UNIVAC 9200 & 9300

MANAGEMENT SUMMARY

UNIVAC's entry in the blossoming small-scale computer system market consists of the 9200 and 9300 systems, introduced in 1966, and the 9200 II and 9300 II, which were added in 1969. Designed primarily for business data processing, these systems have, from their introduction, provided a nicely balanced combination of economy and processing power for small-volume users. Today, they offer novice users simplicity of operation in thoroughly proven systems. Sophisticated users also currently employ the 9200/9300 systems quite effectively as I/O processors and as communications terminals in conjunction with larger computers.

Introduced in June 1966, a little more than two years after the IBM System/360, the 9200 and 9300 were the premier members of the long-awaited UNIVAC 9000 Series.

An upgrade system, the UNIVAC 9400, was unveiled in January 1968, and the 9700 was announced in November 1971 to top off the upward-compatible family. Development of these two larger systems is currently proceeding at a rapid pace. The 9400 was effectively replaced by the 9480 in June 1973; the 9480 has MOS memory and 9400-identical performance at much lower cost, with consequent increased cost-effectiveness. Initial U.S. deliveries of the 9700 began in late 1973; MOS memory has replaced the originally announced plate-wire memory, and virtual memory for the system is known to be an imminent development. Both the 9480 and 9700 can run under UNIVAC's effective OS/4 operating system, and the 9700 is slated to receive the more advanced and powerful OS/7 operating system early in 1974. (The 9400 and 9480 are covered in Report 70C-877-02, and the 9700 is covered in Report 70C-877-03.)

Spanning entry-level to medium-scale users, the long-lived UNIVAC 9200/9300 systems, introduced in 1966, offer users an array of mature and well-proven card, tape, and disc processing systems which are upward-compatible to the larger UNIVAC 9400, 9480, and 9700.

CHARACTERISTICS

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

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.

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 ASCII, depending upon setting of a mode byte.

MAIN STORAGE

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

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). A variety of disc drives, magnetic tape units, and other peripheral equipment can be added.

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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 and 370.

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 third-generation 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.

Although UNIVAC's plated-wire memories have performed well, it is now clear that semiconductor technology is destined to displace both magnetic core and plated wire as the principal computer storage medium. UNIVAC itself is now using MOS memory in place of plated wire in both the 9480 and the 9700.

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. The Spectra 70 line and its progeny, the RCA 2, 3, 6, and 7, live on for former RCA customers as the UNIVAC Series 70. UNIVAC stepped in to acquire the RCA customer base soon after RCA's exit from the EDP marketplace. (The UNIVAC Series 70 line is described in Report 70C-877-21.)

Even so, UNIVAC's decision to strive for data and program compatibility between its 9000 Series and the System/360 represented an important step toward industry standardization and improved communication. UNIVAC, however, did not go 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 IBM 360/20, though still widely used, is now being rapidly displaced by IBM's newer System/3 and by other more cost-effective systems. But the System/3 is not directly compatible with the IBM System/360 or 370; nor, for that matter, are the other strong competitors in the current small-system market. The 9200 and 9300 systems of today thus compete with systems which are

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, except for print buffer area (during printing) and reserved storage area.

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 an extra-cost option in the 9200 and 9300 card systems. 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.

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 and Uniservo 12 Magnetic Tape Subsystem 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.

I/O INTERFERENCE: Demands on the processor imposed by multiplexer channel operations range from

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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
PROCESSORS				
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	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	400/600	600	600
Max. magnetic tape speed, bytes/sec.	none	68,320	34,160	68,320
8410 Disc Files	yes	yes	yes	yes
8411 Disc Drives	no	yes	no	yes
8414 Disc Drives	no	yes	no	yes

not quite so directly comparable, and which do not share the popular System/360 conventions.

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 some changes, but not extensive ones, before they can be translated and executed on a 9200/9300 system, and vice versa.
- 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

less than 1 percent (for card reading and punching) to about 33 percent (for magnetic tape I/O). Computing is suspended during selector channel I/O operations, though multiplexer I/O operations can continue.

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).

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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 a broad range of peripheral equipment, including data communications controls, an optical document reader, paper tape I/O, line printers with speeds of up to 1600 lpm, and three types of disc files – including IBM 2311-compatible and 2314-compatible units. Magnetic tape speed, long limited to a maximum of 34,160 bytes per second, was doubled in April 1971 when UNIVAC announced the availability of the 1600-bpi Uniservo 12 tape unit with 9200/9300 systems. Other peripheral units introduced during 1971 include a 1000-cpm card reader, an upper-and-lower-case printer, and a console/inquiry station. Only a MICR sorter/reader remains conspicuously absent from the 9200/9300 peripheral line-up.

The software complement now includes adequate support for card, tape, and disc-oriented systems (including limited multiprogramming and local/remote inquiry capabilities 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. And UNIVAC's still-bundled support policy can lead to important savings for users.

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 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 on page 70C-877-01c. 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 UNIVAC 9200/9300 central processor are surprisingly fast and thoroughly reliable. Their main memory cycle times are, in fact, considerably faster than those of the IBM System/3, though their decimal addition times are slower:

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.

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. Each "master" tape unit can control up to three "slave" tape units. 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.

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

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	UNIVAC 9200 and 9200 II	UNIVAC 9300 and 9300 II	IBM System/3
Main memory cycle time, microseconds/ byte	1.2	0.6	1.52
5-digit decimal add time, microseconds	103.2	51.6	24.4

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. More than 3000 of the 9200/9300 systems are now in use throughout the world.

In an effort to boost the sales of the 9200/9300 systems, which were lagging as a result of the weak economy and the steadily improving product lines from competitive computer makers, UNIVAC made several significant marketing moves in 1971.

In March 1971, the discounts on UNIVAC's extended-term leases were increased. Customers now receive a discount from the short-term monthly rental prices of 15% on a 3-year lease or 25% on a 5-year lease, compared with the previous discount of only 15% on a 5-year lease.

Then, in August 1971, UNIVAC introduced the 9311 and 9314 "D" Systems. These are "packaged" disc-oriented configurations consisting of a 9300 II Processor with 16K, 24K, or 32K bytes of main storage, a 600-lpm printer, 600-cpm card reader, 75-200-cpm punch, and two 8411 or 8414 disc drives. None of the hardware was new, but the pricing certainly was: the 9311 and 9314 systems are offered at purchase prices up to 24% and rental prices up to 11% below the list prices of their individual components.

In October 1971, UNIVAC announced three more packaged "D" systems built around the 9200 II Processor: the 9210, 9211, and 9214. Each system consisted of a 9200 II Processor with up to 32K bytes of main storage, a multiplexer channel, and the multiply, divide, and edit instructions; a 250-lpm printer with 120 print positions; a 400-cpm card reader; a 75-to-250-cpm card punch; and two spindles of disc storage. The 8410 Disc File was used in the 9210 system, the 2311-compatible 8411 Disc Drives in the 9211 system, and the 2314-compatible 8414 Disc Drives in the 9214 system. The 9211 and 9214 systems also included a selector channel.

UNIVAC is no longer offering the bargain-priced 9210, 9211, and 9214 "D" systems; and the 9311 and 9314 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 a control unit and up to 16 tape units. Each "master" tape unit can control up to three "slave" tape units. A single Uniservo 12 subsystem can be connected to the selector channel of a 9200 II or 9300 II Processor only.

400-CPM CARD READER: The 0711-00 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. Has a 1200-card input hopper and a 1500-card stacker. Standard integrated card input unit for the 9200; also usable with the 9200 II.

600-CPM CARD READER: The 0711-02 reads 80-column cards serially by column at 600 cpm. Otherwise, has same specifications as the 400-cpm reader. Standard integrated card input unit for the 9300 and 9300 II; also usable with the 9200 II.

1000-CPM CARD READER: The 0716 reads 80-column cards serially by column at 1000 cpm. Can be equipped to read 51- or 66-column short cards. Has a 2400-card input hopper and two 2000-card stackers. Compressed code translation and image-mode reading are standard; translation to EBCDIC or ASCII is an extra-cost option. Connects to the multiplexer channel of a 9200, 9200 II, 9300, or 9300 II Processor.

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: The 0603 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 integrated card output unit for all four processors.

200/250-CPM CARD PUNCH: The 0604 punches 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.

Use of the pre-punch read feature on the above punches does not fulfill UNIVAC's requirement of an 80-column card reader in the 9200/9300 system.

PAPER TAPE SUBSYSTEM: The 0920-02 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.

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"D" systems are currently offered only on a 5-year-lease basis. The company's reason for limiting the availability of these packaged configurations is that some of the required peripheral devices are no longer available in sufficient supply.

Based on available and usually reliable sources, Datapro estimates that the 9200/9300 line reached its high-water mark in 1969-70 with approximately 4100 installations. As is the policy with most major mainframe vendors, UNIVAC neither discloses such figures nor comments on them. The 9200/9300 processors are still in current production, according to UNIVAC, but Datapro believes that most of the systems now being delivered are returns, a natural occurrence as users upgrade from these mature small-scale systems.

USER REACTION

Datapro was able to interview eight 9200 users and six 9300 users, all of whom were early users of these systems. Here's a summary of their current status:

- 9200 Users: One moved up to a UNIVAC 9300 II about three years ago. A second converted to a 9300 II in 1969 and is now replacing both that system and a UNIVAC 418 with a Burroughs B 2700. A third, with a tape-oriented 9200 installed in 1969, presently plans an upgrade to a disc-oriented 9200 II. A fourth user is satisfied with his 8K card-oriented 9200, installed in 1968, which he evaluated as superior to the 360/20 alternative at the time, but states that he's leaning toward a 360 or 370 for the future. A fifth has had a 16K 9200 II since 1970 and now has three 8414 discs on order; he found his system cheaper than a 360/20 and also states that he switched to UNIVAC because of better vendor service. A sixth user is totally satisfied with his 9200 II, which began as a 12K tape system and is being upgraded to a 24K disc system using two 8414's and the Concurrent Operating System. A seventh has been pleased since 1967 with his 12K dual-8410 Minimum Operating System 9200. And the eighth and final 9200 user has been basically satisfied since 1971 with an 8K card-oriented 9200.

- 9300 Users: The first 9300 user has moved from his 4-tape, 16K Nonconcurrent Operating System setup, installed in 1970, to a system with 32K and 7 tapes running under the Concurrent Operating System; he is trying to decide between a UNIVAC 9480 and an IBM 370/125 for his next system. A second user, with a 9300 since 1968, now has 32K and 6 tapes on the system, which runs under NCOS, and is considering a 9480 upgrade. A third 9300 II user was forced to move to a 90K Burroughs B 3500 when the agency which he is part of switched vendors. A

250/300-LPM BAR PRINTER: An integral part of each 9200 and 9200 II Processor. Uses an interchangeable, horizontally oscillating type bar. 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 BAR 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: The 0768-00 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.

With a special feature installed, the 0768-00 prints at 1200 lpm when the full 63-character set is used and at 1600 lpm when using any 43 contiguous characters.

840/1000/2000-LPM PRINTER: The 0768-02 features full upper-and-lower-case alphabetic printing plus high-speed numeric printing. Each of the 132 print positions has 92 discrete characters, with the 10 numerics and 4 special characters duplicated on opposite sides of the drum. Peak printing speed is 2000 lpm for numerics (at single, double, or triple spacing), 1000 lpm for up to 87 contiguous characters, and 840 lpm when all 94 characters are used. A choice of three character sets is offered, all in the UNIVAC II-14 font which is readable by the 2703 Optical Document Reader. A Print Code Expansion feature allows logical expansion of the character set to 108 different characters. Skipping speed is 33 inches per second. Connects to the multiplexer channel of a 9200 II, 9300, or 9300 II Processor.

CONSOLE/INQUIRY UNIT: Consists of a typewriter-style data entry keyboard and a 30-character-per-second serial printer similar to the one used in the UNIVAC DCT 500 Data Communications Terminal. Serves as a system control center and/or a local inquiry station. Multiple units can be connected a system to provide additional inquiry stations, but only one can serve as an operator's console. Connects to the multiplexer channel of a 9200, 9200 II, 9300, or 9300 II Processor equipped with a disc or tape subsystem, and allows use of the OS/500 operating system.

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 OCR Size A font. Has a 2000-document feed hopper and three 1000-document stackers. Connects to the multiplexer channel of all four processors.

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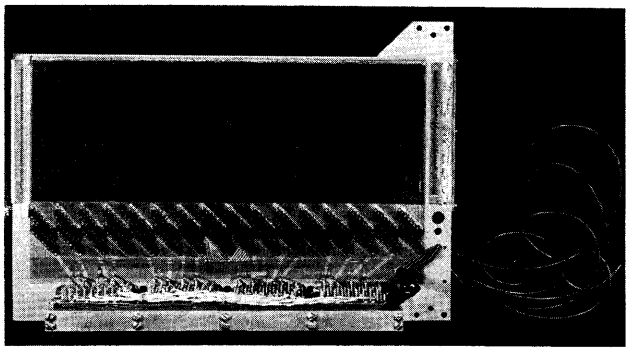
fourth purchased a 16K, 4-tape 9300 five years ago as an upgrade from a UNIVAC 1005; he runs under MOS, and has since acquired a 1-megabyte IBM 370/155 that will absorb the 9300's work when a buyer can be found for it. A fifth moved up from his 32K, 6-tape 9300, installed in 1968, to a 32K, 4-tape, 4-disc system with an 1100-lpm printer in 1972; he formerly used RPG, but is switching to COBOL even though he feels that UNIVAC's COBOL generates considerable extraneous coding. A sixth and final 9300 user, who had moved up to 32K, 6 tapes, and NCOS, has switched (January 1973) to a 96K IBM 370/135 under DOS Release 27.

In summary, this admittedly small sample shows a fairly high level of user satisfaction with the 9200/9300 product line. The systems are generally regarded by their users as workhorses that get the job done in reliable though unspectacular fashion. CPU reliability is clearly outstanding, although the usual assortment of mechanical problems has been encountered with the associated peripheral equipment. Several users mentioned trouble with the Uniservo VI C Magnetic Tape Units; UNIVAC acknowledges early problems with these units but maintains that they have now been largely overcome. Users were generally well pleased with UNIVAC's maintenance service.

With respect to the 9200/9300 software, major complaints were conspicuous by their absence. Most of the users interviewed were using the RPG language, and this is believed to be generally true of the systems' users as a whole. One user is converting to exclusive use of COBOL, and another was a nearly 100% BAL shop. Two installations reported minor use of FORTRAN, but heavy FORTRAN utilization is rare on the 9200/9300 systems, which do not offer floating-point arithmetic hardware. Finally, no use of UNIVAC applications software turned up in this small sampling.

Several of the interviewed 9200/9300 users have significantly expanded their systems or moved up to larger models within the UNIVAC 9000 Series. Those users now facing upgrades are generally looking favorably upon the UNIVAC 9480. On the other hand, UNIVAC has lost and will continue to lose some of its 9200/9300 upgrade accounts to IBM and other vendors – just as the UNIVAC 9480 and 9700 will win converts from IBM and other competitive product lines.

In conclusion, Datapro feels that the mature UNIVAC 9200/9300 systems still offer a number of significant strengths to small-volume business data processing users: proven software, a wide array of peripheral equipment, bundled support, System/360 compatibility, flexible long-term lease plans, and attractive prices. □



UNIVAC's plated-wire memory is the most distinctive hardware feature of the 9200/9300 computers.

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 channle of a 9200, 9200 II, 9300, or 9300 II Processor through a combination of DCS-1 and/or DCS-4 subsystems.

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, or an equivalent system. Transmission can be in either EBCDIC or ASCII code and in either Transparent or Nontransparent mode. UNIVAC provides a macro library that enables the 9000 Series computer to serve as a remote terminal to a System/360 or 370 using BTAM or QTAM.

INTERCOMPUTER CONTROL UNIT FEATURE: Allows local on-line communication in a slave mode between a 9200/9300 and a UNIVAC 418 III, 494, or 1106/1108 system. It consists of 56 cards in a frame mounted within the 9200/9300 processor.

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

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the Non-Concurrent Operating System (NCOS), as well as a Tape Assembler, NCOS Report Program Generator, and COBOL and FORTRAN compilers; 14K 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: Four 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.

OS 500 OPERATING SYSTEM: OS 500, introduced in mid-1971, is an operating system designed to provide users of tape or disc-oriented 9200/9300 systems with console control and both local and remote inquiry capabilities. Most of OS 500's functions and operations are similar to those of COS and NCOS; but unlike the other two, OS 500 is designed to keep the system in continuous operation instead of halting when various abnormal conditions arise.

OS 500 requires a 9200 II, 9300, or 9300 II Processor with at least 24K bytes of main memory, a card reader, a Console/Inquiry Unit, and either an 8410, 8411, or 8414 disc subsystem or a magnetic tape subsystem. OS 500 can also support additional local Console/Inquiry Units (for inquiry use only), DCT 500 remote inquiry units, and various data communications interfaces. A single main program can operate concurrently with one or more "symbiont" data transcription routines. When an inquiry is received, OS 500 can suspend execution of the main program, roll it out to disc storage, and load and execute the appropriate inquiry program. Upon completion of inquiry processing, the main program is restored and resumed.

COBOL: Compilers for the Minimum American National 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 American National Standard FORTRAN and includes some extensions beyond ANS 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.

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.

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

SWITCH is a series of three programs designed to convert IBM 360/20 Card or Tape RPG soure programs into UNIVAC 9200/9300 RPG source programs. The ACTS-1 Translator facilitates the conversion of IBM 1401/1440/1460 Autocoder or SPS source programs into UNIVAC 9200/9300 Assembly-language source programs.

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

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

Accounts Receivable Processing
Bill of Materials Processor (tape-oriented)
Critical Path Method Scheduling
Dairy Route Accounting
Fixed Assets Accounting
General Ledger Processing
LINCO III Automatic Typesetting
Mortgage Accounts Processing
Savings Accounts Processing
Universal Student Academic Scheduling
Wholesale Ice Cream Accounting

PRICING

EQUIPMENT: The following systems are representative of the types of 9200 and 9300 systems that are widely installed and are supported by standard UNIVAC software. All necessary control units and adapters are included in the indicated prices. The quoted rental prices are for 1-year leases and include equipment maintenance.

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 $1,225 and $42,570, respectively.

9311-A SERIES D DISC SYSTEM: Consists of 16K 9300 II Processor with Multiplexer Channel and Selector Channel, 600-lpm Printer with 132 print positions, 600-cpm Card Reader, 75-200-cpm Card Punch, and two 8411 Disc Drives with control. Monthly rental and purchase prices for this "packaged" configuration are $3,451 and $111,040, respectively.

9314-C SERIES D 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, 75-200-cpm Card Punch, and two 8414 Disc Drives with control. Monthly rental and purchase prices for this "packaged" configuration are $4,469 and $150,120, 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 $4,036 and $142,270.

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 8414 Disc Drives with control. Monthly rental and purchase prices are approximately $7,515 and $274,580, 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.

LONG-TERM LEASES: In addition to the basic 1-year agreement, UNIVAC offers extended-term leases for the 9200/9300 systems at significantly lower monthly rates. Under a 3-year "level-payment" agreement, the monthly equipment charge is 85% of the 1-year rental rate shown in the accompanying price list. Under a 5-year "level-payment" agreement, the monthly charge is 75% of the 1-year rental rate. Under a 5-year "reducing-payment" agreement, the monthly 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. At the end of a 5-year lease term, the user can extend his lease for another 2 or 3 years at an additional discount. Attractive purchase options are also offered to long-term lease customers upon expiration of their leases. ■

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*
PROCESSORS AND MAIN STORAGE				
3030-00	9200 Processor (includes 250-lpm Bar Printer with 96 print positions)	13,485	87	310
3030-94	9200 II Processor (includes Multiplexer Channel and 250-lpm Bar Printer with 96 print positions)	15,834	95	364
7007-93	Storage; 8,192 bytes; for 9200 & 9200 II	17,485	37	402
7007-92	Storage; 12,288 bytes; for 9200 & 9200 II	29,275	55	673
7007-91	Storage; 16,384 bytes; for 9200 & 9200 II	34,755	73	799
7007-87	Storage; 24,576 bytes; for 9200 II only	52,505	110	1,207
7007-85	Storage; 32,768 bytes; for 9200 II only	69,295	146	1,593
3030-02	9300 Processor (includes 600-lpm Bar Printer with 120 print positions, and the Multiply, Divide, Edit feature)	27,825	205	635
3030-96	9300 II Processor (includes Multiplexer Channel, Selector Channel, 600-lpm Bar Printer with 120 print positions, and the Multiply, Divide, Edit feature)	34,535	222	782
7007-08	Storage; 8,192 bytes; for 9300 only	24,390	55	555
7007-10	Storage; 12,288 bytes; for 9300 only	38,155	73	870
7007-12	Storage; 16,384 bytes; for 9300 & 9300 II	44,675	92	1,024
7007-18	Storage; 24,576 bytes; for 9300 & 9300 II	63,720	128	1,464
7007-14	Storage; 32,768 bytes; for 9300 & 9300 II	81,145	146	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	16	116
F0868-01	132 Print Positions (for 9200 & 9200 II)	7,730	22	179
F0865-00	Variable Speed Printing (for 9200 & 9200 II)	2,900	16	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 Printer (for 9300 & 9300 II)	1,690	16	42
F0969-00	8 Lines/Inch Print Spacing (for 9300 & 9300 II)	220	—	5
MASS STORAGE				
F1023-01	Disc File Control (for up to eight 8410 drives)	8,910	39	205
8410-00	Dual Disc File, Master; 3.2 million bytes	13,475	167	310
8410-92	Dual Disc File, Slave; 3.2 million bytes	13,475	140	310
8410-02	Single Disc File, Slave; 1.6 million bytes	8,220	89	189
F1015-00	Buffer/Fastband Search (mandatory feature for 8410)	7,080	32	163
F1016-00	Disc Drive (expands 8410-02 to Dual Disc File, Slave)	5,255	50	121
F1102-00	Disc Cartridge (for 8410 drives)	240	NA	12
5024-00	Disc File Control (for up to eight 8411 drives)	20,010	85	460
8411-00	8411 Disc Drive; 7.25 million bytes	19,920	80	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)	300	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	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
8414-85	Single 8414 Disc Drive (for configuration expansion); 29 million bytes	16,500	65	410
INPUT/OUTPUT UNITS				
F1043-00	Dual Channel Feature (for 5024-02)	3,700	15	85
F1214-00	Disc Pack (for 8414 drives)	440	NA	20
0858-99	Uniservo VI C Subsystem; includes 9-track Control, Master and 1 Slave Tape Unit	32,190	230	771
0858-98	Uniservo VI C Subsystem; includes 7-track Control, Master and 1 Slave Tape Unit	32,190	230	771
F0828-00	7-Track Feature (for 0858-99)	2,130	5	55
F0827-00	Data Conversion (for 0858-98)	2,130	5	55
F1021-99	7-to-9-Track Conversion (for 0858-98)	200**	—	—
0858-14	Uniservo VI C Slave Tape Unit; 9-track	10,470	74	252
0858-10	Uniservo VI C Master Tape Unit; 9-track	17,350	123	420
0858-01	Uniservo VI C Slave Tape Unit; 7-track	10,470	74	252
0858-00	Uniservo VI C Master Tape Unit; 7-track	17,350	123	420
F1021-00	7-to-9-Track Conversion (for 0858-00 or 0858-01)	100**	—	—
5017-99	Uniservo 12 Magnetic Tape Control (for up to 16 9-track, 1600-bpi, nonsimultaneous Uniservo 12 Tape Units)	22,185	90	510

*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)*
INPUT/OUTPUT UNITS (continued)				
F0823-99	7-Track Feature (for 5017-99)	4,785	15	110
F0826-00	9-Track NRZI Feature (for 5017-99)	4,785	15	110
0861-00	Uniservo 12 Master Tape Unit; 9-Track	20,015	107	482
0861-01	Uniservo 12 Slave Tape Unit; 9-track	11,745	74	283
0861-04	Uniservo 12 Master Tape Unit; 7-track	18,055	107	435
0861-05	Uniservo 12 Slave Tape Unit; 7-track	10,440	74	252
F0935-00	Dual Density Feature (for 0861-00)	2,175	10	50
0711-00	Card Reader; 400 cpm	4,970	39	121
0711-02	Card Reader; 600 cpm	6,630	72	159
F0872-00	Short Card Feature; 51 Columns (for 0711-00 or 0711-02)	1,425	10	38
F0872-01	Short Card Feature; 66 Columns (for 0711-00 or 0711-02)	1,425	10	38
F1054-01	90-Column Read Feature (for 0711-00 or 0711-02)	430	–	22
F1097-00	Multi-Strobe Read Feature (for 0711-00 or 0711-02)	1,145	5	27
0716-97	Card Reader and Control; 1000 cpm	13,680	90	299
F1487-00	Short Card Feature; 51 columns (for 0716-97)	1,425	10	38
F1487-01	Short Card Feature; 66 columns (for 0716-97)	1,425	10	38
F1488-00	Validity Check Feature (for 0716-97)	720	–	15
F1498-00	Alternate Stacker Fill Feature (for 0716-97)	480	–	10
F1530-00	Dual Translate; either EBCDIC or ASCII (for 0716-97)	960	5	21
0603-04	Card Punch; 75-200 cpm	6,630	77	152
F0870-00	Read/Punch Feature (for 0603-04)	2,840	16	71
F0871-00	Selective Stacker Feature (for 0603-04)	410	–	10
0604-00	Card Punch; 200 cpm	9,920	96	241
0604-99	Card Punch; 250 cpm	15,660	96	378
F0875-00	Read/Punch Feature (for 0604-00 or 0604-99)	4,970	50	121
F0945-00	250-cpm Rate (for 0604-00)	5,740	–	136
0920-02	Paper Tape Control (for F1033-02 & F1032-02)	7,540	27	181
F1033-02	Paper Tape Reader; 300 char/sec	1,600	16	38
F1034-00	Reader Spooler (for F1033-02)	1,600	5	38
F1032-02	Paper Tape Punch; 110 char/sec	5,480	22	132
F1035-00	Punch Takeup Spooler (for F1032-02)	655	5	15
0768-00	Printer and Control; 900/1100 lpm	40,675	337	981
0768-99	Printer and Control; 1200/1600 lpm	50,465	417	1,217
F1071-00	1600/1200-lpm Rate (converts 0768-00 to 0768-99)	9,790	80	236
0768-02	Printer and Control; 840/1000/2000 lpm	46,545	379	1,123
F1522-00	Print Code Expansion Feature (for 0768-02)	240	–	5
8541-95	Console/Inquiry Station	6,960	32	145
2703-00	Optical Document Reader; 300 dpm	42,000	187	918
F1108-00	600-dpm Speed Upgrade (for 2703-00)	10,560	32	231
F1163-00	Modulus 10 Check Digit (for 2703-00)	960	5	21
F1106-00	Mark Read—EBCDIC (for 2703-00)	7,920	37	173
F1106-01	Mark Read—ASCII (for 2703-00)	7,920	37	173
F1149-00	Punch Card Read Feature (for 2703-00)	2,640	10	57
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	16	93
F0822-98	1001 Control; permits connection of a UNIVAC 1001 Card Controller	4,355	10	101
DATA COMMUNICATION SUBSYSTEMS				
F1000-00	Line Terminal Control 1 (for DCS-1)	4,570	16	110
8575-00	Line Terminal Control 4 (for DCS-4)	10,500	44	254
F1357-00	Line Terminal Control 1C (for DCS-1C)	6,000	26	131
8577-00	Line Terminal Control 1C, Free-Standing	8,640	32	189
	Note: Numerous line terminals, communications interfaces, and optional features enable the above controls to accommodate a wide range of communications facilities and equipment.			
9300 SERIES "D" SYSTEMS				
9311-A	Includes Processor with 16,384 bytes of storage, Selector Channel, Multiplexer Channel, 600-lpm Printer, 600-cpm Card Reader, 75-200-cpm Card Punch, two 8411 Disc Drives and Control.	111,040	675	2,776**
9311-B	As above, with 24,576 bytes of storage	119,240	709	2,981**
9311-C	As above, with 32,768 bytes of storage	130,120	726	3,253**
9314-A	Includes Processor with 16,384 bytes of storage, Selector Channel, Multiplexer Channel, 600-lpm Printer, 600-cpm Card Reader, 75-200-cpm Card Punch, two 8414 Disc Drives and Control.	131,040	665	3,276**
9314-B	As above, with 24,576 bytes of storage	139,240	699	3,481**
9314-C	As above, with 32,768 bytes of storage	150,120	716	3,753**
F1652-99	Card Punch Upgrade; provides a 200-cpm Row Punch in any Series "D" System	3,454	19	82**

*Rental does not include maintenance.
**At present, the 9300 Series "D" systems are offered only under a 5-year lease.

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