a fixed disk drive similar in concept to the older 8450. See the Characteristics section of this report for specific statistics.

Univac also offers a variety of magnetic tape drives in both 7-track and 9-track models, with data transfer rates ranging from 34,160 to 320,000 bytes per second. Latest to join the extensive magnetic tape line is the Uniservo 22 & 24.

The Uniservo 22 and 24 provide 800/1600 bpi recording at 75 and 125 ips, respectively. Transfer rates for the Uniservo 22 are 60KBS (NRZI) and 120KBS (PE), while

MAIN STORAGE

STORAGE TYPE: N-channel MOS using 16K-bit chips.

CYCLE TIME: Read/write cycle time of 580 nanoseconds; 625 nanosecond access to corrected read data; and 928 nanosecond partial write cycle. Memory refresh takes 24 nanoseconds. The memory fetch is one word in the C models and four words serially in the H models. Single and partial word writes are available. In multiprocessor systems, storage modules may be interleaved under control of the system support processor (SSP) software.

CHECKING: The Main Storage Unit (MSU) contains circuitry for single-bit error detection and correction and detection of double-bit errors. Multiples of double-bit errors and some odd multiples of double bit errors are also detected. Memory errors are detected using a 7-bit hamming code generated for all read and write operations.

A parity bit with each half-word is checked whenever storage is referenced for I/O transfers via the two IOU interfaces. The MSU also detects single-bit address errors and out of bounds addresses.

STORAGE PROTECTION: The Bank Descriptor Registers (BDRs) loaded by the 1100 Operating Systems, 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 a guard mode interrupt. The setting of a bit in the Designator Register determines whether the protection is against write operations; read, write, or jump operations; or whether no protection exists. In the first case, the operating system is in privileged mode. Under this mode, priviledged programs such as real time programs or executive controlled subroutines may enter nonalterable (reentrant) subroutines for reading or jumping only. In the second case, the operating system is in user mode. In the third case, the BDR's are loaded but ignored since the operating system is in OPEN mode. Registers BDRO and BDR1 correspond to I-bank (instruction word) address ranges and Registers BDR2 and BDR3 correspond to D-bank (data word or operand) address ranges.

RESERVED STORAGE: The low end of memory is reserved for storing the processor state during interrupts. The processor state consists of the program status, addressing status, and interrupt status. Interrupt routines and the general register stack are also located in the low end of memory.

BUFFER STORAGE (H models only)

STORAGE TYPE: IC semiconductor.

CAPACITY: 8,192 words. Buffer storage is located in the Storage Interface Unit (SIU) of the H models. A read request results in a serial retrieval of a four word block from the MSU—the requested word and three adjacent words. Subsequent read references to the same or adjacent words in the block are presented at SIU speed with no further reference to the MSU required. The 8,192 words in the buffer are divided into 512 sets. Each set contains four 4-word blocks. The SIU employs a paired least recently used (PLRU) algorithm to control aging and replacement of data blocks within each set. In case of buffer malfunction, the affected blocks are automatically bypassed.

CYCLE TIME: 116 nanoseconds per word.

CENTRAL PROCESSOR

All models of the 1100/60 employ the same basic 116 nanosecond CPU, which is a multi-microprocessor implementa-

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for the Uniservo 24 they are 100 KBS (NRZI) and 200 KBS (PE).

Univac offers six printers for use with the 1100/60. They range in speeds from 760 to 2000 lpm. The newly announced 0776-04 has speeds of 760/940/1200 lpm depending on the character set. Standard features are 136 print positions, 10 characters per inch, and 6 or 8 lines per inch.

Data base/data communications capabilities are strongly emphasized. 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.

The DCP/40 Communications Processor, announced concurrently with the 1100/60 system, is based on the same multi-microprocessor architecture as the 1100/60. This unit can handle from 16 to 256 communications lines and contains from 32K to 512K 36-bit words of memory. The DCP/40 can be used as a front-end processor, nodal processor, or remote concentrator, and is supported by TELCOM software. The DCP/40 will handle data rates of 45 to 1.3 million bps as well as automatic answering and dialing. The DCP/40 supports UDLC, bisync, synchronous and asynchronous transmission. First shipments of the DCP/40 are scheduled for July 1980.

Sperry Univac's Distributed Communication Architecture, first announced in November 1976, continues to be a viable technology in the vendor's overall communications philosophy. Under the DCA concept, according to Sperry Univac, continued compatibility of present and future products will be ensured by specifying interfaces and functions of all components and providing guidelines for the building of communications networks. DCA can

tion of the 1100 Series architecture. The 1100/60 utilizes the Motorola 10800 as an LSI building block. The Motorola 10800 is a 4-bit slice with a 70 microinstruction repertoire using 10K ECL technology. The 1100/60 contains two microexecution units each composed of nine 10800 components. The two microexecution units concurrently execute parts of the same macroinstruction (see below). Complete execution of every microinstruction requires four cycles. Speed is enhanced further by overlapping execution of microinstructions. To further increase performance, microprocessor functions are generated using a phantom branching technique in which one of two functions is selected for execution in each microprocessor, one cycle after microaddress selection.

The concept of availability, reliability, and maintainability (ARM) was an important consideration in the design of the 1100/60 processor according to Sperry Univac. To implement ARM, Sperry Univac provided duplicates for the microinstruction units, executing the same function on the same data in the duplicate unit and comparing the results at the end of each cycle. Similarly, the shifter, logic function section, and control store address generator are also duplicated. The 1100/60 also includes a hardware instruction retry mechanism which allows the system to recover from most transient faults, transparent to the operating environment.

All magnetic storage in the processor includes parity and/or error correction including main storage, control storage, and buffer storage in the H models. An overrride mechanism bypasses sections of the buffer not operational. All failing components are bypassed for later maintenance provided they have backup within the system.

Multilayer panel packaging technology is used to provide logic interconnection for the CPU and the SIU. A printed circuit backplane replaces most of the point-to-point wire wrap connections along with the power distribution system. Up to 72 printed circuit cards are attached to the backplane in two rows of 36 cards. This yields a maximum of 17,280 connector pins attached to the backplane. The backplane is composed of two boards each having 16 copper layers, 8 for signals and 8 for utility. Logic cards are also multilayer, containing four signal layers, two voltage layers, two ground layers, and two pad layers.

The DCP/40 is constructed with the same multi-microprocessor architecture as the 1100/60 processor. It can have over two million bytes of main-storage and up to 16 I/O processors. Each I/O processor can control up to 16 communications lines. The DCP/40 is the hardware portion of the Telcon Intelligent Communications System.

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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.

DCA allows the user to centralize control in a single node or distribute it among several nodes to minimize the possibility of failure. Networks can be designed to adapt to changing conditions, such as network failures, by moving control functions within the network. Star, hierarchical, and ring networks can all be accommodated within the DCA, with reconfiguration from one type to another. According to Univac, all types of communications operations—remote batch, interactive, time-sharing, and simple message switching—can be designed within the DCA framework.

Concurrently with the DCA announcement, Univac also introduced Telcon, a new communications system. Telcon provides not only front-end processing for the 1100 Series, but network capability for communications with other 1100 systems, other Univac systems such as the Series 90, and other vendors' host systems or networks. The basic hardware of a Telcon system is now incorporated into the aforementioned DCP/40.

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.

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 multiprogrammed 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

The 1100/60 processor has an address range of 16 million words and makes extensive use of relative addressing. Sperry Univac has not yet extended the processor to this limit, leaving this enhancement for a possible future announcement.

The hardware monitor feature enables an 1100/60 to collect system profile performance data on hardware and software. Sampling of data can be initiated by software or operator request. The signals are sampled every 475 microseconds and collected by the systems support processor (SSP) every 30 seconds for storage in the system log for later report generation.

Among other features of the 1100/60 processor are: interprocessor interrupt interface, program relocation, arithmetic designators, split-word arithmetic, and shifting. The interprocessor interrupt interface allows operational control by the operating system to permit a CPU to interrupt another CPU or to be interrupted by another CPU in a multiprocessor environment. Program relocation is supported via relative addressing.

Nine special internal designators define arithmetic operational rules and exceptions. These rules and exceptions include floating point zero conventions, arithmetic exceptions, divide check, overflow, carry, and double precision underflow.

Addition and subtraction of fixed point numbers can be performed on half- or third-words simultaneously. This is permitted because each partial word operates as a separate independent entity with its own end-around carry.

The 1100/60 performs both 36-bit single length shifting or 72-bit double length shifting. Shifting types include right and left circular, right and left logical, right algebraic, and scale factor. Other features of the processor can be found in the Register and Instruction Repertoire sctions of this report.

CONTROL STORAGE: Consists of 2000 words where each word is 36-bits wide. Control storage has an access time of 50 nanoseconds.

REGISTERS: The 1100/60 processor contains a general register stack (GRS) that consists of 36-bit integrated circuit registers with a basic cycle time of 116 nanoseconds. The GRS includes 128 program addressable control registers with some overlap of function and some areas guard mode protected (e.g., the executive system of the operating system). The GRS includes an unassigned non-indexing register; 15 index registers; 4 registers that can be used for either indexing or accumulation; 16 accumulators; and the processor state control registers consisting of 2 pointer registers, the Executive Bank Descriptor Table Pointer and the User Bank Descriptor Table Pointer. There are 11 interrupt status words, including the Immediate Storage Check Designator Register and Guard Mode Designator Register, a quantum timer, Bank Descriptor Table Indexes, and jump history stack; 16 special registers, including the Real Time Clock (guard mode protected) Repeat Count Register, Mask Register, and user registers R3 through R15; 16 special guard mode protected executive registers, such as Executive Registers R0 and R3 through R15; Repeat Count Register and Mask Register; a guard mode protected (executive) non-indexing register; 15 executive index registers; 4 executive registers for indexing or accumulation; and 16 executive accumulators.

The Real Time Clock is initially loaded by the program and decremented once every 200 microseconds. The Repeat Count Register controls repeated operations such as block transfer and search instructions. The Mask Register is used with the search command in determining which portions of words are to be compared in repeated masked search operations. The Jump History Stack holds the recent 24-bit absolute addresses of jump instructions. The Quantum

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SPERRY UNIVAC 1100/60 SYSTEM SUMMARY

System Components	1100/61, Model				1100/62, Model	
	C1	C2	H1	H2	H1MP	H2MP
Number of CPU's	1	1	1	1	2	2
Number of I/O Units	1	1	1	1	2	2
Extended Inst. Set	No	Yes	No	Yes	No	Yes
Storage Interface Units/ Words of Buffer Storage	0/0	0/0	1/8K	1/8K	2/16K	2/16K
Main Storage Unit, words	524K to 1048K	524K to 1048K	524K to 1048K	524K to 1048K	1048K* to 2096K	1048K* to 2096K
System Support Processor/ Console	1	1	1	1	2	2
Auxiliary Consoles	0-3	0-3	1-3	1-3	1-5	1-5

*524K to 1048K words in each processor.

drum units, but Sperry Univac now offers a Disc-Resident System that uses fixed disk drives instead of drums for all systems functions.

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 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 new 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 Query Language Processor (QLP 1100), an English-language batch or interactive interface to DMS 1100.

Additional security measures have been added to the 1100 Series software product line in the form of the Terminal Security System (TSS), which allows installation managers to create and maintain their own security environment, and the QUOTA System, which enables each installation to define the limits of resource usage available to each batch and demand user. New ASCII-oriented compilers for the COBOL and FORTRAN languages are other recent additions to the 1100 Operating Systems software line-up, as is a Univac Series 70-compatible RPG.

All software for the 1100/60, except the operating system, is unbundled. Newly announced software includes a CMS 1100, a data dictionary for data management users, and QLP extensions. A new on-site service for operating

Timer, once loaded with an initial value, is decremented every 116 nanoseconds of actual CPU use, provided that a bit in the Designator Register is set. The Bank Descriptor Registers are described in the section entitled Storage Protection. The Designator Register generally determines functioning characteristics of the CPU.

The Breakpoint Register is employed with the address breakpoint mechanism. It allows an interrupt to be initiated when an equality comparison is made between the absolute address in the register or an operand address. The Breakpoint Register is operational on all instruction addresses, read/write references to main memory, and I/O references to main memory.

ADDRESSING: Both indirect and direct addressing are possible in the 1100/60. Indirect addressing is possible to any desired number of levels, with full indexing capabilities at each level. Operand addresses can be modified by the contents of any of 19 index registers. If desired, the contents of the index register can be automatically incremented by any specific value each time the register is referenced.

The 1100/60 has 161 standard 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 1100/60 system, additional privileged instructions are included, and an optional extended instruction set (EIS) is also available.

Most instructions specify the address of one operand in main storage and one of the 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.

The instruction set is broken down as follows: 11 load instructions, 8 store instructions, 20 fixed point arithmetic instructions, 16 floating point arithmetic instructions, 14 repeated search instructions, 14 test or skip instructions, 12 shift instructions, 17 executive system control instructions, 29 jump instructions, 4 logical instructions, 11 miscellaneous instructions, 5 I/O instructions, and 20 optional EIS instructions.

EIS includes bit string instructions for moving, comparing, and translating character or byte fields; decimal arithmetic and edit instructions; and instructions for converting between ASCII, decimal and binary notation. Sperry Univac states that gains realized by the use of EIS can be expected to be

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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.

COMPATABILITY

Within the 1100 Series, Sperry Univac has maintained a high degree of program and data compatibility. This has been continued with the 1100/60, both on the source and object level. There is no direct program compatibility, at the machine or assembly-language level, between the 1100 Series and any other line of 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, 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 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, Univac Series 70, or Univac 494 COBOL programs to Univac ASCII COBOL; a FORTRAN Source Translator for System 360/370, Series 70, or Univac 494 FORTRAN programs; and an 1100 Data File Converter to convert IBM, Series 70, or 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 UNIVAC Fieldata and ASCII format, an upward-compatible RPG compiler, and a new stand-alone 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/MARKETING STRATEGY

In terms of relative performance levels, Sperry Univac describes the position of the 1100/60 by individual model. If the Model C1 is assigned a relative performance level of 1, then the Model C2 is 1.2 times more powerful and approximately equivalent to the IBM 4341. The Model H1 is twice as powerful as the Model C1, while the Model H2 is 2.4 times more powerful. The Model H1MP is 3.8 times more powerful than the Model C1. The Model H2MP is slightly less powerful than the IBM 3032 and 4.5 times as powerful as the Model C1. If the 1106 is given a relative performance of 1, the Model C1 is 1.9 times the 1106; the Model C2, 2.3 times it; the Model H1 3.8 times it; the Model H2, 4.5 times it; the Model H1MP, 7.2 times it; and the Model H2MP, 8.6 times the 1106.

in the range of 25 to 35 percent for heavy COBOL/DMS batch type environments.

INSTRUCTION TIMINGS: Sperry Univac states that instruction timings for the 1100/60 will be made available only to "qualified" users or consultants.

INTERRUPTS: A program interrupt facility causes storage of the current processor state in the three groupings of program status, address status, and interrupt status from the Processor State Register's 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, processor or storage fault, program error, or program-requested interrupt.

There are 24 priority level interrupts available in the 1100/60. Priority levels 0 through 10 are internal interrupts, which can neither be locked out nor deferred. The remainder are external interrupts which can be both locked out and deferred. All external interrupts are presented to each CPU in the system. Therefore, an interlocked synchronization mechanism is provided to ensure that only one CPU actually accepts the interrupt request.

PHYSICAL SPECIFICATIONS: The 1100/60 central complex cabinet is 30 inches deep, 78 inches wide, and 64 inches high. The cabinet weighs approximately 1500 pounds. Power requirements for the basic CPU complex cabinet is 7 KVA, 60 Hz, motor alternator not required. Cooling required by the CPU complex is less than 1500 cubic feet per minute forced air, supplied from room air or false floor. Sperry Univac quotes the heat dissipation as less than 24,000 BTU per hour. Recommended temperature for the typical system is 75 degrees F with a relative humidity of 50 percent noncondensing.

SYSTEM SUPPORT PROCESSOR (SSP): The 1100/60 SSP provides partitioning, system control, maintenance, and console management functions. The SSP is a stand-alone desk-sized unit that interfaces to the CPU complex and its component parts including the CPU, IOU, MSU, and SIU. A basic configuration for the SSP includes CRT/keyboard/printer console, a console interface, diskette drive, remote maintenance interface, and central complex interface.

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. Partitioning is supported via partitioning panel displays. The SSP also defines special system protection modes such as real-time and maintenance modes.

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 control the partitioning of subsystems is also provided.

Two partitioning features are built into the IOU. One feature controls shared peripheral interface units on word channels, and the other controls the byte channel transfer switch for subsystems connected to a block multiplexer channel. The SSP provides control of system functions such as clocks and timers, stop jump control, initial load path, and auto recovery through system operator panel displays on the console. An optional System Performance Monitor (see Software) is also under SSP control.

The SSP acts as a primary maintenance tool through functions such as control storage loading, fault corrections, scan/set data comparisons, error logging, and a remote maintenance capability. One of the tools available to the SSP for maintenance is the Logic Analyzer, which provides a

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Sperry Univac's marketing strategy is three pronged: firstly, selected older accounts will be migrated to the new system because of the age of their equipment and the need to improve price/performance; secondly, as needs for expansion to presently viable systems arise, the 1100/60 system can be added as part of a distributed data processing network; finally, Sperry Univac plans to add new accounts by industry. As application software is developed for a specific industry, sales people will be added and trained to support that industry.□

means of sampling and recording logic signals at discrete intervals of time. Not only does the SSP control the sampling rate, but also the starting/stopping of logic signal recording.

The SSP also acts as the communications link between the 1100/60 and the system console(s). The minimum system console consists of a Uniscope 200 Display Terminal with alphanumeric keyboard, 200 cps bidirectional printer, a control panel, and a stand. 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.

INPUT/OUTPUT CONTROL

I/O CHANNELS: All 1100/60 models contain one Input/Output Unit (IOU). The IOU consists of a central control module (CCM) and up to five channel modules. The CCM provides indepenent control paths to up two CPUs and up to two SSPs and data paths to/from up to two MSUs and the channel modules. The CCM processes all I/O instructions, passes control information to the channel modules, controls main storage requests, updates control words and format status words, and generates all interrupt requests.

Each channel module consists of either one block multiplexer channel or four word channels. The basic IOU contains one word channel and one block multiplexer channel. A fully configured IOU can consist of either two block multiplexer channels and 12 word channels or three block multiplexer channels and 8 word channels.

Individual word channels operate in one of three modes: 36-bit internally specified index (ISI), 18-bit externally specified index (ESI), or 9-bit ESI. The ISI mode word channel has one subchannel assignment. The ESI mode word channel has up to 64 subchannels, while the block multiplexer channel has up to 128 subchannels for concurrent operation. Each IOU can support up to 1024 subchannels. One subchannel is reserved for the status table, leaving 1023 for use by the system.

The maximum block multiplexer channel data rate is 1.66 million bytes per second. The maximum word channel data rate is 0.60 million words per second in ISI mode. The aggregate output data rate for a word channel module operating in ISI mode is 0.86 million words per second. The aggregate input data rate for a word channel module is 1.4 million words per second.

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.

The microinstruction execution units utilize overlap execution techniques, with one new microinstruction starting each cycle.

CONFIGURATION RULES

The 1100/61 Model C1 consists of the 1100/60 CPU with 524K words of memory expandable to 1048K words in 262K word increments, one IOU with a second optional, an SSP and a system console with up to three auxiliary consoles optional. Each console may have up to three console printers. A printer is standard with the system console, but optional with the auxiliary console.

The 1100/61 Model C2 is the same as the C1 with the addition of the extended instruction set (EIS).

The 1100/61 Model H1 consists of the 1100/60 CPU with 524K words of memory expandable to 1048K words in 262K word increments, one IOU with a second optional, one 8K-word SIU, an SSP, and multiprocessor capability. The console configuration is the same as for the 1100/60 Model C1.

The 1100/61 Model H2 configuration is the same as the Model H1 with the addition of the EIS. The 1100/62 Model H1 consists of two 1100/61 Model H1 systems in a tightly coupled multiprocessor configuration. Similarly, the 1100/62 Model H2 consists of two 1100/61 Model H2 Systems in a tightly coupled multiprocessor configuration. A maximum of 7 consoles (2 system and 5 auxiliary) are permitted in a 1100/62 Model H1 or H2 configuration with one console interfaced to both SSP's.

Minimum peripheral equipment required to complete a 1100/60 processing system includes an 0716 Card Reader Subsystem, an 0776 Printer Subsystem, an 8450 Disk Subsystem with one control unit and two 8450 Disk Drives, and a magnetic tape subsystem with one control unit and two Uniservo 22 or 24 Magnetic Tape Units.

As an alternative, a minimum peripheral system would include a communications subsystem with at least one input terminal, an 0770 Printer Subsystem, an 8430/8433/8434/8470 Disk Subsystem with one control unit and two 8430, 8433, 8434, or 8470 Disk Drives, and a magnetic tape subsystem with one control unit and two Uniservo 30, 32, 34, or 36 Magnetic Tape Units.

No maximum peripheral restrictions are placed on the 1100/60 configurations other than channel considerations (see Input/Output Control). However, some peripheral subsystems used on earlier Sperry Univac 1100 Series Systems can only be configured with present software support. Sperry Univac will not enhance any of the existing 1100 Series software for these subsystems. For additional configuration details, see the Mass Storage and Input/Output Units sections of this report.

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. Drumspeed is quoted as 7,200 rpm. The data transfer rate is 240,000; 120,000; 60,000; 30,000; or 15,000 words (1,080,000; 540,000; 270,000; 135,000; 67,500 bytes) per second, depending upon the degree of interlacing employed. An FH-432 subsystem con-

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sists of a control unit and one to eight drums. Total subsystem capacity is 2,097,152 words (9,437,184 bytes). 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 (9,437,184 bytes) in 1536 data tracks, each served by a fixed read/write head. Average access time is 17 milliseconds. Drum speed is quoted as 1800 rpm. The data transfer rate is the same as shown for the FH-432, depending upon the degree of interlacing employed. An FH-1782 subsystem consists of a control unit and one to eight drums. Total subsystem capacity is 8,388,608 words (75,497,472 bytes). 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 drive revolves at 3600 rpm with average rotational delay of 8.34 milliseconds. The 8405 drives are available in two versions: the 8405-04 Fixed-Head Disk provides six recording surfaces and up to 688,128 36-bit words per disk drive, and the 8405-00 provides 12 recording surfaces and up to 1,376,256 36-bit words (6,193,152 bytes) per disk drive. Each recording surface contains 64 tracks plus 8 spares, each of which can contain up to 16 records, and each record containing 112 36-bit words. The data transfer rate is 138,222 36-bit words (622,000 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. The F2558-00 Feature allows the attachment of up to eight 8405 Drives to the 5046 Disk Control.

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 (77,374,084 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. Minimum and maximum head movement times are 7 and 50 milliseconds respectively. Average head movement time is 27 milliseconds, average rotational delay is 8.3 milliseconds with a drive rotational speed of 3600 rpm. The data transfer rate is 179,111 36-bit words (806,000 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 Drives can be intermixed with 8433 Disk Drives on the 5039 Control Unit. The F2047-00 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.

The F3192-00 Feature allows the 8430/8433 to be attached to the 5056-83 8470 Disk Control. Another controller, the 5046-99 (single access) or 5046-97 (dual access) controls up to 16 8430/8433/8434 Disk Drives. The F2561-00 Features gives the 5046 32-device capability. Still another controller, the 5046-95 controls up to 16 8430/8433/8450 Disk Drives. It has a feature for dual access as well. For additional configuration information, see the 8470 Disk Subsystem.

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 (154,748,160 bytes). There are 20 records of 112 words each per track and 808 tracks (plus 7 spares) on each of the 19 recording surfaces. Minimum, average, and maximum head positioning times are 10, 30, and 55 milliseconds respectively. Drive notation is 3600 rpm with an average rotational delay of 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. (See the 8430 section above for expansion capabilities. The 8433 also includes the command retry facility and error correction coding circuitry. For additional configuration information see the 8470 Disk Subsystem.

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. For additional configuration information see the 8430 Disk Subsystem.

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.

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. Data is recorded on 878 tracks per surface in 29 records of 112 words each per track.

Each 8434 Disk Drive stores up to 54,183,136 words (243,824,110 bytes). Minimum, average, and maximum head movement times are 10, 30, and 55 milliseconds respectively. The drive has a rotational speed of 3600 rpm and a rotational delay of 8.3 milliseconds. The data transfer rate is 279,333 words (1,257,000 bytes) per second.

8450 DISK SUBSYSTEM: The 8450 Disk Drive provides up to 54,079,200 words (243,356,400 bytes) of storage. The head disk assembly (HDA) provides eight platters with 15 surfaces used for data and one surface for servo control. The bottom surface of the lowest platter provides data storage under control of an optional 60 head fixed head assembly. Data is recorded on 56 of these tracks with 6 spares. Moveable head assemblies with two heads per surface provides the means for recording on the other 14 surfaces. These heads each cover 555 tracks (plus 5 spares). Each 8450 has the optional capability of 181,888 words of fixed head storage. Data is recorded on 1110 moving head and 56 fixed head tracks per surface in 29 records of 112 words per track.

Minimum, average and maximum head movement times are 4, 23, and 46 milliseconds respectively. Head positioning

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time for the fixed head option is 8.3 milliseconds (rotational delay factor). The drive has a rotational speed of 3600 rpm and a rotational delay of 8.3 milliseconds. Transfer rate for the drive is 280,000 words (1,260,000 bytes) per second.

The 8450 Disk Drive connects to a word channel through the 5046 Storage Control Unit, 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 of 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. The 8450 may also be attached to the 8470 Subsystem; see the next entry.

8470 DISK 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.

The bottom surface of the lowest platter provides data storage under control of an optional 60 head fixed head assembly. Data is recorded on 56 of these tracks with 6 spares. Moveable head assemblies with two heads per surface provide the means for recording on the other 14 surfaces. These heads each cover 625 tracks plus 5 spares. Each 8470 has the optional capability of 241,920 words of fixed head storage. Data is recorded on 1250 moving head and 56 fixed head tracks per surface in 40 records of 112 words per track.

Minimum, average, and maximum head movement times are 4, 23, and 46 milliseconds respectively. Head positioning time for the fixed head option is 8.3 milliseconds (rotational delay factor). 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 with or without fixed head option. 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 12 MAGNETIC TAPE UNIT: The Uniservo 12 is not being sold as part of the 1100/60 product line, but can be attached. For detailed information, see the Univac 1100 Series report (70C-877-11).

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 9-track versions have a recording density of 1600/800 bpi PE/NRZI and a data rate of 96,000/48,000 bytes per second. The 7-track NRZI version operates at 200,556, or 800 bpi, with data rates of 12,000, 33,400, or 48,000 bytes 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. The standard 9-track version has a recording density of 1600 bpi (in phase-encoded mode) and a data rate of 192,000 bytes 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 bytes per second. A Uniservo 16 subsystem consists of up to 16 tape units connected to a single- or dual channel control unit. Uniservo 16 and Uniservo 12 tape units can be intermixed in the same subsystem, provided they are not dual-access units.

UNISERVO 20 SERIES MAGNETIC TAPE UNITS: High-performance tape drives that use standard ½-inch tape and matches the performance of the IBM 2420 Model 7 (in one model). Data is recorded in the 9-track mode at 1600 bpi. Tape speed is 200 inches per second, forward or backward, yielding a data transfer rate of 320,000 bytes per second. Operational conveniences include a power window, automatic tape threading, and wrap-around tape cartridge loading. A Uniservo 20 subsystem consists of 1 to 16 tape units connected to either one or two control units. Uniservo 12 and 16 tape units can also be connected to the Uniservo 20 control unit. 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 features in each tape unit.

The three models in the Uniservo 20 series and their characteristics are as follows:

- Uniservo 20—a conventional PE unit with a transfer rate of 320,000 bytes per second at 1600 bpi. Tape speed is 200 inches per second.
- Uniservo 22—a 9-track unit designed for NRZI and PE recording. The transfer rate is 120,000 bytes per second at 1600 bpi or 60,000 bytes per second at 800 bpi. Tape speed is 75 ips.
- Uniservo 24—a 9-track unit designed for NRZI and PE recording. The transfer rate is 200,000 bytes per second at 1600 bpi or 100,000 bytes per second at 800 bpi. Tape speed is 125 ips.

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:

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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. Tape speed is 75 inches/second.

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.

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 and 24-character printing rates of 1435, 2320, and 3000 lpm. The printers, each of which contains an integral control unit, can be connected to an 1100/60 system via a word channel.

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 940 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 have 136 print positions as standard equipment. Printing takes place at 10 characters per inch. The 0776 printers have a single-space print time of 14.2 milliseconds, and single-space print time of 14.2 milliseconds, a single line space time of 16 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.

TYPE 0716-89 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, validity checks, stacker feature permitting the alternate filling of stackers one and two when in the "stop on errors" mode, and dual translate. Connects to an 1100/60 system via a word channel.

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 500-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 1100/60 system via a word channel.

UNISCOPE 100 AND 200: These alphanumeric display stations are the foundation in Sperry Univac's terminal line. The Uniscope 100 and 200, both stand-alone display terminals, can be used in a single-station or multiple-station arrangement with up to 31 display units connected to a computer I/O channel or a communications line via one or two multiplexers. The basic multiplexer provides 8 channels and can be expanded up to 16 channels in increments of four channels. A communications modem is required for operation over a communications facility.

The display characteristics of the two models are presented in the following table.

	Viewing Area		Display Format		
Uniscope Model	Width, inches	Height, inches	Char/ Line	Lines/ Display	Screen Capacity, Chars.
100	10	5	80	12	960
100	10	5	64	16	1024
200	10	7	64	24	1536
200	10	7	80	24	1920

Both models display a standard character set of 64 symbols, including upper case alphabetics, numerics, and special symbols. As an option, both models are available with a 96-character set of displayable symbols that includes lower case alphabetics and 6 additional special symbols. Data is displayed in green. Characters are formed via the stroke technique on the Uniscope 100 and via a 7-by-9 dot matrix on the Uniscope 200.

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TERMINALS FOR THE 1100/60 SYSTEM

Terminal/System	Timing	Maximum Transmission Speed (bps)	Mode	Protocol(s) Supported	Comments
U 100/U 200	Sync. or Async.	9600	Half-Duplex	U 100/200	—
DCT 500	Async.	300	Half-Duplex	DCT 500/TTY	Single or multidropped line
UTS 400	Sync. or Async.	4800 2400	Half-Duplex	U 100/200	May be multidropped
UTS 700	Sync.	9600	Half- or Full-Duplex	U 100/200 NTR REM 1	May be multidropped
9200/9300 Remote	Sync.	9600	Half- or Full-Duplex	NTR REM 1	Remote batch
Remote 90/30	Sync.	9600	Full-Duplex	NTR	Remote batch
V77 Minicomputer	Sync.	9600	Full-Duplex	UDLC	May also support IBM BSC and SDLC

Any of nine keyboards can be specified. These include four key arrangements with or without the Protected Format feature and one key arrangement, numeric-only, upper case alphanumeric, upper and lower case alphanumeric, upper case alphanumeric/numeric, and upper and lower case alphanumeric/numeric. Four Program Function keys are standard with all key arrangements. The combined numeric keygroup includes 15 keys arranged in an adding machine format and is located at the right of the alphanumeric keygroup. The keys include three keys for the Protected Format feature. Cursor, edit, and other functions are implemented via up to 24 additional keys.

Cursor direction controls move the cursor in any of four directions (left, right, up, and down) and are designed for either step-by-step or repetitive operation. The cursor can also be returned to home position (initial display position) or to the beginning of the next line (carriage return). Horizontal tabulation allows the cursor to be advanced to the position immediately following a stored horizontal tab character, or to the home position if a horizontal tab character is not located between the cursor and the end of the screen. The cursor and the character located at the cursor position blink so that the cursor position can be easily located.

Protective Format, a standard feature, permits a terminal- or computer-generated format to be displayed. Format descriptors can be made to blink and are protected from inadvertent entry by the display operator. The cursor moves between non-protected fields by tabbing or automatically when the end of a field is reached.

Edit controls provide insert, delete, and erase functions. Both character and line insert and delete functions are standard. Character insertion or deletion affects all data to the right of the cursor up to the end of the line occupied by the cursor. Line insertion or deletion affects all data to the right of the cursor up to the last displayable position of the screen. When formatted data is displayed, these functions affect only the variable fields; the fixed fields (format descriptors) are protected from inadvertent alteration. The standard erase functions include character, line, and screen erase. Character erase erases the character at the cursor position. Line erase erases all data from the cursor to the end of the line. Screen erase erases all data from, and including, the cursor position to the end of the screen. Space characters are inserted in all erased character positions.

Other standard functions include Cycle, a character repeat feature, Selective Blink, Roll, and Selected Fields within a data record. Search, a bidirectional address search, is performed at 120 inches/second. Two Feature Group options are available for the Model 610; Feature Groups A and B for a Model 610 used with the Uniscope 100, and Feature Groups D and E for a Model 610 used with the Uniscope 200. Feature Groups B and E combine the features of Groups A and D, respectively, with their own. A conversion option, Feature Group C, converts a Model 610 with Feature Group A to a Group B unit.

Feature Groups A and D add Read-After-Write, Protected Format (which allows fixed formats to be recorded for later use), List, and Edit. List permits off-line printing of a single block, multiple blocks, or all recorded data on the cassette. Edit allows the operator to selectively edit single blocks of data or to copy an entire tape on a second cassette.

Feature Groups B and E combine two additional features with those of Group A or D. ASCII Record Separators can be used as file delimiters, blink characters, and cursor indication sequences. Alphanumeric Identifier Search permits the use of a search key that corresponds to data within the initial 16 characters of a tape block. In addition, Feature Group E permits copying to an address.

Two printers are available for the Uniscope 100 or 200: the non-impact Model 800 Terminal Printer and the impacttype Communications Output Printer.

Model 800 provides 80 print positions and prints up to 300 char/second using an electrostatic technique. The printer provides the full upper and lower case ASCII character set and forms each character via a 7-by-9 dot matrix. Horizontal pitch is 10 char/inch, and vertical spacing is 6 lines/inch.

The Communications Output Printer is the same printer used in the Univac DCT 500. Printing is performed at 30 char/second using a 63-symbol print set. The print set is specified by the user from available sets that include ASCII, EBCDIC, A/H (Univac business or scientific), or ECMA/ISO (international). The unit prints 132 columns per line. Horizontal pitch is 10 char/inch, and vertical spacing is 6 lines/inch. The printer accommodates six-part continuous forms (or three-part carbonless forms) from 3⅞ inches to 14⅞ inches wide. Forms are fed at 30 lines/second

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(manual feed); skipping speed is 12 inches or 72 lines per second.

The Model 610 Tape Cassette System features two independent cassette tape recorders with shared electronics and a common interface to the auxiliary interface channel of the Uniscope unit. Each drive accommodates a Philips-type cassette containing 300 feet of 0.15-inch-wide magnetic tape. Phase-encoded data is recorded serially at 800 bits/inch. On-line data storage is rated at 700,000 characters per cassette (1.4 million characters per system). Tape speeds are: read/write, 6 inches/second; search, 6 or 120 inches/second; rewind, 120 inches/second.

Asynchronous or synchronous communications in the halfduplex mode at data rates ranging from 300 to 9600 bits/second (1200 char/second) is offered. Transmission speed is determined by the internal clock of the specified modem. The transmission code is 8-level ASCII (including parity); asynchronous transmission uses a 10-unit code structure.

The Uniscope 100 and 200 are each equipped with an EIA Standard RS-232C interface and operate over a voice-band communications facility via a modem. Integral modems are available from UNIVAC that provide compatibility with the Bell System 201 or 202 Data Sets. When operating in a party-line environment, both single-station displays and multiple-station display configurations can share a common communications line. Transmission compatibility with the IBM 2701 and 2703 line controllers is available.

OTHER TERMINALS: Sperry Univac offers a wide variety of terminal equipment including the UTS 400 Display Terminal (see Report 70D-877-06 for details), the UTS 400 Text Editor, the UTS 700 Remote Batch Terminal, DCT 500 Series, Sperry Univac 9200/9300 Remote, Sperry Univac V77 minicomputer, and the Sperry Univac 90/30 system. Brief details of these terminals are given in the table. It is beyond the scope of this report to discuss these terminals in detail.

COMMUNICATIONS CONTROL

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 1100/60 and other 1100 Series 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/40) and the Telcon network software. Multiple DCP's can be combined to form a node of hgih throughput and processing capability.

The original DCP and its currently-announced successor, the DCP/40, are independently operating communications processors, designed to perform as front ends, remote concentrators/terminal controllers, stand-alone network nodes, or in a combination of these roles at the same time.

The DCP/40 represents a significant increase in the 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.

For user migration, there are several different microprogrammed packages available to run on the DCP/40. One is designed for the user of a Series 90 CPU, and permits the DCP/40 to emulate an MCC to the host. Another package offers the DCP/40 emulation of an original DCP; the last drives the DCP/40 in its own "native mode". The major advantage of the emulation packages is that the user need not change his existing communications software, which may be resident in either his host or in an original DCP. Programs and user code running an original DCP cannot be run on a DCP/40 operating in "native mode"; new user code and operating software needs to be assembled and generated.

The DCP/40 is a modular hardware system that can be tailored to meet the needs of a broad range of users. The network software, Telcon, like the hardware, is also modularly structured and readily tailored by the user. A repertoire of over 285 instructions is available to the user for the generation, assembly and loading of message handling routines.

The Telcon-controlled system performs all message control operations. As users access the system (network), predetermined routing paths are followed, or alternate routes are selected using predefined table search routines should established paths become unavailable. Specialized I/O controllers (frequently microcoded modules) handle specific functions including terminal interfaces, line, trunk or channel control.

Terminal handlers in the DCP/40, software and firmware, are available for most standard Univac terminal devices, as well as several non-Univac terminals including Teletype and IBM 2780/3780 batch. Other software modules handle particular line protocols such as the UDLC trunk lines, or access links to/from X.25 packet switching services.

DCP/40 message switching can be achieved through usercoded applications which use the message routing facilities inherent in the Telcon software. Message routing between terminals, host systems, and network-resident applications is achieved either through user definition in the network generation process, or by a dynamic selection through network management services.

If multiple DCP/40's are configured in the network, each is assigned both specific and network-common responsibilities. For example, all messages remain the responsibility of the originating DCP until accepted by another DCP or end user. Under normal conditions, main memory is used to maintain message queues and buffers, with disk storage used for overflow. Terminal and line handlers are placed as close to the terminals or gateway links as possible, usually in the nearest DCP. This philosophy permits as much of the network as possible to consist of high-speed trunk lines, and the low-speed lines running a variety of different terminal protocols, character codes, transmission speeds and modes, to be minimized.

In addition to off-loading the host, the DCP/40 lends a degree of network reliability and resiliency to the user. The stand-alone capability of a single network DCP 40 may permit continued message acceptance and storage of data during periods of temporary inaccessibility to a given host or

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terminal. Similarly, multiple DCP/40's may be redundantly configured to maximize network uptime or increase network throughput. The user is free to mix and match all of the communications processors and subsystems thus far discussed into an efficient communications network. Cost may be a limiting factor in providing increased sophistication.

The Telcon operating system supports local disk and magnetic tape storage for their respective DCP's. This support permits functions including store and forward message switching, logging, journalization, file management and monitoring.

The Uniservo 10 Magnetic Tape Subsystem provides magnetic tape I/O for the DCP. The subsystem configuration consists of two tape drives housed in a single cabinet, along with the basic control logic. Data is recorded in the 9-track mode at 1600 bpi PE or 800 bpi NRZI. Tape speed is 25 ips, forward or backward, yielding a data transfer rate of 40,000 bytes per second PE and 20,000 bytes per second NRZI.

A 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.

A 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/40 Compatible Processor, a DCP/40 limited to 128K bytes of main memory. 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 three Scanner II's can be attached to the DCP/40 in DCP mode, supporting up to 384 half-duplex or 192 full-duplex communications lines for each DCP. In MCC mode, one Scanner II is allowed.

GENERAL COMMUNICATION SUBSYSTEM (GCS): Announced in March 1975, the GCS replaces 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 ESII/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.

DCA COMMUNICATIONS FRONT ENDS AND SUBSYSTEMS

	GCS	DCP/40
1100/60 DCA Host	Yes	Yes
Date First Delivered	1/76	7/79
Host Communications Software Required	CMS 1100 (GCS)	CMS 1100 (DCP)
Support of Host		
Front End	Yes	Yes
Remote	No	Yes
Number Hosts Supported	1	2
Controller Memory:		
Minimum (K bytes)	—	128
Maximum (K bytes)	—	2000
Lines Controlled		
If all half duplex	32	255
If all full duplex	32	255
Controller Software		
Host Resident	Yes	No
Telecon	No	Yes
Host Channel Connection		
Word	Yes	Yes
Byte	No	Yes
Host Independent Comm. Processing	No	Yes
Microprocessor Based	No	Yes
Microcoded Line Handlers	No	Yes
Supports Local Mass Storage	No	Yes
Emulation Capability	—	DCP

SOFTWARE

OPERATING SYSTEM: All UNIVAC 1100 Series systems utilize the 1100 Operating System, which was originally released as EXEC 8 for the third-generation UNIVAC 1108 system and has been extended to support all 1100 Series systems including the 1100/60 system.

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.)

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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 udpating 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 a 1100/60 system with 131K words of main memory, 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 disc-oriented, and the tape units are available for other functions. Drum or disc 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.

A single set of symbolic programs comprises the 1100 Operating System. A Symbolic Stream Generator (SSG) tailors the system to the specific 1100/60 system, its configuration, and the requirements of each user. A complete system 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. 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.

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.

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 compute-oriented activities. Periodic time-slices can be alloted 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 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 65K 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. Bank referencing instructions effectively replace one of the accessible banks with a new bank; these instructions are direct hardware functions.

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

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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 to be taken off-lien 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 the 1100/60 since it includes the 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. Univac states that the system will normally be back on the air within 15 to 60 seconds after recognition of a failure.

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 mater 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 sufficent data to restore the files if required. For magnetic tape handling, the EXEC includes a new 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 new 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), High Volume Time Sharing (HVTS), 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: CMS 1100 is the communication network interface for the 1100/60 system to a DCA-based DDP Telcon network. It is a new product in the sense that it has been separated from the 1100 system generation process, thus allowing the entire terminal network configuration to be generated, checked, and corrected without generating a full system. CMS has cognizance of all terminals in an 1100 Series computer network. It acts as the communications "front end" to the Transaction Interface 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 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 messages 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 (planned for future release) 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.

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Sperry Univac states that a typical throughput level for TIP would be 5 "standard transactions" per second (or 18,000 per hour) on a single-processor 1106 or 50 "standard transactions" per second (or 180,000 per hour) on a 2 x 2 1110 system. (A standard transaction is defined as having 50 characters of input, 100 characters of output, 6 mass storage file accesses, a 4,000-word transaction program, and 10,000 user instruction executions.) TIP typically requires 4K to 6K words of main storage.

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).

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.

HIGH VOLUME TIME SHARING (HVTS): An alternative to CTS; HVTS looks to the end user line a subset of CTS. It has the ability to handle 50 to 2000 active terminals concurrently. Each terminal can be active in one of six modes: APL, BASIC and FORTRAN language modes; a data mode; master mode; and monitor mode. A quota set regulates each terminal user, restricting use by time of day, maximum CPU usage, maximum program size, maximum data size, maximum program execution time, and langauge mode selection.

In addition to CTS and HVTS, a Demand Interface feature allows a user at an interactive terminal access to all system functions, all software processors, and job control language statements.

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 Dta 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 "mbmer 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 reentrant 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 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.

With the announcement of the 1100/60, 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.

QUERY LANGUAGE PROCESSOR: QLP 1100 is an English-language inquiry system that allows inquiries to be made to data bases generated under DMS 1100. On the 1100/60 systems, QLP 1100 has the ability to access standard data files and incorporates extended reporting capabilities. It uses a command language designed around a simplified English syntax and requires a minimum

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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 languages, 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 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 repl 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.

SPERRY UNIVAC DISTRIBUTED COMMUNICATIONS ARCHITECTURE: Describes the currently-available communications hardware and software components through which networking of Univac processors and terminal devices is achieved.

Whether network control is host-dependent or host-independent, there are still certain hardware components and subsystems required to implement a DCA network. Inherently, a DCA node or host must contain several software components which provide it with the network interface. These components are detailed in this report.

The capability of completely separating communications management from applications processing is a key characteristic of DCA from the network architectures of many other major vendors. The off-loading of communications processing permits the host, or hosts, to concentrate their energies on applications processing; their primary function.

In fact, in a DCA network, the host may (from a communications point of view) be required only to compile user programs for network management. Support programs would reside in the host for this purpose, and after compilation, object code would be loaded directly into channel-attached front ends, or written to storage media for later loading into remote communications nodes. The host would then be free of communications and network control activities.

It is noteworthy that Univac offers an extensive library of modular network management applications. User programming for tailored communications functions (such as message switching) is also fully supported.

Another feature which serves to distinguish DCA from the architectural offerings of other major vendors is the facile acceptance into the DCA environment of non-Univac terminals, processors and networks, and the flexible modularity of the existing Univac communications hardware and software.

A DCA network, based on existing Univac offerings, will typically be a hierarchical network. That is, network management may be centralized within a central host, or its front end. Univac has indicated that several of its programmable machines (UTS 400, V77, BC/7, etc.) now possess the hardware capability to function as network nodes (in addition to their applications processing capability) and that DCA software is under development. The latest V77 minicomputer, the V77-800,has already been provided with DCA networking software.

A minimal DCA network requires a DCA host with a communications subsystem. The host may be either an 1100 mainframe running under the 1100/OS operting system, or a 90 Series CPU, model 60 or larger, running the VS/9 operating system.

A DCA terminal is generally one for which a standard terminal handling module is available from Univac. In DCA, each terminal might be operating with different character codes (ASCII, EBCDIC), transmission modes (start/stop asynchronous, character synchronous), or terminal protocols (U100, IBM 2780). It is the responsibility of the DCP closest to the terminal to translate its data format into a common trunk language—typically UDLC.

Any communications operation in a DCA network involves three functionally-separate but interconnecting layers; the Applications Environment, the Termination Environment, and the Transport Environment. With the exception of the actual transmission facility, each terminus of a communications link contains some portion of each layer which can be paired with its corresponding component at the other end.

UDLC: A bit-oriented, synchronous protocol designed for full-duplex operation. Devices connected by UDLC trunks can utilize either switched or non-switched, voice-grade or digital lines. UDLC, like its SDLC, HDLC and ADCCP predecessors, uses bit sequences for control codes rather than whole characters. (Hence the nomenclature "bit-oriented".) This characteristic permits much more control information to be contained in the same or smaller amount of message space.

A UDLC trunk requires that a device at one end assume the role of a primary station, and exert control over the other, or secondary station (or stations, if on a multi-dropped line). Control between the devices will be in one of three modes determined by the degree of communications capability in the secondary station. Each mode varies in its treatment of the secondary station, and each is designed for a specific environment, such as polling of multidropped terminals, communications between two DCP's, or whatever.

A UDLC message is called a frame, which is the user's data surrounded by control bits. The length of the user data field is variable, but will generally be maximized depending on

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several parameters such as buffer space limitation, or the quality of the transmission facility.

Each frame begins and ends with an 8-bit flag field which notifies the receiving device that a message is beginning and ending, and also provides for synchronization timing. An address field follows the first flag and, while it also is generally an 8-bit field, it may be extended in 8-bit multiples. An 8-bit address field will accommodate up to 255 unique addresses in the network, which includes all addressable terminals and nodes.

The address field is followed by a control field of 8 or 16 bits. This field may include any of hundreds of possible link control messages which are encoded in several bits. It defines to the receiving station whether the message is of a supervisory, control or information nature, and permits consecutive messages to be sequenced and numbered.

The receiving station detects errors in the message through the use of a cycle redundancy check field (CRC), which follows the data field and precedes the ending flag. The 16-bit CRC is a binary polynominal which is derived through an algorithm common to all the network stations. With an 8-bit control field, the transmitting station may send up to seven messages before requiring validation by the receiver. This characteristic permits line overhead associated with verification of each message to be comnsiderably reduced.

Errors are corrected through retransmission, and numerous other methods are utilized to handle transmission problems. For example, timeouts and threshold counters are used to reduce overhead in polling, and prevent an unrecoverable error from resulting in indefinite retransmission. If a certain number of retries is reached, a subroutine for rerouting may be automtically invoked.

NINE THOUSAND REMOTE (NTR) 9000 INTERFACE: Enables a UNIVAC 9200/9300, 90/30, or 90/40 computer system equipped with a Data Communications Subsystem (DCS) or Communications Adapter to operate as a remote batch terminal to an 1100 Series host processor through full-duplex communications lines. Fieldata, ASCII, and EBCDIC codes can be handled. NTR supports 9000 Series systems configured with the 0711 and 0716 card readers, 0603 and 0604 card punches, the bar printer and the 0768-00, 0768-02, 0768-99, and 0770 printers, a CalComp plotter, and paper tape reader/punches. Provisions are available for off-line operation of the 9000 Series computer and for diagnostic services for the 9000 Series peripherals. The software supports console-to-console communications between the 1100 Series host processor and the remote 9000 Series system and handles message compression to enhance communications line efficiency. Message integrity and recovery are achieved by assigning a unique number to each message transmitted in both directions. NTR was announced in 1974 and can be tailored to each installation through a relatively straightforward Symbolic Stream Generator.

COBOL: The newest and most powerful COBOL compiler offered by 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 compielr. 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 new, re-entrant Univac 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 new 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 operting 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.

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: Sperry Univac's 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.

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UBASIC: 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: Univac offers an 1100 Series compiler for JOVIAL, a general-purpose procedure-oriented language that is used mainly in military command and control applications. JOVIAL describes functions to be performed by algebraic and logical notations.

PL/1: The 1100 Series PL/1 compiler is 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. Advanced facilities such as teleprocessing are scheduled for future release.

RPG: The 1100-Series RPG is upward-compatible with UNIVAC Series 70 RPG. It supports sequential, indexed sequential, and table files and parovides 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).

MACRO: A general-purpose processor for extending host languages through its ability to process character strings. MACRO performs text generation, editing, and validation.

ASSEMBLER: The 1100 Series Meta-Asembler (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).

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 haivng 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.

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 UNIVAC Series 70, IBM System/360 and 370, and several other computer families.

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

APT (Automatically Programmed Tools)
ASET (Author System for Education and Training)
FMPS (Functional Mathematical Programming System)
GPSS 1100 (General Purpose System Simulator)
OPTIMA (Project Management System)
SUFICS (Sperry Univac Financial Integrated Control System)
SIMSCRIPT
UNIVAS Information Storage and Retrieval Ssytem
UNIS (Univac Industrial Systems); includes Bill of Materials Processor, Inventory Control, and Planning and Scheduling.

PRICING

EQUIPMENT: The following systems illustrate some of the configurations that are possible within the UNIVAC 1100/60 Systems. All can use the 1100 Operating System. All necessary control units and adapters are included in the indicated prices. Quoted lease prices are separate from equipment maintenance charges.

SMALL 1100/61 MODEL C2 SYSTEM: Includes 1100/60 CPU with 524K words (2 megabytes) of main memory, system support processor, maintenance console, system console, one block multiplexer channel, four word channels, IOU, two 8470 Fixed Disk Drives with two controllers, an 8430 Disk Drive with removable pack, two 120 KB Uniservo 22 Magnetic Tape Drives with controller, a 1200 lpm 0776 Printer with controller, a GCS Communication System with 8 communications lines, a 1000 cpm 0716 Card Reader with controller, and the 1100 Operating System. Purchase price is $788,909; five year lease $14,715; monthly maintenance $3,100.

MEDIUM 1100/62 MODEL H2 SYSTEM: Includes 1100/60 CPU with 524K words (2 megabytes) of main memory, system support processor, maintenance console, system console, one block multiplexer channel, four word channels, an IOU, two 8470 Fixed Disk Drives with two controllers, an 8430 Disk Drive with removable pack, three 320 KB Uniservo 30 Magnetic Tape Drives with controller, a 1200 lpm 0776 Printer with controller, a GCS Communications System with 16 communications lines, a 1000 cpm 0716 Card Reader with controller, and the 1100 Operating System. Purchase price is $1,235,526; five year lease $22,428; monthly maintenance $4,398.

LARGE 1100/62 MODEL H2 MP SYSTEM: Includes two 1100/61 Model H2 Computer Complexes with 1048K words (4 megabytes) of memory, four 8470 Fixed Disk Drives with two controllers, six 1250 KB, 6250 bpi Uniservo 36 Magnetic Tape Drives with controller, 2000 lpm 0770 Printer with controller, a DCP/40 Communications System with 16 communications lines, and the 1100 Operating System. Purchase price is $2,267,907; five year lease $41,454, monthly maintenance $7,855.

CONTRACT TERMS: The standard UNIVAC use and service agreements allow unlimited use of the equipment (exclusive of the time requried 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

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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	$108	$128
Each add'l. hour	54	64
Max. charge per call	270	320

For users who elect not to contract for maintenance with 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

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

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

TERMS, SOFTWARE, AND SUPPORT: The 1100/60 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. 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.

TRACE: Sperry Univac has initiated a new remote hardware maintenance concept through its facility in Roseville, Minnesota. The Total Remote Assistance Center (TRACE) is available to the 1100/60 system customers via a dedicated WATS number 24 hours per day and seven days per week. Via TRACE, a user's 1100/60 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 properly, and can be utilized for comparison purposes during diagnostic testing.■

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly 1-Year*	Lease Charge 5-Years*
PROCESSOR COMPLEX					
3042-99	1100/61 Model C1 Standard Processing Complex; includes 1100/60 CPU with standard instruction set and 524K words of main memory, an IOU with one block multiplexer and one four-channel word channel module, a system support processor, and a system console with printer	$318,975	$1,150	$ 7,590	$ 6,015
3042-96	1100/61 Model C2 Standard Processing Complex; same as 3042-99 but with extended instruction set	355,365	1,250	8,460	6,705
3042-93	1100/61 Model H1 High Performance Processing Complex; includes 1100/60 CPU with standard instruction set, 524K words of main memory, 8K-word high speed buffer, and integrated multi-processor capability; an IOU with one block multiplexer and one four channel word channel; a system support processor; a systems console with printer; and a maintenance console	657,040	1,750	15,645	12,395
3042-90	1100/61 Model H2 High Performance Processing Complex; same as 3042-93 but with extended instruction set	693,610	1,850	16,515	13,085

*Lease charges do not include maintenance.

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly 1-Year*	Lease Charge 5-Years*
PROCESSOR COMPLEX OPTIONS					
F2917-00	Model Upgrade; makes 1100/6 Model C1 or H1 into equivalent of C2 or H2 through the addition of the extended instruction set	91,425	100	2,175	1,725
1952-99	Model Upgrade; makes 1100/6 Model C1 into H1 or C2 into H2	338,300	600	8,055	6,385
3042-87	Multiprocessing Upgrade for the 1100/6 Model H1; adds a second H1 Processing Complex to 3042-93 together with transfer switches to allow either system support processor to attach the maintenance console and the remote maintenance modem				
3042-84	Multiprocessing Upgrade for the 1100/60 Model H2; same as 3042-87 but adds H2 to H2	748,465	1,950	17,820	14,120
F2869-00	Performance Monitor; provides scannable buffered counters within a processing complex to allow the system support processor to collect selected performance parameters; one required per complex	30,475	20	725	575
F2688-00	IOU Expansion; provides space for up to two word channel modules and one block multiplexer channel; one per complex	10,335	20	245	195
V2916-00	IOU Expansion; provides space for up to two block multiplexer channels	10,335	20	245	195
F2684-00	Word Channel Module; provides four independent word channel interfaces; for use with F2688-00 or F2916-00	19,500	90	465	370
F2690-00	Block Multiplexer Channel provides interface for up to eight byte oriented control units; for use with F2688-00 or F2916-00	16,430	60	390	310
F2867-00	Shared Peripheral Interface (SPI) Control; provides capability to control up to six word control units, each with up to four SPI interfaces	15,265	20	365	290
F2904-00	Byte Channel Transfer Switch (BCTS) Control; provides capability to control one fully configured 4 by 8 byte channel transfer switch; maximum of two F2867-00 and/or F2904-00 per complex	15,265	20	365	290
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	18,750	62	442	330
2521-02	For remote operation	18,750	62	442	330
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	18,750	62	442	330
F2601-00	Additional Primary Module; adds a second 2x1 primary module and operator control for switching up to four subsystem strings	9,930	34	234	175
F2601-02	For remote operation	9,930	34	234	175
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	9,930	34	234	175
F2601-03	For remote operation	9,930	34	234	175
F2602-00	Secondary Module; expands primary module from 2x1 to 4x1	6,755	26	159	120
F2602-01	For remote operation	6,755	26	159	120
F2603-00	Secondary Module; expands F2600-00 to 4 by capability	555	—	13	10
F2604-00	DC Power Redundancy; adds back up DC supplies for hot standby dynamic power redundancy	2,540	11	60	45
3542-97	Additional System Console; attaches to system support processor; (SSP); includes CRT console with keyboard, 200-cps bidirectional printer and console table	27,135	110	645	510
3542-94	Auxiliary System Console; same as 3542-97 but without printer	10,971	60	260	205
0786-02	Console Printer; up to three per console allowed; requires F1247-01 and F2656-01 for attachment to 3542-94	6,250	54	160	140
F2656-01	Terminal Interface; required to interface 0786-02 to any 1100/60 console	400	—	10	8
F1247-01	Auxiliary Interface; required to interface 0786-02 to 3542-94 console	310	—	10	7
2522-00	Transfer Switch; allows console to be switched between two SSPs	1,050	—	25	20
MEMORY					
K2687-00	262K-word Memory Expansion Module; maximum of two per processing complex	30,475	50	725	575
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	406	2,140	1,605
F0929-00	Write Lockout Feature for 5012-00/99 drum control	1,392	5	30	22
F0930-00	Shared Peripheral Interface for 5012-00/99 drum control; multiprocessor application only	22,608	40	471	355
6016-00	FH-432 Drum; 262K words	52,848	166	1,210	825
6015-00	FH-1782 Drum; 2048K words	146,064	467	3,345	2,280
F0786-01	Dual Channel Feature for 6016-00 drum	3,024	24	69	47
F0767-00	Dual Channel Feature for 6015-00 drum	3,024	27	69	47
5046-99	8430/8433/8434 Control; controls up to sixteen 8430, 8433 and/or 8434 disk drives; maximum 866 megawords of storage; requires minimum of two disk drives	102,000	428	2,770	1,800
5046-97	8430/8433/8434 Dual Control; for dual-access subsystem operation; requires two channels	176,448	749	5,015	3,260
8434-99	8434 Disk Storage; provides two single-spindle disk drives with non-removable pack	66,600	242	2,140	1,390

*Lease charges do not include maintenance.

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EQUIPMENT PRICES

	MASS STORAGE (Continued)	Purchase Price	Monthly Maint.	Monthly 1-Year*	Lease Charge 5-Years*
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	43	185	120
F2558-00	8405 Fixed-Head Disk Capability; allows up to eight 8405 fixed-head disk drives to be attached to the 5046-99 control, two required for 5046-97 control (precludes use of F2561-00 32-device capability)	2,160	5	52	34
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	15	56	42
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 5046-99/97 controls	6,600	31	138	102
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 8450 disk drives	102,000	428	2,700	1,800
5046-93	8430/8433/8450 Dual Control; two control units; each with the same characteristics and restrictions as the 5046-95/94 control; requires two F2838-00 8450 capability expansions or two F2720-00 8430/8433 capability expansions	176,448	749	5,015	3,260
F2838-00	8450 Capability Expansion, allows 5046-95/94 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	48	150	100
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	11	60	42
F2837-00	Power Control Expansion, required when total number of disk drives exceeds 16; two required for 5046-93/92 dual control	7,680	43	185	7,680
F2555-00	Shared Peripheral interface, multiprocessor, allows 5046-95/94 to connect to two separate 1100 Series processors, two required for 5046-93/92 control	6,600	31	138	102
8450-99	8450 Disk Storage, provides two 8450 disk drives using non-interchangeable data module included as part of each drive	66,600	242	2,140	1,390
8450-97	8450 Disk Storage, provides two 8450 disk drives using non-interchangeable data modules with fixed and movable heads	74,600	268	2,390	1,590
F2717-99	8450 Fixed-Head Conversion converts 8450-99/98 disk storage unit to an 8450-97/96 disk storage unit	13,600	26	250	200
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	15	56	42
5056-99	8470 Disk Subsystem; includes 5056-83 controller for up to eight 8470 drives and one 8470 drive without fixed heads	87,200	300	2,355	1,755
5056-97	With fixed heads for up to 338,688 words additional capacity	94,000	320	2,490	1,845
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 but not fixed head feature	162,000	560	4,375	3,240
5056-93	With fixed head feature in each drive	175,600	600	4,645	3,440
5056-91	8470 Disk Subsystem; same as 5056-95, but with four drives	224,000	774	6,050	4,480
5056-89	With fixed head feature in each drive	251,200	854	6,590	4,880
5056-87	8470 Disk Subsystem; same as 5056-95 but with eight drives	328,600	1,202	8,870	6,570
5056-85	With fixed head feature in each drive	383,000	1,362	9,950	7,370
5056-83	8470 Disk Control; interfaces up to two word channels	102,000	428	2,700	1,800
F2994-00	Four Channel Capability for 5056-83	8,090	31	170	125
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	11,680	49	276	205
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	49	276	205
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	17	95	70
F3193-00	Controller Enhancement for up to 32 drives; required on 5056-83 when over 16 drives are configured	1,600	4	34	25
F2837-00	Power Control Expansion; required on 5056-83 when over 16 drives are configured	7,680	43	185	120
8470-99	8470 Disk Drive without fixed heads	33,600	100	945	700
8470-97	With fixed heads	38,400	120	1,080	800
F2717-03	8470 Conversion Package; converts 8470-99 to 8470-97	6,800	20	135	100
F2718-00	8470 Dual Access Feature; provides dual access and simultaneous read/write (r/w) read/read (r/r), write/read (w/r) and write/write (w/w)	2,688	14	56	42
5039-91	8433/8430 Control for up to eight 8430 and/or 8433 disk drives; includes one I/O interface and 1024 words of buffer storage; minimum two disk drives per subsystem	72,000	313	1,730	1,125
F2870-00	5039 Channel Adapter; required to operate a 5039-99, 5039-95 or 5039-93 with an 1100/60 via a block multiplexer channel	1,560	—	—	—
F2047-00	Drive Expansion Feature for the 5039-91; provides for up to 16 8433/8430 drives to be attached to the 5039-91	7,680	43	185	120

*Lease charges do not include maintenance.

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly 1-Year*	Lease Charge 5-Years*
MASS STORAGE (Continued)					
8430-99	8430 Disk Drive; removable disk media	24,960	137	600	390
F2076-00	8405 Capability; adds capability for 5039-91 to control up to eight 8405-00/01/04/05 fixed head disk drives; mutually exclusive with F2047-00	2,160	5	52	34
F1230-00	Disk Pack for the 8430-99; 17 million words	750	—	46	30
8433-00	8433 Disk Drive; removable disk media	36,480	199	875	570
F1223-00	Disk Pack for the 8433-00; 34 million words	1,150	—	58	38
F2342-00	Disk Drive Upgrade; Converts 8430-99 to 8433-00	11,520	63	275	180
F2021-00	8433/8430 Dual Access Feature; provides dual access and simultaneous r/r, r/w, w/r, and w/w on any two 8433-00 or 8430-99	2,160	5	52	34
8405-00	8405 Disk Drive; fixed head, 1.3 million words	76,800	467	1,845	1,200
8405-04	0.68 million words	46,080	280	1,110	720
F1664-00	8405 Dual Access Feature; provides dual access and simultaneous read/read, read/write, write/read, or write/write on any two 8405 drives	2,160	5	52	34
MAGNETIC TAPE UNITS					
5017-00	Uniservo 12/16 Magnetic Tape Control, up to sixteen 9-track PE, 1600-bpi nonsimultaneous Uniservo 12 and/or Uniservo 16 Tape Units	28,560	163	655	476
F0899-00	Simultaneous Operation for 5017-00 control; permits simultaneous r/r, r/w, w/r, and w/w on any two Uniservo 16 drives with dual access feature	21,312	110	490	375
F1131-99	Conversion Feature; converts older 5017-99 to 5017-00; if F0899-00 is present F1131-98 is required	2,112	13	44	37
F1131-98	Conversion Feature; converts older F0899-00 to F0899-99 (adds dual access and Uniservo 16 capability); requires F1131-99	2,064	13	43	37
F0825-00	Dual Channel Capability; permits non-simultaneous operation on two block multiplexer channels; if F0899-00 is present, two F0825-00 features are required	4,416	26	92	74
F0823-99	7-Track NRZI 800 bpi capability for 5017-00; includes data conversion	5,760	26	120	100
F0823-96	Includes BCD/EBCDIC (FORTRAN H set translator)	5,760	26	120	100
F0826-00	9-track NRZI Capability for 5017-00	5,760	26	120	100
F1028-96	Adds 9-track NRZI to F0823-99 or F0823-96	4,176	16	87	70
F1028-95	Adds 7-track NRZI and Data Conversion to F0826-00	4,176	16	87	70
F1028-93	Adds 7-track NRZI, BCD/EBCDIC (FORTRAN H set) Translator and Data Conversion to F0826-00	4,176	16	87	70
0862-04	Uniservo 16 Tape Unit; 9 track, PE, 1600 bpi, 120 ips	22,032	170	505	370
0862-06	Uniservo 16 Tape Unit; 7 track, NRZI, 200/556/800 bpi, 120 ips	22,032	170	505	370
F0937-01	Dual Density Feature for the 0862-04; adds 9 track 800 bpi	2,448	—	51	40
F1319-00	Dual Access Feature for the Uniservo 16; also provides simultaneous r/r, r/w, w/r, and w/w on two or more Uniservo 16	2,448	14	51	40
F1040-02	Converts 0862-06 to 0862-04	NC	NC	NC	NC
5045-93	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 5054-93 allowing the total of eight tape units	28,320	154	590	470
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	27	22
F0823-95	7-Track NRZI Capability for the 5045-93; includes ASCII to BCD translator and data conversion	5,760	22	120	100
F0823-94	Same as F0823-95 but translation is field data to BCD	5,760	22	120	100
F1028-18	Adds 9-track NRZI Capability to F0823-95/94	4,175	12	87	70
F0826-01	Adds 9-track NRZI Capability to 5045-93	5,760	26	120	100
F1028-90	Adds 7-track NRZI with ASCII/BCD translator and data conversion to F0826-01	4,175	12	87	70
F1028-89	Translator is fieldata/BCD	4,175	12	87	70
F1028-88	Translator is ASCII/fieldata	4,175	12	87	70
F2627-00	Translation Feature for 9-track Uniservo 14 and Uniservo 20 drives on 5045 controls; translation is in both directions involving ASCII/EBCDIC, field data/EBCDIC, and field data/ASCII	2,064	12	47	34
F2627-01	Second 9-track translator; requires F2627-00	2,064	12	47	34
0870-03	Uniservo 14 Tape Unit; 9 track, PE, 1600 bpi, 60 ips	14,880	93	310	250
0870-04	Uniservo 14 Tape Unit; 9 track, PE/NRZI, 1600/800 bpi 60 ips	16,080	101	335	270
0870-05	Uniservo 14 Tape Unit; 7 track, NRZI, 800/556/200 bpi, 60 ips	14,880	93	310	250
F2194-00	Adds 9-track NRZI to the 0870-03; requires F0826-01	1,200	6	25	20
F2194-02	Converts 0870-05 into 0870-03	1,200	6	25	20
F2194-03	Converts 0870-05 into 0870-04; requires F0826-01	1,200	6	25	20
5034-02	Uniservo 20 Control for up to 16 9-track, PE, 1600 bpi, nonsimultaneous Uniservo 20s or a mixture of up to 16 Uniservo 20s or Uniservo 16s	45,888	166	1,050	765
F0832-92	7-track NRZI Capability for the 5034-02; includes ASCII to BCD translator and data conversion	5,760	22	120	100
F0832-91	Same as F0832-92 but translation is fieldata to BCD	5,760	22	120	100
F0832-90	Same as F0832-92 but translation is ASCII to fieldata	5,760	22	120	100
F0832-90	Same as F0832-92 but translation is ASCII to fieldata	5,760	22	120	100
F1028-07	Adds 9-track NRZI Capability to F0832-90/-91/-92	4,175	12	87	70

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		Purchase Price	Monthly Maint.	Monthly 1-Year*	Lease Charge 5-Years*
MAGNETIC TAPE UNITS (Continued)					
F0826-99	Adds 9-track NRZI Capability to 5034-02	6,552	32	133	105
F1028-87	Adds 7-track NRZI with ASCII/BCD translator and data conversion				
F1028-86	Translator is fieldata/BCD	4,175	12	87	70
F1028-85	Translator is ASCII/fieldata	4,175	12	87	70
F1487-00	Dual Channel Feature for the 5034-02; provides non-simultaneous access to the control from two block multiplexer channels; not software supported	4,416	22	100	74
0864-00	Uniservo 20 Tape Unit; 9 track, PE, 1600 bpi, 200 ips	27,696	199	635	460
F1510-00	Dual Access Feature for the Uniservo 20; also provides simultaneous r/r, r/w, w/r, and w/w on two or more Uniservo 20	2,448	14	51	41
F2002-00	Enables Uniservo 16 to run with 5034-02	158	—	—	—
F2003-00	Enables Uniservo 12 to run with 5034-02	158	—	—	—
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	187	1,135	850
0876-97	Uniservo 22 Magnetic Tape Drive; dual density PE/NRZI, 1600/800 bpi, 9 track, 75 ips	19,190	93	500	370
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	196	1,185	960
0876-93	Uniservo 24 Magnetic Tape Drive; dual density PE/NRZI, 1600/800 bpi, 9 track, 125 ips	21,215	102	550	480
F2800-99	Adds PE/NRZI Control Unit to Uniservo 22 or 24 for dual access operation	25,520	94	135	480
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	13	50	40
F3132-00	Permits non-simultaneous operation of the 0876-99 or 0876-95	4,415	24	90	75
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	10	45	30
F3136-05	Provides ASCII (processor) to EBCDIC (tape) and fieldata (processor) to ASCII	2,065	10	45	30
F3136-06	Provides fieldata (processor) to EBCDIC (tape) and fieldata (processor) to ASCII	2,065	10	45	30
5042-00	Uniservo 30 Control for up to eight 9-track, dual density (GCR/PE) Uniservo 30, 32, 34, and/or 36 drives	55,392	308	1,170	865
F2131-00	Adds 9-track NRZI to 5042-00; prerequisite for all 7-track NRZI features	3,648	20	76	57
F2585-00	Translation Feature for 9-track drives on 5042 control; translation is in both directions involving ASCII/EBCDIC, fieldata/EBCDIC, and fieldata/ASCII	2,064	12	43	32
F2585-01	Second 9-track Translator; F2585-00 required	2,064	12	43	32
F2584-99	Add 7-track NRZI to 5042-00; includes ASCII to BCD translator and data conversion	1,824	11	38	29
F2584-98	Translator is ASCII to fieldata	1,824	11	38	29
F2584-97	Translator is fieldata to BCD	1,824	11	38	29
F2135-00	Dual Channel Feature for the 5042-00; provides nonsimultaneous access to the control from two block multiplexer channels; not software supported	6,000	34	125	94
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	960	5	20	15
0872-00	Uniservo 30 Magnetic Tape Drive; 9 track, dual density PE/NRZI, 1600/800 bpi, 200 ips	34,800	194	780	545
0872-02	Uniservo 30 Magnetic Tape Drive; 7 track, NRZI, 800/556/200 bpi, 200 ips	34,800	194	780	545
F2123-00	Conversion Feature; converts 0872-02 to 0872-00	3,774	—	79	59
0873-00	Uniservo 32 Magnetic Tape Drive; 9 track, dual density GCR/PE, 6250/1600 bpi, 75 ips	31,584	175	725	495
0873-02	Uniservo 34 Magnetic Tape Drive; 9 track, dual density GCR/PE, 6250/1600 bpi, 125 ips	36,192	201	830	565
F2125-00	Conversion Feature; converts 0873-00 to 0873-02	4,608	26	96	72
0874-00	Uniservo 36 Magnetic Tape Drive; 9 track, dual density GCR/PE, 6250/1600 bpi, 200 ips	38,880	216	890	605
PRINTERS					
0770-00	Line Printer and Control; 800 lpm with 48 character set	56,304	287	1,173	940
0770-02	1400 lpm	64,896	376	1,352	1,080
0770-04	2000 lpm	86,686	478	2,220	1,445
F1533-00	160 Print Positions for 0770 Series Printers	4,416	20	92	74
F1534-00	Expanded Character Set Control, required for other than 48-character print cartridges	2,880	5	60	48
F2230-00	Printer Upgrade; 0770-00 to 0770-02	8,592	89	179	140
F2230-01	Printer Upgrade; 0770-00 to 0770-04	30,382	192	1,047	505
F2230-02	Printer Upgrade; 0770-02 to 0770-04	21,790	103	868	365
F2822-00	Dynamic Advance Control; reduces slew rate by 50 percent to optimize stacking of light forms	300	—	7	6

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	PRINTERS (Continued)	Purchase Price	Monthly Maint.	Monthly 1-Year*	Lease Charge 5-Years*
	Print Cartridges for 0770 Series Printers				
F1536-00	48-character Alphanumeric Business/Commercial	462	—	22	18
F1536-01	48-character Alphanumeric Scientific	462	—	22	18
F1536-03	48-character Alphanumeric for United Kingdom	462	—	22	18
F1536-04	48-character Alphanumeric for Denmark and Norway	462	—	22	18
F1536-05	46-character Alphanumeric for Finland and Sweden	462	—	22	18
F1536-06	48-character ANSI standard OCR	462	—	22	18
F1537-00	94-character ASCII Graphic (ANSI X3.4-1968)	462	—	22	18
F1537-01	63-character Alphanumeric for Denmark and Norway	462	—	22	18
F1537-02	63-character Alphanumeric for Finland and Sweden	462	—	22	18
F1537-03	68-character ISO Universal OCR-B	462	—	22	18
F1537-04	68-character OCR H-14 Universal	462	—	22	18
F1537-05	58-character COBOL/FORTRAN/Business	462	—	22	18
F1537-06	177-character International	462	—	22	18
F1537-07	95-character Alphanumeric for Finland and Sweden	462	—	22	18
F1537-08	128-character Alphanumeric/Katakama for Japan	462	—	22	18
F1537-09	24-character Numeric	462	—	22	18
F1537-10	114-character Alphanumeric/Katakama for Japan	462	—	22	18
F1537-11	68-character Universal OCR-A	462	—	22	18
F1537-12	68-character Universal ECMA-11 OCR-B	462	—	22	18
F1537-13	68-character Universal Univac 77L OCR-B	462	—	22	18
F1537-14	63-character Modified FORTRAN	462	—	22	18
F1537-15	63-character Modified ASCII	462	—	22	18
F1537-19	384-character American Library Association	462	—	22	18
F1537-20	192-character Farsi/English	462	—	22	18
F1537-21	128-character OCR-A	462	—	22	18
F1537-23	94-character Optimized ASCII	462	—	22	18
F1537-24	68-character Optimized ISO Universal OCR-B	462	—	22	18
0776-00	Line Printer and Control; 760 lpm with 48 character set	41,400	219	865	690
0776-02	940 lpm	46,680	262	975	780
0776-04	1200 lpm	59,040	300	1,230	984
F2217-00	Printer Upgrade; 0776-00 to 0776-02	5,280	43	110	90
F2217-02	Printer Upgrade; 0776-00 to 0776-04	17,640	81	365	294
F2217-04	Printer Upgrade; 0776-02 to 0776-04	12,360	38	255	204
F2245-00	Expanded Character Set Control; required for character sets with more than 64 characters	2,160	5	45	36
	Print Cartridges for 0776 Series Printers				
F2216-00	48-character Alphanumeric Business/Commercial	1,440	—	30	24
F2216-01	48-character Alphanumeric Scientific	1,440	—	30	24
F2216-07	24-character Numeric	1,440	—	30	24
F2216-08	63-character Modified FORTRAN	1,440	—	30	24
F2216-09	63-character Modified ASCII	1,440	—	30	24
F2216-10	48-character OCR-A	1,440	—	30	24
F2215-00	94-character ASCII	1,440	—	30	24
F2216-03	68-character ISO Universal OCR-B	1,440	—	30	24
F2216-04	68-character OCR H-14 Universal	1,440	—	30	24
F2216-05	58-character COBOL/FORTRAN/Business	1,440	—	30	24
F2216-06	177-character International	1,440	—	30	24
F2216-11	68-character Universal OCR-A	1,440	—	30	24
F2216-12	68-character Universal ECMA-11 OCR-B	1,440	—	30	24
F2216-13	68-character Universal Univac 77L OCR-B	1,440	—	30	24
F2216-20	94-character Optimized ASCII	1,440	—	30	24
F2216-21	68-character Optimized ISO Universal OCR-B	1,440	—	30	24
F2216-23	128-character OCR-A	1,440	—	30	24
	PUNCHED CARD EQUIPMENT				
0604-99	Card Punch and Control; 250 cpm	26,640	182	555	470
0716-89	Card Reader and Control; 1000 cpm; comes with code translator EBCDIC, ASCII, compressed code, or fieldata code	18,384	138	383	291
F1487-00	51-Column Card Read feature	1,968	14	41	30
F1487-01	66-column Card Read Feature	1,968	14	41	30
F1488-00	Validity Check	816	—	17	18
F1498-00	Stacker Feature; permits the alternate filling of stackers one and two when in the stop-on-errors mode	528	—	11	8
F1486-00	Translate Mode Conversion; from EBCDIC to ASCII	105	—	—	—
F1486-01	Compressed Code to ASCII	105	—	—	—
F1486-02	ASCII to EBCDIC	105	—	—	—
F1486-03	Compressed Code to EBCDIC	105	—	—	—
F1486-04	ASCII to Compressed Code	105	—	—	—
F1486-05	EBCDIC to Compressed Code	105	—	—	—
F1486-06	To Fieldata Code	100	—	—	—
F1530-00	Adds a second translator to translate mode under program control	1,104	5	23	17

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly 1-Year*	Lease Charge 5-Years*
DATA COMMUNICATIONS					
8583-00	General Communications Subsystem (GCS) houses maximum of 32 communications terminals with interfaces and/or communication terminal dialers	19,344	62	403	305
F1971-00	Expansion Power Supply, required when 24 or more terminals are included in the GCS configuration	2,160	5	45	34
F1972-00	Spare CTC for controlling up to 32 lines in ESI mode on an I/O channel	9,408	37	196	150
F1973-00	Communication Terminal Asynchronous; up to 2400 bps; asynchronous bit serial transmission	1,632	9	34	26
F1973-01	Communication Terminal Asynchronous; same as F1973-02, but with external interrupt capability	3,840	15	80	60
F1973-02	Communication Terminal Asynchronous—VII; provides for block parity generation and checking	3,456	15	72	54
F1974-00	Communication Terminal Synchronous—Standard; up to 50,000 bps; synchronous bit serial transmission	2,400	12	50	38
F1974-01	Communications Terminal Synchronous; same as F1974-02, but with external interrupt capability	4,560	18	95	71
F1974-02	Communication Terminal Synchronous VII; provides for block parity and checking	4,080	18	85	64
F1975-00	Communications Terminal Synchronous up to 56,000 bps, bit serial transmission	4,320	17	90	60
F1976-00	High-Level Communications Terminal; provides capability to handle bit-oriented Data Link Control, up to 56,000 bps	4,800	19	100	75
F1977-99	Communication Terminal Dialer	672	3	14	11
F1978-00	Communication Interface—Telegraph	240	1	5	4
F1979-00	Communication Interface—Modem	432	2	9	7
F1979-01	Identical to C1—modem (1979-00) except permits use of a modem not having a receive clock	672	3	14	11
F1980-00	Communication Interface—High-Speed (allows connection of a CTS—Std. or CTS—VII to the CCITT V.35 interface)	864	4	18	14
F1980-01	Communication Interface (allows connection of a CTS—Std. or CTS—VII to the ATT 303 modem or equivalent)	864	4	18	14
F1983-00	Spare Basic Clock	240	1	5	4
F1984-00	Expansion Clock (provides asynchronous timing rates not included in the basic clock)	240	1	5	4
F2072-00	Allows connections to a CTS—Std. to a MIL 188C synchronous interface	672	3	14	11
F2074-00	Communications Interface—automatic inbound bit rate detection	1,440	3	30	23
8596-99	Distributed Communications Processor (40 (DCP/40); freestanding unit including processor with 128K bytes of memory, I/O controller module, IOP, and control storage; requires integrated flexible disk plus free standing flexible or cartridge disk and communication line modules	57,535	241	1,500	1,200
F1930-00	128K byte memory increment; up to three may be added to 8596-99; additional memory uses 1945-00	5,570	25	145	115
8596-98	DCP/40 Compatible Processor; 128K bytes of main storage; no memory expansion possible; requires Type 11 Scanner for communications	57,560	241	1,500	1,200
F1931-02	Upgrades 8596-98 to 8596-99	95	1	5	5
F1935-00	Scanner Storage Adapter; provides an interface between the local storage of the 8596-98 and a Type 11 Scanner	2,160	9	55	45
F1934-99	Scanner Command Interrupt; provides a control interface between the 8596-98 and up to three Type II Scanners or one F 1950-00 and two Type II Scanners; includes first F 1950-00	2,880	12	75	60
F1950-00	Command/Interrupt Module; provides control interface for IOP and 8596-98; required if second IOP is configured in 8596-98	720	3	20	15
1945-00	DCP/40 Freestanding Expansion Cabinet; contains power supply and power controller; accommodates IOP and/or memory; up to three per system allowed, one containing up to three 512K-byte storage banks of up to 512K bytes each	27,060	113	705	565
F2942-00	Storage Controller; supplied with 128K bytes of memory; mounts in 1945-00; up to two F1929-99 and ine 128K byte memory modules may be added	26,880	112	700	560
F1929-99	Storage Controller Expansion; includes 128K bytes of memory; provides control for 512K bytes of memory, required for storage banks three and four; mounts in F2942-00	13,950	60	365	290
F1939-00	Integrated Flexible Disk Subsystem; includes 256K-byte flexible disk and controller; mounts in 8596-99/-98	1,920	10	50	40
F1933-00	IOP Controller Module; mounts in 1945-00; includes IOP and space for three additional IOPs and storage port expander	14,680	61	380	305
F2941-99	Second IOP Expansion; provides Second IOP for 8596-99/-98 or 1945-00; includes power for two more IOP expansion	14,920	62	390	310
F1932-99	Third IOP; mounts in 1945-00 or 8596-99; includes storage port expander	14,185	59	370	295
F1932-98	Fourth IOP; mounts in 1945-00 or 8596-99	10,635	44	280	220
F1928-00	Operator Station; work surface for local console and free standing flexible disk unit; 8596-99/-98	1,200	—	30	25

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EQUIPMENT PRICES

DATA COMMUNICATIONS (Continued)		Purchase Price	Monthly Maint.	Monthly 1-Year*	Lease Charge 5-Years*
F2944-00	Isolation Transformer; allows 8596-99/-98 or 1945-00 to operate on 200, 208, 220, 230, or 240 volts AC 50/60 Hz	2,400	10	65	50
F1825-05	Active Line Indicator; provides a visual display of line activity on up to 16 communication line modules on an IOP; mounts on top of cabinet containing IOP	960	4	25	20
F1936-00	Storage Port Expander; provides a multiplexed interface to a single local storage access port for up to four requestors; installs in 8596-99/-98 when two or more 1945-00 are configured	3,500	15	95	75
F2943-00	Interface Expander: accommodates up to four F1948-00, or two F1946-01 or two F1948-00 and one F1946-01; up to four F2943-00 allowed per 8596-99/-98 or 1945-00	1,170	5	30	25
F1946-01	1100 Series ISI Interface; provides a full duplex ISI intrface to a 1100 Series Host Processor Word Channel; 32 data bits plus two odd strapable parity bits; maximum of two per 8596-99 or 1945-00; requires F2943-00	4,000	17	105	85
F1946-00	1100 Series ISI Interface; provides a half duplex ISI interface to a 1100 Series Host Processor Word Channel; 32 data bits plus two odd strapable parity bits; maximum of four per 8596-98; requires F2943-00	4,000	17	105	85
F1947-00	Series 90 Byte Interface; provides interface to Series 90 Host Byte or Block Multiplexer Channel; maximum of two per 8596-991-98 or 1945-00; mutually exclusive with F2943-00	4,000	17	105	85
F1948-00	16-bit Peripheral Interface; provides interface to a peripheral subsystem or another DCP/40 or DCP system; allows operation in 80 or 16-bit mode; odd strapable parity bit provided; requires F2943-00	3,000	13	80	65
F1949-00	8-bit Interface for peripherals such as flexible disk on 8596-99/-98	1,045	4	30	25
F1941-00	Full Duplex Interface to Asynchronous Data Sets; conforms to EIA RS232-C and CCITT V.24 and V.28; data set rates of 45.5, 50, 56.8, 74.2, 15, 100, 110, 134.5, 150, 200, 300, 600, 1050, 1200, 1800, or 2400 bps	740	3	20	15
F1942-00	Full Duplex Interface to Synchronous Data Sets; conforms to EIA RS232-C and CCITT V.24 and V.28; data set rates up to 9600 bps	740	3	20	15
F3163-00	Full Duplex Interface to Synchronous Modems; conforms to EIA RS232-C and CCITT V.24 and V.28; operates with Bell DDS up to 9600 bps; line module may be loaded with microprogram with data formats for protocols including UDLC (up to 19,200 bps) BSC (up to 9600 bps), REM1 (up to 19,200 bps), and 1100 FDX (up to 19,200 bps)	1,275	6	35	30
F3164-01	Full Duplex Interface to carrier facilities conforming to CCITT V.35; UDLC protocol data formats; V.35 facilities (48K bps), Bell DDS and DSDS facilities (56K bps)	3,745	16	100	80
F1945-00	Auto Dialing Line Module; interface to Bell 801 Automatic Calling Units or those conforming to CCITT V.24 and V.25	1,005	4	25	20
8406-00	Diskette Drive; 256K bytes	3,360	17	93	70
8406-02	Diskette Drive; 256K bytes, 50 Hz	3,360	17	93	70
F2338-00	Second Diskette Drive; installs with 8406-00	1,040	10	29	22
F2338-02	Second Diskette Drive; 50 Hz	1,040	10	29	22
8408-02	Cartridge Disk Control for up to two drives	5,564	25	139	104
F2380-04	Fixed/Removable Cartridge Disk Drive; five megabytes fixed, five megabytes removable	17,750	96	418	314
F2380-06	220-240 Volt version	17,750	96	418	314
F2187-00	Second I/O Interface for dual F2380 configuration	1,568	7	39	29
0871-01	Uniservo 10 Magnetic Tape Unit; 9 track, PE/NRZI, 1600/800 bpi, 25 ips	13,425	72	280	210
F2721-00	Uniservo 10 Controller; for up to two 0871-01 drives	10,320	43	270	215
F2879-00	AC Power Switch; for remote control of second 0871-01 power from DCP/40	1,200	5	30	25
3542-93	DCP Console; includes logic cabinet, 15 inch CRT and power supply	6,690	55	170	125
0786-56	Console Printer; 200 cps unidirectional; interfaces to 3542-93	5,250	30	140	117
0786-54	Console Printer; 200 cps bidirectional; interfaces to 3542-93	6,960	50	180	155
0774-90	Console Printer; 300 cps; interfaces to 3542-93	2,630	20	71	50
1928-03	Type II Scanner; provides the capability to control data between the 8596-98 and up to 128 half duplex or 64 full duplex communications lines	23,000	61	575	431
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	10	59	44
F2263-02	Expansion; for line adapter positions 96 to 128	1,120	4	28	21
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	11
F1801-02	With speed scan option for data rates up to 230.4 bps; operates on ports 0 and 4 as a full duplex pair; one per 1928-03	600	3	15	11
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	7	43	32
F1869-01	Auto Line Speed Detection; provides 1928-03 with the capability to automatically determine operation characters such as character length; one per 1928-03	452	3	11	9
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	9

*Lease charges do not include maintenance.

1100/60

New Product Announcement

Sperry Univac recently announced three new additions to its 1100/60 family of computers: the 1100/60 Attached Virtual Processor (AVP) and two mid-range uniprocessors, the 1100/61 E1 and E2.

1100/60 ATTACHED VIRTUAL PROCESSOR (AVP): On October 29, 1980, Sperry Univac introduced its new attached processor system to provide a migration path for its Series 90 users into its word-oriented 1100/60 system. The Series 90 systems are the 90/60, 90/70, and 90/80, all of which use the VS/9 virtual operating system. The new 1100/60 AVP is designed to enable execution of applications written for VS/9 concurrently with applications written for the OS 1100 operating system of the 1100/60 family. The 1100/60 AVP can be attached to all uniprocessor models in the 1100/60 family, the C1, C2, E1, E2, H1, and H2. It cannot at present be attached to the 1100/60 dual-processor systems. Performance is said to be comparable to the 90/80-3.

According to Univac, 1100/60 AVP users would initially dedicate their system to running current VS/9 applications. As operating requirements increase, new applications would be written to run under the native OS 1100 operating system.

The 1100/60 AVP incorporates system features found in both Series 90 and 1100/60 processors. On the VS/9 side, the hardware includes a CPU with a logic bus structure and microcode control similar to the Univac 90/80 family. In addition, the reliability features of the 90/80, such as parity checking, control store, and duplicate adders, have been maintained and applied to the AVP. The 1100/60 System Support Processor (SSP) is also included, and provides partitioning, system control, maintenance, and console management functions.

The system's main memory ranges from 524K (2 megabytes) to 1048K words (4 megabytes). An 8K word (32K bytes) cache unit provides buffer storage of instructions and data between the 1100 Main Storage Unit (MSU) and the AVP CPU. The cache is designed to improve CPU performance while reducing the number of requests into the MSU.

I/O operations are handled by the 1100/60 AVP using a new software product, the Attached Processor Control Software (APCS). The 1100/60 AVP can accommodate VS/9 random access data files via direct, logical, or local attachment. The Direct Attachment feature permits disk subsystems of the Series 90 systems to attach directly to the 1100/60 block multiplexer channel. Files written for VS/9 can be run on the 1100/60 AVP without change. The Logical Attachment facility permits the VS/9 user to utilize current technology random access devices, such as the Univac 8470 (564 megabytes) disk drive, that are not included in standard VS/9 configurations. The third access mode, Local Attachment, permits devices available for VS/9 operation, but not for OS 1100, to be run on the 1100/60 AVP. The devices are attached to an optional block multiplexer channel.

Tape volumes written on the Series 90 can be processed by the 1100/60 AVP without modification. All VS/9 spooling to printer, card reader and card punch devices is simulated through APCS using standard OS 1100 spooling facilities.

Several VS/9 software products have been modified for use in the 1100 Series. Those unbundled products are IMS 1100, based on the IMS/90 transaction processing system; the Interactive Processing System 1100; a full-screen display text editor called EDIT 1100; the Programmers Advanced Debugging System, PADS 1100; and an industry compatible RPG II compiler.

For conversion from VS/9 to OS 1100, Univac is offering a bundled series of programs and services called the Univac Conversion Assistance Program (UCAP). The major element in UCAP is the Univac Integrated Management, Planning Analysis, and Conversion tools (IMPACT). The primary components of IMPACT are System Analysis Software, the Planning and Scheduling System, and the Conversion Project Control System. Other conversion aids include language converters for COBOL, FORTRAN, and PL/1, an Assembly Language to ASCII COBOL translator, and file compare and conversion routines.

1100/60

New Product Announcement

A low-range 1100/60 AVP complex, including an 1100/60 C1 with 524K words (2 megabytes) of memory and an AVP, costs $440,684. A top-end system using a 1048K-word (4 megabytes) 1100/60 E1 and an AVP costs $701,598. The monthly lease prices for the 1100/60 C1 and E1 complexes are $8,427 and $13,352, respectively. The initial systems are to be delivered in December, 1982.

1100/61 MODELS E1 and E2: To further enhance its 1100/60 family of systems, Univac introduced the 1100/61 E1 and E2 uniprocessors on September 24, 1980. A dual-processor version of each system, known as the 1100/62 E1 and E2, is also available. The new systems bring the total number of 1100/60 processors to ten—six uniprocessors and four multiprocessors.

System architecture on the 1100/61 models E1 and E2 is similar to other models in the 1100/60 family. Both processors have a 2K word cache memory for increased performance. The E2 has the 1100/60 Extended Instruction Set. Each system has an I/O unit with one block multiplexer channel and one word channel module, 524K words (2 megabytes) of main storage, a System Support Processor (SSP), a system console with printer, and a maintenance console. The main memory is expandable to 1048K words (4 megabytes) of storage. Both systems can be field upgraded to the high performance H1 and H2 uniprocessor. The model E1 can be field upgraded to the model E2. The models C1 and C2 can be field upgraded to the E1 and E2. The model E1 has 45 percent more power than the C1, and the E2 has 40 percent more performance than the C2 when running standard business applications. All peripherals and I/O devices available with 1100/60 systems can be used with the 1100/61 models E1 and E2. Performance on the 1100/61 E1 is estimated to be slightly higher than the IBM 4341-1 and the 1100/61 E2 is about 15 percent less than the 4341-2.

A basic 1100/61 E1 with 524K words (2 megabytes), 2K word (8K bytes) cache, I/O processor, and SSP with consoles costs $518,975. A five-year lease costs $11,342 per month. The 1100/61 E2, configured the same, costs $555,545, and leases over five years for $12,139 monthly, including maintenance. The first system deliveries are scheduled for first quarter 1981.

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.*	Monthly 5-Year Lease	Monthly Support Service
1100/60 ATTACHED VIRTUAL PROCESSOR					
1100/60 C1	AVP Processor Complex with 524K words of memory	$440,684	$1,601	$ 8,427	$550
1100/60 E1	AVP Processor Complex with 1048K words of memory	701,598	2,022	13,352	750
1100/61 PROCESSORS					
3042-75	Model E1 processor with 524K words of memory, 2K words cache memory	518,975	1,552	9,790	750
3042-72	Model E2 processor with 524K words of memory, 2K words cache memory, Extended Instruction Set	555,545	1,659	10,480	750
F2917-00	System upgrade from Model E1 to E2	91,424	107	1,725	—
1952-95	System upgrade from Model E1 to H1, also E2 to H2	212,370	321	4,005	—
3042-69	Dual-processor conversion for Model E1; adds second processor to 3043-75	444,670	1,659	8,390	—
3042-66	Dual-processor conversion for Model E2; adds second processor to 3042-72	481,240	1,766	9,080	—

		Monthly Charge
SOFTWARE FOR 1100/60 AVP		
IMS 1100	Transaction Processing System	$185
EDIT 1100	Text Editor	300
IPS 1100	Interactive Processing System	900
PADS 1100	Program Debugging System	200
	RPG II	125
	Univac Conversion Assistance Program (UCAP)	NC

*Monthly maintenance is normally not included in monthly lease prices and must be added on.□

UNIVAC 1100/60 System

EQUIPMENT PRICES

DATA COMMUNICATIONS (Continued)		Purchase Price	Monthly Maint.	Monthly 1-Year*	Lease Charge 5-Years*
F2944-00	Isolation Transformer; allows 8596-99/-98 or 1945-00 to operate on 200, 208, 220, 230, or 240 volts AC 50/60 Hz	2,400	10	65	50
F1825-05	Active Line Indicator; provides a visual display of line activity on up to 16 communication line modules on an IOP; mounts on top of cabinet containing IOP	960	4	25	20
F1936-00	Storage Port Expander; provides a multiplexed interface to a single local storage access port for up to four requestors; installs in 8596-99/-98 when two or more 1945-00 are configured	3,500	15.	95	75
F2943-00	Interface Expander: accommodates up to four F1948-00, or two F1946-01 or two F1948-00 and one F1946-01; up to four F2943-00 allowed per 8596-99/-98 or 1945-00	1,170	5	30	25
F1946-01	1100 Series ISI Interface; provides a full duplex ISI intrface to a 1100 Series Host Processor Word Channel; 32 data bits plus two odd strapable parity bits; maximum of two per 8596-99 or 1945-00; requires F2943-00	4,000	17	105	85
F1946-00	1100 Series ISI Interface; provides a half duplex ISI interface to a 1100 Series Host Processor Word Channel; 32 data bits plus two odd strapable parity bits; maximum of four per 8596-98; requires F2943-00	4,000	17	105	85
F1947-00	Series 90 Byte Interface; provides interface to Series 90 Host Byte or Block Multiplexer Channel; maximum of two per 8596-991-98 or 1945-00; mutually exclusive with F2943-00	4,000	17	105	85
F1948-00	16-bit Peripheral Interface; provides interface to a peripheral subsystem or another DCP/40 or DCP system; allows operation in 80 or 16-bit mode; odd strapable parity bit provided; requires F2943-00	3,000	13	80	65
F1949-00	8-bit Interface for peripherals such as flexible disk on 8596-99/-98	1,045	4	30	25
F1941-00	Full Duplex Interface to Asynchronous Data Sets; conforms to EIA RS232-C and CCITT V.24 and V.28; data set rates of 45.5, 50, 56.8, 74.2, 15, 100, 110, 134.5, 150, 200, 300, 600, 1050, 1200, 1800, or 2400 bps	740	3	20	15
F1942-00	Full Duplex Interface to Synchronous Data Sets; conforms to EIA RS232-C and CCITT V.24 and V.28; data set rates up to 9600 bps	740	3	20	15
F3163-00	Full Duplex Interface to Synchronous Modems; conforms to EIA RS232-C and CCITT V.24 and V.28; operates with Bell DDS up to 9600 bps; line module may be loaded with microprogram with data formats for protocols including UDLC (up to 19,200 bps) BSC (up to 9600 bps), REM1 (up to 19,200 bps), and 1100 FDX (up to 19,200 bps)	1,275	6	35	30
F3164-01	Full Duplex Interface to carrier facilities conforming to CCITT V.35; UDLC protocol data formats; V.35 facilities (48K bps), Bell DDS and DSDS facilities (56K bps)	3,745	16	100	80
F1945-00	Auto Dialing Line Module; interface to Bell 801 Automatic Calling Units or those conforming to CCITT V.24 and V.25	1,005	4	25	20
8406-00	Diskette Drive; 256K bytes	3,360	17	93	70
8406-02	Diskette Drive; 256K bytes, 50 Hz	3,360	17	93	70
F2338-00	Second Diskette Drive; installs with 8406-00	1,040	10	29	22
F2338-02	Second Diskette Drive; 50 Hz	1,040	10	29	22
8408-02	Cartridge Disk Control for up to two drives	5,564	25	139	104
F2380-04	Fixed/Removable Cartridge Disk Drive; five megabytes fixed, five megabytes removable	17,750	96	418	314
F2380-06	220-240 Volt version	17,750	96	418	314
F2187-00	Second I/O Interface for dual F2380 configuration	1,568	7	39	29
0871-01	Uniservo 10 Magnetic Tape Unit; 9 track, PE/NRZI, 1600/800 bpi, 25 ips	13,425	72	280	210
F2721-00	Uniservo 10 Controller; for up to two 0871-01 drives	10,320	43	270	215
F2879-00	AC Power Switch; for remote control of second 0871-01 power from DCP/40	1,200	5	30	25
3542-93	DCP Console; includes logic cabinet, 15 inch CRT and power supply	6,690	55	170	125
0786-56	Console Printer; 200 cps unidirectional; interfaces to 3542-93	5,250	30	140	117
0786-54	Console Printer; 200 cps bidirectional; interfaces to 3542-93	6,960	50	180	155
0774-90	Console Printer; 300 cps; interfaces to 3542-93	2,630	20	71	50
1928-03	Type II Scanner; provides the capability to control data between the 8596-98 and up to 128 half duplex or 64 full duplex communications lines	23,000	61	575	431
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	10	59	44
F2263-02	Expansion; for line adapter positions 96 to 128	1,120	4	28	21
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	11
F1801-02	With speed scan option for data rates up to 230.4 bps; operates on ports 0 and 4 as a full duplex pair; one per 1928-03	600	3	15	11
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	7	43	32
F1869-01	Auto Line Speed Detection; provides 1928-03 with the capability to automatically determine operation characters such as character length; one per 1928-03	452	3	11	9
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	9

*Lease charges do not include maintenance.

UNIVAC 1100/60 System
EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Monthly 1-Year*	Lease Charge 5-Years*
DATA COMMUNICATIONS (Continued)					
F1826-00	Synchronous Line Adapter for 1928-03; provides full duplex interface to data sets conforming to RS-232C and CCITT V.24 and V.28	760	7	19	16
F1826-01	With supervisory channel up to 150 bps asynchronous; requires two line adapter positions	1,160	9	29	25
F1827-00	With modem interface conforming to Mil-STD-188C and MIL STD-188C and and MIL STD-188-100 low level	760	7	19	16
F1828-00	Asynchronous Line Adapter for 1928-03; provides full duplex interface to data sets conforming to RS-232C and CCITT V.24 and V.28	600	6	15	13
F1828-01	With reverse channel up to five bps for Bell 202-type modems	760	7	19	16
F1828-02	With a supervisory channel up to 150 bps asynchronous; requires two line adapter positions	920	9	23	20
F1829-00	With interface conforming to MIL-STD 188C and MIL-STD-188-100 low level	600	6	15	13
F1830-00	Wideband Line Adapter for 1928-03; provides capability to connect one synchronous full duplex line for operation at 19.2, 40.8, 50 or 230K-bps; for use with AT&T 300 Series Data Set	920	9	23	20
F1831-00	Dial Adapter for 1928-03; provides interface for attachment to one Bell 801 Automatic Calling Unit; requires F1928, F1926 or F1835	600	6	15	13
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	6	15	13
F1834-00	Wideband Line Adapter; similar to F1830-00 but modem	920	9	23	20
F1835-00	TWX Line Adapter for 1928-03; interfaces the US TWX Network	600	6	15	13
F1836-00	Telex Line Adapter for 1928-03; interfaces the Western Union Telex in the US				
F2519-00	Full Duplex Interface to Asynchronous Data Sets for 1928-03; conforms to RS-232C 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	7	19	14
F2521-00	Interface for 1928-03; provides input of parallel data from touch tone telephone sets via Bell 407A/B Data Station	1,000	10	25	19
TERMINALS**					
3536-89	Uniscope 100 Display Terminal; 960 or 1024 characters; 64 character set	3,175	51	77	54
F1241-04	Expands Uniscope 100 character set to 96 characters	680	16	11	30
3542-99	Uniscope 200 Display Terminal; 1536 or 1920 characters; 64 character set	4,252	51	106	74
F2044-01	Expands Uniscope 200 character set to 96 characters	701	—	16	11
3542-98	Uniscope 200 with international 64 character set	4,252	51	106	74
F2044-03	Expands Uniscope 200 international character set to 96 characters For Uniscope 100 and 200	701	—	16	11
F1844-00	Uniscope 100 Numeric Keyboard	270	2	7	5
F1844-01	Uniscope 100 Upper Case Alpha Keyboard	300	2	12	8
F1844-02	Uniscope 100 Upper/Lower Case Alpha Keyboard	300	2	12	8
F1844-03	Uniscope 100 Upper Case Alpha Typewriter and numeric Keyboard	490	2	19	13
F1844-04	Uniscope 100 Upper/Lower Case Alpha Typewriter and Numeric Keyboard	490	2	19	13
F1844-05	Same as F1844-01 but with protected format keys	300	2	12	8
F1844-06	Same as F1844-02 but with protected format keys	300	2	12	8
F1844-07	Same as F1844-03 but with protected format keys	490	2	19	13
F1844-08	Same as F1844-04 but with protected format keys	490	2	19	13
F1466-00	Special Function keyset for automatic disconnect	108	1	3	2
F1245-00	Direct Interface; 2400, 4800, or 9600 bps	470	5	11	8
F1245-01	Synchronous Interface to a modem or terminal multiplexer	470	5	11	8
F1245-02	Asynchronous Interface to a modem or terminal multiplexer; 300, 600, 1200, 1600, 1800, or 2400 bps	470	5	11	8
F1245-13	Synchronous Interface to an IBM 2701 and SDAII or 2703 and synchronous base z via modem or terminal multiplexer	470	5	11	8
F1245-14	Asynchronous Interface to an IBM 2701 and Terminal Adapter III; 300, 600, 1200, 1600, 1800, or 2400 bps	470	5	11	8
F1247	Auxiliary Peripheral Interface	310	—	10	7
8538-99	Terminal Multiplexer; for up to eight terminals	1,781	6	50	38
F1264-00	Multiplexer Expansion; expands number of terminals to 16	356	—	12	9
8538-97	Same as 8538-99 but for modems F 1970-00 and F 1970-01	1,680	6	48	36
F1266-00	Synchronous/Asynchronous Interface to a modem terminal multiplexer	356	—	12	9
F1266-02	Direct Interface with clock for connection to a CTMC or DCS without modem; 2400, 4800, 9600 bps	320	—	11	8
0786-00	Unidirectional Matrix Printer; 200 cps	4,540	32	120	102
0786-02	Bidirectional Matrix Printer; 200 cps	6,250	64	160	140
F2656-01	Printer Interface to Uniscope	400	—	10	8
F2696-00	Converts 0786-00 to 0786-02	1,710	21	40	38
F2648-00	Document Parking Bar; for removal of single forms	114	1	3	2
F2646-00	Option for 6 or 8 lines per inch	151	1	4	3
F2647-00	Vertical Form Unit; 6 lines per inch	228	1	6	5
F2647-02	Vertical Form Unit; 8 lines per inch	228	1	6	5
8541-06	Printwheel Printer; 30 cps	2,596	33	74	56
F1780-00	Variable Forms Length Feature	195	1	6	5
0774-96	300 cps terminal printer	2,320	24	61	43
0866-97	Dual Drive Magnetic Tape Cassette; 700K bytes each	1,947	32	62	39
F2142-00	Tape Cassette Option; read after writing, writing enhanced protect format, off-line cassette to cassette copying and off-line cassette to printer transfer	577	—	15	11
F2142-01	Adds search by identifier, writing of ASCII record separators and copy to address	906	—	26	20

* Lease charges do not include maintenance
**For pricing on the UTS 400, see Report 70D-877-06

UNIVAC 1100/60 System

SOFTWARE PRICES

		Monthly Lease Charge
6107-11	Optima 1100 Project Management System	$300
6503-00	Aset-1100 Author System for Education and Training	
6510-00	Unis-1100 ASCII Master Data Processor (MDP)	150*
6150-01	Unis-1100 ASCII Inventory Management (IM)	300*
6510-02	Unis-1100 ASCII Planning and Schedule/Work Order Management (PSWOM)	300*
6510-97	Unis-1100 MOP/IM Combination	450*
6510-98	Unis-1100 IM/PSWOM Combination	600*
6510-99	Unis-1100 MDP/IM/PSWOM Combination	750*
6523-00	Unidas Information Storage and Retrieval System	600
6547-00	Sperry Univac Financial Integrated Control System (SUFICS) 1100	700
6547-01	SUFICS 1100 Risk Analysis	60
6547-02	SUFICS 1100 Hierarchical Consolidate	100
6547-03	SUFICS 1100 Symbolic Editor and Renumbering Routine	180
6162-00	Checkpoint/Restart	100
6133-00	Data Processor	50
6175-00	Integrated Recovery Utility	300
6161-00	Performance Analysis Routines	200
6158-00	Quota Input Processor	150
6167-00	Sentry	500
6166-00	Simulation Library	50
6135-00	Sort/Merge	100
6163-00	Terminal Security System	150
6148-00	Communications Management System (CMS)	350
6169-01	CMS 1100 General Communications System	350
6169-00	CMS 1100 DCP	500
6170-00	Conversational Time Sharing System	250
6177-00	Define File Processor	50
6155-00	Data Management System (DMS) 1100	750
6176-00	Data Dictionary	300
6168-00	M/S (MATH-PAK/STAT-PAK)	200
6174-00	Functional Mathematical Programming System (FMPS)	500
6174-01	FMPS—Gamma	200
6147-00	High Volume Time Sharing	500
6168-00	Comprehensive Mathematical and Statistical Library	200
6159-00	Processor Common Communications System	100
6152-00	Processor Common Input/Output System	50
6157-00	Query Language Processor (QLP) 1100	300
6157-01	QLP 1100 with PCIOS Interface	350
6157-00	Remote Processing System	200
6179-00	Universal Terminal System 400	100
6143-00	Univac Automatic Document System	400
6143-01	IICOMP-80	
6143-01	IICOMP-80 Device Handler (Information International Comp 80 Micro-File Recording System)	50
6143-02	APS 4 Device Handler (Autologic Inc. APS4 CRT Phototype Setting System)	50
6172-00	APL 1100	400
6134-00	APT 1100	275
6134-01	APT 1100 with lathe capabilities	350
6171-00	UBASIC	100
6178-00	Syntax Analyzer for UBASIC	50
6153-00	COBOL, ASCII character recognition	200
6149-00	Syntax Analyzer for ASCII, COBOL and DMS 1100	100
6130-02	COBOL, UTS 400	95
6154-00	FORTRAN, ASCII character recognition	300
6150-00	Syntax Analyzer for ASCII, FORTRAN	100
6165-00	General Syntax Analyzer	85
6160-00	MACRO	100
6151-00	PL/1	200
6164-00	RPG 1100	100
6144-00	DCP/40 MCC Emulate Operating System	75
6136-00	DCP/40 DCP Emulate Operating System	90
6136-01	DCP/40 Operating System	115
6136-99	DCP/40-MCC Operating System	150
6136-98	DCP/40-DCP Operating System	150

*This charge applies to rented, leased, or purchased equipment in existing installations.

1100/60

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The 1100/60 AVP incorporates system features found in both Series 90 and 1100/60 processors. On the VS/9 side, the hardware includes a CPU with a logic bus structure and microcode control similar to the Univac 90/80 family. In addition, the reliability features of the 90/80, such as parity checking, control store, and duplicate adders, have been maintained and applied to the AVP. The 1100/60 System Support Processor (SSP) is also included, and provides partitioning, system control, maintenance, and console management functions.

The system's main memory ranges from 524K (2 megabytes) to 1048K words (4 megabytes). An 8K word (32K bytes) cache unit provides buffer storage of instructions and data between the 1100 Main Storage Unit (MSU) and the AVP CPU. The cache is designed to improve CPU performance while reducing the number of requests into the MSU.

I/O operations are handled by the 1100/60 AVP using a new software product, the Attached Processor Control Software (APCS). The 1100/60 AVP can accommodate VS/9 random access data files via direct, logical, or local attachment. The Direct Attachment feature permits disk subsystems of the Series 90 systems to attach directly to the 1100/60 block multiplexer channel. Files written for VS/9 can be run on the 1100/60 AVP without change. The Logical Attachment facility permits the VS/9 user to utilize current technology random access devices, such as the Univac 8470 (564 megabytes) disk drive, that are not included in standard VS/9 configurations. The third access mode, Local Attachment, permits devices available for VS/9 operation, but not for OS 1100, to be run on the 1100/60 AVP. The devices are attached to an optional block multiplexer channel.

Tape volumes written on the Series 90 can be processed by the 1100/60 AVP without modification. All VS/9 spooling to printer, card reader and card punch devices is simulated through APCS using standard OS 1100 spooling facilities.

Several VS/9 software products have been modified for use in the 1100 Series. Those unbundled products are IMS 1100, based on the IMS/90 transaction processing system; the Interactive Processing System 1100; a full-screen display text editor called EDIT 1100; the Programmers Advanced Debugging System, PADS 1100; and an industry compatible RPG II compiler.

For conversion from VS/9 to OS 1100, Univac is offering a bundled series of programs and services called the Univac Conversion Assistance Program (UCAP). The major element in UCAP is the Univac Integrated Management, Planning Analysis, and Conversion tools (IMPACT). The primary components of IMPACT are System Analysis Software, the Planning and Scheduling System, and the Conversion Project Control System. Other conversion aids include language converters for COBOL, FORTRAN, and PL/1, an Assembly Language to ASCII COBOL translator, and file compare and conversion routines.

1100/60

New Product Announcement

A low-range 1100/60 AVP complex, including an 1100/60 C1 with 524K words (2 megabytes) of memory and an AVP, costs $440,684. A top-end system using a 1048K-word (4 megabytes) 1100/60 E1 and an AVP costs $701,598. The monthly lease prices for the 1100/60 C1 and E1 complexes are $8,427 and $13,352, respectively. The initial systems are to be delivered in December, 1982.

1100/61 MODELS E1 and E2: To further enhance its 1100/60 family of systems, Univac introduced the 1100/61 E1 and E2 uniprocessors on September 24, 1980. A dual-processor version of each system, known as the 1100/62 E1 and E2, is also available. The new systems bring the total number of 1100/60 processors to ten—six uniprocessors and four multiprocessors.

System architecture on the 1100/61 models E1 and E2 is similar to other models in the 1100/60 family. Both processors have a 2K word cache memory for increased performance. The E2 has the 1100/60 Extended Instruction Set. Each system has an I/O unit with one block multiplexer channel and one word channel module, 524K words (2 megabytes) of main storage, a System Support Processor (SSP), a system console with printer, and a maintenance console. The main memory is expandable to 1048K words (4 megabytes) of storage. Both systems can be field upgraded to the high performance H1 and H2 uniprocessor. The model E1 can be field upgraded to the model E2. The models C1 and C2 can be field upgraded to the E1 and E2. The model E1 has 45 percent more power than the C1, and the E2 has 40 percent more performance than the C2 when running standard business applications. All peripherals and I/O devices available with 1100/60 systems can be used with the 1100/61 models E1 and E2. Performance on the 1100/61 E1 is estimated to be slightly higher than the IBM 4341-1 and the 1100/61 E2 is about 15 percent less than the 4341-2.

A basic 1100/61 E1 with 524K words (2 megabytes), 2K word (8K bytes) cache, I/O processor, and SSP with consoles costs $518,975. A five-year lease costs $11,342 per month. The 1100/61 E2, configured the same, costs $555,545, and leases over five years for $12,139 monthly, including maintenance. The first system deliveries are scheduled for first quarter 1981.

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.*	Monthly 5-Year Lease	Monthly Support Service
1100/60 ATTACHED VIRTUAL PROCESSOR					
1100/60 C1	AVP Processor Complex with 524K words of memory	$440,684	$1,601	$ 8,427	$550
1100/60 E1	AVP Processor Complex with 1048K words of memory	701,598	2,022	13,352	750
1100/61 PROCESSORS					
3042-75	Model E1 processor with 524K words of memory, 2K words cache memory	518,975	1,552	9,790	750
3042-72	Model E2 processor with 524K words of memory, 2K words cache memory, Extended Instruction Set	555,545	1,659	10,480	750
F2917-00	System upgrade from Model E1 to E2	91,424	107	1,725	—
1952-95	System upgrade from Model E1 to H1, also E2 to H2	212,370	321	4,005	—
3042-69	Dual-processor conversion for Model E1; adds second processor to 3043-75	444,670	1,659	8,390	—
3042-66	Dual-processor conversion for Model E2; adds second processor to 3042-72	481,240	1,766	9,080	—
			Monthly Charge		
SOFTWARE FOR 1100/60 AVP					
IMS 1100	Transaction Processing System		$185		
EDIT 1100	Text Editor		300		
IPS 1100	Interactive Processing System		900		
PADS 1100	Program Debugging System		200		
	RPG II		125		
	Univac Conversion Assistance Program (UCAP)		NC		

*Monthly maintenance is normally not included in monthly lease prices and must be added on.□