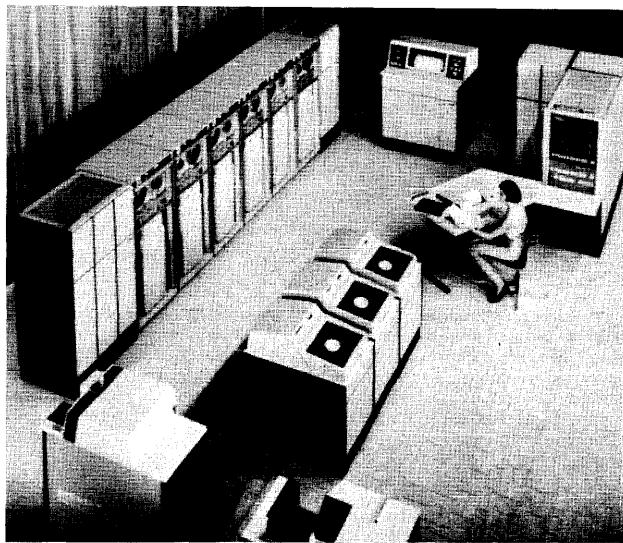


# UNIVAC 9400



## MANAGEMENT SUMMARY

The medium-scale UNIVAC 9400 was introduced in January 1968 as the third member of UNIVAC's 9000 Series product line. It offers considerably higher performance than the small-scale 9200 and 9300 systems which were announced 19 months earlier. Despite repeated indications that larger processors would soon be added to the 9000 Series to create a System/360-style family, the 9400 at this writing (December 1969) remains the largest member of the series. Customer deliveries began in May 1969.

Like the 9200/9300 systems, the 9400 makes use of monolithic integrated circuits and UNIVAC's plated-wire main memory. Also, like the 9200 and 9300, the 9400 has an overall design that is similar to that of the IBM System/360—except for a smaller instruction set that omits about one-fourth of the standard System/360 instructions and all of the floating-point instructions.

As a result of these technological innovations and the smaller instruction repertoire, UNIVAC can offer substantially more processing power per dollar than the System/360 line. Specifically, the 9400 provides higher internal processing speeds than the System/360 Model 40 while costing less than comparable configurations of the System/360 Model 30.

Similar to the IBM System/360 in overall design, the medium-scale UNIVAC 9400 offers higher processing speeds than the System/360 Model 40 at lower prices than the Model 30. The degree of compatibility with both the IBM systems and the smaller UNIVAC 9200/9300 computers, however, is somewhat limited.

## CHARACTERISTICS

**MANUFACTURER:** UNIVAC Division, Sperry Rand Corporation, P. O. Box 8100, Philadelphia, Pa. 19101.

**MODEL:** UNIVAC 9400.

### DATA FORMATS

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

**FIXED-POINT OPERANDS:** Can range from 1 to 16 bytes (1 to 31 digits plus sign) in decimal mode; 1 halfword (16 bits) or 1 word (32 bits) in binary mode.

**FLOATING-POINT OPERANDS:** No hardware facilities; FORTRAN compiler uses 5 or 10 bytes per operand: 8 bits for binary exponent and 7 or 17 decimal digits plus sign for fraction.

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

**INTERNAL CODE:** EBCDIC or USASCII, depending upon setting of a mode bit.

### MAIN STORAGE

**STORAGE TYPE:** Plated-wire (a thin-film memory technique).

**CAPACITY:** From 24,576 to 131,072 bytes, in six sizes: 24K, 32K, 49K, 65K, 98K, or 131K bytes.

**CYCLE TIME:** 0.6 microsecond per 2-byte access.

**CHECKING:** Parity bit with each byte is generated during writing and checked during reading.

**STORAGE PROTECTION:** Optional Limits Register holds address limits of the program in operation. An interrupt is generated whenever a write operation is attempted in a storage location outside these limits.

**RESERVED STORAGE:** The first 512 bytes of main storage are reserved to hold specific operating information.

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► Unfortunately, the 9400's restricted instruction set also means that its degree of program compatibility with the System/360 is not as high as a prospective user might reasonably hope. The 9400 has 70 instructions, 65 of which are also present in the far larger System/360 instruction set. But the full System/360 repertoire includes more than 50 instructions which are not available in the 9400. Among these are all the floating-point instructions, plus numerous variations of the basic commands such as add, subtract, load, store, shift, etc.

As a result, it will be substantially easier to modify a UNIVAC 9400 assembly-language program for reassembly and execution on a System/360 than to move a System/360 program to the 9400—hardly a desirable situation from the viewpoint of UNIVAC salesmen. There is, however, a high degree of data interchangeability between the two lines, and programmers with System/360 experience can easily learn to program the 9400.

Program compatibility between the 9400 and the smaller UNIVAC 9200/9300 systems is also less than complete. The 9400 Processor has 35 instructions that are not present in the smaller processors, as well as a different set of I/O and supervisory control instructions. As a result, all programs written for 9200/9300 systems will at least have to be reassembled or recompiled prior to execution on a 9400. Thus, a 9200 or 9300 user contemplating a move to the 9400 is faced with much the same situation as a System/360 Model 20 user considering a move to one of the larger System/360 processors.

The 9400 is best suited for business data processing, and its instruction set has clearly been chosen to maximize its performance in typical commercial applications. Complete arithmetic facilities for variable-length decimal operands are provided, whereas the binary multiply and divide instructions have been left out. The nonavailability of floating-point arithmetic hardware makes the 9400 a doubtful choice for most scientific applications, even though a FORTRAN compiler with unusually powerful language facilities is offered.

Like most current UNIVAC computers, the 9400 displays a strong emphasis on data communications. The 9400 Processor can control up to 64 duplex lines, and the hardware communications facilities are well supported by the standard UNIVAC software.

The 9400 offers an adequate complement of peripheral devices, though not an outstandingly broad one by present-day standards. Three IBM-compatible tape units ►

### ► CENTRAL PROCESSORS

**INDEX REGISTERS:** The programmer has access to sixteen 32-bit general registers, which are used for indexing, base addressing, and as accumulators. (A second full set of 16 registers is used by the operating system.)

**INDIRECT ADDRESSING:** None.

**INSTRUCTION REPERTOIRE:** 70 instructions, including facilities for decimal arithmetic, binary addition and subtraction (but not binary multiplication or division), comparison, code translation, logical operations, packing, unpacking, editing, shifting, testing, branching, I/O, and supervisory control. Seven I/O and control instructions are "privileged" and usable only by the operating system. Nearly all of the other instructions are the same as instructions in the much larger repertoire of IBM System/360 Models 25 and above

**INSTRUCTION TIMES:** For 1-address binary addition of 32-bit fields: 6.0 microseconds.

For 2-address decimal addition of signed 5-digit (3-byte) fields: 22.2 microseconds.

Most instructions that use fixed-length operands are executed in 6 microseconds or less; those that use variable-length operands require substantially more time, as indicated in the above comparison of add times.

### INPUT/OUTPUT CONTROL

**I/O CHANNELS:** One multiplexer channel, which can accommodate a number of simultaneous low-speed I/O operations, is standard. One or two selector channels, each of which can handle one high-speed I/O operation at a time, can be added.

**CONFIGURATION RULES:** High-speed peripheral devices, such as Uniservo 12 and 16 Magnetic Tape Units or 8411 and 8414 Disc Drives, must be connected to a selector channel. Up to eight control units can be connected to each selector channel.

Low-speed devices, including Uniservo VI C Magnetic Tape Units and Data Communications Subsystems, are normally connected to the multiplexer channel, which can accommodate up to 8 control units and has 8 shared and 128 nonshared subchannel addresses.

**SIMULTANEOUS I/O OPERATIONS:** Concurrently with computing, the 9400 Processor can control multiple I/O operations with a combined data rate of up to 85,000 bytes/sec on the multiplexer channel, plus one I/O operation with a data rate of up to 333,000 bytes/sec on each selector channel.

### MASS STORAGE

**8411 DISC DRIVE:** Provides interchangeable disc-pack storage of moderate capacity. Each disc pack contains six 14-inch discs, weighs 10 pounds, holds up to 7.25 million bytes of data, and is compatible with the IBM 1316 Disk Pack used in IBM 2311 Disk Storage Drives. One read/write head serves each of the 10 recording surfaces. Up to 36,250 bytes (10 tracks) can be read or written at each position of the comb-type access mechanism. Average head movement time is 75 milliseconds, average rotational delay is 12.5 milliseconds, and data transfer rate is 156,000 bytes per second. Record lengths are variable.

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► provide data rates ranging from 34,160 to 192,000 bytes per second. A 1200/1600-lpm printer achieves the highest on-line printing speeds currently offered by any major computer manufacturer. Conversely, the only available card reader operates at only 600 cpm, so the use of multiple on-line card readers will be desirable in many applications. No MICR reader is currently available.

The scope of practical applications for the 9400 was substantially broadened by the September 1969 announcement of the 2703 Optical Document Reader and the 8414 Disc Drive. The 2703 reads printed numeric data and/or vertical pencil marks from turnaround documents. The 8414 is an IBM 2314-compatible unit that provides large-capacity on-line storage of the disc pack type, complementing the 2311-compatible 8411 Disc Drive that was introduced along with the 9400.

Software support for the 9400 is just about what a prospective buyer might reasonably expect it to be. Like most of its competitors, the 9400 offers a choice of four programming languages: Assembler, COBOL, FORTRAN, and RPG. A comprehensive operating system is available in versions for both disc and tape-oriented systems. Multiprogramming of up to five independent programs is possible in disc-oriented systems, while tape-oriented systems are limited to running up to five data transcription routines concurrently with a single main program.

In summary, it is difficult to find any one aspect of the 9400 that warrants strong praise or criticism. For business data processing users who are considering the installation of a medium-scale System/360, the 9400's higher speeds and lower prices make it a very attractive alternative. Each prospective user must decide for himself whether or not the 9400's clear-cut performance advantage is outweighed by other factors such as its smaller instruction repertoire, its less extensive array of peripheral equipment, its smaller complement of supporting software, and its limited System/360 compatibility. □

► Up to eight 8411 Disc Drives (58 million bytes) can be connected to a Disc File Control, and up to eight controls can in turn be connected to each UNIVAC 9400 selector channel. The following options are available: File Scan, which permits searching of data areas as well as record keys; Record Overflow, which permits records longer than one track (3652 bytes); and Dual Channel, which allows two different computers to access an 8411 subsystem.

**8414 DISC DRIVE:** Provides large-capacity random-access storage in interchangeable 11-disc packs which are 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/sec. Record lengths are variable.

From two to eight 8414 Disc Drives can be connected to a Disc Control, providing from 58.4 to 233.4 million bytes of on-line storage. Up to eight Disc Controls, in turn, can be connected to each UNIVAC 9400 selector channel. The File Scan and Record Overflow features are standard, and the Dual Channel capability is optional.

### INPUT/OUTPUT UNITS

**UNISERVO VI C MAGNETIC TAPE UNIT:** A low-cost tape drive that reads and records data on standard ½-inch tape in IBM-compatible formats. Available in both 9-track and 7-track versions. Tape speed is 42.7 inches per second, forward or backward, and data transfer rate is 34,160 bytes per second at 800 bpi. The 9-track version has a recording density of 800 bpi, while the 7-track version can operate at 200, 556, or 800 bpi. An optional feature enables the 9-track version to handle 7-track tape as well. The Data Conversion feature, for 7-track drives, converts each group of four 6-bit characters from tape into three 8-bit bytes in main storage, and vice versa.

A Uniservo VI C Subsystem consists of a control unit and from 2 to 8 tape drives. The subsystem must be connected to a shared multiplexer subchannel of the 9400 Processor.

**UNISERVO 12 MAGNETIC TAPE UNIT:** A medium-speed tape drive that reads and records data on standard ½-inch tape in IBM-compatible formats. Available in both 9-track and 7-track versions. Tape speed is 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 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.

From 1 to 16 Uniservo 12 and/or Uniservo 16 Tape Units can be connected to a tape control, and up to 8 controls can in turn be connected to each UNIVAC 9400 selector channel. Optional features enable the tape control to be connected to two selector channels, permitting simultaneous read/read, read/write, or write/write tape operations.

**UNISERVO 16 MAGNETIC TAPE UNIT:** A high-speed tape drive that reads and records data on standard ½-inch tape in IBM-compatible formats. Available in both 9-track and 7-track versions. Tape speed is 120 inches per second, forward or backward. The standard 9-track version has a recording density of 1600 bpi (in phase-encoded mode) and a data rate of 192,000 bytes 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. □

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► 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.

From 1 to 16 Uniservo 12 and/or Uniservo 16 Tape Units can be connected to a tape control, and up to 8 tape controls can in turn be connected to each UNIVAC 9400 selector channel. Optional features enable the tape control to be connected to two selector channels, permitting simultaneous read/read, read/write, or write/write tape operations.

**600-CPM CARD READER:** Reads 80-column cards serially by column at 600 cpm. Can be equipped to read 51- or 66-column short cards or UNIVAC 90-column cards. Reads in either EBCDIC or card-image mode. Has a 1200-card feed hopper and one 1500-card stacker. Connected via a shared multiplexer subchannel.

**250-CPM CARD PUNCH:** Punches 80-column cards in row-by-row fashion at 250 cpm, in either EBCDIC or card-image mode. Has a 1000-card feed hopper and two 1000-card stackers. Can be equipped with a pre-punch read station, giving the unit read/punch capabilities. Connected via the multiplexer channel.

**PAPER TAPE SUBSYSTEM:** Consists of a 300-char/sec reader, 110-char/sec punch, and control unit in a single cabinet. Reads and punches 5-, 6-, 7-, or 8-level tape. Spoolers are optional for both the reader and punch. Connected via the multiplexer channel.

**900/1100-LPM PRINTER:** Prints at 900 lpm when the full 63-character set is used and at 1100 lpm when using any 49 contiguous characters. Uses a conventional rotating-drum print mechanism. Has 132 print positions. Skipping speed is 33 inches per second at the normal vertical spacing of 6 lines per inch. Connected via a shared multiplexer subchannel.

**1200/1600-LPM 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 print mechanism. Has 132 print positions. Skipping speed is 33 inches per second at the normal vertical spacing of 6 lines per inch. Connected via a shared multiplexer subchannel.

**2703 OPTICAL DOCUMENT READER:** Reads printed numeric data from individual documents ranging from 2.75 to 4.25 inches in height and 3.00 to 8.75 inches in length. Basic speed of 300 six-inch documents per minute can be increased to 600 dpm by an optional feature. Other options permit reading of vertical pencil marks and of standard 80-column punched cards. Character set consists of the digits 0-9 and four special symbols, in either UNIVAC H-14 or USASCSOCR Size A font. Has a 2000-document feed hopper and three 1000-document stackers. Connected via the multiplexer channel.

**CHANNEL ADAPTERS:** Permit any of the following small-scale UNIVAC data processing systems to be connected to the 9400 multiplexer channel: 1004, 1005, 9200, 9200 II, 9300, or 9300 II. The smaller processor can function in either an on-line or off-line mode. When on-line, it performs card reading, punching, and/or printing functions under control of the 9400 Processor.

## COMMUNICATION CONTROLS

**DATA COMMUNICATIONS SUBSYSTEMS:** Remote communications devices are connected to a UNIVAC 9400 system by means of a Communications Adapter and from one to four Data Communications Subsystems. The DCS-1, DCS-4, and DCS-16 subsystems can accommodate 1, 4, and 16 half-duplex or full-duplex lines, respectively. Each DCS is connected to one of the eight shared multiplexer subchannels. The Communications Adapter, at the interface between the DCS and the Processor, provides special-character recognition, parity recognition and generation, data chaining, and interrupt classification capabilities.

Each DCS consists of a single Line Terminal Controller, plus a Line Terminal and a Communications Interface for each connected line. Numerous models of line terminals and interfaces permit asynchronous and/or synchronous transmission over a wide range of communications services at speeds of 75 to 250,000 bits per second.

The DCS-1C, announced in December 1969, is a Binary Synchronous Data Communications Subsystem that enables a 9000 Series computer to communicate with an IBM System/360 computer, using either EBCDIC or USASCII code and either Transparent or Nontransparent mode.

## SOFTWARE

**OPERATING SYSTEM:** Software support for the UNIVAC 9400 is structured around an operating system that is available in both tape and disc-oriented versions. The tape-oriented version requires at least four magnetic tape units, while the disc-oriented version requires at least two disc drives. Both versions also require a card reader and printer (or a smaller UNIVAC computer connected as an I/O subsystem).

The system control facilities of the operating system are divided into four main categories: Supervisor, Job Control, Data Management, and Message Control.

The Supervisor resides in main storage and schedules and coordinates all activities within the system. Its functions include interrupt handling, I/O scheduling and initiation, job time allocation, operator communication, job accounting, and control of multiprogrammed operations. In disc-oriented systems, up to five independent programs can be executed concurrently if sufficient memory and peripherals are available. In tape-oriented systems, multiprogramming is limited to the concurrent execution of a single main program and up to five "symbiont" (data transcription) routines. (No multiprogramming is possible in 24K tape systems.) The Supervisor provides five different priority levels, three of which are available for users' programs.

The Job Control routine controls transitions between job steps, suspension or cancellation of jobs, restarting of jobs, and termination of jobs. It receives its instructions from control cards which constitute a "job stream." In disc systems, job streams can be stored in disc files for subsequent selection and execution. In tape systems, the job streams are processed as they are read in via the card reader.

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*This closeup of the 9400 console also shows three of UNIVAC's 2311-compatible 8411 Disc Drives.*

► Data Management provides comprehensive input/output control facilities, including record blocking and unblocking, I/O buffering, data validation, and label processing. These facilities are provided by subprograms which are generated as part of the operating system and referenced by macro-instructions in users' programs. Nonsequential files in disc storage can be accessed by either the Direct (random) Access Method, in which the user must specify the address of the desired disc record, or the Indexed Sequential Access Method, in which the user need only specify the key of the desired record. In a multiprogramming environment, the Data Management routines can be shared by all programs, thereby reducing main storage requirements.

The Message Control Program provides macro-instructions that enable the user to generate custom-tailored message control and message processing routines to handle communications input/output. Messages of fixed or variable length can be queued in main and/or disc storage, and the generated routines can perform functions such as code translation, message sequencing, time stamping, and error checking. Use of the full Message Control Program services requires a system with 65K bytes of main storage, though more limited communications I/O facilities are available for 49K systems.

**COBOL:** UNIVAC offers two COBOL compilers for the 9400. Basic COBOL requires a system with 32K bytes of main storage and includes the minimum USA Standard COBOL language facilities (i.e., Level 1 of the Nucleus, Sequential Access, Segmentation, and Table Handling modules). Extended COBOL requires a system with 65K bytes of main storage and two disc drives. It includes the following facilities of USA Standard COBOL: Level 2 of the Nucleus, Sequential Access, and Table Handling modules, and Level 1 of the Random Access, Sort, and Segmentation modules.

**FORTRAN:** A FORTRAN compiler is available for operation on disc or tape systems with at least 32K bytes of main storage. It includes all the language facilities of full USA Standard FORTRAN. In addition, there are more than 20 useful language extensions, such as direct-access I/O statements and the ability to handle arrays of up to 7 dimensions.

**ASSEMBLER:** The 9400 Assembler permits programs to be coded in a symbolic assembly language that is very similar to, though not totally compatible with, the Assembler languages for the UNIVAC 9200/9300 systems and the IBM System/360. Disc and tape versions are available for operation on systems with the minimum 24K bytes of main storage. The Assembler produces relocatable object modules which can be written on either disc or tape. These object modules can be linked to other modules prior to being loaded and executed. A macro-instruction facility simplifies the inclusion of pre-coded subprograms.

**REPORT PROGRAM GENERATOR:** The 9400 RPG is designed to accept UNIVAC 9200/9300 RPG source programs for generation and execution on a 9400. It is available for both tape and disc systems with the minimum 24K bytes of main storage. The generated RPG object programs can be recorded on tape, disc, or punched cards to eliminate the need for re-generation of the program before subsequent report runs. The object programs are relocatable modules that can be linked to other programs and stored in disc or tape libraries.

**UTILITY ROUTINES:** A Sort/Merge program capable of using disc and/or tape drives is available. It can sort fixed or variable-length records into either ascending or descending sequence, and includes provisions for the user's own coding. The program's operation can be controlled by parameters entered either when the sort is generated or at run time.

A Linkage Editor combines object modules produced by the language translators into "load modules" which are suitable for loading and execution under operating system control.

Library Service routines facilitate the creation and maintenance of various types of libraries on tape and disc.

Other available utility programs include data transcription routines, file maintenance routines, a dynamic (snapshot) dump, and a terminal (postmortem) dump.

To facilitate conversions from other computers to the 9400, UNIVAC offers simulators for the UNIVAC 1050 and Solid-State computers and translators for IBM 1400 Series Autocoder and SPS and for IBM System/360 BAL.

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- **APPLICATION PROGRAMS:** Programs announced to date include IMPACT (inventory management), IMS (information retrieval, display, and update), Message Switching, and LINCO (typesetting).

### PRICING

**SMALL TAPE SYSTEM:** Consists of 24K Processor (with standard console keyboard-printer and multiplexer channel), 600-cpm Card Reader, 250-cpm Card Punch, 900/1100-lpm Printer, and four Uniservo VI C (34KB) Tape Units with control. Monthly rental and purchase prices are \$5,880 and \$204,940, respectively. (Under a 5-year lease, the monthly rate is \$5,175.)

**TYPICAL DISC SYSTEM:** Consists of 32K Processor, one Selector Channel, 600-cpm Card Reader, 250-cpm Card Punch, 900/1100-lpm Printer, and four 8411 Disc Drives with control. Monthly rental and purchase prices are approximately \$7,725 and \$284,800, respectively.

**TAPE/DISC SYSTEM:** Consists of 65K Processor, two Selector Channels, 600-cpm Card Reader, 250-cpm Card Punch, 1200/1600-lpm Printer, two 8411 Disc Drives

with control, and six Uniservo 12 (68KB) Tape Units with control. Monthly rental and purchase prices are approximately \$10,285 and \$375,500, respectively.

With the maximum 131K bytes of main memory, the rental and purchase prices of the above "Tape/Disc System" would be higher by \$1,600 and \$59,160, 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.

**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 (included in all rental prices quoted above) 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)*
<b>PROCESSOR AND MAIN STORAGE</b>				
3019-00	9400 Processor (includes Operator's Console, Keyboard/Printer, Interval Timer, and Multiplexer Channel)	33,280	135	765
F1092-00	Selector Channel 1	7,830	30	180
F1092-01	Selector Channel 2	7,830	30	180
F1091-00	Storage Protection Feature	4,350	20	100
7010-94	Storage; 24,576 bytes	55,465	225	1,275
7010-95	Storage; 32,768 bytes	79,390	325	1,825
7010-96	Storage; 49,152 bytes	107,230	435	2,465
7010-97	Storage; 65,536 bytes	123,760	505	2,845
7010-98	Storage; 98,304 bytes	157,035	640	3,610
7010-99	Storage; 131,072 bytes	182,920	745	4,205
<b>MASS STORAGE</b>				
5024-00	Disc File Control (for up to eight 8411 drives)	20,010	80	460
8411-00	8411 Disc Drive; 7.25 million bytes	19,920	75	415
F1043-00	Dual Channel Feature (for 5024-00)	3,700	15	85
F1098-00	Record Overflow Feature (for 5024-00)	435	—	10
F1099-00	File Scan Feature (for 5024-00)	1,525	—	36
F1211-00	Disc Pack Feature (for 8411 drives)	490	NA	15
5024-02	Disc Control (for up to eight 8414 drives)	26,400	90	550
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
F1043-00	Dual Channel Feature (for 5024-02)	3,700	15	85
F1214-00	Disc Pack (for 8414 drives)	650	NA	20
<b>INPUT/OUTPUT UNITS</b>				
0858-99	Uniservo VI C Subsystem; includes 9-track Control, Master and 1 Slave Tape Unit	32,190	205	735
0858-98	Uniservo VI C Subsystem; includes 7-track Control, Master and 1 Slave Tape Unit	32,190	205	735
F0828-00	7-Track Feature (for 0858-99)	2,130	5	53
F0827-00	Data Conversion (for 0858-98)	2,130	5	53
F1021-99	7-to-9-Track Conversion (for 0858-98)	200**	—	—
0858-14	Uniservo VI C Slave Tape Unit; 9-track	10,470	70	240
0858-10	Uniservo VI C Master Tape Unit; 9-track	17,350	115	400
0858-01	Uniservo VI C Slave Tape Unit; 7-track	10,470	70	240
0858-00	Uniservo VI C Master Tape Unit; 7-track	17,350	115	400
F1021-00	7-to-9-Track Conversion (for 0858-00 or 0858-01)	100**	—	—
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
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
F1029-99	Simultaneous Operation (for 5017-99)	14,140	60	325
F1029-00	Simultaneous Operation (for 5017-00)	15,880	70	365
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

\* Rental prices do not include equipment maintenance.

\*\* One-time charge; applies to rented or purchased equipment.

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### Equipment Prices

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
<b>INPUT/OUTPUT UNITS (Continued)</b>				
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
F0936-99	Simultaneous Operation (for 0862-00 or 0862-02)	870	—	20
F0937-00	Dual Density Feature (for 0862-00)	2,175	—	50
F1040-00	7-to-9-Track Conversion (converts 0862-02 to 0862-00)	100**	—	—
0711-05	Card Reader and Control; 600 cpm	8,265	75	190
F0872-00	Short Card Feature; 51 Columns (for 0711-05)	1,425	10	37
F0872-01	Short Card Feature; 66 Columns (for 0711-05)	1,425	10	37
F1054-02	90-Column Read Feature (for 0711-05)	410	—	20
F1177-00	Validity Check Feature (for 0711-05)	720	—	15
0604-99	Card Punch and Control; 250 cpm	15,660	90	360
F0875-00	Read/Punch Feature (for 0604-99)	4,970	47	116
0920-02	Paper Tape Control (for F1033-02 & F1032-02)	7,540	26	173
F1033-02	Paper Tape Reader; 300 char/sec	1,600	15	37
F1034-00	Reader Spooler (for F1033-02)	1,600	5	37
F1032-02	Paper Tape Punch; 110 char/sec	5,480	21	126
F1035-00	Punch Takeup Spooler (for F1032-02)	655	5	15
0768-00	Printer and Control; 900/1100 lpm	40,675	315	935
0768-99	Printer and Control; 1200/1600 lpm	50,465	390	1,160
F1071-00	1600/1200-lpm Rate (converts 0768-00 to 0768-99)	9,790	75	225
2703-00	Optical Document Reader; 300 dpm	42,000	175	875
F1108-00	600-dpm Speed Upgrade (for 2703-00)	10,560	30	220
F1163-00	Modulus 10 Check Digit (for 2703-00)	960	5	20
F1106-00	Mark Read—EBCDIC (for 2703-00)	7,920	35	165
F1106-01	Mark Read-ASCII (for 2703-00)	7,920	35	165
F1149-00	Punch Card Read Feature (for 2703-00)	2,640	10	55
F1154-00	Validity Check Feature (for 2703-00)	480	—	10
F1001-00	Channel Adapter; permits connection of a UNIVAC 9200 or 9300 Processor	3,700	15	85
F0943-99	Channel Adapter; permits connection of a UNIVAC 1004 or 1005 Processor	3,855	15	89
<b>DATA COMMUNICATION SUBSYSTEMS</b>				
F1093-00	Communications Adapter (for 9400 Processor)	1,960	5	45
F1000-00	Line Terminal Control 1 (for DCS-1)	4,570	15	105
8575-00	Line Terminal Control 4 (for DCS-4)	10,500	42	242
F1094-00	Line Terminal Control 4A (for DCS-4); housed in 9400 Processor cabinet	10,000	40	230
8575-01	Line Terminal Control 16 (for DCS-16)	22,185	90	510

Note: Numerous line terminals, communications interfaces, and optional features enable the above controls to accommodate a wide range of communications facilities and equipment.

\* Rental prices do not include equipment maintenance.  
\*\* One-time charge; applies to rented or purchased equipment.