UNIVAC 1106 & 1108

MANAGEMENT SUMMARY

The UNIVAC 1106 and 1108 are large-scale computer systems that are being successfully employed in a broad range of scientific, business, communications, and real-time applications, ranging from conventional batch processing to airline reservation systems. The 1108 has long been recognized as one of the most reliable and effective large-scale systems on the market. The newer 1106 provides most of the same features in a slower and considerably less costly package.

The UNIVAC 1108 was introduced in July 1964 as a single-processor system. Initial customer deliveries were made in July 1965. Simultaneously, UNIVAC announced the availability of multiprocessor configurations of the 1108, which were initially delivered late in 1967. More than 200 UNIVAC 1108 systems are now in use around the world.

Although the 1108 has the 36-bit word length and binary arithmetic facilities of the "classical" (i.e., IBM 704-style) scientific computer, UNIVAC was foresighted enough to endow it with a number of additional capabilities that make it suitable for virtually the entire spectrum of ▷

The UNIVAC 1108 has a well-deserved reputation as one of the most effective large-scale computer systems on the market. The slower, lower-priced UNIVAC 1106 and several other recent developments have significantly reduced the cost of 1100-style computing.

CHARACTERISTICS

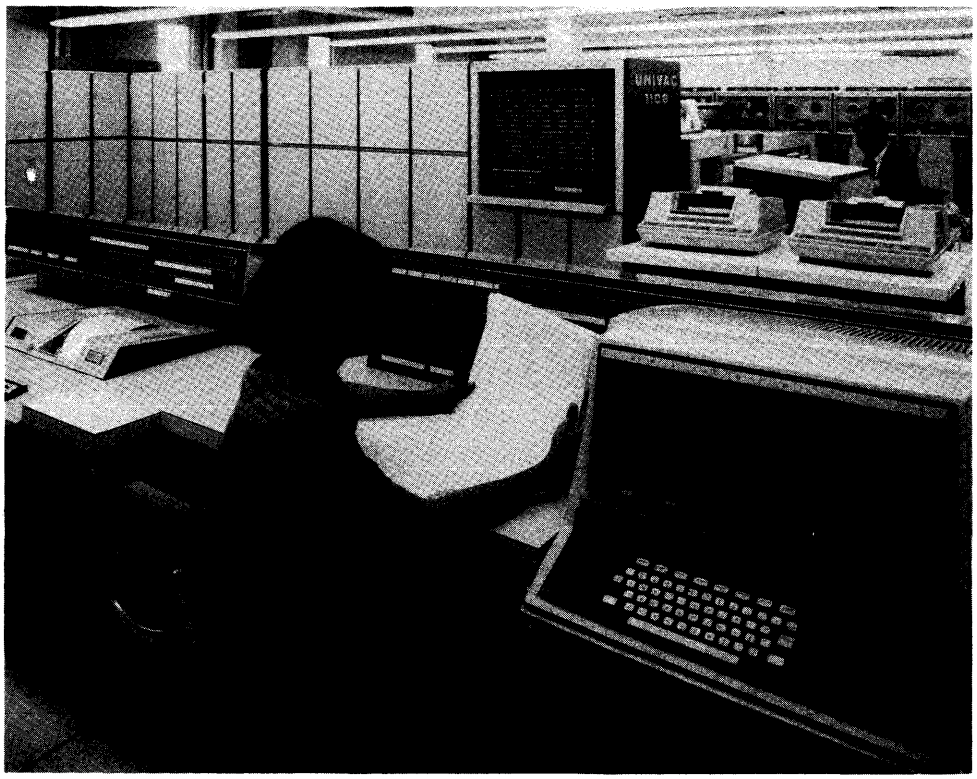
MANUFACTURER: UNIVAC Division, Sperry Rand Corporation, P.O. Box 500, Blue Bell, Pa. 19422

MODELS: UNIVAC 1106 and 1108.

DATA FORMATS

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

FIXED-POINT OPERANDS: One 36-bit word. Addition and subtraction can also be performed upon 2-word (72-bit) operands and upon 18-bit half-words and 12-bit third-words; the leftmost bit holds the sign in each case. Moreover, partial words of 6, 9, 12, or 18 bits can be transferred into and out of the arithmetic and control registers. ▶



The UNIVAC 1108 Display Console provides comprehensive system control facilities through a CRT display, Keyboard, Pagewriter, and indicator panel.

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large-scale computer applications. Among these features are:

- Large main storage capacity—65,536 to 262,144 words.
- High internal speed—most 1108 instructions can be executed in a single 750-nanosecond core cycle through overlapped accessing of instructions and data stored in separate core modules.
- Modularity—an 1108 multiprocessor system can include up to three central processors and two I/O controllers, and the system can readily be reconfigured for "fail-soft" operation.
- Real-time capabilities—two clocks, a powerful interrupt system, storage protection facilities, and a group of registers accessible only to the operating system equip the 1108 for a wide range of real time, communications, and multiprogramming functions.
- Control registers—128 integrated-circuit registers, including 16 accumulators and 15 index registers, enhance the power and flexibility of the 1108 Processor.
- Partial-word operands—although no decimal arithmetic facilities are provided, partial words of 6, 9, 12, or 18 bits can be conveniently manipulated.
- Drum storage—UNIVAC offers a variety of reliable drum units, ranging from head-per-track FH-432 Drums with a 4.3-millisecond average access time to moving-head Fastrand III units capable of storing up to 198 million characters.

The UNIVAC 1106 was introduced in March 1969, with deliveries beginning in December 1969. Completely program-compatible with the 1108, the 1106 has a core cycle time of 1.5 microseconds—exactly half as fast—and a price tag that is lower by at least $14,000 a month for comparable system configurations. Also, the 1106 is offered only in single-processor configurations. Users who are attracted by the proven capabilities of the 1108 but do not require all of its processing power are finding the 1106 to be a very attractive alternative.

A considerably more powerful system, the 1110, has long been under development at UNIVAC, but its introduction has repeatedly been delayed. It now appears likely that the 1110 will be unveiled late in 1970.

Meanwhile, a number of recent UNIVAC announcements have further increased the capabilities and/or lowered the prices of the 1106 and 1108 systems:

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

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

INTERNAL CODE: A 6-bit BCD code, Fieldata, is used for the line printers and console devices; the processors are not code-sensitive and can conveniently manipulate data in any 6-bit or 9-bit code.

MAIN STORAGE

STORAGE TYPE: Magnetic core.

CAPACITY: 1106—65,536, 131,072, 196,608, or 262,144 words of Multi-Modular Storage (consisting of two 32,768-word modules per 65K bank), or 131,072 or 262,144 words of Unitized Storage (which is only half as costly but precludes overlapped accessing of instructions and data). 1108—65,536, 131,072, 196,608, or 262,144 words, with each 65K bank composed of two 32,768-word modules. A minimum of 131K words are required for a multiprocessor system and for the use of EXEC 8 in any 1106 or 1108 system.

CYCLE TIME: 1.5 microseconds per word for the 1106, and 0.75 microsecond per word for the 1108. Except in the case of 1106 Unitized Storage, each 32K-word module operates independently, permitting overlapped accessing of instructions and data when they are located in different modules.

CHECKING: Parity bit with each half-word is checked whenever storage is referenced.

STORAGE PROTECTION: The Storage Limits Register, loaded by the Executive System, defines the upper and lower boundaries of both the instruction area and data area that may be referenced by the currently active user program. Any attempt to reference an address beyond these limits causes an interrupt. The setting of a bit in the Processor State Register determines whether the protection is against write operations only or against all reads, writes, and jumps.

CENTRAL PROCESSORS

REGISTERS: Each processor has 128 program-addressable control registers. Each integrated-circuit register is 36 bits long and has a cycle time of 166 nanoseconds in the 1106 and 125 nanoseconds in the 1108. Users' programs can make use of 15 index registers, 16 accumulators (4 of which also serve as index registers), 8 unassigned registers (which can be used for fast-access temporary storage), a Repeat Count Register, a Mask Register, and a Processor State Register. Accessible only to the Executive System are 32 I/O access control registers, duplicate sets of 15 index registers and 16 accumulators, and a real-time clock register which is decremented every 200 microseconds.

INDEXING: Operand addresses can be modified by the contents of any of the 15 index registers. If desired, the

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- In October 1969, UNIVAC introduced an alternative core memory system for the 1106. Called Unitized Storage, it costs only half as much as the original Multi-Modular Storage—but performance is degraded because the Unitized Storage does not permit overlapped accessing of instructions and data.

- Also in October 1969, UNIVAC announced Unitized Channel Storage, a large-capacity auxiliary core memory (up to 1,048,576 words) that uses the same peripheral interface and software as the UNIVAC drum subsystems. For users who can afford its high prices, UCS expedites multiprogramming by permitting extremely rapid swapping of programs into and out of main storage.

- During the same month, UNIVAC expanded the 1100 Series peripheral complement by adding the Uniservo 12 and 16 Magnetic Tape Units, which provide increased performance at about the same price as the earlier Uniservo VI C and VIII C drives, and the 8414 Disc Drive, an IBM 2314-compatible disc pack storage unit.

- In January 1970, UNIVAC unveiled the 1108 Shared Processing System. The 1108 SP is a bargain-priced dual-processor configuration in which one processor handles all I/O functions while the other is dedicated to computing. UNIVAC figures that the two processors, sharing a common core memory of 131K to 262K words, provide roughly two-thirds more computational capacity than an 1108 Unit Processor.

- In August 1970, UNIVAC significantly reduced the price of main storage in 1108 systems with capacities of 196K or 262K bytes. The monthly rental for a storage expansion from 65K to 262K words, for example, was reduced from $31,320 to $21,930—a saving of 30 percent. In addition to making the 1108 more attractive to new buyers, the price reductions are designed to encourage present users to add more storage and to upgrade from EXEC II to the more powerful EXEC 8 Operating System.

The UNIVAC 1108 was originally conceived as an improved version of the second-generation UNIVAC 1107 system. The 1107, initially delivered in 1962, had been well received by scientific computer users. In addition to its effective hardware design, a major factor in the 1107's success was its drum-based software, which resulted in compilation speeds and overall operational efficiency substantially higher than those of most of the competitive systems of the early 1960's.

The 1108 is largely program-compatible with the 1107 and offers more than five times the internal speed, as well as larger storage capacities and useful new facilities such as contents of the index register can be automatically incremented by any specified value each time the register is referenced.

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

INSTRUCTION REPERTOIRE: Consists of 144 instructions, all one word in length. Most instructions specify the address of one operand in core storage and one of the 16 accumulators. Complete binary arithmetic facilities are provided for single-precision fixed-point and both single and double-precision floating-point operands. Addition and subtraction can also be performed on double-precision fixed-point operands and on 18-bit half-words and 12-bit third-words. Also included are extensive facilities for testing, shifting, searching, and logical operations. Not available, however, are instructions for decimal arithmetic, radix conversion, code translation, or editing.

INSTRUCTION TIMES: See table below. All times are in microseconds and are for alternate-bank memory accessing (instructions and data in separate banks). For same-bank accessing (as in the 1106 with Unitized Storage), execution time for each instruction is increased by one core cycle.

	1106	1108
Fixed-point add/subtract (36 bits)	1.50	0.75
Fixed-point add/subtract (72 bits)	3.17	1.63
Fixed-point multiply (36 bits)	3.67	2.38
Fixed-point divide (36 bits)	13.95	10.13
Floating-point add/subtract (single precision)	3.00	1.88
Floating-point multiply (single precision)	4.00	2.63
Floating-point divide (single precision)	11.50	8.25
Floating-point add/subtract (double precision)	4.50	2.63
Floating-point multiply (double precision)	6.67	4.25
Floating-point divide (double precision)	24.00	17.25
Load/store (36, 18, 12, 9, or 6 bits)	1.50	0.75
Load/store (72 bits)	3.00	1.50

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

INTERRUPTS: A program interrupt facility causes storage of the Processor State Register's current contents and a transfer of control to one of 28 fixed core storage locations whenever one of the following conditions occurs: completion of an I/O operation, abnormal condition in an I/O subsystem, processor or main storage fault, program error, or program-requested interrupt.

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storage protection and double-precision arithmetic. Thus, the 1108 quickly superseded the 1107. More significantly, the similarity between the two machines provided UNIVAC with a virtually ready-made complement of software for the 1108. The EXEC II Operating System and its associated assembler and compilers, which had been developed for the 1107, were revised slightly and made available to initial users of the 1108.

As a result, UNIVAC found itself in the enviable position of being able to offer a powerful large-scale computer, supported by field-proven software, during a period in the mid-1960's when IBM, GE, and several other firms were encountering severe difficulties in developing the software to go with their third-generation computers. This combination of circumstances led to rapid worldwide acceptance of the 1108, which in turn has been one of the principal factors in UNIVAC's recent resurgence to an important—and highly profitable—position in the computer industry.

But the EXEC II software, which ranked among the best of the second-generation operating systems, leaves much to be desired when measured by current standards. Oriented toward batch-mode processing, it provides no facilities for true multiprogramming, multiprocessing, data communications, time-sharing, or real-time functions (although a number of sophisticated users, such as Computer Sciences Corporation, have modified EXEC II to provide some of these facilities).

To enable 1108 users to take full advantage of the system's outstanding hardware capabilities, UNIVAC set out to develop a comprehensive new operating system called EXEC 8. Not surprisingly, UNIVAC's software designers then ran into most of the same monumental development problems as their competitors. As a result, EXEC 8's arrival was long delayed—and now that it's available, many users are reporting lower-than-promised operational efficiencies together with higher-than-planned core storage requirements. The most recently released versions of EXEC 8, however, reflect considerable improvements in these areas.

EXEC 8's capabilities, if not its performance to date, are impressive indeed. It furnishes comprehensive supervisory and control facilities for three distinct modes of multiprogrammed operation: batch, demand (or time-sharing), and real-time (or communications). EXEC 8 users can choose from a wide variety of programming languages, including COBOL, FORTRAN, ALGOL, BASIC, JOVIAL, and assembly language.

In direct price/performance confrontations, the UNIVAC 1106 and 1108 usually compare quite favorably with the large IBM System/360 models and other competitive systems. UNIVAC's decision to keep its pricing fully "bundled" gives it an additional cost advantage over IBM

CONSOLE: The Display Console is a free-standing I/O subsystem used to monitor and direct the system's operations. It is connected to I/O Channel 15 of every 1100 Series Processor. The console consists of an operator's control and indicator panel, a CRT capable of displaying 16 lines of 64 characters each, a typewriter-style keyboard for data entry, a UNIVAC Pagewriter Printer capable of printing 80-character lines at 25 characters per second, and a day clock that displays the time of day and furnishes timing information to the central processor.

INPUT/OUTPUT CONTROL

I/O CHANNELS: The basic 1106 Processor has 4 I/O channels, expandable in 4-channel increments to a maximum of 16 channels.

The basic 1108 II Processor has 8 I/O channels, expandable in 4-channel increments to a maximum of 16. Each 1108 I/O Controller has 4 channels, expandable in 4-channel increments to a maximum of 16.

The 1108 Shared Processing System includes 8 channels in the I/O Processor, expandable in 4-channel increments to a maximum of 16.

CONFIGURATION RULES: An 1106 system consists of an 1106 Processor with 4 to 16 I/O channels, Display Console, either 65K to 262K words of Multi-Modular Storage or 131K or 262K words of Unitized (non-overlapped) Storage, and associated peripheral subsystems.

An 1108 Unit Processor System consists of one 1108 II Processor with 8 to 16 I/O channels, Display Console, 65K to 262K words of main storage, and associated peripheral subsystems.

An 1108 Multiprocessor System consists of one to three 1108 II Processors (each with Display Console and 8 to 16 I/O channels), one or two I/O Controllers, 131K to 262K words of main storage, and associated peripheral subsystems. In addition, a Multi-Module Access (MMA) is required for each 65K storage module, a Shared Peripheral Interface (SPI) is required for each peripheral subsystem to be accessed by two Processors or I/O Controllers, and an Availability Control Unit (ACU) is required to control the system configuration in systems that include more than one Processor.

An 1108 Shared Processing System consists of an I/O Processor with 8 to 16 I/O channels, a Main Processor dedicated to computational activities, a Display Console, 131K to 262K words of main storage, an MMA for each 65K storage module, and associated peripheral subsystems.

Each peripheral subsystem fully occupies one or two I/O channels, depending upon the type of control unit employed. (See the descriptions of specific Mass Storage and Input/Output Units below.)

SIMULTANEOUS OPERATIONS: One input or output operation on each I/O channel can occur simultaneously with computing. In 1108 Multiprocessor Systems, each Processor, each I/O Controller, and each main storage module can operate simultaneously and independently.

MAXIMUM I/O DATA RATES: 1106 Processor—286,000 words/second on each I/O channel and 667,000 words/

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The UNIVAC 1106 offers most of the same features as the faster 1108 in a considerably less costly package.

and other unbundled manufacturers. But IBM's recent introduction of the System/370 has closed the price/performance gap. It's a new ball game now. And it will be interesting to see what new announcements and pricing strategies will be forthcoming as UNIVAC strives to retain and further improve its currently strong position in the large-scale computer market. □

second total for the system. 1108 Processor–444,000 words/second on each I/O channel and 1,333,000 words/second total for all channels on a single processor. 1108 I/O Controller–250,000 words/second on each I/O channel and 1,333,000 words/second total for all channels on a single controller.

I/O INTERFERENCE: For most peripheral subsystems, one core storage cycle is required for each 36-bit word transferred to or from memory.

MASS STORAGE

UNITIZED CHANNEL STORAGE (UCS): Provides extremely rapid random access to up to 1,048,576 words (6,291,456 characters) of data in magnetic core storage. Data transfer rate is 2.6 million characters per second, with no loss of time due to rotational delays. Uses the same peripheral interface and software as the UNIVAC drum subsystems. Each UCS subsystem consists of a control unit and one to four 262,144-word storage modules. The subsystem can be shared between processors in a multiprocessor system. Announced in October 1969, UCS is scheduled for initial customer deliveries in the fourth quarter of 1970.

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 in 3 tracks in parallel, and each 3-track group holds 2,048 words. Average access time is 4.3 milliseconds. Data transfer rate ranges from 1,440,000 down to 90,000 characters per second, depending upon the degree of interlacing employed. An FH-432 subsystem consists of a control unit and one to eight drums. FH-432 and FH-1782 drums can be intermixed in the same subsystem, and dual-channel access to a subsystem is possible through the use of two control units and appropriate special features.

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

FH-880 MAGNETIC DRUM: Provides three times the storage capacity of the FH-432 Drum with an access time four times as long. Stores 786,432 words (4,718,592 characters) in 768 data tracks, each served by a fixed read/write head. Data is read and written in 6 tracks in parallel, and each 6-track group holds 6,144 words. Average access time is 17 milliseconds. Maximum data transfer rate is 360,000 characters per second. An FH-880 subsystem consists of a single-channel control unit and one to eight drums.

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FASTRAND MASS STORAGE: Provides moderately fast access to large quantities of data stored on magnetic drums. Each Fastrand unit is served by 64 read/write heads. The heads are mounted on a common positioning unit that moves laterally, allowing each head to serve 192 tracks. Average head positioning time is 57 milliseconds, and average rotational delay is 35 milliseconds. Data is stored in 28-word sectors. An off-line search capability enables the Fastrand unit to search for a specific data record and notify the central processor when it is found.

Two models of Fastrand Mass Storage are currently being marketed. Fastrand II stores 22,020,096 words (132 million characters) in each drum unit, while Fastrand III, which has a 50 percent higher recording density, stores 33,030,144 words (198 million characters) in each unit. Data transfer rate is 153,600 characters per second for Fastrand II and 230,400 characters per second for Fastrand III.

An optional feature called Fastband adds 24 fixed read/write heads, each serving one track, with an average access time of 35 milliseconds. The Fastband option increases the storage capacity by 43,008 words per Fastrand II unit or 64,512 words per Fastrand III unit.

A Fastrand II or III subsystem consists of a single- or dual-channel control unit and from one to eight drums. The dual-channel control unit permits simultaneous operations on any two drums in the subsystem.

8414 DISC DRIVE: Provides large-capacity random-access storage in interchangeable 11-disc packs which are physically compatible with the IBM 2316 Disk Packs used in the IBM 2314 Direct Access Storage Facility. Each pack stores up to 29.17 million bytes of data. Up to 145,880 bytes (20 tracks) can be read or written at each position of the comb-type access mechanism. Average head movement time is 60 milliseconds, average rotational delay is 12.5 milliseconds, and data transfer rate is 312,000 bytes/second. Record lengths are variable, with each track capable of holding up to 7,294 eight-bit bytes. The File Scan and Record Overflow features are standard.

An 8414 subsystem consists of a control unit and two to eight disc drives; the Multi-Subsystem Adapter (MSA) and Function Buffer Expansion Feature are prerequisites. A dual-access subsystem can be configured by adding a second control unit and the MSA Expansion feature.

INPUT/OUTPUT UNITS

UNISERVO VI C MAGNETIC TAPE UNIT: A low-cost tape drive that reads and records data on standard 1/2-inch tape in IBM-compatible formats. Available in both 9-track and 7-track versions. Tape speed is 42.7 inches per second, forward or backward. The 9-track version has a recording density of 800 bpi, while the 7-track version can operate at 200, 556, or 800 bpi. The 9-track model transfers 45,547 six-bit characters (or 34,160 bytes) per second, while the 7-track model transfers a maximum of 34,160 characters per second (at 800 bpi). A Uniservo VI C subsystem consists of up to 16 tape units (4 "master" units and 12 "slave" units) connected to a single- or dual-channel control unit.

UNISERVO VIII C MAGNETIC TAPE UNIT: Reads and records data on standard 1/2-inch tape in IBM compatible formats. Available in both 9-track and 7-track versions. Tape speed is 120 inches per second, and backward reading is a standard feature. The 9-track version has a recording density of 800 bpi, while the 7-track version can operate at 200, 556, or 800 bpi. The 9-track model transfers 128,000 six-bit characters (or 96,000 bytes) per second, while the 7-track model transfers a maximum of 96,000 characters per second (at 800 bpi). A Uniservo VIII C subsystem consists of up to 16 tape units connected to a single- or dual-channel control unit.

UNISERVO 12 MAGNETIC TAPE UNIT: A medium-speed tape drive that reads and records data on standard 1/2-inch tape in IBM-compatible formats. Available in both 9-track and 7-track versions. Tape speed is 42.7 inches per second, forward or backward. The standard 9-track version has a recording density of 1600 bpi (in phase-encoded mode) and a data rate of 68,320 bytes (or 91,000 six-bit characters) per second; the optional Dual Density feature permits operation at 800 bpi (in NRZI mode) at a data rate of 34,160 bytes per second—the same speed as the Uniservo VI C. The 7-track version can operate at 200, 556, or 800 bpi, with corresponding data rates of 8,540, 23,740, or 34,160 characters per second. A Uniservo 12 subsystem consists of up to 16 tape units (4 "master" units and 12 "slave" units) connected to a single- or dual-channel control unit; the Multi-Subsystem Adapter is a prerequisite. Uniservo 12 and Uniservo 16 tape units can be intermixed in the same subsystem, provided they are not dual-access units.

UNISERVO 16 MAGNETIC TAPE UNIT: A high-speed tape drive that reads and records data on standard 1/2-inch tape in IBM-compatible formats. Available in both 9-track and 7-track versions. Tape speed is 120 inches per second, forward or backward. The standard 9-track version has a recording density of 1600 bpi (in phase-encoded mode) and a data rate of 192,000 bytes (or 256,000 six-bit characters) per second; the optional Dual Density feature permits operation at 800 bpi (in NRZI mode) at a data rate of 96,000 bytes per second. The 7-track version operates at 200, 556, or 800 bpi, with corresponding data rates of 24,000, 66,720, or 96,000 characters per second. A Uniservo 16 subsystem consists of up to 16 tape units connected to a single- or dual-channel control unit; the Multi-Subsystem Adapter is a prerequisite. Uniservo 16 and Uniservo 12 tape units can be intermixed in the same subsystem, provided they are not dual-access units.

CARD READER: Reads 80-column cards serially by column at 900 cpm, using photodiodes with redundant read checking. Input hopper holds 3000 cards and main stacker holds 2400 cards. Error cards are routed into a 100-card reject stacker. Reads data punched in Fieldata code, row binary, or column binary. Connects to a Card Control, which uses one I/O channel and also accommodates a 300-cpm Card Punch.

CARD PUNCH: Punches 80-column cards on a row-by-row basis at 300 cpm, with read-after-punch checking. Has a 1000-card input hopper and two 850-card stackers. Can punch data in Fieldata code, row binary, or column binary. Connects to a Card Control, which uses one I/O channel and also accommodates a 900-cpm Card Reader.

HIGH-SPEED PRINTER: Prints at 1200 lpm when the full 63-character set is used and at 1600 lpm when using any 43 contiguous characters. Uses a conventional rotating-drum printing mechanism. Has 132 print positions. Skipping speed is 33 inches per second when printing at 6 lines per inch; an alternate line spacing of 8

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lines per inch can be manually selected. Handles continuous forms from 4 to 22 inches in width. Connects to a Printer Control, which occupies one I/O channel and can be expanded to control a second printer.

UNIVAC 9000 SERIES SUBSYSTEMS: A UNIVAC 9200, 9200 II, 9300, or 9300 II Computer System can be connected directly to an 1100 Series system by means of an Inter-Computer Control Unit (ICCU). The ICCU permits direct communication in the 36-bit word format. The 9000 Series system must include at least 8K bytes of storage, a multiplexer I/O channel, integrated printer, and card reader. Other 9000 Series peripheral units and features can also be used, but software support via the ICCU is limited to the card reader, punch, and printer. See Report 70C-877-01 for details about the 9000 Series Computer Systems.

UNIVAC 1107 SUBSYSTEMS: In addition to the standard 1108 peripheral devices described above, a number of 1107 subsystems can also be used with the 1108. Among these subsystems, which are no longer in production, are the Uniservo II A, III A, III C, and IV C Magnetic Tape Subsystems and the 1004 Card Processor.

COMMUNICATION CONTROLS

1106/1108 COMMUNICATIONS SUBSYSTEM: Enables an 1106 or 1108 system to transmit and receive data over up to 32 communications lines, at speeds of up to 50,000 bits per second, under direct program control of the central processor. The subsystem consists of a Communication Terminal Module Control (CTMC) which connects to any processor I/O channel, and up to 16 Communications Terminal Modules (CTM's).

Each serial CTM accommodates two full-duplex or two half-duplex lines. Transmission is in asynchronous bit-serial mode, using codes of 5, 6, 7, or 8 levels. The low-speed, medium-speed, and high-speed CTM's can handle speeds of up to 300, 1600, and 50,000 bits per second, respectively. Speeds of over 4800 bps also require a High-Speed Interface Module, which is not supported by UNIVAC software. In addition to the bit-serial CTM's, there are parallel input and output modules, which handle up to 75 eight-bit characters per second on a single line, and a single-line automatic dialing module.

WORD TERMINAL SYNCHRONOUS (WTS): Links a single synchronous communications line to an 1106 or 1108 I/O channel. Handles 6-bit character codes at speeds of 2000, 2400, or 40,800 bits per second. Communicates with main storage on a word-at-a-time basis (six 6-bit characters per word). Adds character and message parity to outgoing data and checks the parity of incoming data. Automatic dialing and unattended answering are optional features. The WTS is not supported by UNIVAC software.

COMMUNICATION TERMINAL SYNCHRONOUS (CTS): Links a single synchronous communications line to an 1106 or 1108 I/O channel. Handles 5, 6, 7, or 8-bit character codes at speeds of 2000, 2400, or 40,800 bits per second. Communicates with main storage on a character-at-a-time basis. Can generate and check parity in accordance with plugboard wiring. Automatic dialing and unattended answering are optional features.

SOFTWARE

OPERATING SYSTEMS: UNIVAC 1106 and 1108 users have a choice of two comprehensive operating systems, EXEC II and EXEC 8.

EXEC II was originally developed for the second-generation UNIVAC 1107 system. It is fully supported for the 1106 and 1108 and is still in fairly widespread use, mainly because it became available long before EXEC 8 and because it facilitated conversion for 1107 users. Also, EXEC II requires only 65K words of main storage, versus 131K for EXEC 8. EXEC II, however, provides no facilities for true multiprogramming, although multiple data transcription functions can be overlapped with the execution of one main program at a time.

EXEC 8 was developed specifically for the third-generation UNIVAC 1108. It supports batch, real-time, and time-sharing operations on 1106 and 1108 systems. Since most new users will elect to use this newer, more powerful operating system, the capabilities of EXEC 8 and its related language processors and utility routines are emphasized in this report.

EXEC II OPERATING SYSTEM: A drum-oriented operating system designed to supervise and control the sequential compilation and/or execution of user programs. The drum is used as a buffer store for I/O data and for storage of program segments, systems programs, and library programs.

The most distinctive feature of EXEC II is its emphasis upon "symbionts." A symbiont is a routine that transfers data between a peripheral device and an intermediate storage device (usually the drum). Two or more symbionts can operate simultaneously with a single user-written main program. The use of symbionts and drum buffers for I/O operations permits effective utilization of the available card readers, punches, and printers and helps to ensure that the central processor will be kept productively occupied even though only one main program at a time is being processed.

The minimum configuration for EXEC II is a UNIVAC 1106 or 1108 system with 65K words of main storage, one FH-1782 Drum or equivalent (2 million words), two magnetic tape units, and either a card reader, punch, and printer or an on-line UNIVAC 9200 or 9300 system.

EXEC II is the principal component of "Software Package B" for the UNIVAC 1107, developed for UNIVAC by Computer Sciences Corporation in the early 1960's. UNIVAC offers 1106 and 1108 users a slightly revamped version of this package, which also includes an assembler, effective drum-oriented COBOL and FORTRAN V compilers, a generalized sort/merge routine, and a variety of utility routines and application programs. An 1106 or 1108 operating under EXEC II can directly execute most programs written for an 1107, though others will require minor modifications. Also, many of the EXEC 8 programs described below, including the COBOL and FORTRAN compilers, can be run under EXEC II control.

EXEC 8 OPERATING SYSTEM: EXEC 8 is the principal operating system for the UNIVAC 1106 and 1108. It supervises and controls multiprogrammed operation in three basic processing modes: batch, demand (or conversational), and real-time.

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Batch processing jobs can be submitted either locally or remotely. EXEC 8, like EXEC II, uses symbiont routines and drum buffering for effective overlapping of multiple I/O functions with computing. A scheduling routine selects the runs to be initiated in accordance with user-assigned priorities and deadlines.

The demand processing facilities of EXEC 8 permit interactive use of the 1108 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.

Real-time and communications programs, which are subject to specific time constraints, receive top-priority handling by EXEC 8. No attempt is made to generalize the control facilities for real-time programs. Instead, EXEC 8 provides suitable facilities for interrupt handling, priority scheduling, inter-program protection, program switching, and I/O device handling, leaving it up to individual users to supply the appropriate interfaces to their programs.

The minimum configuration for EXEC 8 is a UNIVAC 1106 or 1108 system with 131K words of main storage, three FH-432 drums or equivalent (786K words), one Fastrand Mass Storage Unit or equivalent 8414 Disk Storage, two magnetic tape units, and either a card reader, punch, and printer or an on-line 9000 Series computer system. Once the EXEC 8 system has been loaded from tape, it is fully drum-oriented, and the tape units are available for other functions. Drum storage is used for permanent storage of EXEC 8 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. EXEC 8 functions occupy a minimum of 20,000 words of main storage and may require several times this amount in complex environments.

The EXEC 8 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. The Dynamic Allocator allots core space according to the needs of each individual task within a run; storage swaps between core and drum are performed when necessary to provide prompt responses to demand-processing terminals. The CPU Dispatcher controls switching of the processor from one currently active task to another; periodic time-slices can be allotted to demand-mode routines.

The multiprocessor version of EXEC 8 controls up to three 1108 II Processors and two I/O Controllers. Multiprocessing is handled as a logical extension of EXEC 8's multiprogramming capabilities. EXEC 8 maintains a list of processor activities currently waiting to be performed. Each processor in turn inspects this list, selects a suitable 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 EXEC 8 File Control System handles the creation and maintenance of program and data files, and maintains a master directory of all cataloged 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.

The EXEC 8 Indexed Sequential File Management System (ISFMS) handles the creation, accessing, and maintenance of indexed sequential files, which can be processed in either random or sequential fashion. ISFMS is designed to interface with programs coded in either COBOL or Assembler language.

COBOL: The 1108 COBOL language is a reasonably comprehensive implementation of D.O.D. COBOL-65. It includes the Table Handling, Mass Storage, Sort, and Segmentation facilities, the COMPUTE, COPY, and ENTER verbs, and several useful extensions. The MONITOR verb, for example, facilitates testing and debugging by providing dynamic printouts of the values of specified data items. The six-phase COBOL compiler runs under EXEC 8 and produces relocatable binary object programs plus diagnostic messages, source and object listings, and cross-reference listings.

In May 1970 UNIVAC announced the availability of a new COBOL compiler that conforms with the ANSI (American National Standards Institute) COBOL language specifications and runs under EXEC 8. Capabilities for indexed sequential file access are included as direct COBOL verbs.

FORTRAN V: The UNIVAC 1108 FORTRAN V language is a powerful algebraic programming system that includes, as subsets, all the facilities of ANSI (formerly USASI) FORTRAN, UNIVAC 1107 FORTRAN, and IBM 7090/7094 FORTRAN IV. Among the unusual language features of 1108 FORTRAN V are the following:

1. A variable may have up to seven subscripts, and complex subscript expressions are permitted.
2. Mixed-mode arithmetic is permitted, with only a few exceptions.
3. Backward DO loops (with decreasing index variables) are permitted.
4. The FLD function permits extraction and insertion of bit fields.
5. The DEFINE, DELETE, ENTRY, IMPLICIT, INCLUDE, and NAMELIST statements provide useful additional facilities.

The six-phase FORTRAN V compiler runs under EXEC 8 control. Primary design emphasis is on the generation of efficient object programs, with respect to both execution time and storage requirements, rather than on rapid compilation. Several types of optimization procedures are performed on each source program.

UNIVAC also offers an EXEC 8 Conversational FORTRAN Processor that permits statement-by-statement compilation and checking of FORTRAN programs by demand-mode users at remote terminals. Here the emphasis is on effective interaction between man and machine rather than on the generation of efficient object programs. The Conversational FORTRAN language is a proper subset of 1108 FORTRAN V, so programs written

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and debugged in the conversational mode can be recompiled by the FORTRAN V compiler for efficient execution. The Conversational FORTRAN user can construct, store, alter, and execute individual statements or complete routines, change the values of variables, rename variables, take checkpoints, and request information selectively.

LIFT is a source-language translator that converts programs written in the FORTRAN II language into FORTRAN V, so that they can be compiled by the 1108 FORTRAN V compiler. LIFT itself is written in FORTRAN V and runs under EXEC 8 control.

ALGOL: The UNIVAC 1108 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 EXEC 8 control.

BASIC: UNIVAC announced the availability of a BASIC compiler for demand-mode operation under EXEC 8 control in June 1970. Each BASIC-language source statement is checked for proper syntax and corrected if necessary before the next statement is accepted. 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.

OTHER COMPILERS: Also available for operation under EXEC 8 control are compilers for JOVIAL, a general-purpose procedure-oriented language that is frequently used in military command and control applications, and for two list processing languages, LISP and SNOBOL.

ASSEMBLER: The UNIVAC 1106/1108 Assembler System operates under EXEC 8 and translates programs from symbolic assembly language into relocatable machine-language object programs. The Assembler language permits direct programmer control of all the 1100 Series processing facilities. Facilities for programmer-defined macros are provided by the PROC (Procedure) and FUNC (Function) directives. There are only a few minor language differences between the EXEC 8 and EXEC II Assemblers.

UTILITY ROUTINES: The 1106/1108 Sort/Merge Package is a generalized routine that uses the 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 EXEC II and EXEC 8 Operating Systems include ample complements 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.

APPLICATION PROGRAMS: The application packages currently available from UNIVAC include:

APT III (Automatically Programmed Tools)
FMPS (Functional Mathematical Programming System)
Linear Programming System
PERT/Time and PERT/Cost
GPSS II (General Purpose Systems Simulator)
SIMULA (Simulation Language)
COPI (Computer Oriented Programmed Instruction)
FOIL (File Oriented Interpretive Language)
UIL (UNIVAC Instructional Language)

PRICING

EQUIPMENT: The following systems illustrate the wide range of configurations that are possible within the UNIVAC 1106/1108 line. All three systems can use the EXEC 8 Operating System. All necessary control units and adapters are included in the indicated prices, and the quoted rental prices include equipment maintenance.

UNIVAC 1106 TAPE/DRUM SYSTEM: Consists of one 1106 Processor with 131K words (786K characters) of Unitized Storage and 8 I/O Channels, Display Console, three FH-432 Drums (4.7 million characters), one Fastrand II Mass Storage Unit (132 million characters), four 9-track Uniservo 12 Magnetic Tape Units (68KB), 900-cpm Card Reader, 300-cpm Card Punch, and 1200/1600-lpm Printer. Monthly rental and purchase prices are approximately $26,000 and $1,185,000, respectively.

UNIVAC 1108 TAPE/DRUM SYSTEM: Consists of one 1108 II Processor with 131K words (786K characters) of Main Storage and 8 I/O Channels, plus same peripheral equipment as the UNIVAC 1106 system above. Monthly rental and purchase prices are approximately $50,600 and $2,219,000, respectively.

UNIVAC 1108 MULTIPROCESSOR SYSTEM: Consists of three 1108 II Processors, 262K words (1.572 million characters) of Main Storage, two I/O Controllers with eight channels each, three Display Consoles, one Availability Control Unit, four Multi-Module Access Units, ten Shared Peripheral Interfaces, eight FH-432 Drums with dual-channel Control Units (12.5 million characters), four Fastrand III Mass Storage Units with Dual Control (792 million characters), twelve 9-track Uniservo 16 Magnetic Tape Units (192KB) with dual-channel Control Units, two 900-cpm Card Readers, two 300-cpm Card Punches, and two 1200/1600-lpm Printers. Monthly rental and purchase prices (exclusive of the extensive data communications and remote terminal equipment normally used in a system of this type) are approximately $149,400 and $6,526,000, respectively.

SOFTWARE AND SUPPORT: UNIVAC has not "unbundled" to date, so the equipment prices listed above include all of the UNIVAC software described in this report and all normal educational courses and professional assistance. (A Basic Equipment Plan, offered only to certain self-sufficient users, provides the equipment and standard software, without UNIVAC support services, at a discount of approximately 13% from the list prices shown here.)

CONTRACT TERMS: The standard UNIVAC use and service agreements allow unlimited use of the equipment (exclusive of the time required for remedial and preventive maintenance). There are no extra-use charges. The basic maintenance charge covers maintenance of the equipment for nine consecutive hours a day, Monday through Friday. Extended periods of maintenance are available at extra cost.■

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
1106 PROCESSOR AND MAIN STORAGE				
3011-20	1106 Processor (with 4 I/O Channels)	283,230	1,165	5,900
F0680-99	I/O Channel Expansion (4 channels)	21,000	60	485
7005-60	Multi-Modular Storage; 65,536 words	205,875	375	4,290
7005-58	Multi-Modular Storage; 131,072 words	411,750	745	8,580
7005-57	Multi-Modular Storage; 196,608 words	617,625	1,120	12,865
7005-56	Multi-Modular Storage; 262,144 words	823,500	1,490	17,155
7013-04	Unitized Storage; 131,072 words	205,875	575	4,290
7013-00	Unitized Storage; 262,144 words	411,750	1,150	8,580
1108 PROCESSORS AND MAIN STORAGE				
3011-91	1108 II Processor (with 8 I/O Channels and 65,536 words of Core Storage)	1,086,900	3,070	24,840
F1053-99	Multiprocessor Capability (required on each 3011-91 in a multiprocessor system)	8,700	–	200
F0680-01	I/O Channel Expansion (4 additional channels; for 3011-91 or 3011-87)	21,000	60	485
3011-87	1108 Shared Processor (consists of an I/O Processor with 8 I/O Channels, a Main Processor dedicated to computing, 65,536 words of Core Storage and 2 MMA's)	1,500,630	4,335	32,195
7005-48	65K Storage Expansion; add to Processor for 131,072 words total	457,500	600	10,440
7005-47	131K Storage Expansion; add to Processor for 196,608 words total	640,500	1,220	14,620
7005-46	196K Storage Expanison; add to Processor for 262,144 words total	960,750	1,745	21,930
1108 MULTIPROCESSOR SYSTEM COMPONENTS				
5013-00	I/O Controller (with 4 I/O channels, 256-word index storage, and 131K addressing)	174,000	120	4,000
F0778-00	I/O Channel Expansion (4 channels)	22,620	60	520
F0790-00	Index Storage Expansion (256 words)	32,450	–	705
F0832-00	Processor Interface (for second Processor)	5,220	–	120
F0832-01	Processor Interface (for third Processor)	5,220	–	120
F0833-00	MMA Interface (for addressing 196K words)	2,610	–	60
F0833-01	MMA Interface (for addressing 262K words; F0833-00 is a prerequisite)	2,610	–	60
2506-00	Availability Control Unit (for up to 3 Processors, 2 I/O Controllers, 4 MMA's and 6 SPI's; expandable to up to 24 SPI's)	52,200	115	1,200
F0874-00	ACU Expansion (for up to 6 more SPI's)	2,830	10	65
0954-99	Multi-Module Access (permits up to 2 Processors and 1 I/O Controller to access a 65K storage module)	56,550	50	1,300
F0879-00	MMA Expansion (enables an MMA to accommodate up to 3 Processors and 2 I/O Controllers)	2,610	–	60
0955-04	Shared Peripheral Interface (permits 2 Processors or I/O Controllers to share a peripheral subsystem)	19,575	25	450
0955-05	Shared Peripheral Interface (has same functional characteristics, and shares a cabinet with, Type 0955-04 SPI)	17,400	20	400
F0789-00	SPI Expansion (adds a third interface)	3,480	5	80
F0789-01	SPI Expansion (adds a fourth interface; FO789-00 is a prerequisite)	2,375	5	55
CONSOLE				
4009-99	Display Console (includes control console, entry keyboard, CRT display, and Page-printer; one required with each 1106 or 1108 Processor)	32,625	250	750
F0774-00	Auxiliary Console (required when CTMC's are used; houses 4 CTMC's)	6,600	10	155
MASS STORAGE				
5031-00	Control Unit for Unitized Channel Storage	40,800	150	850
7013-97	Unitized Channel Storage; 262K words	270,240	630	5,630
7013-95	Unitized Channel Storage; 524K words	540,480	1,260	11,260
7013-93	Unitized Channel Storage; 786K words	810,720	1,890	16,890
7013-91	Unitized Channel Storage; 1048K words	1,080,960	2,520	22,520
5012-00	FH-432/FH-1782 Drum Control	82,515	260	1,885
F0929-00	Write Lockout Feature (for 5012-00)	1,040	5	25
F0930-00	Shared Peripheral Interface (for 5012-00)	17,905	25	415
F0930-01	SPI Expansion (adds third interface to F0930-00)	2,675	5	65
F0930-02	SPI Expansion (adds fourth interface to F0930-00)	2,060	5	50
6016-00	FH-432 Drum; 262K words	42,435	100	970
6015-00	FH-1782 Drum; 2097K words	117,210	260	2,680
F0786-01	Dual Channel Feature (for FH-432)	2,255	15	55
F0767-01	Dual Channel Feature (for FH-1782)	2,255	15	55

* Rental prices do not include equipment maintenance.

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
MASS STORAGE (continued)				
7427-03	FH-880 Drum Control	58,800	190	1,360
7304-01	FH-880 Drum; 786K words	85,165	190	1,960
5009-24	Fastrand II Control (single channel)	51,060	115	1,165
5009-77	Fastrand II Dual Control (two channels; includes Dual Access Adapter for Drum 1)	120,495	230	2,770
F0959-99	Dual Access Adapter (required for each additional drum connected to 5009-77)	1,830	10	40
6010-00	Fastrand II Storage Unit; 132 million characters	164,640	300	3,750
F0686-01	Fastbands Feature (for 6010-00)	8,235	25	190
F0688-01	Write Lockout Feature (for 6010-00)	1,040	5	25
5009-90	Fastrand III Control (single channel)	62,220	135	1,430
5009-85	Fastrand III Dual Control (two channels; includes Dual Access Adapter for Drum 1)	147,010	270	3,380
F0959-97	Dual Access Adapter (required for each additional drum connected to 5009-85)	1,830	10	40
6010-10	Fastrand III Storage Unit; 198 million characters	200,800	350	4,615
F0686-01	Fastbands Feature (for 6010-10)	8,235	25	190
F0688-01	Write Lockout Feature (for 6010-10)	1,040	5	25
5024-02	8414 Disc Control	26,400	90	550
F1043-00	Dual Channel Feature (provides access to 5024-02 from 2 I/O channels)	3,700	15	85
F1371-00	Dual Access (permits simultaneous 2-channel access when used with two 5024-02 Controls)	2,160	5	45
0961-02	Multi-Subsystem Adapter (prerequisite for 5024-02)	23,760	55	495
F1321-02	MSA Expansion (required for dual-access operation)	18,960	45	395
8414-92	Two 8414 Disc Drives; 58 million bytes	57,600	150	1,200
8414-94	Four 8414 Disc Drives; 116 million bytes	110,880	290	2,310
8414-96	Six 8414 Disc Drives; 174 million bytes	159,840	420	3,330
8414-98	Eight 8414 Disc Drives; 232 million bytes	207,840	550	4,330
F1214-00	Disc Pack (for 8414 Drives)	650	NA	20
INPUT/OUTPUT UNITS				
5008-00	Uniservo VI C Control (single channel)	31,070	35	710
5008-98	Uniservo VI C Control (dual channel)	62,140	70	1,420
F0627-04	Translator (BCD/Fieldata code; for 5008-00)	4,410	5	105
F0627-99	Translator (BCD/Fieldata code; for 5008-98)	8,820	10	210
F0706-00	9-Track Capability (for 5008-00 or 5008-98; two requried for simultaneous operation)	1,960	5	45
0858-00	Uniservo VI C Master Tape Unit; 7-track	17,350	115	400
0858-08	Uniservo VI C Master Tape Unit; 7-track (with simultaneous R/R, R/W capability)	19,800	115	455
0858-01	Uniservo VI C Slave Tape Unit; 7-track (up to 3 Slaves can be used with each Master Unit)	10,470	70	240
0858-10	Uniservo VI C Master Tape Unit; 9-track	17,350	115	400
0858-12	Uniservo VI C Master Tape Unit; 9-track (with simultaneous R/R, R/W capability)	19,800	115	455
0858-14	Uniservo VI C Slave Tape Unit; 9-track (up to 3 Slaves can be used with each Master Unit)	10,470	70	240
5008-12	Uniservo VIII C Control (single channel)	62,430	120	1,430
5008-89	Uniservo VIII C Control (dual channel)	124,860	240	2,860
F0704-00	VI C Capability (for 5008-12 or 5008-89; two required for simultaneous operation)	3,385	5	80
F0706-00	9-Track Capability (for 5008-12 or 5008-89; two required for simultaneous operation)	1,960	5	45
F0627-98	Translator (BCD/Fieldata code; for 5008-89)	8,820	10	210
F0627-04	Translator (BCD/Fieldata code; for 5008-12)	4,410	5	105
0859-00	Uniservo VIII C Magnetic Tape Unit; 7-track	32,735	110	750
0859-08	Uniservo VIII C Magnetic Tape Unit; 7-track (for dual-channel simultaneous operation)	34,045	110	780
0859-04	Uniservo VIII C Magnetic Tape Unit; 9-track	33,390	110	765
0859-10	Uniservo VIII C Magnetic Tape Unit; 9-track (for dual-channel simultaneous operation)	34,700	110	795
0961-02	Multi-System Adapter (prerequisite for Uniservo 12/16 Subsystem)			
F1321-02	MSA Expansion (required for dual-channel operation)			
5017-99	Uniservo 12 Magnetic Tape Control (for up to sixteen 9-track, 1600-bpi, nonsimultaneous Uniservo 12 Tape Units)	22,185	90	510
5017-00	Uniservo 12/16 Magnetic Tape Control (for up to sixteen 9-track, 1600-bpi, nonsimultaneous Uniservo 12 and/or Uniservo 16 Tape Units)	23,925	100	550

* Rental prices do not include equipment maintenance.

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
INPUT/OUTPUT UNITS (continued)				
F0825-00	Dual Channel Feature (for 5017-00 or 5017-99; permits nonsimultaneous operation on either of two Selector Channels)	3,700	15	85
F1131-99	Uniservo 16 Capability (for 5017-99)	1,740	10	40
F0899-00	Simultaneous Operation (for 5017-99)	16,100	65	370
F0899-99	Simultaneous Operation (for 5017-00)	17,840	75	410
F0823-99	7-Track NRZI Capability (for 5017-00 or 5017-99)	4,785	15	110
F0826-00	9-Track NRZI Capability (for 5017-00 or 5017-99)	4,785	15	110
0861-00	Uniservo 12 Master Tape Unit; 9-track, 1600 bpi (includes logic for up to 3 Slave Units)	20,015	100	460
0861-01	Uniservo 12 Slave Tape Unit; 9-track, 1600 bpi	11,745	70	270
0861-04	Uniservo 12 Master Tape Unit; 7-track, 200/556/800 bpi (includes logic for up to 3 Slave Units)	18,055	100	415
0861-05	Uniservo 12 Slave Tape Unit; 7-track, 200/556/800 bpi	10,440	70	240
F0934-99	Simultaneous Feature (for 0861-00)	3,265	15	75
F0934-98	Simultaneous Feature (for 0861-04)	3,265	15	75
F0935-00	Dual Density Feature (for 0861-00)	2,175	10	50
F1041-00	7-to-9-Track Conversion (converts 0861-04 to 0861-00)	1,960	–	45
F1042-00	7-to-9-Track Conversion (converts 0861-05 to 0861-01)	1,305	–	30
0862-00	Uniservo 16 Tape Unit; 9-track, 1600 bpi	31,755	110	730
0862-02	Uniservo 16 Tape Unit; 7-track, 200/556/800 bpi	31,755	110	730
F0937-01	Dual Density Feature (for 0862-04)	2,175	10	50
F1319-00	Dual Access Feature	2,175	10	50
5010-00	Card Control (for 1 reader and 1 punch)	28,620	265	655
0706-97	Card Reader; 900 cpm	15,385	125	355
0600-00	Card Punch; 300 cpm	21,560	230	485
5011-00	Printer Control	30,015	200	685
F0751-00	Printer Control Expansion (for second printer)	23,055	100	530
0758-00	Printer; 1200/1600 lpm	43,500	305	945
F0597-97	1004 Control (for on-line connection of a UNIVAC 1004 Card Processor)	10,230	30	240
F1095-02	1108/9000 Inter-Computer Control Unit (for on-line connection of a UNIVAC 9000 Series Computer)	8,920	45	205
DATA COMMUNICATIONS				
F0900-06	Communication Terminal Module Controller (accommodates up to 16 CTM's)	24,700	135	570
F0906-06	Spare CTMC (mounts in, and provides backup capability for, original CTMC)	9,020	50	210
F0901-04	CTM—Low Speed; up to 300 bps	2,255	15	50
F0902-02	CTM—Medium Speed; up to 1600 bps	1,895	15	70
F0903-02	CTM—High Speed; up to 50,000 bps	3,630	15	85
F0905-00	Automatic Dialing Module	635	5	15
F0904-00	Parallel Output Module; up to 75 char/sec	1,315	10	30
F0904-01	Parallel Input Module; up to 75 char/sec	1,315	10	30
F1019-01	High-Speed Interface Module; 8 duplex lines (for speeds above 4800 bps on F0903-02)	3,050	10	70
F1019-03	High-Speed Interface Module; 4 duplex lines	1,525	5	35
F0771-02	Word Terminal Synchronous (WTS) Module	14,210	160	325
8552-01	WTS Basic Cabinet (holds 2 WTS Modules)	8,380	80	190
F0614-00	Power Supply (for first WTS Module)	3,335	30	80
F0614-01	Power Supply (for second WTS Module)	3,335	30	80
F0772-00	Voice-Band Interface (connects WTS to Bell System 201 Data Set or equivalent)	225	–	5
F0772-01	Unattended Answering (F0772-00 is prerequisite)	225	–	5
F0772-02	Automatic Dialing (F0772-01 is prerequisite)	1,670	15	40
F0772-03	Broad-Band Interface (connects WTS to Bell System 301 Data Set or equivalent)	225	–	5
F0615-00	Communication Terminal Synchronous (CTS) Module	8,380	80	190
8552-00	CTS Basic Cabinet (holds 6 CTS Modules	8,380	80	190
F0614-00	Power Supply (for first 3 CTS Modules)	3,335	30	80
F0614-01	Power Supply (for second 3 CTS Modules)	3,335	30	80
F0616-00	Broad-Band Interface (connects CTS to Bell System 301 Data Set or equivalent)	3,335	30	80
F0617-00	Unattended Answering (cannot be used with F0616-00)	225	–	5
F0618-00	Automatic Dialing (F0617-00 is prerequisite)	1,670	15	41

* Rental prices do not include equipment maintenance.

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NEW PRODUCT ANNOUNCEMENT

On November 10, 1970, concurrently with the unveiling of the UNIVAC 1110 system, UNIVAC announced several significant new developments in the 1106/1108 product line: a dual-processor version of the 1106, a specialized version of the EXEC 8 Operating System called the 1106 Disc Resident System, a new Communications/Symbiont Processor, and four new new peripheral subsystems.

UNIVAC 1106 MULTIPROCESSOR SYSTEM: This new dual-processor configuration is designed for applications that require continuous, "fail-safe" operation in addition to a sizeable amount of raw computing power. A basic 1106 Multiprocessor System includes:

- Two independent 1106 Processors, each with 4 to 16 I/O channels, and each equipped with the new Multiprocessor Capability feature.
- A minimum of 131,072 words of 1.5-microsecond main storage, expandable to a maximum of 262,144 words.
- A Shared Memory Interface on each 65K main storage module.
- An Availability Control Unit that permits the hardware to be partitioned into two independent systems.
- Two CRT Display Consoles.

Software support will be furnished by the EXEC 8 Operating System. A basic 1106 Multiprocessor System without peripheral equipment rents for about $24,770 per month or sells for about $1.16 million. Deliveries are scheduled to begin in May 1971. Prices of the new 1106 Multiprocessor Capability, Availability Control Unit, and Shared Peripheral Interfaces are the same as for the corresponding 1108 components. The 1106 Shared Memory Interface sells for $28,160 or rents for $645 plus $50 maintenance.

UNIVAC 1106 DISC RESIDENT SYSTEM: This specialized version of the powerful EXEC 8 Operating System stores the non-resident Executive functions in 8414 Disc Storage instead of in the usual high-speed drums. Thus, it reduces the cost of the minimum equipment configuration required for EXEC 8, at some sacrifice in performance because of the slower disc access times. The Disc Resident System provides all the facilities of EXEC 8 and requires the following minimum configuration: an 1106 Processor, 131K words of Unitized Storage, a 4-drive 8414 Disc Subsystem, a UNIVAC 9300 Subsystem, and 2 Uniservo VI C Magnetic Tape Units. The system will be available in March 1971.

COMMUNICATIONS/SYMBIONT PROCESSOR: The C/SP is an independently programmed computer designed to relieve the main 1100 Series processors of the processing functions associated with the control of data communications and card and printer I/O operations. Announced along with the UNIVAC 1110, the C/SP can also be included in UNIVAC 1106 or 1108 configurations for improved communications capabilities. For details and pricing of the C/SP, please refer to the UNIVAC 1110 report (70C-877-12).

NEW PERIPHERAL EQUIPMENT: The four new peripheral subsystems, announced with the UNIVAC 1110 and also available for use with 1106 and 1108 systems, are:

- The large-capacity 8440 Disc Subsystem, whose characteristics are similar to (though not compatible with) the IBM 3330.
- The 320KB Uniservo 20 Magnetic Tape Unit.
- The Type 0768-02 Printer, which connects to an on-line UNIVAC 9300 or C/SP and provides both upper and lower case printing.
- The 1000-cpm Type 0716 Card Reader, which connects to an on-line UNIVAC 9300 or C/SP.

For details about these peripheral subsystems, please refer to the UNIVAC 1110 report (70C-877-12).

UNIVAC 1106 & 1108

and debugged in the conversational mode can be recompiled by the FORTRAN V compiler for efficient execution. The Conversational FORTRAN user can construct, store, alter, and execute individual statements or complete routines, change the values of variables, rename variables, take checkpoints, and request information selectively.

LIFT is a source-language translator that converts programs written in the FORTRAN II language into FORTRAN V, so that they can be compiled by the 1108 FORTRAN V compiler. LIFT itself is written in FORTRAN V and runs under EXEC 8 control.

ALGOL: The UNIVAC 1108 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 EXEC 8 control.

BASIC: UNIVAC announced the availability of a BASIC compiler for demand-mode operation under EXEC 8 control in June 1970. Each BASIC-language source statement is checked for proper syntax and corrected if necessary before the next statement is accepted. 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.

OTHER COMPILERS: Also available for operation under EXEC 8 control are compilers for JOVIAL, a general-purpose procedure-oriented language that is frequently used in military command and control applications, and for two list processing languages, LISP and SNOBOL.

ASSEMBLER: The UNIVAC 1106/1108 Assembler System operates under EXEC 8 and translates programs from symbolic assembly language into relocatable machine-language object programs. The Assembler language permits direct programmer control of all the 1100 Series processing facilities. Facilities for programmer-defined macros are provided by the PROC (Procedure) and FUNC (Function) directives. There are only a few minor language differences between the EXEC 8 and EXEC II Assemblers.

UTILITY ROUTINES: The 1106/1108 Sort/Merge Package is a generalized routine that uses the 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 EXEC II and EXEC 8 Operating Systems include ample complements 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.

APPLICATION PROGRAMS: The application packages currently available from UNIVAC include:

APT III (Automatically Programmed Tools)
FMPS (Functional Mathematical Programming System)
Linear Programming System
PERT/Time and PERT/Cost
GPSS II (General Purpose Systems Simulator)
SIMULA (Simulation Language)
COPI (Computer Oriented Programmed Instruction)
FOIL (File Oriented Interpretive Language)
UIL (UNIVAC Instructional Language)

PRICING

EQUIPMENT: The following systems illustrate the wide range of configurations that are possible within the UNIVAC 1106/1108 line. All three systems can use the EXEC 8 Operating System. All necessary control units and adapters are included in the indicated prices, and the quoted rental prices include equipment maintenance.

UNIVAC 1106 TAPE/DRUM SYSTEM: Consists of one 1106 Processor with 131K words (786K characters) of Unitized Storage and 8 I/O Channels, Display Console, three FH-432 Drums (4.7 million characters), one Fastrand II Mass Storage Unit (132 million characters), four 9-track Uniservo 12 Magnetic Tape Units (68KB), 900-cpm Card Reader, 300-cpm Card Punch, and 1200/1600-lpm Printer. Monthly rental and purchase prices are approximately $31,800 and $1,109,000, respectively.

UNIVAC 1108 TAPE/DRUM SYSTEM: Consists of one 1108 II Processor with 131K words (786K characters) of Main Storage and 8 I/O Channels, plus same peripheral equipment as the UNIVAC 1106 system above. Monthly rental and purchase prices are approximately $57,900 and $2,144,000, respectively.

UNIVAC 1108 MULTIPROCESSOR SYSTEM: Consists of three 1108 II Processors, 262K words (1.572 million characters) of Main Storage, two I/O Controllers with eight channels each, three Display Consoles, one Availability Control Unit, four Multi-Module Access Units, ten Shared Peripheral Interfaces, eight FH-432 Drums with dual-channel Control Units (12.5 million characters), four Fastrand III Mass Storage Units with Dual Control (792 million characters), twelve 9-track Uniservo 16 Magnetic Tape Units (192KB) with dual-channel Control Units, two 900-cpm Card Readers, two 300-cpm Card Punches, and two 1200/1600-lpm Printers. Monthly rental and purchase prices (exclusive of the extensive data communications and remote terminal equipment normally used in a system of this type) are approximately $159,900 and $6,704,000, respectively.

SOFTWARE AND SUPPORT: UNIVAC has not "unbundled" to date, so the equipment prices listed above include all of the UNIVAC software described in this report and all normal educational courses and professional assistance. (A Basic Equipment Plan, offered only to certain self-sufficient users, provides the equipment and standard software, without UNIVAC support services, at a discount of approximately 13% from the list prices shown here.)

CONTRACT TERMS: The standard UNIVAC use and service agreements allow unlimited use of the equipment (exclusive of the time required for remedial and preventive maintenance). There are no extra-use charges. The basic maintenance charge covers maintenance of the equipment for nine consecutive hours a day, Monday through Friday. Extended periods of maintenance are available at extra cost.■

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
1106 PROCESSOR AND MAIN STORAGE**				
3011-20	1106 Processor (with 4 I/O Channels)	283,230	1,246	6,195
F0680-99	I/O Channel Expansion (4 channels)	21,000	64	485
7005-60	Multi-Modular Storage; 65,536 words	205,875	401	4,504
7005-58	Multi-Modular Storage; 131,072 words	411,750	797	9,009
7005-57	Multi-Modular Storage; 196,608 words	617,625	1,198	13,508
7005-56	Multi-Modular Storage; 262,144 words	823,500	1,594	18,012
7013-04	Unitized Storage; 131,072 words	205,875	615	4,504
7013-99	Unitized Storage; 262,144 words	411,750	1,230	9,009
1108 PROCESSORS AND MAIN STORAGE				
3011-91	1108 II Processor (with 8 I/O Channels and 65,536 words of Core Storage)	1,086,900	3,284	24,845
F1053-99	Multiprocessor Capability (required on each 3011-91 in a multiprocessor system)	8,700	–	200
F0680-01	I/O Channel Expansion (4 additional channels; for 3011-91 or 3011-87)	21,000	64	485
3011-87	1108 Shared Processor (consists of an I/O Processor with 8 I/O Channels, a Main Processor dedicated to computing, 65,536 words of Core Storage and 2 MMA's)	1,500,630	4,638	32,195
7005-48	65K Storage Expansion; add to Processor for 131,072 words total	457,500	642	10,440
7005-47	131K Storage Expansion; add to Processor for 196,608 words total	640,500	1,305	14,620
7005-46	196K Storage Expanison; add to Processor for 262,144 words total	960,750	1,867	21,930
1108 MULTIPROCESSOR SYSTEM COMPONENTS				
5013-00	I/O Controller (with 4 I/O channels, 256-word index storage, and 131K addressing)	174,000	128	4,000
F0778-00	I/O Channel Expansion (4 channels)	22,620	64	520
F0790-00	Index Storage Expansion (256 words)	32,450	–	705
F0832-00	Processor Interface (for second Processor)	5,220	–	120
F0832-01	Processor Interface (for third Processor)	5,220	–	120
F0833-00	MMA Interface (for addressing 196K words)	2,610	–	60
F0833-01	MMA Interface (for addressing 262K words; F0833-00 is a prerequisite)	2,610	–	60
2506-00	Availability Control Unit (for up to 3 Processors, 2 I/O Controllers, 4 MMA's and 6 SPI's; expandable to up to 24 SPI's)	52,200	123	1,200
F0874-00	ACU Expansion (for up to 6 more SPI's)	2,830	10	68
0954-99	Multi-Module Access (permits up to 2 Processors and 1 I/O Controller to access a 65K storage module)	56,550	53	1,300
F0879-00	MMA Expansion (enables an MMA to accommodate up to 3 Processors and 2 I/O Controllers)	2,610	–	60
0955-04	Shared Peripheral Interface (permits 2 Processors or I/O Controllers to share a peripheral subsystem)	19,575	26	472
0955-05	Shared Peripheral Interface (has same functional characteristics, and shares a cabinet with, Type 0955-04 SPI)	17,400	21	420
F0789-00	SPI Expansion (adds a third interface)	3,480	5	80
F0789-01	SPI Expansion (adds a fourth interface; FO789-00 is a prerequisite)	2,375	5	55
CONSOLE				
4009-99	Display Console (includes control console, entry keyboard, CRT display, and Page-printer; one required with each 1106 or 1108 Processor)	32,625	267	750
F0774-00	Auxiliary Console (required when CTMC's are used; houses 4 CTMC's)	6,600	10	155
MASS STORAGE				
5031-00	Control Unit for Unitized Channel Storage	40,800	160	892
7013-97	Unitized Channel Storage; 262K words	270,240	674	5,911
7013-95	Unitized Channel Storage; 524K words	540,480	1,348	11,822
7013-93	Unitized Channel Storage; 786K words	810,720	2,022	17,733
7013-91	Unitized Channel Storage; 1048K words	1,080,960	2,696	23,644
5012-00	FH-432/FH-1782 Drum Control	82,515	278	1,979
F0929-00	Write Lockout Feature (for 5012-00)	1,040	5	26
F0930-00	Shared Peripheral Interface (for 5012-00)	17,905	26	435
F0930-01	SPI Expansion (adds third interface to F0930-00)	2,675	5	68
F0930-02	SPI Expansion (adds fourth interface to F0930-00)	2,060	5	52
6016-00	FH-432 Drum; 262K words	42,435	107	1,018
6015-00	FH-1782 Drum; 2097K words	117,210	278	2,814
F0786-01	Dual Channel Feature (for FH-432)	2,255	16	57
F0767-01	Dual Channel Feature (for FH-1782)	2,255	16	57

* Rental prices do not include equipment maintenance.
**See page 70C-877-11n for prices of 1106 II and 1106 Multiprocessor components.

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
MASS STORAGE (continued)				
7427-03	FH-880 Drum Control	58,800	203	1,360
7304-01	FH-880 Drum; 786K words	85,165	203	1,960
5009-24	Fastrand II Control (single channel)	33,190	123	1,165
5009-77	Fastrand II Dual Control (two channels; includes Dual Access Adapter for Drum 1)	78,320	246	2,770
F0959-99	Dual Access Adapter (required for each additional drum connected to 5009-77)	1,830	10	40
6010-00	Fastrand II Storage Unit; 132 million characters	107,015	321	3,750
F0686-01	Fastbands Feature (for 6010-00)	8,235	26	190
F0688-01	Write Lockout Feature (for 6010-00)	1,040	5	25
5009-89	Fastrand III Control (single channel)	62,220	144	1,430
5009-85	Fastrand III Dual Control (two channels; includes Dual Access Adapter for Drum 1)	147,010	288	3,380
F0959-97	Dual Access Adapter (required for each additional drum connected to 5009-85)	1,830	10	40
6010-10	Fastrand III Storage Unit; 198 million characters	200,800	374	4,615
F0686-01	Fastbands Feature (for 6010-10)	8,235	26	190
F0688-01	Write Lockout Feature (for 6010-10)	1,040	5	25
5024-02	8414 Disc Control	26,400	90	550
F1043-00	Dual Channel Feature (provides access to 5024-02 from 2 I/O channels)	3,700	15	85
F1371-00	Dual Access (permits simultaneous 2-channel access when used with two 5024-02 Controls)	2,160	5	45
0961-02	Multi-Subsystem Adapter (prerequisite for 5024-02)	23,760	58	519
F1321-02	MSA Expansion (required for dual-access operation)	18,960	48	414
8414-92	Two 8414 Disc Drives; 58 million bytes	33,000	130	820
8414-94	Four 8414 Disc Drives; 116 million bytes	66,000	260	1,540
8414-96	Six 8414 Disc Drives; 174 million bytes	99,000	390	2,160
8414-98	Eight 8414 Disc Drives; 232 million bytes	132,000	520	2,680
F1214-00	Disc Pack (for 8414 Drives)	650	NA	20
INPUT/OUTPUT UNITS				
5008-00	Uniservo VI C Control (single channel)	31,070	37	745
5008-98	Uniservo VI C Control (dual channel)	62,140	74	1,490
F0627-04	Translator (BCD/Fieldata code; for 5008-00)	4,410	5	110
F0627-99	Translator (BCD/Fieldata code; for 5008-98)	8,820	10	220
F0706-00	9-Track Capability (for 5008-00 or 5008-98; two requried for simultaneous operation)	1,960	5	47
0858-00	Uniservo VI C Master Tape Unit; 7-track	17,350	123	420
0858-08	Uniservo VI C Master Tape Unit; 7-track (with simultaneous R/R, R/W capability)	19,800	123	477
0858-01	Uniservo VI C Slave Tape Unit; 7-track (up to 3 Slaves can be used with each Master Unit)	10,470	74	252
0858-10	Uniservo VI C Master Tape Unit; 9-track	17,350	123	420
0858-12	Uniservo VI C Master Tape Unit; 9-track (with simultaneous R/R, R/W capability)	19,800	123	477
0858-14	Uniservo VI C Slave Tape Unit; 9-track (up to 3 Slaves can be used with each Master Unit)	10,470	74	252
5008-12	Uniservo VIII C Control (single channel)	40,580	128	1,501
5008-89	Uniservo VIII C Control (dual channel)	81,160	256	3,002
F0704-00	VI C Capability (for 5008-12 or 5008-89; two required for simultaneous operation)	2,200	5	84
F0706-00	9-Track Capability (for 5008-12 or 5008-89; two required for simultaneous operation)	1,960	5	47
F0627-98	Translator (BCD/Fieldata code; for 5008-89)	8,820	10	220
F0627-04	Translator (BCD/Fieldata code; for 5008-12)	4,410	5	110
0859-00	Uniservo VIII C Magnetic Tape Unit; 7-track	21,275	117	802
0859-08	Uniservo VIII C Magnetic Tape Unit; 7-track (for dual-channel simultaneous operation)	22,130	117	834
0859-04	Uniservo VIII C Magnetic Tape Unit; 9-track	21,700	117	802
0859-10	Uniservo VIII C Magnetic Tape Unit; 9-track (for dual-channel simultaneous operation)	22,555	117	834
0961-02	Multi-System Adapter (prerequisite for Uniservo 12/16 Subsystem)	23,760	58	519
F1321-02	MSA Expansion (required for dual-channel operation)	18,960	48	414
5017-99	Uniservo 12 Magnetic Tape Control (for up to sixteen 9-track, 1600-bpi, nonsimultaneous Uniservo 12 Tape Units)	22,185	90	510
5017-00	Uniservo 12/16 Magnetic Tape Control (for up to sixteen 9-track, 1600-bpi, nonsimultaneous Uniservo 12 and/or Uniservo 16 Tape Units)	23,925	100	550

* Rental prices do not include equipment maintenance.

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UNIVAC 1106 & 1108

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
INPUT/OUTPUT UNITS (continued)				
F0825-00	Dual Channel Feature (for 5017-00 or 5017-99; permits nonsimultaneous operation on either of two Selector Channels)	3,700	15	85
F1131-99	Uniservo 16 Capability (for 5017-99)	1,740	10	40
F0899-00	Simultaneous Operation (for 5017-99)	16,100	65	370
F0899-99	Simultaneous Operation (for 5017-00)	17,840	75	410
F0823-99	7-Track NRZI Capability (for 5017-00 or 5017-99)	4,785	15	110
F0826-00	9-Track NRZI Capability (for 5017-00 or 5017-99)	4,785	15	110
0861-00	Uniservo 12 Master Tape Unit; 9-track, 1600 bpi (includes logic for up to 3 Slave Units)	20,015	107	482
0861-01	Uniservo 12 Slave Tape Unit; 9-track, 1600 bpi	11,745	74	283
0861-04	Uniservo 12 Master Tape Unit; 7-track, 200/556/800 bpi (includes logic for up to 3 Slave Units)	18,055	107	435
0861-05	Uniservo 12 Slave Tape Unit; 7-track, 200/556/800 bpi	10,440	74	252
F0934-99	Simultaneous Feature (for 0861-00)	3,265	16	78
F0934-98	Simultaneous Feature (for 0861-04)	3,265	16	78
F0935-00	Dual Density Feature (for 0861-00)	2,175	10	52
F1041-00	7-to-9-Track Conversion (converts 0861-04 to 0861-00)	1,960	—	47
F1042-00	7-to-9-Track Conversion (converts 0861-05 to 0861-01)	1,305	—	31
0862-00	Uniservo 16 Tape Unit; 9-track, 1600 bpi	31,755	110	730
0862-02	Uniservo 16 Tape Unit; 7-track, 200/556/800 bpi	31,755	110	730
F0937-01	Dual Density Feature (for 0862-04)	2,175	—	50
F1319-00	Dual Access Feature	2,175	10	50
5010-00	Card Control (for 1 reader and 1 punch)	28,620	283	687
0706-97	Card Reader; 900 cpm	15,385	133	372
0600-00	Card Punch; 300 cpm	21,560	246	485
5011-00	Printer Control	30,015	213	718
F0751-00	Printer Control Expansion (for second printer)	23,055	107	556
0758-00	Printer; 1200/1600 lpm	43,500	326	992
F0597-97	1004 Control (for on-line connection of a UNIVAC 1004 Card Processor)	10,230	32	240
F1095-02	1108/9000 Inter-Computer Control Unit (for on-line connection of a UNIVAC 9000 Series Computer)	8,920	48	215
DATA COMMUNICATIONS				
F0900-06	Communication Terminal Module Controller (accommodates up to 16 CTM's)	24,700	144	598
F0906-06	Spare CTMC (mounts in, and provides backup capability for, original CTMC)	9,020	53	220
F0901-04	CTM—Low Speed; up to 300 bps	2,255	16	52
F0902-02	CTM—Medium Speed; up to 1600 bps	2,895	16	73
F0903-02	CTM—High Speed; up to 50,000 bps	3,630	16	89
F0905-00	Automatic Dialing Module	635	5	15
F0904-00	Parallel Output Module; up to 75 char/sec	1,315	10	31
F0904-01	Parallel Input Module; up to 75 char/sec	1,315	10	31
F1019-01	High-Speed Interface Module; 8 duplex lines (for speeds above 4800 bps on F0903-02)	3,050	10	73
F1019-03	High-Speed Interface Module; 4 duplex lines	1,525	5	36
F0771-02	Word Terminal Synchronous (WTS) Module	14,210	171	341
8552-01	WTS Basic Cabinet (holds 2 WTS Modules)	8,380	85	199
F0614-00	Power Supply (for first WTS Module)	3,335	32	84
F0614-01	Power Supply (for second WTS Module)	3,335	32	84
F0772-00	Voice-Band Interface (connects WTS to Bell System 201 Data Set or equivalent)	225	—	5
F0772-01	Unattended Answering (F0772-00 is prerequisite)	225		
F0772-02	Automatic Dialing (F0772-01 is prerequisite)	1,670	—	5
F0772-03	Broad-Band Interface (connects WTS to Bell System 301 Data Set or equivalent)	225	16 —	42 5
F0615-00	Communication Terminal Synchronous (CTS) Module	8,380	85	199
8552-00	CTS Basic Cabinet (holds 6 CTS Modules	8,380	85	199
F0614-00	Power Supply (for first 3 CTS Modules)	3,335	32	84
F0614-01	Power Supply (for second 3 CTS Modules)	3,335	32	84
F0616-00	Broad-Band Interface (connects CTS to Bell System 301 Data Set or equivalent)	3,335	32	84
F0617-00	Unattended Answering (cannot be used with F0616-00)	225	—	5
F0618-00	Automatic Dialing (F0617-00 is prerequisite)	1,670	16	43

* Rental prices do not include equipment maintenance.

This price list reflects the UNIVAC price changes that became effective on February 1, 1972. Monthly maintenance charges for most components were increased by 7%, and monthly rental prices of the 1106 mainframe and many peripheral devices were increased by 5%.

UNIVAC 1106 & 1108

NEW PRODUCT ANNOUNCEMENT

On November 10, 1970, concurrently with the unveiling of the UNIVAC 1110 system, UNIVAC announced several significant new developments in the 1106/1108 product line: a dual-processor version of the 1106, a specialized version of the EXEC 8 Operating System called the 1106 Disc Resident System, a new Communications/Symbiont Processor, and four new new peripheral subsystems. Then, in January 1972, UNIVAC introduced the faster 1106 II system.

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- Two independent 1106 Processors, each with 4 to 16 I/O channels, and each equipped with the new Multiprocessor Capability feature.
- A minimum of 131,072 words of main storage, expandable to a maximum of 262,144 words.
- A Shared Memory Interface on each 65K main storage module.
- An Availability Control Unit that permits the hardware to be partitioned into two independent systems.
- Two CRT Display Consoles.

Software support is furnished by the EXEC 8 Operating System.

UNIVAC 1106 II: This new model, introduced on January 19, 1972, delivers processing power intermediate between that of the original 1106 and the faster 1108. The 1106 II uses a standard 1106 processor and 131K to 262K words of multi-modular core storage with a cycle time of 1.0 microsecond, compared with 1.5 microseconds for the 1106 and 0.75 microsecond for the 1108. The new system is available in both unit processor and multiprocessor configurations. Software support is furnished by the EXEC 8 Operating System. The 1106 II was available for benchmark testing at announcement time, and customer deliveries began in March 1972.

The UNIVAC 1100 family of computers now includes the 1106, 1106 II, and 1108 – all available in either unit processor or multiprocessor systems – and the multiprocessor UNIVAC 1110.

UNIVAC 1106 DISC RESIDENT SYSTEM: This specialized version of the powerful EXEC 8 Operating System stores the non-resident Executive functions in 8414 Disc Storage instead of in the usual high-speed drums. Thus, it reduces the cost of the minimum equipment configuration required for EXEC 8, at some sacrifice in performance because of the slower disc access times. The Disc Resident System provides all the facilities of EXEC 8 and requires the following minimum configuration: an 1106 Processor, 131K words of Unitized Storage, a 4-drive 8414 Disc Sub-System, a UNIVAC 9300 Subsystem, and 2 Universo VI C Magnetic Tape Units.

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- The 1000-cpm Type 0716 Card Reader, which connects to an on-line UNIVAC 9300 or C/SP.

For details about these peripheral subsystems, please refer to the UNIVAC 1110 report (70C-877-12).

EXTENDED-TERM LEASES: In addition to the basic 1-year agreement, UNIVAC now offers long-term leases for the 1100 Series Systems at significantly lower monthly rates. Under a 5-year "level-payment" agreement, the monthly equipment charge is 75% of the 1-year rental rate. Under a 5-year "reducing-payment" agreement, the monthly equipment charge is 85% of the 1-year rental rate during the first year, 80% the second year, 75% the third year, 70% the fourth year, and 65% the fifth year. The 1108 (but not the 1106) is also available under a 3-year or 4-year lease, at a monthly equipment charge of 90% or 82.5% of the 1-year rental rate, respectively.

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
1106 PROCESSORS AND MAIN STORAGE				
3011-20	1106 Processor (with 4 I/O channels)	283,230	1,246	6,195
FO680-99	I/O Channel Expansion (4 channels)	21,000	64	485
F1053-98	Multiprocessor Capability (required on each 3011-20 Processor in a multiprocessor system)	8,700	0	200
Unitized Storage; 1.5 microsecond cycle time:				
7013-04	131,072 words	205,875	615	4,504
7013-99	262,144 words	411,750	1,230	9,009
Storage I (Multi-Modular); 1.5 microsecond cycle time:				
7005-60	65,536 words	205,875	401	4,504
7005-58	131,072 words	411,750	797	9,009
7005-57	196,608 words	617,625	1,198	13,508
7005-56	262,144 words	823,500	1,594	18,012
Storage II (Multi-Modular); 1.0 microsecond cycle time:				
7005-42	131,072 words	474,540	897	10,909
7005-41	196,608 words	713,748	1,298	16,408
7005-40	262,144 words	953,215	1,694	21,913
1106 MULTIPROCESSOR SYSTEM COMPONENTS				
2506-00	Availability Control Unit (for up to 2 Processors, 4 MMA's, and 6 SPIs; expandable to a maximum of 24 SPI's)	52,200	123	1,200
F0874-00	ACU Expansion (for up to 6 more SPI's)	2,830	10	68
0955-04	Shared Peripheral Interface (permits 2 Processors to share a peripheral subsystem)	19,575	26	472
0955-05	Shared Peripheral Interface (has same functional characteristics, and shares a cabinet with, Type 0955-04 SPI)	17,400	21	420
F1384-98	Unitized MMA (allows 3 Processors to access a 131K module of Unitized Storage)	40,237	75	925
0962-99	Shared Memory Interface (allows 2 Processors to access a 65K module of 1.5-microsecond Multi-Modular Storage)	28,160	50	645
0954-99	Storage II MMA (allows 2 Processors to access a 65K module of 1.0-microsecond Multi-Modular Storage)	56,550	53	1,300

*Rental prices do not include equipment maintenance.