

UNIVAC 9200 & 9300

MANAGEMENT SUMMARY

The 9200/9300 systems constitute UNIVAC's small-scale entry in the third-generation computer market. Designed primarily for business data processing, they offer most small-volume users a nicely balanced combination of processing power and economy. They are also being effectively employed as I/O processors and remote communication terminals in conjunction with larger computers.

The 9200 and 9300 systems were announced in June 1966, more than two years later than the IBM System/360. They were the first two members of the long-awaited UNIVAC 9000 Series, and UNIVAC salesmen assured their prospects that the series would soon be expanded into a System/360-like family of processors. But, to date, only the medium-scale UNIVAC 9400 has been added to the line. The lack of large-scale models in the 9000 Series will not represent a significant drawback for most users who start with a 9200 or 9300 system, since the 9400 should offer more than enough expansion potential to meet their future needs.

A group of small-scale data processing systems that feature plated-wire main memories and System/360-style architecture. Originally quite limited in its peripheral and software facilities, the line has been greatly enhanced by recent hardware and software additions.

CHARACTERISTICS

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

MODELS: UNIVAC 9200, 9200 II, 9300, and 9300 II.

DATA FORMATS

BASIC UNIT: 8-bit byte. Each byte can represent 1 alphanumeric character, 2 BCD digits, or 8 binary bits. Two consecutive bytes form a "halfword."

FIXED-POINT OPERANDS: 1 halfword (16 bits) in binary mode. In decimal mode, lengths can range from 1 to 16 bytes (1 to 31 digits plus sign) for arithmetic operations and from 1 to 256 bytes for move, edit, and logical operations.



This card-oriented UNIVAC 9300 system includes the dual-feed 1001 Card Controller (left) as well as the basic card reader and

punch (at right). The 600-lpm printer is an integral part of the processor cabinet (center).

UNIVAC 9200 & 9300

▷ Two characteristics of the 9200/9300 systems aroused strong interest throughout the EDP world: they were the first commercial computers to employ plated-wire main memories, and they are largely compatible with the IBM System/360.

The plated-wire memories use a UNIVAC-developed, thin-film storage technique that results in demonstrably higher speeds and lower prices than most of the magnetic core memories in other current computers. By operating in a nondestructive-readout mode, the plated-wire memory eliminates the need for regeneration of the data after every read operation. Moreover, plated-wire memories can be manufactured and tested largely in continuous, automated processes, whereas core memories still tend to require painstaking manual assembly operations.

UNIVAC was not the first major computer manufacturer to announce an IBM-compatible product line; that distinction went to RCA, which introduced the Spectra 70 line in December 1964. Even so, UNIVAC's decision to strive for data and program compatibility with the System/360 represented an important step toward industry standardization and improved communication.

Actually, UNIVAC has not gone as far down the road toward total System/360 compatibility as RCA. The 9200/9300 systems employ the same byte-oriented data structure, EBCDIC code, I/O media, and instruction formats as the System/360. But the UNIVAC processors have a repertoire of only 32 or 35 instructions, and not all of these have direct counterparts in the System/360's far larger instruction set. There is a higher degree of correspondence between the facilities of the 9200/9300 systems and the small-scale System/360 Model 20, but here again the compatibility is by no means complete.

The implications of the resulting compatibility picture can be summarized this way:

- Data can be freely interchanged between suitably equipped System/360 and 9200/9300 systems.
- Programmers who have System/360 experience can easily learn to program the 9200/9300 systems in the same language, and vice versa.
- System/360 source programs written in Assembler, COBOL, FORTRAN, or RPG will generally require changes ranging from very slight to quite extensive before they can be translated and executed on a 9200/9300 system, and vice versa.

▶ **FLOATING-POINT OPERANDS:** No hardware facilities; FORTRAN compiler and MATHPAC routines use 6 bytes per operand: 2 decimal digits for exponent and 11 digits plus sign for fraction.

INSTRUCTIONS: 4 or 6 bytes in length, specifying 1 or 2 memory addresses, respectively.

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

MAIN STORAGE

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

CAPACITY

9200 Processor: 8,192, 12,288, or 16,348 bytes.

9200 II and 9300 Processors: 8,192, 12,288, 16,348, 24,576, or 32,768 bytes.

9300 II Processor: 16, 348, 24,576, or 32,768 bytes.

CYCLE TIME: 1.2 microseconds per 1-byte access in 9200 and 9200 II; 0.6 microsecond per 1-byte access in 9300 and 9300 II.

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

STORAGE PROTECTION: None.

RESERVED STORAGE: First 260 bytes of main storage are reserved for registers, buffer control words, and printer image area.

CENTRAL PROCESSORS

INDEX REGISTERS: The programmer has access to eight 16-bit general registers, used for indexing, base addressing, and as accumulators. (A second set of eight general registers is used in the I/O mode.)

INDIRECT ADDRESSING: None.

INSTRUCTION REPERTOIRE: 35 instructions, 3 of which (decimal multiply, divide, and edit) are offered as a \$75-per-month option in the 9200 and 9200 II Processors. Included are facilities for decimal arithmetic, binary addition and subtraction, comparison, code translation, logical AND and OR, packing, and unpacking. Most of the instructions are identical with those of the IBM System/360 Model 20, but the input/output and control instructions are different.

INSTRUCTION TIMES: See table; the times shown are for 1-address binary addition of halfword (16-bit) fields and for 2-address decimal addition of signed 5-digit (3-byte) fields.

INPUT/OUTPUT CONTROL

I/O CHANNELS: One multiplexer channel is standard in the 9300 II and optionally available for the other three processors. One selector channel is standard in the 9300 II and optionally available for the 9200 II Processor only.

UNIVAC 9200 & 9300
CHARACTERISTICS OF THE 9200/9300 PROCESSORS

	9200	9200 II	9300	9300 II
MAIN STORAGE				
Cycle time, microseconds	1.2	1.2	0.6	0.6
Bytes fetched per cycle	1	1	1	1
Minimum capacity, bytes	8,192	8,192	8,192	16,384
Maximum capacity, bytes	16,384	32,768	32,768	32,768
PROCESSOR				
Multiply, Divide, & Edit	optional	optional	standard	standard
Add time, microseconds (16-bit binary fields)	40.8	40.8	20.4	20.4
Add time, microseconds (5-digit decimal fields)	103.2	103.2	51.6	51.6
CHANNELS				
No. of selector channels	none	0 or 1	none	1
Maximum selector channel data rate, bytes/sec.	—	350,000	—	350,000
No. of multiplexer channels	0 or 1	0 or 1	0 or 1	0 or 1
Maximum multiplexer channel data rate, bytes/sec.	85,000	85,000	85,000	85,000
PERIPHERALS				
Integrated printer speed, lpm	250/300	250/300	600	600
Basic card reader speed, cpm	400	100/600	600	600
Magnetic tape speed, bytes/sec.	none	34,160	34,160	34,160
8410 Disc Files	yes	yes	yes	yes
8411 Disc Drives	no	yes	no	yes
8414 Disc Drives	no	yes	no	yes

- There is no object-program compatibility between the two lines; programs written for a System/360 must be reassembled or recompiled before execution on a 9200/9300 system, and vice versa.

As announced in 1966, the 9200/9300 product line included only two central processors and a curiously restricted complement of peripheral equipment and software. The 9200 was strictly a card-oriented processor, while the 9300 offered magnetic tape and card I/O but not much else. Mass storage and data communications facilities were conspicuously absent.

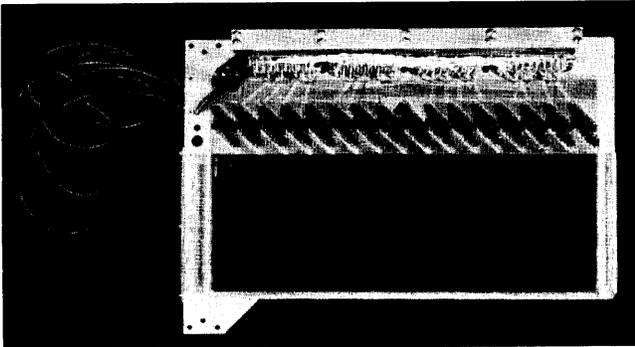
Since then, UNIVAC has busily expanded both the product line and the supporting software, thereby greatly increasing both its scope of applications and its overall attractiveness in the marketplace. The line now includes data communications controls, an optical document reader, paper tape I/O, line printers with speeds of up to

- CONFIGURATION RULES:** Controls for the integrated printer and the basic card reader and punch are built into each processor. The 8411 and 8414 Disc Drives require the selector channel, which is available only for the 9200 II and 9300 II Processors and can accommodate up to 6 disc control units. All other peripheral devices are connected via the multiplexer channel, which can accommodate up to 8 control units and 64 devices.

SIMULTANEOUS I/O OPERATIONS: Concurrently with computing, the processor can control card reading, punching, and printing on the three basic I/O units, plus multiple I/O operations with a combined data rate of up to 85,000 bytes per second on the multiplexer channel. The selector channel accommodates one I/O operation at a time with a data rate of up to 350,000 bytes per second, but in this case computation is suspended while data is being transferred.

I/O INTERFERENCE: Demands on the processor imposed by multiplexer channel operations range from less than 1 percent (for card reading and punching) to about 33 percent (for magnetic tape I/O). Computing is suspended during selector channel (disc) I/O operations, though multiplexer I/O operations can continue.

UNIVAC 9200 & 9300



UNIVAC's plated-wire memory is the most distinctive hardware feature of the 9000 Series computers.

▷ 1600 lpm, and three types of disc files—including IBM 2311-compatible and 2314-compatible units. Magnetic tape speed, surprisingly, is still limited to 34,160 bytes per second.

The software complement now includes adequate, if unimaginative, support for card, tape, and disc-oriented systems (including limited multiprogramming for 24K and 32K systems). After getting off to a very late start in the development of application programs, UNIVAC has recently introduced a number of well-conceived packages.

The biggest single event in the steady expansion of the 9200/9300 line occurred in February 1969, when the 9200 II and 9300 II Processors were introduced. These new models feature greatly increased I/O capabilities at very small increases in cost. A selector channel accommodates data transfer rates as high as 350,000 bytes per second and is used to control the 8411 and 8414 Disc Drives. The 9200 II Processor offers magnetic tape I/O and up to 32K bytes of storage, whereas the original 9200 is a card-only system with a maximum storage capacity of 16K bytes.

The distinguishing characteristics of all four of the current processors are summarized in the table. Internal speeds of the 9300 and 9300 II Processors are identical and exactly twice as fast as those of the 9200 and 9200 II. A 9200 Processor can be successively field-upgraded to a 9200 II, then to a 9300, and finally to a 9300 II.

The processors are compact, attractively-styled units that include integrated bar-type printers. Monolithic integrated circuits are used throughout. Customer deliveries began in June 1967, and the systems delivered to date have generally lived up to UNIVAC's reputation for reliable, well-engineered hardware.

▶ MASS STORAGE

8410 DISC FILE: Uses interchangeable single-disc cartridges to provide low-cost random-access storage. Each of the two disc surfaces in the 7.5-pound cartridge holds 1.6 million bytes of data, but only one of the surfaces on each disc drive can be on-line (accessible for reading and writing) at a time. Each surface contains 100 logical data tracks, and each track is divided into 100 sectors of 160 bytes each. In addition, each surface has one "Fastband," a fast-access track that contains fifty 160-byte sectors and is particularly useful for storage of file directories.

Two read/write heads are mounted on a single access arm, which moves radially across the disc. Average head movement time is 117 milliseconds, and average rotational delay is 25 milliseconds. The single "Fastband" is served by a fixed read/write head and has an average access time of 25 milliseconds.

The minimum 8410 Subsystem consists of a Dual Disc Drive Master containing two disc drives, control unit, and 160-byte buffer. This configuration provides 3.2 million bytes of on-line storage. Additional Single or Dual Disc File units can be added, up to a maximum total of 8 drives (or 12.8 million bytes of on-line storage).

8411 DISC DRIVE: Provides interchangeable disc-pack storage of larger capacity than the 8410 Disc File. 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.

Up to eight 8411 Disc Drives (58 million bytes) can be connected to a Disc File Control, which in turn can be connected only to the selector channel of a 9200 II or 9300 II Processor. 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 (3625 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. The 8414 Disc Control, in turn, can be connected only to the selector channel of a 9200 II or 9300 II Processor. The File Scan and Record Overflow features are standard, and the Dual Channel capability is optional.

UNIVAC 9200 & 9300

➤ The UNIVAC 9200/9300 systems provide impressive performance at attractive prices in the small-volume business data processing applications for which they were designed, while retaining a reasonable degree of compatibility with larger computers produced by UNIVAC, IBM, and RCA. Despite the advent of strong new competitors such as the IBM System/3 and the NCR Century Series, the 9200/9300 systems continue to deserve serious consideration by companies shopping for a small-scale data processing system. □

➤ INPUT/OUTPUT UNITS

UNISERVO VI C MAGNETIC TAPE UNIT: 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 two to eight tape drives. One or two tape subsystems can be connected to the multiplexer channel of a 9300 or 9300 II Processor, while a single tape subsystem can be used with the 9200 II. Read/write/compute simultaneity is possible in 9300 or 9300 II systems with two tape subsystems.

400-CPM CARD READER: Reads 80-column cards serially by column at 400 cpm. Can be equipped to read 51- or 66-column short cards or UNIVAC 90-column cards. Standard card input unit for the 9200; also usable with the 9200 II.

600-CPM CARD READER: Reads 80-column cards serially by column at 600 cpm. Otherwise, has same specifications as the 400-cpm reader. Standard card input unit for the 9300 and 9300 II; also usable with the 9200 II.

1001 CARD CONTROLLER: Has two card feeds, each equipped with a photoelectric read station, and a total of seven stackers. Each feed can operate independently at up to 1000 cpm. Thus, the 1001 can read data from two separate files and perform on-line card merging and selection operations. Arithmetic facilities and a 256-character core memory enable the 1001 to perform collating, editing, sorting, and proving operations in an off-line mode. Usable with all four processors, the 1001 is connected to the multiplexer channel via a 1001 Control.

75-200-CPM CARD PUNCH: Punches 80-column cards in column-by-column fashion. Speed ranges from 75 cpm when all 80 columns are punched to 200 cpm when the last column punched is column 14 or lower. Can be equipped with a pre-punch read station and programmable stacker selection. Standard card output unit for all four processors.

200/250-CPM CARD PUNCHES: Punch 80-column cards in row-by-row fashion at either 200 or 250 cpm, depending upon the model selected. Two program-selectable 1000-card stackers are standard. Can be equipped with a pre-punch read station. Connects to the multiplexer channel of a 9200 II, 9300, or 9300 II Processor.

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. Connects to the multiplexer channel of all four processors.

250/300-LPM PRINTER: An integral part of each 9200 and 9200 II Processor. Uses an interchangeable, horizontally oscillating typebar. Basic model has 96 print positions and a speed of 250 lpm with the standard 63-character set. Optional features increase the speed to 300 lpm and the number of print positions to 120 or 132. The Variable-Speed Printing feature provides a special 48-character typebar that yields speeds of 500 or 600 lpm when using a 16-character numeric set and 250 or 300 lpm when the entire 48-character alphanumeric set is used. Skipping speed is 25 inches/sec.

600-LPM PRINTER: An integral part of each 9300 and 9300 II Processor. Uses an interchangeable, horizontally oscillating typebar. Has 120 print positions (expandable to 132) and a speed of 600 lpm with the standard 63-character set. The High-Speed Numeric Print feature provides a special 16-character typebar that permits printing at 1200 lpm. Skipping speed is 25 inches/sec.

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. Has 132 print positions. Connects to the multiplexer channel of a 9200 II, 9300, or 9300 II Processor.

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. Has 132 print positions. Connects to the multiplexer channel of a 9200 II, 9300, or 9300 II Processor.

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. Connects to the multiplexer channel of all four processors.

COMMUNICATION CONTROL

DATA COMMUNICATIONS SUBSYSTEMS—DCS-1 & DCS-4: The DCS-1 connects one communications line to a 9000 Series computer, while the DCS-4 connects up to four lines. A maximum of eight full-duplex lines can be connected to the multiplexer channel of a 9200, 9200 II, 9300, or 9300 II Processor through a combination of DCS-1 and/or DCS-4 subsystems.

UNIVAC 9200 & 9300

► Each DCS consists of a single Line Terminal Controller, plus 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 variety of communications services at speeds of 75 to 230,400 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 equipped with a 2701 Data Adapter Unit. Transmission can be in either EBCDIC or USASCII code and in either Transparent or Nontransparent mode. UNIVAC will provide a macro library that will enable the 9000 Series computer to serve as a remote terminal to a System/360 using BTAM or QTAM. DCS-1C deliveries will begin in the fourth quarter of 1970.

SOFTWARE

SUPPORT LEVELS: The software support available to a 9200 or 9300 user depends upon the types of peripheral devices and the amount of main memory available. There are four basic categories of support:

CARD-ORIENTED SYSTEMS: The principal software facilities for systems without magnetic tape or disc units are an Assembler, Report Program Generator, Input/Output Control System, Gangpunch/Reproduce Program, and MATHPAC routines. All are operable on a system with as little as 8K bytes of main memory.

TAPE-ORIENTED SYSTEMS: 8K tape systems can use all the card-oriented software plus the Minimum Operating System (MOS) and a Tape Input/Output Control System and sort routines; 12K tape systems can use the MOS Report Program Generator; 16K systems can use the Non-Concurrent Operating System (NCOS), as well as a Tape Assembler, NCOS Report Program Generator, and COBOL and FORTRAN compilers; 24K and larger tape systems can operate under the Concurrent Operating System (COS).

8410 DISC SYSTEMS: 12K systems equipped with 8410 Disc Files can use all the card-oriented software plus the Minimum Operating System, Disc Sort, Input/Output Control System, and the MOS Report Program Generator; 16K systems can also use a Disc Assembler and the "control stream" operating mode. "Concurrency" is possible with 24K or 32K bytes.

8411-8414 DISC SYSTEMS: 16K systems equipped with at least one 8411 or two 8414 Disc Drives can operate under either MOS or NCOS and use a Disc Sort and Input/Output Control System. At least 24K is required for use of the Concurrent Operating System, Disc Assembler, Report Program Generator, and COBOL compiler.

OPERATING SYSTEMS: Three different operating systems are available for tape and/or disc-oriented 9200/9300 systems:

MINIMUM OPERATING SYSTEM: MOS is designed for configurations with 8K to 16K bytes of main storage, a card reader, card punch, and either disc storage or two or three magnetic tape drives. It consists of a Supervisor and a Job Control Program, which are stored on cards and loaded via the card reader. All

programs must be stored on cards, though tape units and disc files can be used for data input and output. Thus, MOS cannot handle stacked-job processing. The system's principal functions are interrupt servicing, I/O control, operator communication, and interfacing with data communications I/O routines.

NON-CONCURRENT OPERATING SYSTEM: NCOS is designed for configurations with 16K to 32K bytes of main storage, a card reader, and either two or more disc drives or four or more magnetic tape drives. The principal NCOS control programs are an Initial Program Loader, Supervisor, and Job Control Program. NCOS locates and loads programs and overlays from tape or disc, initiates and terminates program execution, handles interrupts, controls I/O operations, coordinates operator communication, provides program restart capabilities, and interfaces with data communications I/O routines. NCOS handles sequential stacked-job processing of one program at a time, as directed by a "control stream" entered via the card reader.

CONCURRENT OPERATING SYSTEM: COS is essentially the same as NCOS except for the addition of a limited multiprogramming capability, which UNIVAC calls "concurrency." A single main program can operate concurrently with up to five data transcription routines, called "symbionts." Each symbiont transfers data between a tape or disc drive and a slower I/O device or communications line. COS requires at least 24K bytes of main storage, and the tape version requires at least five tape drives.

COBOL: Compilers for the Minimum USA Standard COBOL language are available for 16K tape systems and 24K disc systems.

FORTRAN: A FORTRAN compiler is offered for 16K tape-oriented systems. The language is a subset of full USA Standard FORTRAN and includes some extensions beyond USASI Basic FORTRAN.

ASSEMBLERS: The 9200/9300 Assemblers permit programs to be coded in a symbolic assembly language that is similar to, though not fully compatible with, the IBM System/360 Model 20 Assembler language. Assemblers are offered for 8K card systems, 16K tape systems, 16K systems with 8410 Disc Files, and 24K systems with 8411 or 8414 Disc Drives. All versions have macro-instruction facilities, though the Card Assembler requires a separate pre-assembly macro pass.

REPORT PROGRAM GENERATORS: RPG is probably the most widely used programming language in small 9200/9300 installations. Using five types of preprinted coding forms, the programmer prepares a set of specifications describing the input data, calculations, and desired output. The RPG then generates a program to perform the required functions. The coding forms and source language are essentially the same as those of IBM System/360 RPG.

UNIVAC offers RPG's for 8K card systems, 12K tape systems, 12K systems with 8410 Disc Files, and 24K systems with 8411 or 8414 Disc Drives. Programs generated for disc systems can process either sequential or indexed sequential files.

UNIVAC 9200 & 9300

► **INPUT/OUTPUT CONTROL SYSTEMS (IOCS):** These are sets of macro-instructions that facilitate the coding and control of input/output operations. Separate versions are available for card, tape, and disc systems. The Disc IOCS can handle sequential, indexed sequential, and random file organizations. Special input/output routines are also available for controlling data communications, the 2703 Optical Document Reader, high-speed printers, paper tape I/O, etc.

UTILITY ROUTINES: Tape and disc sort routines are available. The tape sort requires at least 12K bytes and three magnetic tape drives. The 8410 and 8411/8414 disc sorts require 12K and 16K bytes, respectively. All are generalized routines that can accommodate either fixed or variable-length records and the user's own coding.

The Gangpunch-Reproduce program accepts problem-oriented specifications and generates programs which enable a card-oriented 9200/9300 system to perform a variety of gangpunching, reproducing, and sequence-checking functions.

MATHPAC is a library of more than 30 closed sub-routines which perform floating-point arithmetic and evaluate commonly-used mathematical functions (square root, sine, log, etc.).

Other utility routines are available to handle diagnostic, data transcription, file maintenance, and other commonly-required functions.

APPLICATION PROGRAMS: The limited number of application packages currently available from UNIVAC includes:

- Bill of Materials Processor
- Critical Path Method Scheduling
- Fixed Assets Accounting
- General Ledger Processing
- LINCO III Automatic Typesetting System
- Mortgage Accounts Processing
- Savings Accounts Processing

PRICING

EQUIPMENT: The following systems are representative of the types of 9200 and 9300 systems that are being widely installed and are supported by standard UNIVAC software. All necessary control units and adapters are

included in the indicated prices, and the quoted rental prices include equipment maintenance. Effective February 1, 1970, UNIVAC raised the purchase, rental, and maintenance prices for most of the 9200/9300 components by approximately 5 percent; these new prices are reflected below.

MINIMUM 9200 CARD SYSTEM: Consists of 8K 9200 Processor, 250-lpm Printer with 96 print positions, 400-cpm Card Reader, and 75-200-cpm Card Punch. Monthly rental and purchase prices are approximately \$1,140 and \$41,100, respectively.

9200 II DISC SYSTEM: Consists of 16K 9200 II Processor, Selector Channel, Multiply-Divide-Edit feature, 300-lpm Printer with 120 print positions, 600-cpm Card Reader, 75-200-cpm Card Punch, and two 8411 Disc Drives with control. Monthly rental and purchase prices are approximately \$3,540 and \$135,400 respectively.

9300 TAPE SYSTEM: Consists of 16K 9300 Processor, Multiplexer Channel, 600-lpm Printer with 120 print positions, 600-cpm Card Reader, 75-200-cpm Card Punch, and four Uniservo VI C Tape Units with control. Monthly rental and purchase prices are approximately \$3,970 and \$142,300, respectively.

9300 II TAPE/DISC SYSTEM: Consists of 32K 9300 II Processor with Multiplexer Channel and Selector Channel, 600-lpm Printer with 132 print positions, 600-cpm Card Reader, 250-cpm Card Punch, six Uniservo VI C Tape Units with control, and two 8411 Disc Drives with control. Monthly rental and purchase prices are approximately \$7,380 and \$275,000, 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.

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. ■

UNIVAC 9200 & 9300

Equipment Prices

		<u>Purchase Price</u>	<u>Monthly Maint.</u>	<u>Rental (1-year lease)*</u>
PROCESSORS AND MAIN STORAGE				
3030-00	9200 Processor (includes 250-lpm Bar Printer with 96 print positions)	12,810	68	294
3030-94	9200 II Processor (includes Multiplexer Channel and 250-lpm Bar Printer with 96 print positions)	14,985	74	347
7007-93	Storage; 8,192 bytes; for 9200 & 9200 II	16,665	32	383
7007-92	Storage; 12,288 bytes; for 9200 & 9200 II	28,015	47	641
7007-91	Storage; 16,384 bytes; for 9200 & 9200 II	33,325	63	761
7007-87	Storage; 24,576 bytes; for 9200 II only	50,010	95	1,150
7007-85	Storage; 32,768 bytes; for 9200 II only	66,000	126	1,517
3030-02	9300 Processor (includes 600-lpm Bar Printer with 120 print positions, and the Multiply, Divide, Edit feature)	27,825	160	635
3030-96	9300 II Processor (includes Multiplexer Channel, 600-lpm Bar Printer with 120 print positions, and the Multiply, Divide, Edit feature)	34,535	173	782
7007-08	Storage; 8,192 bytes; for 9300 only	24,390	47	555
7007-10	Storage; 12,288 bytes; for 9300 only	38,155	63	870
7007-12	Storage; 16,384 bytes; for 9300 & 9300 II	44,675	79	1,024
7007-18	Storage; 24,576 bytes; for 9300 & 9300 II	63,720	110	1,464
7007-14	Storage; 32,768 bytes; for 9300 & 9300 II	81,145	126	1,853
PROCESSOR FEATURES AND CHANNELS				
F0882-00	Multiply, Divide, Edit Feature (for 9200 & 9200 II)	3,380	5	79
F0869-98	Multiplexer Channel (for 9200)	2,175	5	53
F1104-99	Selector Channel (for 9200 II)	3,330	10	68
F0963-00	300-lpm Print Speed (for 9200 & 9200 II)	2,175	—	53
F0866-00	120 Print Positions (for 9200 & 9200 II)	5,070	15	116
F0868-01	132 Print Positions (for 9200 & 9200 II)	7,730	21	68
F0865-00	Variable Speed Printing (for 9200 & 9200 II)	2,900	15	68
F0969-00	8 Lines/Inch Print Spacing (for 9200 & 9200 II)	220	—	5
F1130-00	Form Alignment (for 9200 & 9200 II)	410	—	10
F0869-01	Multiplexer Channel (for 9300)	3,380	5	79
F0864-00	132 Print Positions (for 9300 & 9300 II)	3,140	10	74
F0867-00	High-Speed Numeric Print (for 9300 & 9300 II)	1,690	15	42
F0969-00	8 Lines/Inch Print Spacing (for 9300 & 9300 II)	220	—	5
MASS STORAGE				
F1023-00	Disc File Control (for up to eight 8410 drives)	8,910	37	205
8410-00	Dual Disc File, Master; 3.2 million bytes	13,475	131	310
8410-92	Dual Disc File, Slave; 3.2 million bytes	13,475	131	310
8410-02	Single Disc File, Slave; 1.6 million bytes	8,220	84	189
F1015-00	Buffer/Fastband Search (mandatory feature for 8410)	7,080	26	163
F1016-00	Disc Drive (expands 8410-02 to Dual Disc File, Slave)	5,255	47	121
F1102-00	Disc Cartridge (for 8410 drives)	380	NA	12
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 (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

* Rental prices do not include equipment maintenance.

UNIVAC 9200 & 9300

Equipment Prices

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
INPUT/OUTPUT UNITS				
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**	—	—
0711-00	Card Reader; 400 cpm	4,970	32	116
0711-02	Card Reader; 600 cpm	6,630	63	152
F0872-00	Short Card Feature; 51 Columns (for 0711-00 or 0711-02)	1,425	10	37
F0872-01	Short Card Feature; 66 Columns (for 0711-00 or 0711-02)	1,425	10	37
F1054-01	90-Column Read Feature (for 0711-00 or 0711-02)	430	—	21
F1097-00	Multi-Strobe Read Feature (for 0711-00 or 0711-02)	1,145	5	26
0603-04	Card Punch; 75-200 cpm	6,630	63	152
F0870-00	Read/Punch Feature (for 0603-04)	2,840	15	68
F0871-00	Selective Stacker Feature (for 0603-04)	410	—	10
0604-00	Card Punch; 200 cpm	9,920	90	230
0604-99	Card Punch; 250 cpm	15,660	90	360
F0875-00	Read/Punch Feature (for 0604-00 or 0604-99)	1,970	47	116
F0945-00	250-cpm Rate (for 0604-00)	5,740	—	130
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
F0943-99	Channel Adapter; permits connection of a UNIVAC 1004 or 1005 Processor	3,885	15	89
F0822-01	1001 Control; permits connection of a UNIVAC 1001 Card Controller	1,690	5	42
DATA COMMUNICATION SUBSYSTEMS				
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
F1357-00	Line Terminal Control 1C (for DCS-1C)	6,000	25	125
8577-00	Line Terminal Control 1C, Free-Standing	8,640	30	180

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.

UNIVAC 9200 & 9300

► **INPUT/OUTPUT CONTROL SYSTEMS (IOCS):** These are sets of macro-instructions that facilitate the coding and control of input/output operations. Separate versions are available for card, tape, and disc systems. The Disc IOCS can handle sequential, indexed sequential, and random file organizations. Special input/output routines are also available for controlling data communications, the 2703 Optical Document Reader, high-speed printers, paper tape I/O, etc.

UTILITY ROUTINES: Tape and disc sort routines are available. The tape sort requires at least 12K bytes and three magnetic tape drives. The 8410 and 8411/8414 disc sorts require 12K and 16K bytes, respectively. All are generalized routines that can accommodate either fixed or variable-length records and the user's own coding.

The Gangpunch-Reproduce program accepts problem-oriented specifications and generates programs which enable a card-oriented 9200/9300 system to perform a variety of gangpunching, reproducing, and sequence-checking functions.

MATHPAC is a library of more than 30 closed sub-routines which perform floating-point arithmetic and evaluate commonly-used mathematical functions (square root, sine, log, etc.).

Other utility routines are available to handle diagnostic, data transcription, file maintenance, and other commonly-required functions.

APPLICATION PROGRAMS: The limited number of application packages currently available from UNIVAC includes:

- Bill of Materials Processor
- Critical Path Method Scheduling
- Fixed Assets Accounting
- General Ledger Processing
- LINCO III Automatic Typesetting System
- Mortgage Accounts Processing
- Savings Accounts Processing

PRICING

MINIMUM 9200 CARD SYSTEM: Consists of 8K 9200 Processor, 250-lpm Printer with 96 print positions, 400-cpm Card Reader, and 75-200-cpm Card Punch. Monthly rental and purchase prices are approximately \$1,085 and \$39,120, respectively. (Under a 5-year lease, the monthly rate is \$955.)

9200 II DISC SYSTEM: Consists of 16K 9200 II Processor, Selector Channel, Multiply-Divide-Edit feature, 300-lpm Printer with 120 print positions, 600-cpm Card Reader, 75-200-cpm Card Punch, and two 8411 Disc Drives with control. Monthly rental and purchase prices are approximately \$3,445 and \$131,800, respectively.

9300 TAPE SYSTEM: Consists of 16K 9300 Processor, Multiplexer Channel, 600-lpm Printer with 120 print positions, 600-cpm Card Reader, 75-200-cpm Card Punch, and four Uniservo VI C Tape Units with control. Monthly rental and purchase prices are approximately \$3,810 and \$136,500, respectively.

9300 II TAPE/DISC SYSTEM: Consists of 32K 9300 II Processor with Multiplexer Channel and Selector Channel, 600-lpm Printer with 132 print positions, 600-cpm Card Reader, 250-cpm Card Punch, six Uniservo VI C Tape Units with control, and two 8411 Disc Drives with control. Monthly rental and purchase prices are approximately \$7,185 and \$267,500, 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. ■