Univac 90/25, 90/30, and 90/40

MANAGEMENT SUMMARY

The Sperry Univac 90/25, 90/30, and 90/40 are the small to medium computer systems of the company's 90 series computer family. The first model introduced was the 90/30 in 1974, followed by the 90/25 in 1977, and the 90/40 in 1978. Approximately 3000 orders for these systems have been booked to date. The 90/25, 90/30, and 90/40 models compete primarily against the IBM System 3, the IBM Systems 370/115 through 370/135, the Burroughs models B1700, B1800, B1900, and the Honeywell Series 60 Level 62 and Level 64.

Sperry Univac recently announced the System 80, an interactive medium-sized computer system that supersedes the 90/25, 90/30, and 90/40 models. The System 80 offers an attractive growth path for the 90/25, 90/30, and 90/40 users. Sperry Univac has stated that the System 80 "is one fifth the size, consumes less than half the power, is twice as fast, and costs about 50 percent less" than the older models.

The OS/3 operating system is used on both the 90/25, 90/30, 90/40 and the new System 80. Sperry Univac has enhanced the facilities of the O/3 operating system, and 90/25, 90/30, and 90/40 users will receive these improvements in Release 7. Especially noteworthy are the new editor, screen generator, improved disk oriented processing, and interactive software (JCL, SYSGEN, etc.).

The 90 series product line features metal oxide semiconductor (MOS) main memory. Memory size for the 90/25 can range from 65,536 to 163,840 bytes, while the memory size for the 90/30 can range from 65,536 to 524,288 ➢

The Sperry Univac 90/25, 90/30, and 90/40 systems are the small-to-medium-range computer systems in the 90 series. These models have been superseded by the interactive System 80. The OS/3 operating system is used in both systems.

MAIN MEMORY: 64K to 1048K bytes.
DISK CAPACITY: 57.9 million to 3.2 billion bytes.
WORKSTATIONS: Up to 12 local.
PRINTERS: 300 lpm to 2000 lpm.
OTHER I/O: Magnetic tape, punched card, paper tape.

CHARACTERISTICS

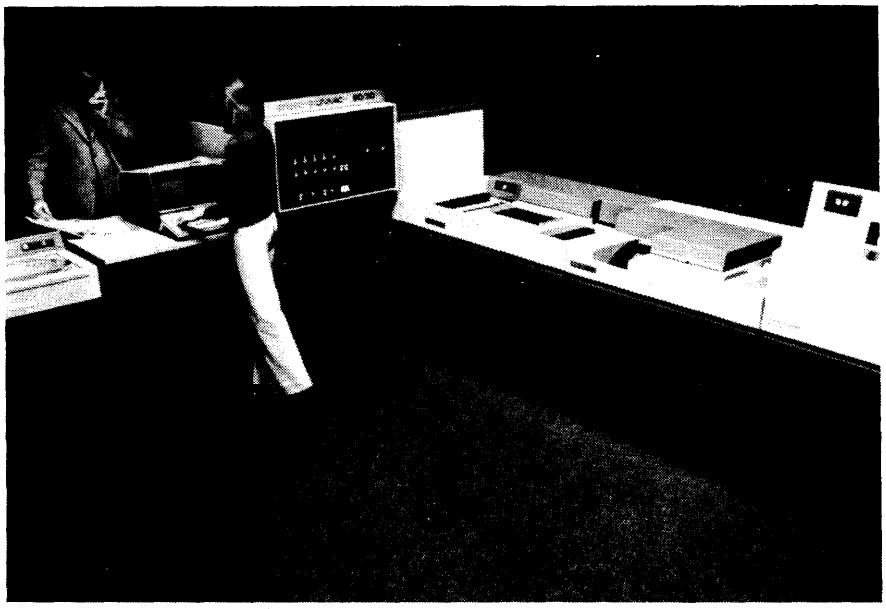
MANUFACTURER: Sperry Univac Division, Sperry Rand Corporation, P.O. Box 500, Blue Bell, Pennsylvania 19422. Telephone (215) 542-4011.

MODELS: Univac 90/25, 90/25D, 90/30B, 90/30, and 90/40.

DATA FORMATS

BASIC UNIT: 8-bit byte. Each byte can represent 1 alphanumeric character, 2 decimal digits, or 8 binary bits. Two consecutive bytes form a 16-bit "halfword," four consecutive bytes form a 32-bit "word," and eight consecutive bytes form a 64-bit "doubleword."

FIXED-POINT OPERANDS: Can range from 1 to 16 bytes (1 to 31 digits plus sign) in decimal mode; 1 halfword (16 ➢



The basic UNIVAC 90/30 configuration includes a processor with 65K bytes of MOS storage, CRT system console, 500-cpm card reader, 500-lpm printer, and two 8416 Disk Drives with a total capacity of 57.8 million bytes. Also shown in the photo is an optional card punch.

REFERENCE EDITION. This is a mature product line, and no significant further developments are anticipated. Because of its importance, coverage is being continued, but no future update is planned.

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CHARACTERISTICS OF THE 90/25, 90/30 and 90/40 SYSTEMS

	90/25	90/25D	90/30B	90/30	90/40
PROCESSOR					
Relative performance	1.0	1.0	1.3	1.3	1.8
Instruction set	84 plus 64 opt.	84 plus 64 opt.	84 plus 64 opt.	84 plus 64 opt.	15.
MEMORY					
Type	MOS	MOS	MOS	MOS	MOS
Cycle time, nanoseconds	600	600	600	600	500
Bytes fetched per cycle	2	2	2	2	2
Minimum capacity, bytes	65,536	65,536	65,536	65,536	524,288
Maximum capacity, bytes	163,840	163,840	524,288	524,288	1,048,576
Increment size, bytes	32,768	32,768	32,768; 65,536	32,768; 65,536	262,144
I/O CONTROL					
Integrated peripheral channel	1 std.	1 std.	1 std.	1 std.	1 std.
Integrated disk adapter	1 std.	1 std.	1 std.	1 std.	1 std.
Multiplexer channel	1 opt.	1 opt.	1 opt.	1 opt.	1 std.
Selector channel	No	No	2 opt.	2 opt.	1 std.
Maximum aggregate I/O data transfer rate, bytes per second	83,000	83,000	1.8 million	1.8 million	
PERIPHERALS					
Disk System					
8413 (4.8 MB diskette)	1 to 2	1 to 2	1 to 2	1 to 2	1 to 2
8416 (28.9 MB disk)	N/A	2 to 4	2 to 4	2 to 4	N/A
8418-02 (28.9 MB disk)	Up to 2	N/A	Up to 8	Up to 8	Up to 8
8418-04 (57.8 MB disk)	Up to 2	N/A	Up to 8	Up to 8	Up to 8
8430-99 (100 MB disk)	N/A	N/A	Up to 16	Up to 16	2 to 16
8433-00 (200 MB disk)	N/A	N/A	Up to 16	Up to 16	2 to 16
Magnetic tape units					
UNISERVO 10/14	Up to 8	Up to 8	Up to 8	Up to 8	Up to 8
UNISERVO 12/16	N/A	N/A	Up to 16	Up to 16	Up to 16
UNISERVO 20	N/A	N/A	Up to 16	Up to 16	Up to 16
Card Equipment					
Card Readers (CPM)					
0716-91 (80/96 column)	600	600	600	600	600
0716-93 (80/96 column)	1000	1000	1000	1000	1000
0716-99 (80 column)	N/A	1000	1000	1000	1000
0717-00 (80 column)	N/A	N/A	500	500	500
0719-93 (80 column)	300	300	300	N/A	N/A
Card Punch (CPM)					
0605-00	75 to 160	75 to 160	75 to 160	75 to 160	75 to 160
Printers (LPM)					
0778-00/02	300/500	300/500	300/500	300/500	300/500
0770-00/02/04	N/A	N/A	800/1400/2000	800/1400/2000	800/1400/2000
0776-00/04	N/A	N/A	760/900	760/900	760/900

bytes, and the memory size for the 90/40 can range from 524,288 to 1,048,576 bytes. The 90/25 and 90/30 have a memory cycle time of 600 nanoseconds per two bytes, while the 90/40 has a memory cycle time of 500 nanoseconds per two bytes.

Although the 90/30 is not totally dissimilar in design from the 90/60 and 90/70 central processors, it employs some architectural concepts that distinguish it from the larger Series 90 central processors. Among these is the use of integrated peripheral channels to interface both random-access and unit-record peripheral devices economically in small-scale 90/30 configurations. A multiplexer channel and up to two selector channels are optional, to expand the I/O device complement of larger 90/30 systems. However, like the two original members of the

bits) or 1 word (32 bits) in binary mode. Certain operations use a doubleword (63-bit integer field plus sign) in binary mode.

FLOATING-POINT OPERANDS: Optional floating-point hardware provides for addition, subtraction, multiplication, division, loading, storing, and sign control of short or long format operands. The short format provides 24-bit precision and is represented by one word, which uses bit 0 for the sign, bits 1 through 7 for the exponent, and bits 8 through 31 for the fraction. Long format is represented with a doubleword which provides 56-bit precision; the long format is similar to the short format except that the fraction is contained in bit positions 8 through 63. A guard digit is carried by the hardware for intermediate "place holding" during addition/subtraction, multiplication, comparison, and halving.

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

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PERIPHERALS

DEVICE	DESCRIPTION AND SPEED
MAGNETIC TAPE EQUIPMENT	
0870-00	Transport; 9-track, 25 ips, 1600 bpi PE, 40 KBS
0870-01	Transport; 9-track, 25 ips, 800 bpi NRZI, 20 KBS
0870-02	Transport; 7-track, 25 ips, 200/556/800 bpi NRZI, 5/13.9/20 KBS
0870-03	Transport; 9-track, 60 ips, 1600 bpi PE, 96 KBS
0870-04	Transport; 9-track, 60 ips, 800/1600 bpi NRZI/PE, 48/96 KBS
0870-05	Transport; 7-track, 60 ips, 800 bpi NRZI, 48 KBS
0861-00	Transport, master; 9-track, 42.7 ips, 1600 bpi PE, 68 KBS
0861-01	Transport, slave; same characteristics as 0861-00
0861-04	Transport, master; 7-track, 42.7 ips, 200/556/800 bpi NRZI, 8.5/23.7/34 KBS
0861-05	Transport, slave; same characteristics as 0861-04
0862-00	Transport; 9-track, 120 ips, 1600 bpi PE, 192 KBS
0862-02	Transport; 7-track, 120 ips, 200/556/800 bpi NRZI, 24/66.7/96 KBS
0864-00	Transport; 9-track, 200 ips, 1600 bpi PE, 320 KBS
PRINTERS	
0768-00	Drum, 132 positions, 900/1100 lpm
0768-99	Drum, 132 positions, 1200/1600 lpm
0768-02	Drum, 132 positions, 840/1000 lpm
0770-00	Band, 132 positions, 48-character set, 800 lpm
0770-02	Band, 132 positions, 48-character set, 1400 lpm
0770-04	Band, 132 positions, 48-character set, 2000 lpm
0776-00	Band, 136 positions, 48-character set, 760 lpm
0776-02	Band, 136 positions, 48-character set, 940 lpm
PUNCHED CARD EQUIPMENT	
0716-91	Card reader, 80- or 96-column, 600 cpm
0716-93	Card reader, 80- or 96-column, 1000 cpm
0716-99	Card reader, 80-column, 1000 cpm
PAPER TAPE EQUIPMENT	
0920	System; reads and punches 5-, 6-, 7-, or 8-level paper tape at 300 and 110 cps, respectively
INTEGRATED PERIPHERALS	
0605	Card punch, 80-column; 70 to 160 cpm
0717	Card reader, 80-column; 500 cpm
0719-93	Card reader, 80-column; 300 cpm
0773	Printer, band; 48-, 64-, 96-, or 128-character sets, 300 lpm with 48-character set, 120 or 132 print positions
0778-00	Printer, band; 48-, 64-, 96-, or 128-character sets, 300 lpm with 48-character set, 120 or 132 print positions
0778-02	Printer, band; 48-, 64-, 96-, or 128-character sets, 500 lpm with 48-character set, 120 or 132 print positions

Series 90, the 90/30 employs a writable control storage for implementation of the basic instruction repertoire plus the optional instructions and emulation microcode, and relocation hardware for flexible main memory management.

The major difference between the 90/30 and the 90/25 is a 30-percent slower CPU, use of 16K memory chips, and modification of the integrated peripheral channel to permit connection of a floppy disk subsystem. At the

INTERNAL CODE: EBCDIC or ASCII, depending upon setting of a mode bit in the program status word by certain processor instructions. The processor is sensitive to zone fields and edit control characters.

MAIN STORAGE

STORAGE TYPE: MOS (metal oxide semiconductor).

CAPACITY: For the 90/25 and 90/25D, from 65,536 to 163,840 bytes in increments of 32,768 bytes. For the 90/30

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same time the 90/25 was introduced, Sperry Univac announced that it was adding a new CPU to the 90/30 line, and that the same floppy disk subsystem offered with the 90/25 would also be available with the 90/30. The new 90/30B CPU offers 90/30 performance but enables the attachment of the lower-speed peripherals used with the 90/25 system. The 90/25 can be upgraded to a 90/30B system in the filed without replacing the peripherals.

The 90/40 owes its increased performance level to two important differences from the 90/30: the addition of an instruction lookahead buffer and faster main memory. Additional throughput gains should also be realized from the 90/40's increased main memory capacity of 1048K bytes, compared to the 524K-byte maximum capacity of the 90/30. Main memory is based on 16K-bit chips and has a cycle time of 500 nanoseconds per 2-byte access. Another important improvement in the 90/40 is a data transfer rate increase of 20 percent in the selector and multiplexer channels.

Sperry Univac has packaged the 90/40 differently from the 90/30. The 90/40 is offered in a more complete package with fewer optional features. The basic 90/40 system includes several features that are optional with the 90/30. Specifically, the minimum 90/40 system includes storage protection, micro-logic expansion, channel cabinet, one selector channel, 5039 disk storage control, and a communications adapter that can control up to 12 half-duplex or 6 full-duplex lines—all of which are offered as options with the 90/30. In addition, the 90/40 main memory capacity begins at 524K bytes, which is the maximum memory available on the 90/30.

The 90/25, 90/30, and 90/40 offer the complete set of System 360 Model 50 nonprivileged instructions. The basic instruction repertoire consists of 84 instructions, including complete arithmetic facilities for variable-length decimal operands and binary arithmetic operations. Sixty-four additional instructions can be implemented on 90/25 and 90/30 (standard on the 90/40) via a micrologic expansion feature, including 44 optional floating-point instructions.

The Univac 90/25 can be configured as a card or cardless system. The basic configuration using punched cards includes a central processor with 65K bytes of main memory (expandable to 163 bytes), an operator's console with a 1024-character CRT and typewriter-style keyboard, a 300-cpm card reader, a 300- or 500-lpm printer, and disk storage capacity of 58 million bytes. An optional 75-to-160-cpm card punch can also be attached. Disk capacity can be expanded to 115 million bytes. The cardless verison of the system uses a diskette subsystem that has a data storage capacity of 243K bytes: the diskette subsystem replaces the punch card devices. All input/output devices are integrally attached to the central processor.

and 90/30B, from 65,536 to 524,288 bytes in increments of 65,536 bytes or 131,072 bytes. The 90/30 can also be incremented by 32,768 bytes to 262,144 bytes of main storage. The 90/30B can also be incremented by 32,768 bytes to 196,608 bytes of main storage. For the 90/40, from 524,288 to 1,048,576 bytes in increments of 262,144 bytes.

CYCLE TIME: For the 90/25, 90/25D, 90/30 and 90/30B, 600 nanoseconds per 2-byte access; for the 90/40, 500 nanoseconds per 2-byte access.

CHECKING: Parity bit with each byte is generated during writing and checked during reading, with additional parity generation and checking provided on the channels and memory busses.

STORAGE PROTECTION: The optional Storage Protect feature utilizes 8 keys to provide read and/or write protection for 512-byte segments of main storage, or for 1024-byte segments in configurations with more than 128K bytes of main storage, or for 2048-byte segments with more than 256K bytes of main storage, or for 4096-byte segments with more than 524K bytes of main storage.

RESERVED STORAGE: The first 832 bytes of main storage are reserved to hold specific operation information accessed by the hardware and the supervisor, for models 90/25, 90/25D, 90/30B, and 90/30. The first 1020 bytes of main storage are reserved for specific operating information for the 90/40 system.

CENTRAL PROCESSOR

REGISTERS: The programmer has access to sixteen 32-bit general registers that are used for indexing, base addressing, and as accumulators. (A second full set of 16 registers is used by the operating system.) Four double-word floating-point registers are standard.

Eight additional standard program relocation registers in low-order main storage serve as base registers for the program modules in main memory; one of these registers is reserved for the operating system. These program relocation registers act with other relocation hardware to facilitate the OS/3 rollout/rollin capability.

INDIRECT ADDRESSING: None.

CONTROL STORAGE: In addition to main storage, a fast writable control storage of 1K 82-bit words is available for the microprograms used to support the basic instruction set, microdiagnostics, and integrated emulation of Univac 9200/9300 and IBM 360/20 systems. An additional 1K of writable control storage is optional to supply the expanded instruction set, including floating-point operations. Data is loaded into the writable control storage from a regular disk storage unit during the prep routine.

INSTRUCTION REPERTOIRE: 84 instructions in the basic instruction set, including decimal arithmetic, fixed-point binary arithmetic, code conversion, logical operations, packing, unpacking, editing, shifting, testing, and branching. On the models 90/25, 90/25D, 90/30B and 90/30 an optional expanded instruction set adds 44 floating-point instructions plus 20 additional non-privileged instructions. A 148-instruction set is standard for the Model 90/40.

INSTRUCTION TIMES: All times are estimated and are given in microseconds. The times for binary instructions are for the register-to-indexed-storage (RX) formats. Operations involving the use of negative numbers require slightly longer execution times.

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In addition to the integrated input/output devices, the 90/25 can also support a Uniservo 10 magnetic tape subsystem, an 80/96-column card reader, and a Univac 9200/9300 channel adapter on its integrated multiplexer channel. The multiplexer channel operates at a maximum speed of 83K bytes/second.

Communications capability on the 90/25 is provided by the integrated communications adapter. The ICA supports three communications lines and is attached to the 90/25's Integrated Peripheral Channel. The peripheral channel has a transfer rate of up to 50K bytes/second.

I/O capabilities of the 90/30 span a wide range. The basic system with its Integrated Peripheral Channel can accommodate a CRT console, a 500-card-per-minute card reader, a 500-line-per-minute printer, and an optional 75- to 160-card-per-minute card punch. An optional integrated disk adapter permits attachment of two Model 8418 Disk Drives with a combined storage capacity of 58 or 115.6 million bytes. Up to eight Model 8418 Disk Drives can be attached to the integrated disk adapter for a total of over 462 million bytes of random-access storage. In addition, 100-megabyte Model 8430 Disk Pack Drives or 200-megabyte Model 8433 Disk Pack Drives can be added to 90/30 systems for a maximum subsystem capacity of 3.2 billion bytes.

Communications capabilities for 90/30 and 90/40 systems are provided by an integrated communications adapter that can control up to 24 half-duplex lines.

Many users of small-to-medium-sized computer systems express frustration with the limited capacity for expanding their I/O capabilities without first upgrading to larger central processor models. An important element of the 90/30 design is to prolong the life of the central processor by permitting extensive growth of its I/O processing and on-line storage capacities beyond those available with the integrated peripheral interfaces. An optional multiplexer channel allows connection of 1000-card-per-minute readers and printers with speeds of up to 2000 lines per minute. Two optional selector channels expand the system's range of peripheral devices to include magnetic tape drives with transfer rates of up to 320,000 bytes per second and the Univac 8430/8433 Disk Subsystem. The latter, a product of Univac's Information Storage Systems division, offers up to 16 IBM 3330-type disk storage drives per controller, for a total of 3.2 billion bytes of on-line random-access storage. Also available is a paper tape subsystem.

The 90/40 model central processor includes 524,288 bytes of memory (expandable 1,048,576 bytes). Storage protect, micrologic expansion, and one selector channel are standard equipment. (For the I/O capabilities see the chart characteristics of the 90/25, 90/30, and 90/40 on page 70C-877-04c).

	90/25D & 90/25	90/30 & 90/30B	90/40
Binary add/subtract (32 bits)	5.4	5.4	3.5
Multiply (32 bits)	42.0	39.6	32.0
Divide (32 bits)	67.8	65.4	54.0
Load (RX)	5.4	4.8	3.75
Store (RX)	7.8	5.4	4.0
Compare (RX)	7.8	5.4	3.5

EMULATION: Integrated emulation features are available for the IBM System/360 Model 20 and for the Sperry Univac 9200/9300 systems. Both the IBM 360/20 and the Sperry Univac 9200/9300 emulators operate as a "job" under control of the OS/3 operating system and can be executed concurrently with 90/30 native-mode programs. Preliminary performance estimates indicate that the 90/30 can execute 360/20 programs with performance at least equal to that of a native-mode 360/20. The 90/40 includes the 9200/9300 compatibility mode and 360/20 compatibility mode.

INPUT/OUTPUT CONTROL

I/O CHANNELS: The 90/25, 90/25D, 90/30, 90/30B, and 90/40 processors include an integrated peripheral channel (IPC). The IPC is used to attach a CRT console, a floppy disk subsystem, a card reader, a card punch, a line printer, and a communications adapter. The IPC adapter allows the System 80 workstations via a workstation controller to be directly connected to the processors. IPC permits a maximum of 12 workstations. The integrated disk adapter is standard on all models except the 90/40, where it is available as an option. The integrated disk adapter is used to control the 8418 disk drives. The multiplexer channel is standard on the model 90/40 and is optional on all other models. The multiplexer channel is used to connect slow-speed peripherals. Up to two selector channels are available on the models 90/30, 90/30B, and 90/40. The selector channel is used for high-speed peripherals such as 8430 or 8433 disk drives or the UNISERVO 12, 16, or 20 magnetic tape units. An integrated communications adapter is available on all models (a standard feature on 90/40). When used on the 90/25, the communications adapter provides the capability for up to three communication lines, one of which may be a full-duplex line. On the other models the communications adapter can handle 12 half-duplex lines and, with a communications adapter expansion feature, these models can control up to 24 half-duplex lines.

MASS STORAGE

8413 DISKETTE SUBSYSTEM: The floppy disk system can be used in place of the card reader on all models. The 8413 Diskette Subsystem is attached to the integrated peripheral channel and includes two or four drives, each having a capacity of 242,994 bytes. Data is recorded on one side of IBM-compatible floppy disks with 73 tracks. Each track is divided into 26 sectors of 128 bytes each. Average head-positioning time is 260 milliseconds, and average rotational delay is 83.3 milliseconds. Data transfer rate is 31,248 bytes per second (360 rpm).

8418 DISK SUBSYSTEM: A free-standing disk drive is available in two models: the 8418-92, with a capacity of 28.9 million bytes pe drive; and the 8418-94, with a capacity of 57.9 million bytes per drive. The disk packs used with the 8418 subsystems have eight surfaces, of which seven are used for recording data and one is used as a positioning surface for a servo head. Each recording surface has 808 tracks for data and 7 spare tracks. The 8418-94 uses all 815 cylinders and has a capacity of 57,917,440 bytes per drive, while the 8481-92 uses only the outer 411 cylinders and has a capacity of 28,958,720 bytes per drive. Data tracks are divided into 40

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An integrated peripheral channel adapter enables direct connection of a System 80 workstation via a workstation controller to the 90/25, 90/30, and 90/40 processors. The IPCA permits a maximum of 12 workstations.

Software for the Univac 90/25, 90/30, and 90/40 centers on OS/3, an operating system designed specifically to maximize the modularity and growth potential of the hardware. OS/3 features concurrent execution of up to seven user programs, including programs entered from remote terminals. In addition, each job step may also have one or more tasks which can be executed concurrently. OS/3's design relies heavily on transient routines and re-entrant coding for data management routines to achieve a high level of multiprogramming with a relatively small main memory overhead. For more details refer to the characteristics section of this report.

Language processors available are COBOL, FORTRAN, RPG II, BASIC ASSEMBLY LANGUAGE and BASIC. ESCORT will be available with release 7.1.

Communications software is provided by the Integrated Communications Access Method, which supplies several levels of communications support ranging from device handlers for a wide variety of terminals to a message control program that offers message queueing, remote job entry, and an interface to IMS/90. The modular design of ICAM permits the user to tailor his communication software to his specific communications needs. Network configurations can be expanded by regenerating the Network Control Program, with no alteration of user programs required. Of particular interest to RPG users is a simplified remote I/O capability via an RPG II telecommunications interface. The RPG II telecommunications feature includes software support for the IBM System/3, the IBM 360/20, and larger IBM System/360 computers with OS/360 or DOS BTAM binary synchronous communications support.

Univac is also offering IMS/90, an on-line information storage and retrieval system previously released with the 90/60 and 90/70 systems. IMS/90 permits users at remote terminals to retrieve and update records in files ordinarily used for batch processing through the use of UNIQUE, a user inquiry language that is easy to learn and use.

In the 90/25, 90/30, and 90/40 systems, Univac offers a line of computers that is geared to meet the requirements of a large number of small-system users, especially with its extensive direct-access storage capacity and growth potential, at prices that make it an attractive competitor in the small-to-medium-scale computer marketplace.

USER REACTION

In the 1980 Datapro annual computer survey, we received 62 responses from users of the Univac 90/30 and 90/40 systems. Half of the users who responded acquired their system via lease. Two thirds of the remaining users who

sectors of 256 bytes. Both drives use a programmed servo offset technique to vary the accessor position for recovering from alignment inaccuracies and magnetic defects.

Average head positioning time for the 8418-94 is 33 milliseconds, and for the 8418-92 is 27 milliseconds. For both models, average rotational delay is 10.7 milliseconds and data transfer rate is 625,000 bytes per second.

8430 DISK SUBSYSTEM: The 8430 attaches to the selector channel of either 90/30B or 90/30 or 90/40 systems. It provides large-capacity random-access storage in interchangeable 11-disk packs with storage capacities comparable to the standard-density IBM 3330 disk storage subsystem. Each disk pack stores up to 100 million bytes of data. Up to 247,570 bytes (19 tracks) can be read or written at each position of the access mechanism. Average head movement time is 27 milliseconds, average rotational delay is 8.33 milliseconds (3600 rpm), and data transfer rate is 806,000 bytes per second.

The 8430 disk drives interface the selector channel through the 5039-97 disk drive control. Each 8430 subsystem must contain at least two drives and can be expanded to an eight-drive subsystem by adding additional drives. The subsystem can be further expanded to 16 drives (1.6 billion bytes) if the F2047 expansion feature is added. The 8430 subsystem features command retry facilities and error correction coding.

8433 DISK SUBSYSTEM: Provides random access to very large quantities of data stored on removable "double-density" 3330-type disk packs in 90/30 or 90/30B or 90/40 systems. Each industry-standard disk pack contains up to 200,036,560 bytes of data organized in variable-length records. Each record can occupy an entire track and contain up to 13,030 bytes. There are 808 tracks (plus 7 spares) on each of the 19 recording surfaces. The average head positioning time is 30 milliseconds, and the average rotational delay is 8.3 milliseconds (3600 rpm). Data transfer rate is 806,000 bytes per second.

From two to eight 8433 Disk Drives can be connected to a 5039 control unit for a total of 1.6 billion bytes per subsystem. The F2047 drive expansion feature expands the capability of the 5039 control unit to up to 16 drives, or 3.2 billion bytes. The 8433 and 8430 Disk Drives can be intermixed on one 5039 control unit up to the maximum of 8 or 16 drives. The 8433 includes a command retry facility and error-correction coding circuitry.

INPUT/OUTPUT UNITS

See Peripherals table.

COMMUNICATIONS CONTROLS

INTEGRATED COMMUNICATIONS ADAPTER (90/30, 90/30B and 90/40): Controls message discipline for either 6 full-duplex or 12 half-duplex lines or, with an expansion feature, for either 12 full-duplex or 24 half-duplex lines. Contains the communications adapter interface, a communications multiplexer module, and line adapters can accommodate synchronous, asynchronous, wideband, auto-dial, asynchronous relay, TWX, and Telex communications lines. The integrated communications adapter is mounted in the console stand, and attaches to a special port on the integrated peripheral channel.

INTEGRATED COMMUNICATIONS ADAPTER (90/25): Controls a maximum of three lines, one of which can be full-duplex. Connects to the 90/25's integrated peripheral channel, which has a maximum data transfer rate of 50,000

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responded purchased their system, while the rest of the users opted to rent the equipment. The principal applications were accounting, payroll/personnel, and manufacturing. Most all applications were developed in-house. The primary languages used were COBOL and RPG II. Over half of the users indicated they plan to expand their communications facilities in the coming year. The ratings assigned by the 62 users are given in the following table.

	Excellent	Good	Fair	Poor	WA*
Ease of operation	23	34	4	1	3.3
Reliability of mainframe	34	22	6	0	3.0
Reliability of peripherals	15	32	10	3	3.0
Responsiveness of maintenance service	24	32	3	3	3.2
Effectiveness of maintenance service	16	29	14	3	2.9
Technical support	4	27	21	10	2.4
Education	7	22	25	8	2.5
Documentation	2	23	27	10	2.3
Operating system	17	38	4	3	3.1
Compilers and assemblers	15	44	2	1	3.2
Applications programs	4	24	13	4	2.6
Ease of programming	16	38	6	1	3.1
Ease of conversion	13	31	10	2	3.0
Overall satisfaction	10	40	10	1	3.0

*Weighted Average on a scale of 4.0 for Excellent.

We interviewed three of the survey respondents to obtain additional information and comments. The first was an eastern service bureau company that owns its 90/30 computer system. This user was very satisfied with the reliability of the equipment, but had rated the operating system and ease of programming "Fair" in the survey. During our conversation the DP manager said that he has 16 terminals operating in an IMS environment and 6 terminals dedicated to the editor. He stated that the new enhancements to the OS/3 operating system will provide more flexibilty to his operation, because it will no longer require terminals to be dedicated to the editor. Based on the new enhancements Sperry Univac has made to the OS/3 operating system, this user would now rate the operating system and ease of programming as "Good."

We interviewed the data processing manager of a southern manufacturing firm that has a 90/30 system. This user upgraded to the 90/30 system from an IBM System 3, and he was very pleased with the conversion aids provided by Sperry Univac. This installation has 11 terminals in-house and 2 remote terminals operating under the IMS environment; the end users are happy with their response time. This data processing manager felt that Univac's technical support and maintenance support were very good.

The third user was a county government account in the northwest that purchased its 90/30 system in 1975. This installation was upgraded from a Univac 9200. The director of data processing said they were the first to install an inquiry/response communication system on the

bytes per second. An appropriate line adapter is required for each line.

2521 CHANNEL TRANSFER SWITCH: An electronic "crossbar" arrangement that permits peripheral subsystems to be electrically connected to one of eight CPU's. Individual peripheral subsystems can be manually switched to any one of the CPU's, permitting the reconfiguration of systems to meet varying processing requirements. The basic 2521 consists of a 2 x 1 switch that permits one subsystem to be switched between two CPU's. It is housed in a separate cabinet that has power and physical space for a maximum 4 x 8 configuration. This 2 x 1 configuration can be expanded in two ways; through the addition of up to three F2600-00 subsystem links that expand the switch to 2 x 4, and through the addition of a F2602-00 CPU link that expands the switch to a 4 x 1 configuration. The 2 x 4 switch permits four subsystems to be switched between two CPU's, while the 4 x 1 switch permits one subsystem to be switched between four CPU's. One F2602-00 CPU link can be added to the basic 2521 switch, expanding it to a 4 x 1 configuration. Both F2600-00 subsystem links and F2602-00 CPU links can be added to provide a maximum of four CPU links and four subsystem links.

The switch cabinet includes space and power for a duplicate 4 x 4 configuration that can be interconnected to form a single 4 x 8 switch.

Two independent 2 x 2 switches can also be configured in the cabinet, using the F2601-01 expansion module plus one F2600-00 subsystem link for each switch. However, each one of the F2601-01 expansion modules precludes the addition of one F2602-00 CPU link. Thus, if the maximum of two independent 2 x 2 switches are implemented, the basic channel transfer switch is limited to a maximum 2 x 8 switch.

SOFTWARE

OPERATING SYSTEM: OS/3 is a disk-oriented operating system specifically designed for the 90/25, 90/30, and 90/40 hardware. This proven operating system has been enhanced and is now being used on the new Sperry Univac System 80. The OS/3 software system is a library of programs consisting of an executive, language processors, utility routines, and application programs. The programs that make up the executive are the Supervisor and Job control.

The OS/3 Supervisor resides in main memory and consists of the system modules that perform storage management, task management, I/O control timer service, program management, system recovery, spooling control, record and file protection, program error handling, and diagnostic and debugging aids. Basic resources controlled by the supervisor include main storage for job residence, processing time for program execution, and the queuing and initiation of I/O commands and processing of I/O completion interrupts.

The Task Switcher component of the Supervisor is implemented in microcode and determines the order in which the various tasks are allocated central processing time. Every job step, in turn, has the capability of initiating a theoretical maximum of 255 tasks. Dispatching priority among tasks is specified by the user in a system switch list. Diagnostic debugging aids provided by the Supervisor include a system monitor mode that accumulates information on branch and interrupt activities, main storage snapshots and dumps, system error messages, and program checkpoint/restarts.

The OS/3 Job Control routines control the scheduling and initiation of job steps according to the availability of system resources. Other functions include the suspension and

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90/30. He also stated, "Our installation is 2½ hours away from the local Univac office but we receive excellent software and hardware service from Sperry Univac."□

cancellation of jobs, restarting of jobs, and termination of jobs. Jobs submitted to the system are queued for initiation by a scheduling priority. The main storage requirements for a job can be calculated automatically by OS/3 if all job steps associated with the job reside in a load library. The user also can specify a minimum memory requirement for execution of all job steps within a job and a maximum memory allocation that will enable a job to be processed more efficiently. Main memory is allocated in contiguous "regions" to each job step in increments of 512, 1024, or 2048 bytes. Peripheral devices are allocated for each job and are released under control of a job control statement at the termination of a job step. Automatic volume recognition is supported.

Jobs are initiated on a first-in, first-initiated basis until available resources are insufficient to satisfy the requirements of an encountered job. Succeeding priority levels are then searched for a job that can be accommodated within the available resources. Jobs that require more resources than are currently available remain in the job queues of their respective priority levels until sufficient resources become available.

Data Management provides a convenient interface between user programs and hardware-oriented I/O controls performed by the supervisor. Five access methods are available: the sequential access method (SAM), the direct access method (DAM), the indexed sequential access method (ISAM), multiple indexed random access method (MIPAM), and the system access technique (SAT). SAT is used only by the OS/3 system routines to support library and work files and to access all direct-access files. Re-entrant logical I/O control modules provide for record blocking and unblocking, I/O buffering, data validation, and label processing.

The following improvements have been made to the OS/3 operating system:

- OS/3 manages the multi-job processing demands of both batch and interactive environments.
- OS/3 can support up to 7 jobs running concurrently; each job is capable of initiating up to 255 subtasks.
- Improved disk-oriented processing which assigns temporary files to disk instead of tape. Also, the executive uses disk storage as buffers for any job backlog and for storing output data. This allows the system to operate independently of the essentially low-speed devices.

INTEGRATED COMMUNICATIONS ACCESS METHOD (ICAM): ICAM is designed for users with modest communications needs as well as those users who are committed to a real-time multi-jobbing environment. ICAM provides support for terminals via the ICAM Terminal Support Facility. ICAM is available for workstation support.

ICAM offers the communications user the following features:

- Message Queuing
- Multiple Destination Routing
- Activity Scheduling and Priority Control
- Timer Service
- Checkpoint/Restart
- Journal Control
- Statistics Accumulation
- Standard Interface (GET/PUT interface)
- Transaction Control Interface
- Direct Data Interface
- Communications Physical Interface

ICAM is a modular software package that will handle either simple or complex communications environments. A single ICAM configuration will afford concurrent support for multiple user programs that handle a variety of terminals and line types. Users are provided with macro instructions that will fulfill control table generation, data transfers to and from user-specified buffer areas, communication facility initialization and control, and dynamic terminal and poll table entry alterations in the communications control area.

The ICAM components are:

- Channel Control Routine
- Remote Device Handlers
- Communications Network Controller
- Communications Control Area
- Message User Service Transcriber
- Deferred User Service Tasks
- Global User Service Task
- RPG II Telecommunications
- Remote Batch Processing

INFORMATION MANAGEMENT SYSTEM: IMS is an interactive transaction processing system. This means that processing is initiated by an input message from a remote terminal or workstation. Applications programs process the input message, access data files, and display an output response at the terminal. IMS allows the user to create his own on-line IMS system in which he defines the communications network, user files, IMS action programs, and optional

IMS features. IMS action programs are called UNIQUE, which retrieves, updates, and displays data. A password capability is available with UNIQUE that allows the user to limit access to the data files or certain elements within those files. IMS can run in a multi-jobbing environment since it is considered just another program running under control of the OS/3 operating system.

DATA BASE MANAGEMENT SYSTEM: DMS is a group of system programs that handle the description, initialization, creation, accessing, maintenance, backup, and recovery of data bases. DMS may be accessed by communications applications as well as batch applications. DMS data bases can be used to build a file accessible via COBOL, RPG II, or BAL action programs or UNIQUE. An IMS/DMS interface is available via data manipulation statements embedded in COBOL action programs. The Device Media Control Language uses a COBOL format to describe the physical data base characteristics. The Data Description Language uses a COBOL format to describe the logical data base characteristics. DMS Storage Structure is composed of data items organized into record types, and record types are organized into logical relationships called sets. There are

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three logical data structures: sequential, tree, and network. The manipulation of data in DMS is accomplished by writing data manipulation language statements in the procedure division of a COBOL application program. DML contains statements that allow the user to open and close areas of the data base, find data base records and get them into a storage area, store new records, modify and delete existing records, save current information, and test for set membership. The DMS system support functions include data base initialization, dump and restore, and data base recovery.

COBOL: Common Business Oriented Language is a programming language most widely used in solving business applications. Univac's COBOL compiler conforms to the American National Standard COBOL X3.23-1974 specifications. Programs written in COBOL consist of four major divisions: identification, environment, data, and procedure; therefore, source programs are easily transferable among systems. The levels of American National Standard COBOL X3.23-1974 modules are:

- Nucleus—level 2
- Table handling—level 2
- Sequential I/O—level 2
- Relative I/O—level 2
- Indexed I/O—level 2
- Sort—level 2
- Segmentation—level 2
- Library—level 2
- Debug—level 2
- Interprogram Communications—level 2
- Communications—level 2

BASIC: The Beginner's All-purpose Symbolic Instruction Code language is an interactive programming language designed for both business and scientific programming. Univac's BASIC language compiler complies with American National Standard Minimal BASIC, X3.60-1978, and includes Dartmouth features and compatibility. The BASIC source statements can be entered and compiled at the terminal, and the compilation errors can be corrected immediately. During an interactive session, the user may input, modify, execute, and save programs.

FORTRAN IV: This programming language is designed so that the user can express an algorithm in a way natural to a problem; therefore, FORTRAN is used mostly in engineering and scientific applications. Univac's FORTRAN IV is a superset of the American National Standard FORTRAN X3.10-1966. It is also a compatible superset of the IBM/DOS 360 FORTRAN IV.

BASIC ASSEMBLY LANGUAGE: BAL is a multi-phase language processor system written in a number of loadable sections and read into main storage as overlays during the assembly process. The advantages of assembly language programming are:

- Mnemonic operation codes;
- Symbolic addressing and automatic storage assignment, providing relocatable programs and program sectioning;
- Flexible data representation;
- Macro-facilities; and
- Source code correction facilities.

The OS/3 BAL offers a comprehensive selection of system macros that allow the user to interface with the supervisor, data management, and other sections of the software.

RPG II: Report Program Generator is a processing language that generates an object program from a series of specifications. The RPG II source program may be entered into the system by batch processing via cards or interactive processing via a terminal. Univac's RPG II processor enhancements include:

- Telecommunications interfaces are available via a new RPG II;
- IMS action programs may be written in RPG II;
- Eight control-stream indicators may be used to condition calculations, input files, output files, or specific output records; and
- Terminals are accessible through programmed operations.

OS/3 offers two facilities to simplify input source programs: the RPG II editor and the auto report facility.

ESCORT: This interactive programming language employs English-like verbs and clauses to express programming operations.

ESCORT can be used to develop programs for report generation, data entry and retrieval, and transaction processing.

ESCORT allows the user to create, sort, or merge files; add, delete, or replace records in a file; issue prompting messages to a terminal for input data; and validate the input data. Computational operations include addition, subtraction, multiplication, and division.

EXTENDED SYSTEM SOFTWARE: The Extended System Software provides the user with additional software that increases functionality and ease of use. The Extended System Software is available as a package and contains:

- Screen Format Generator
- Dialog Specification Language Translator
- Data utility
- SORT/MERGE
- SORT 3
- Spooling
- Job Accounting and Report facilities

The SORT/MERGE and SORT 3 are available as separate items.

EDITOR: The editor is an interactive software package that allows the user to generate source programs, data files, and job control streams. It also provides such functions as:

- Create, add to, delete from, and modify text

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- Create, modify, and merge files
- Copy files and texts

EMULATORS: The IBM 360/20 emulator uses microprogramming in combination with OS/3 software to execute programs written for 360/20 systems. The 360/20 emulator functions as a job under the OS/3 operating system. All 360/20 instructions are executed by microprogrammed routines with the exception of I/O instructions and supervisor-related functions, which are executed by software routines.

The Univac 9200/9300 emulator operates as a job under control of OS/3 and executes both the 9200/9300 program and the supervisor with which it was originally run.

APPLICATION PROGRAMS: Univac application packages are designed to meet the data processing requirements of various business applications. The packages now available are:

- Retailing/Wholesaling and Distribution
- UNIS 80 (Manufacturing)
- Accounting Control
- Order Entry
- Information Collection

PRICING

EQUIPMENT: All necessary control units and adapters are included in the indicated prices for the following configurations, and the quoted one-year rental prices include equipment maintenance.

UNIVAC 90/25 BASIC SYSTEM: Consists of a 65K processor, 300-cpm integrated card reader, 75-160-cpm card punch, console printer, 300-lpm integrated printer, integrated disk adapter and two 28.9-million-byte 8418 disk drives. Monthly rental for a one-year lease is $3,215, and purchase price is $105,023. Monthly maintenance is $1,027.

UNIVAC 90/30 MEDIUM DISK SYSTEM: Consists of a 96K processor, storage protection, micrologic expansion, 500-cpm card reader, 500-lpm printer, print position expansion (132 characters), integrated disk adapter, 75-160-cpm card punch, and 173.4 million bytes of disk storage. Monthly rental for a one-year lease is $4,874, and purchase price is $177,360. Monthly maintenance is $1,301.

UNIVAC 90/40 LARGE SYSTEM: Consists of a 1048K processor, three Uniservo 10 tape drives and control, a 500-cpm card reader, a 1200-lpm printer, disk control, and 600 million bytes of disk storage. Monthly rental for a one-year lease is $15,082, and purchase price is $539,040. Monthly maintenance is $3,287.

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

LONG-TERM LEASES: In addition to the basic 1-year agreement, UNIVAC offers an extended-term 5-year lease for 90/25 and 90/30 systems at significatnly lower monthly rates. Under the 5-year agreement, the monthly equipment charge is significantly lower than the 1-year rental rate.■

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*	Rental (5-year lease)*
PROCESSORS AND MEMORY					
3059-/9	90/25 Processor; includes 64K bytes of main memory, two timers, one integrated peripheral channel, relocation registers, CRT/console unit, 9200/9300 compatibility mode, and IBM 360/20 compatibility mode; requires printer, diskette subsystem or card reader, and one integrated disk attachment with two 8418 disk drives	$36,096	$449	$1,607	$700
3059-97	90/25D Processor; includes 64K bytes of main memory, two timers, one integrated peripheral channel, relocation registers, CRT/console unit, 9200/9300 compatibility mode, and one integrated disk attachment with two 8416-02 disk drives; requires printer and diskette subsystem or card reader	58,896	706	2,289	1,110
F2692-99	90/25 to 90/30B Conversion; F2593-00 expansion feature required if 8413-00 diskette subsystem is present	16,632	50	385	330
F2692-98	90/25 to 90/30B Conversion; same as F2748-99 conversion but for 98K system	13,176	43	355	259
F2692-97	90/25 to 90/30B Conversion; same as F2748-99 conversion but for 131K system	9,720	35	325	188
3059-93	90/30 Processor; includes 64K bytes of main memory, two timers, one integrated peripheral channel, relocation registers, CRT/console unit, 9200/9300 compatibility mode, and IBM 360/20 compatibility mode; requires disk storage subsystem, diskette subsystem or card reader and printer	52,728	504	2,011	1,030
3059-95	90/30B Processor; includes 64K bytes of main memory, two timers, one integrated peripheral channel, relocation registers, CRT/console unit, 9200/9300 compatibility mode, and IBM 360/20 compatibility mode; requires printer, diskette subsystem or card reader, and one integrated disk attachment with two 8418-00 disk drives	52,728	504	2,011	1,030
3059-91	90/40 Processor; includes 524K bytes of main memory, two timers, one integrated peripheral channel, relocation registers, a CRT/console unit, external mux and selector channels, communications adapter, storage protect, 5039-97 disk control, 9200/9300 compatibility mode, and IBM 360/20 compatibility mode; requires disk storage subsystem, printer, and diskette subsystem or card reader	274,272	1,562	8,132	5,150

*Rental price does not include maintenance.

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*	Rental (5-year lease)*
PROCESSORS AND MEMORY (Continued)					
3059-89	90/40 Processor; same as 3059-91 but has 5024-99 disk control instead of 5039-97 disk control	273,744	1,675	7,926	5,260
F3198-00	Integrated Peripheral Channel Adapter; enables direct connection of System 80 workstations via workstation controller; permits a maximum 12 workstations; required when the F1625-02 Communications Adapter is present; requires F2121-02 Diskette Communications Adapter Interface Expander	6,240	67	159	130
F3198-01	Integrated Peripheral Channel Adapter; same as F3198-00 except required when F1625-02 C/A is not present; requires F2121-02 if 8413 diskette is present; if 8413 is not present, requires F1624-00 Diskette/Communications Adapter Interface	7,320	72	183	150
F2807-00	Workstation Attachment Module; required for attachment of Integrated Peripheral Channel Adapter for all 90/30 processors serial number 2000/J1000 and below, if F2593-99 8413 capability is not present	2,200	5	55	30
	Memory Expansion for 90/25:				
F2748-00	Memory expansion; 32K bytes; maximum two per processor	14,256	54	330	281
F2948-01	Memory expansion; 32K bytes; maximum one per processor (prerequisite F2748-00)	9,720	37	280	190
	Memory Expansion for 90/30:				
F2948-87	Memory Expansion; 131K bytes; expands 90/30 from 262K to 393K bytes	24,395	110	685	480
	Memory Expansion for 90/30 and 90/30B:				
F2748-92	Memory expansion; 32K bytes; expands 90/30B processor from 65K to 98K bytes or from 96K to 128K bytes	10,800	46	300	210
F2948-01	Memory expansion; 32K bytes; expands processor from 131K to 163K bytes	9,720	37	280	190
F2748-96	Memory expansion; 32K bytes; expands processor from 131K to 163K bytes	9,720	37	280	190
F2748-95	Memory expansion; 65K bytes; expands processor from 131K to 163K bytes	19,440	75	550	385
F2748-93	Memory expansion; 65K bytes; expands processor from 327K to 393K bytes or from 458K to 524K bytes	17,280	59	485	340
F2948-81	Memory expansion; 131K bytes; expands a 90/30 or 90/30B processor from 262K to 393K bytes or from 393K to 524K bytes	24,395	110	685	480
	Memory Expansion for 90/40:				
F2948-89	Memory expansion; 262K bytes; expands 90/40 processor from 524K to 1,048K bytes, maximum two per processor	34,560	235	970	680
PROCESSOR FEATURES					
8541-84	Console Printer; 30 characters per second; for use with all systems; connects to integrated peripheral channel	2,570	29	72	61
F1622-00	Storage Protect; adds two instructions	648	—	15	13
F1623-01	Micrologic Expansion; adds 64 instructions and four 64-bit registers	4,104	19	95	80
1921-00	Channel Cabinet for 90/30; provides interface for housing multiplexer channel and up to two selector channels	8,424	37	195	166
F1618-00	Selector Channel for 1921-00 channel cabinet; maximum two per system	7,344	40	170	145
F2089-00	Integrated Multiplexer Channel; three active subchannels; maximum one per system	11,232	52	260	221
F1620-00	External Multiplexer Channel; for use in 1921-00 channel cabinet; maximum one per system; precludes use of internal multiplexer channel	5,400	40	125	106
INTEGRATED PERIPHERAL SUBSYSTEMS FOR 90/25					
0719-93	Card Reader; attaches to integrated peripheral controller; 300 cpm	6,093	37	141	120
F2324-00	Short Card Feature; 51-column cards	1,512	11	35	30
F2324-01	Short Card Feature; 66-column cards	1,512	11	35	30
0788-00	Printer; 48 characters at 300 lpm; requires F2507 print cartridge	13,824	187	320	272
F2386-00	Expands number of print positions for 0778-00 printer to 136	1,728	11	40	34
F2770-00	Expander; required for use of print cartridges with more than 64-character array	1,944	9	45	38
F2507-00	48-Character Alpha-Numeric Business Set	1,296	NC	30	26
F2507-01	48-Character Alpha-Numeric Scientific Set	1,296	NC	30	26
F2507-02	63-Character Set; compatible with 9200/9300 integral printer	1,296	NC	30	26
F2507-03	48-Character Business Set; compatible with 0770 printer	1,296	NC	30	26
F2507-10	Alpha-Numeric Character Set; contains 48 letters and 16 repeated numeric characters for fast numeric printing	1,296	NC	30	26

*Rental price does not include maintenance.

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*	Rental (5-year lease)*
INTEGRATED PERIPHERAL SUBSYSTEMS FOR 90/25 (Continued)					
F2507-11	Print Cartridge; contains a 63-character set with 13 H-14 characters used with the 2703 optical document reader	1,296	NC	30	26
F2507-12	Print Cartridge; contains a 63-character set with 13 OCR-B ISO numerics; all other characters are font style OCR-B, ECMA 11	1,296	NC	30	26
F2507-13	Print Cartridge; contains a 63-character set with 13 OCR-B, ECMA 11 numerics for use with the 2703 optical document reader	1,296	NC	30	26
F2507-14	Print Cartridge; contains a 62-character set with a 13-character OCR-A numeric set for use with the 2703 optical document reader; all other characters are font style OCR-B, ECMA 11	1,296	NC	30	26
F2510-01	Print Cartridge; contains an 85-character ASCII subset	1,296	NC	30	26
F2510-02	Print Cartridge; contains a 94-character ASCII graphic character set	1,296	NC	30	26
INTEGRATED PERIPHERAL SUBSYSTEMS FOR 90/30					
0773-99	Printer; 48 characters at 500 lpm; requires F1647 or F1650 print cartridge	19,872	204	460	390
F1648-00	132-Position Expansion for 0773-99 printer	1,728	11	40	34
F1648-01	144-Position Expansion for 0773-99 printer; expands from 132 to 144 print positions	1,728	5	40	34
F1648-02	144-Position Expansion for 0773-99 printer; expands from 120 to 144 print positions	3,456	17	80	68
F1649-00	Expander; required for use of print cartridges with more than 64-character array	1,944	9	45	38
INTEGRATED PERIPHERAL SUBSYSTEMS FOR 90/40					
0778-02	Printer; prints 48 characters at 500 lpm; 120 print positions expandable to 136 print positions	19,872	204	460	390
INTEGRATED PERIPHERAL SUBSYSTEMS FOR 90/25, 90/30 AND 90/40					
0605-00	Card Punch; 75-160 cpm	8,856	88	205	175
F1617-00	Punch/Read Station	648	5	15	13
F1647-00	48-Character Alpha-Numeric Business Set	1,296	NC	30	26
F1647-01	48-Character Alpha-Numeric Scientific Set	1,296	NC	30	26
F1647-02	63-Character Set; compatible with 9200/9300 integral printer	1,296	NC	30	26
F1647-03	48-Character Business Set; compatible with 0770 printer	1,296	NC	30	26
F1647-10	Alpha-Numeric Character Set; contains 48 letters and a repeated 16 numeric characters for fast numeric printing	1,296	NC	30	26
F1647-11	Print Cartridge; contains a 63-character set with 13 H-14 characters used with the 2703 optical document reader	1,296	NC	30	26
F1647-12	Print Cartridge; contains a 63-character set with 13 OCR-B ISO numerics; all other characters are font style OCR-B ECMA 11	1,296	NC	30	26
F1647-13	Print Cartridge; contains a 63-character set with 13 OCR-B, ECMA 11 numerics for use with the 2703 optical document reader; all other characters are font style OCR-B, ECMA 11	1,296	NC	30	26
F1647-14	Print Cartridge; contains a 62-character set with a 13-character OCR-A numeric set for use with the 2703 optical document reader; all other characters are font style OCR-B, ECMA 11	1,296	NC	30	26
F1650-01	Print Cartridge; contains an 85-character ASCII subset	1,296	NC	30	26
F1650-02	Print Cartridge; contains a 94-character ASCII graphic character set	1,296	NC	30	26
INTEGRATED PERIPHERAL SUBSYSTEMS FOR 90/30, 90/30B, AND 90/40					
0717-00	Card Reader; 500 cpm	8,208	70	190	160
F1617-00	Short Card Feature; 51-column cards	1,512	11	35	30
F1627-01	Short Card Feature; 66-column cards	1,512	11	35	30
MASS STORAGE					
1621-02	Integrated Disk Adapter; provides interface and control for two 8418 drives	10,800	59	250	210
F1769-01	Integrated Disk Adapter Corner Transition	1,215	—	45	40
8413-00	Dual Diskette; requires F1624-00 interface and F2121-02 expander if communications adapter is present; F1625-97/99 interface and F2593 feature required for 90/30 system	10,800	54	250	212
F2653-00	Diskette Dual Expansion for expanding 8413-00 dual diskette by addition of two read/write diskette drives; maximum four drives per system	3,546	16	82	70
F1215-00	Disk Cartridge for 8415 disk drive; 8.3 megabytes of removable storage	153	—	10	8
F1624-00	Diskette/Communications Adapter Interface; required to connect 8413 diskette subsystem or F1625-02 communications adapter to a 90/30B system	216	—	5	4
F2121-02	Diskette/Communications Adapter Interface Expander; required to connect the 8413 diskette and F1625-02 communications adapter when both are present	1,080	5	25	20
8418-92	Disk Drive; 28.9 megabytes	13,392	89	310	265
8418-94	Disk Drive; 57.8 megabytes	19,872	100	460	390
F1216-02	Disk Pack for 8418 disk drives	450	—	25	21
F2198-00	Disk Storage Upgrade; converts 8418-92 to 8418-94	6,480	12	150	125
8425-00	Disk Storage; provides 58 megabytes using removable disk pack	21,216	129	442	375
F1214-01	Disk Pack; provides up to 58 megabytes of removable storage for 8425 disk drive	433	—	21	18

*Rental price does not include maintenance.

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EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*	Rental (5-year lease)*
MASS STORAGE (Continued)					
5024-99	8424/8425 Control; controls up to eight type 8425 disk storage drives, with direct access to up to 466 megabytes, via selector channel	57,072	469	1,189	1,010
5039-97	8430/8433 Control; controls up to eight type 8430/8433 Disk Storage Drives, with direct access to 800/1600 megabytes, via selector channel	57,600	315	1,385	900
8430-99	Disk Storage; provides 100 megabytes using removable disk pack	18,720	137	600	390
F1230-00	Disk Pack; provides up to 100 or 200 megabytes of removable storage for type 8430 Disk Drive	750	—	46	30
8433-00	Disk Storage; provides 200 megabytes using removable disk pack F1223-00	27,360	199	875	570
F1223-00	Disk Pack; provides up to 200 megabytes of removable storage for type 8433 disk drive	1,150	—	58	38
F2021-00	8430/8433 Dual Access; simultaneous read/read, read/write, write/read, and write/write operation on any two 8430-99 or 8433 disk drives	2,160	5	52	34
F2046	Dual Channel Feature for 8430/8433 disk drives	4,080	17	85	72
F2047-00	16 Drive Expansion, provides the capability to attach up to 16 8430/8433 disk drives to the 5039 control	5,760	43	185	120
F2342-00	Disk Drive Upgrade; converts an 8430-99 to an 8433	8,640	63	275	180
INPUT/OUTPUT UNITS					
5045-04	UNISERVO 10 Control; consists of control and cabinet space for 2 UNISERVO 10 Magnetic Tape Units	12,192	75	254	205
5045-02	Auxiliary Cabinet; for 1 or 2 additional UNISERVO 10 Magnetic Tape Units	1,296	5	27	22
F1028-92	7-Track NRZI Native Mode; adds 7-track NRZI native mode conversion to F0826-00	3,654	12	82	66
F1753-97	7-Track NRZI Native Mode; permits 7-track tapes to be added to 5045-00 Control	5,760	21	120	96
F2143-00	Converts a 5045-00 Control to a 5045-99 Control for attaching UNISERVO 14 Magnetic Tape Units	8,976	54	187	145
0870-00	UNISERVO 10 9-Track PE Magnetic Tape Unit	11,376	71	237	190
0870-01	UNISERVO 10 9-Track PE and NRZI Magnetic Tape Unit	12,576	78	262	210
0870-02	UNISERVO 10 7-Track NRZI Magnetic Tape Unit	11,376	71	237	190
0870-03	UNISERVO 14 9-Track PE Magnetic Tape Unit	14,880	93	310	250
0870-05	UNISERVO 14 7-Track NRZI Magnetic Tape Unit	14,880	93	310	250
F2193-00	Dual Density; adds 9-track NRZI to UNISERVO 10 PE Magnetic Tape Unit	1,200	6	25	20
F2193-02	Converts UNISERVO 10 7-track NRZI Magnetic Tape Unit to 9-track PE Magnetic Tape Unit	—	—	—	—
5017-99	UNISERVO 12 Control; controls up to sixteen 9-track, phase encoded, 1600-bpi, non-simultaneous UNISERVO 12 tape units	26,448	124	605	440
5017-00	UNISERVO 12/16 Control; controls up to sixteen 9-track, phase encoded, 1600-bpi, non-simultaneous UNISERVO 12 and/or 16 tape units	28,560	163	655	476
F0825-00	Dual Channel; permits non-simultaneous operation on two selector channels for one processor or one selector channel on each of two 90/30 Processors	4,416	26	92	74
F1131-99	UNISERVO 16 Capability; permits the use of UNISERVO 16 tape units on type 5017-99 Control	2,112	13	44	37
F1029-99	Simultaneous Operation; provides a second control module for R/R, R/W, W/R, W/W simultaneous operation; simultaneous W/W operation on two UNISERVO 12's is available through separate masters; appropriate features must also be added to the UNISERVO 12 masters; used only with 5017-99	16,896	73	352	300
F1029-00	Simultaneous Operation; provides a second control module for simultaneous operation; appropriate features must also be added to the UNISERVO 12 masters and UNISERVO 16 tape units; used only with 5017-00	18,960	102	395	335
F0823-99	7-Track NRZI; provides the capability of adding 7-track tape units to type 5017-00 or -99 Control or 5045-00 Control	5,760	26	120	100
F0826-00	9-Track NRZI; enables read or write operation in 9-track NRZI mode at a density of 800 bpi; in addition to the 9-track phase encoded 1600 bpi; appropriate features must also be added to the UNISERVO 12 masters and UNISERVO 16 tape units	5,760	26	120	100
F1028-96	9-Track Addition; adds 9-track NRZI to F0823-99	4,176	16	87	70
F1028-95	7-Track Addition; adds 7-track NRZI plus data conversion to F0826-00	4,176	16	87	70
0861-00	UNISERVO 12 Master; 9-track phase encoded master tape unit and logic to handle up to three slave tape units (0861-01); transfer rate is 68,320 bytes per second at a recording density of 1600 bpi; reads forward and backward; for non-simultaneous operation	18,336	147	382	325
0861-01	UNISERVO 12 Slave; 9-track phase-encoded, same characteristics as 0861-00	14,688	101	306	260
0861-04	UNISERVO 12 Master; 7-track NRZI master tape unit and logic to handle up to three slave tape units (0861-05); transfer rate 8,540, 23,741, and 34,160 characters per second at recording densities of 200, 556, and 800 bpi; reads forward and backward; for non-simultaneous operation	15,936	147	332	280
0861-05	UNISERVO 12 Slave; 7-track NRZI tape unit; same characteristics as 0861-04	13,056	101	272	230
F0934-99	Simultaneous Feature; for 9-track phase encoded simultaneous operation; required in each master (0861-00)	4,080	19	85	75

*Rental price does not include maintenance.

Univac 90/25, 90/30, and 90/40

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*	Rental (5-year lease)*
INPUT/OUTPUT UNITS (Continued)					
F0934-01	Simultaneous Feature; required in each master (0861-00) in addition to F0934-99 and F0935-00 to achieve phase encoded and 7- and 9-track NRZI simultaneous operation	4,608	19	96	80
F0934-98	Simultaneous Operation; required in each master (0861-04) to achieve 7-track NRZI simultaneous operation	4,080	19	85	75
F0935-00	Dual Density; required in each master (0861-00) to provide the ability to read or write 7/9-track NRZI tapes in addition to phase encoded tapes at 1600 bpi	2,688	13	56	48
5045-99	UNISERVO 14 Control; includes control and cabinet space for 2 UNISERVO 14 Magnetic Tape Units	21,168	128	441	355
5045-02	Auxiliary Cabinet; for 1 or 2 additional UNISERVO 14 Magnetic Tape Units	1,296	5	27	22
F1028-84	Adds 7-track NRZI native mode plus data conversion to F0826-00	3,654	12	82	66
F1753-97	Provides capability to add 7-track tape units to 5045-99 control	5,760	21	120	100
0870-03	UNISERVO 14 9-track PE Magnetic Tape Unit	14,880	93	310	250
0870-04	UNISERVO 14 9-track PE and NRZI Magnetic Tape Unit	16,080	101	335	270
0870-05	UNISERVO 14 7-track NRZI Magnetic Tape Unit	14,880	93	310	250
F2194-00	Dual Density; adds 9-track NRZI to UNISERVO 14 PE Magnetic Tape Unit; requires F0826-00 in control	1,200	6	25	20
F2194-02	Converts 0870-05 7-track NRZI Magnetic Tape Unit to 9-track PE	—	—	—	—
F2194-03	Converts 0870-05 7-track NRZI Magnetic Tape Unit into 9-track PE and NRZI	1,200	6	25	20
0862-00	UNISERVO 16; 9-track phase encoded tape unit; transfer rate 192,000 bytes per second at a recording density of 1600 bpi; reads forward and backward	22,032	167	505	370
0862-02	UNISERVO 16; 7-track NRZI tape unit; transfer rate 24,000, 66,700, and 96,000 characters per second at recording densities of 200, 556, and 800 bpi; reads forward and backward	22,032	167	505	370
F0936-99	Simultaneous Feature; provides for simultaneous operation when added to 0862-00 or -02; a second control unit or equivalent is required	914	NC	21	17
F0937-00	Dual Density; provides 0862-00 with the ability to read or write 9-track NRZI tape at 800 bpi in addition to phase encoded at 1600 bpi	2,284	NC	51	40
5034-00	UNISERVO 20 Control; controls up to sixteen 9-track, phase encoded, 1600-bpi, non-simultaneous UNISERVO 20's or a mixture of up to 16 UNISERVO 20's, UNISERVO 16's, and UNISERVO 12's, provided at least one UNISERVO 20 is present	36,720	143	840	610
F0823-98	9-Track Capability; provides the capability of adding 7-track NRZI UNISERVO 16 and UNISERVO 12 tape units to type 5034 control; includes data conversion; F0826-99 may not be present	5,544	24	113	90
F0826-99	9-Track NRZI; enables read or write operations in 9-track NRZI mode at a density of 800 bpi; in addition to the 9-track, phase encoded, 1600 bpi on UNISERVO 16 and UNISERVO 12 tape units with appropriate added features; F0823-98 may not be present	6,552	32	133	105
F1028-98	9-Track Addition; adds 9-track NRZI capability to F0823-99	5,544	24	113	90
F1028-97	7-Track Addition; adds 7-track capability and data conversion to F0826-99	4,536	14	92	75
0864-00	UNISERVO 20; 9-track phase encoded tape unit; transfer rate 320,000 bytes per second at a recording density of 1600 bpi; reads forward and backward	27,696	199	635	460
F1510-00	Dual Access; provides for dual access and simultaneous R/R, R/W, W/R, W/W operation when added to two or more UNISERVO 20's; requires two 5034-00 control units	2,448	14	51	41
0716-91	Card Reader and Control; 80- or 96-column, 600 cpm reader	18,187	121	421	360
0716-93	Card Reader and Control; 80- or 96-column, 1000 cpm reader	21,168	172	490	415
0716-99	Card Reader and Control; 80-column, 1000 cpm reader	15,504	129	323	275
F1487-00	Short Card, 51-column; for 9716	1,968	14	41	30
F1487-01	Short Card, 66-column; for 0716	1,968	14	41	30
F1488-00	Validity Check	816	NC	17	13
F1498-00	Alternate Stacker Fill	528	NC	11	8
F1530-99	Dual Translate; adds ASCII translator to translate mode	1,104	5	23	17
0768-00	Printer and Control; prints 49 contiguous characters at 1100 lpm and 63 characters at 900 lpm; 132 print positions	50,928	565	1,061	900
0768-99	Printer and Control; prints 43 contiguous characters at 1600 lpm and 63 characters at 1200 lpm; 132 print positions	63,216	698	1,317	1,120
F1071-00	1600/1200 LPM Rate; converts type 0768-00 to a type 0768-99	12,240	134	255	215
F1820-00	Stacking/Acoustical Aid; provides additional sound suppression to type 0768-00/-99 Printers; also provides power-driven assistance for form stacking	528	NC	11	9
0768-02	Printer and Control; prints 97 contiguous characters at 1000 lpm, 94 characters at 840 lpm, and 2000 lpm for a duplicated 14-character set (10 numerics plus 4 specials)	58,320	529	1,215	1,035
F1522-00	Print Code Expansion; provides for conversion of the 0768-02 to provide for a 103-character set	252	NC	5	4
0770-00	Printer and Control; prints 48-characters at 800 lpm; 132 print positions, 50 ips	56,304	287	1,173	940
0770-02	Printer and Control; same as 0770-00 except 1400 lpm and 75 ips	64,896	376	1,352	1,080

*Rental price does not include maintenance.

Univac 90/25, 90/30, and 90/40

EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*	Rental (5-year lease)*
INPUT/OUTPUT UNITS (Continued)					
0770-04	Printer and Control; same as 0770-00 except 2000 lpm and 100 ips	86,686	478	2,220	1,445
F1533-00	160 Print Position; expands 132 print positions to 160	4,416	20	92	74
F1534-00	Expanded Character Set Control; provides control for print cartridges with other than 48-character sets	2,880	5	60	48
F1536-00	Print Cartridge; 43-character alphanumeric business set	462	NC	22	18
F1536-01	Print Cartridge; 48-character alphanumeric scientific set	462	NC	22	18
F1537-00	Print Cartridge; 94-character ASCII set; requires F1534-00	462	NC	22	18
F1537-03	Print Cartridge; 68-character OCR-B; requires F1534-00	462	NC	22	18
F1537-04	Print Cartridge; OCR H-14 universal; requires F1534-00	462	NC	22	18
F1537-05	Print Cartridge; 58-character set for COBOL, FORTRAN, and business; requires F1534-00	462	NC	22	18
F1537-06	Print Cartridge; 177-character international set; requires F1534-00	462	NC	22	18
F1537-09	Print Cartridge; 24-character numeric and special symbols for high-speed numeric printer; requires F1534-00	462	NC	22	18
F1537-11	Print Cartridge; universal OCR-A character set; requires F1534-00	462	NC	22	18
F1537-12	Print Cartridge; universal OCR-B (ECMA 11); requires F1534-00	462	NC	22	18
F1537-13	Print Cartridge; universal 77L	462	NC	22	18
0776-00	Printer and Control; prints 48 characters at 760 lpm; 136 print positions	36,570	219	850	680
0776-02	Printer and Control; prints 48 characters at 940 lpm; 136 print positions	41,340	262	960	770
0776-04	Printer and Control; prints 48 characters at 1200 lpm; 136 print positions	52,150	300	1,230	984
F2245-00	Expanded Character Set Control; provides for print bands with other than 48-character sets for 0776 printers	1,910	5	45	36
F2217-00	Field conversion; converts 0776-00 printer to 0776-02 printer	4,770	40	110	90
F2216-XX	Print band for 0776 printers	1,270	—	30	24
0920-02	Paper Tape Control	9,408	46	196	170
F1033-02	Paper Tape Reader	1,968	22	41	35
F1032-02	Paper Tape Punch	6,864	32	143	120
F1034-00	Reader Spooler	1,968	5	43	37
F1035-00	Punch Take-Up Spooler	816	5	17	15
COMMUNICATIONS EQUIPMENT					
F1625-02	Communications Adapter for 90/25; provides three lines, one of which can be full duplex; requires F18XX line adapter	8,208	41	190	161
F1625-97	Communications Adapter; controls and coordinates the transfer of data from up to 6 full-duplex or 12 half-duplex communication lines; expandable to 12 full-duplex or 24 half-duplex lines; each line requires a line adapter	8,424	41	195	165
F1625-96	Communications Adapter Expansion; expands the capability of C/A (F1625-99) to control up to 12 full-duplex or 24 half-duplex lines	8,424	41	195	165
F1826-00	Synchronous Line Adapter; provides a full-duplex or 24 half-duplex interface to synchronous data sets conforming to RS-232 and CCITT; compatible with MIL 188C low-level interface electrical characteristics	760	7	19	16
F1826-01	Synchronous Line Adapter; same as F1826-00 and provides reverse channel of up to 150 bps asynchronous; requires two ports	1,160	9	29	25
F1827-00	Synchronous Line Adapter; same as F1826-00 except permits exact compliance with the MIL 188C low-level interface; control line polarity is RS-232	760	7	19	16
R1828-00	Asynchronous Line Adapter; provides a full-duplex or half-duplex interface to asynchronous data sets conforming to RS-232 and CCITT; compatible with MIL 188C low-level interface electrical characteristics	600	6	15	13
F1828-01	Asynchronous Line Adapter; same as F1828-00 and provides reverse channel of up to 5 bps	760	7	19	16
F1828-02	Asynchronous Line Adapter; same as F1828-00 and provides reverse channel of up to 150 bps asynchronous; requires 2 ports	920	9	23	20
F1829-00	Asynchronous Line Adapter; same as F1828-00 except permits exact compliance with the MIL 188C low-level interface; control line parity is RS-232	600	6	15	13
F1830-00	Wideband Line Adapter; provides a synchronous full-duplex interface to an AT&T 300 Series data set operating at 40.8K bits per second with 56K bps top speed	920	9	23	20
F1830-01	Wideband Line Adapter; provides a synchronous full-duplex interface to an AT&T 300 Series data set at 50K bps; includes auto-answering capability	1,104	9	23	20
F1831-00	Dial Adapter; provides the interface to both rotary and Touch-Tone auto dialing units; requires a line adapter location for each dialing unit	600	6	15	13
F1832-00	Asynchronous Relay Line Adapter; provides an asynchronous full-duplex interface optionally compatible with either 20-75 MA neutral or 10-40 MA polar telegraph lines	600	6	15	13
F1834-00	Wideband Line Adapter; same as F1839-01 except conforms to CCITT-V35	920	9	23	20
F1835-00	TWX Line Adapter; provides an interface to the USA TWX network	600	6	15	13
F1836-00	Telex Line Adapter; provides an interface to the USA WU Telex network	600	6	15	13
F1837-00	Active Line Indicator; provides a display panel to display line activity on up to 12 communication lines; two permitted if F1625-98 is present	336	2	7	6

*Rental price does not include maintenance.

Univac 90/25, 90/30, and 90/40
EQUIPMENT PRICES

		Purchase Price	Monthly Maint.	Rental (1-year lease)*	Rental (5-year lease)*
COMMUNICATIONS EQUIPMENT (Continued)					
2521-00	Basic Channel Transfer Switch; 2x1 configuration; includes cabinet with physical space and power for 4x8 configuration	18,750	62	442	330
F2600-00	Expansion Module; expands 2521-00 2x1 switch into a 2x2 configuration; maximum of 3 per 2521-00 switch	555	—	13	10
F2601-00	Expansion Module; 2x1 configuration; forms base for second 2x4 channels switch; requires F2100-00 modules to expand to 2x4 switch	9,930	34	234	175
F2601-01	Independent 2x1 Module; expandable to 2x2 configuration through one F2601-00; precludes addition of one F2602-00 expansion module; maximum of two per 2521-00 switch	9,930	34	234	175
F2602-00	Expansion Module; expands 2x1 basic configuration to a 4x1 configuration by adding links for two CPU's; requires one 2603-00 for each CPU-subsystem crosspoint	6,755	26	159	120
F2603-00	Crosspoint Module; connects one subsystem to each CPU link in F2602-00 expansion module; maximum of 3 per F2602-00 module	555	—	13	10

*Rental price does not include maintenance.

SOFTWARE PRICES

		Monthly Rental
OS/3	(See Support Service Fee)	NC
Extended System Software	Extended System Software (ESS) provides additional system software that increases functionality and ease-of-use. Includes data utilities, Sort/Merge, Sort 3, spooling and job accounting, PPS U6998.	$ 74
Sort/Merge	Sort/Merge provides a varied group of capabilities available as a sub-routine facility accessible through user programs and as a program accessible thru JCL. PPS U7021.	53
Sort 3	Sort 3 is compatible with the IBM System/3 Sort; it offers tab and selection sort capabilities with record selection and control facilities. PPS U7022.	53
Editor	Editor is an interactive facility used to create files; add, delete and modify text; copy files and concatenate files. Extensive facilities are available for creating/updating records in library/spool/data files. PPS U7010.	42
Information Management System	Information Management System (IMS) multi-thread is an interactive transaction processor with integrated file management facilities. An interface to the DMS Data Base Facility (T6218-00) is provided. Extended System Software (6211-98) is a prerequisite. Requires Hardware F1623-XX, Micrologic Expansion. PPS U7000.	150
Information Management System	Information Management System (IMS) single-thread is an interactive transaction processor with integrated file management facilities. An interface to the DMS Data Base Facility (T6218-00) is provided. Extended System Software (6211-98) is a prerequisite. Requires Hardware F1623-XX Micrologic Expansion. PPS U6999.	116
RPG II	Includes RPG II, RPG II Editor and RPG II Auto Report. Editor (6226-00) is a prerequisite for RPG II Editor Utilization. PPS U7002.	53
COBOL-1974	COBOL-1974 conforms to ANS COBOL X3.23-1974 and supports FIPS PUB 21.2; includes functional extensions. PPS U7005.	74
Escort	Escort is an easy-to-use interactive language that utilizes English language directives to create a wide variety of business applications. PPS U7009.	42
FORTRAN IV	FORTRAN IV is a programming language widely used for mathematical and scientific applications. FORTRAN IV implements ANS X 3.9-1966; includes functional extensions. PPS U7006.	84
COBOL-68 BASIC	The BASIC 1968 American National Standard COBOL Compiler System is a language processor that provides an American National Standard COBOL plus extensions. PPS U7003.	50
COBOL-68 Extended	The Extended 1968 American National Standard COBOL Compiler System is a language processor that provides an American National Standard COBOL plus extensions. PPS U7004.	50
FORTRAN (BASIC)	The BASIC FORTRAN System is a compiler and runtime system that implements the ANS BASIC FORTRAN X3.10-1966 language. In addition, it contains many extensions to the standard that provide compatibility with IBM DOS FORTRAN. PPS U7007.	50
Assembler	The Assembler is a multi-phase language processor which translates user-written mnemonics into executable machine instructions. Required for usage of Assembler for other than system generation functions. PPS U7023.	158
Screen Format Generator	The Screen Format Generator (SFG) is an interactive utility program through which the user can create and maintain screen formats for inputting and outputting to a workstation or terminal. PPS U7013.	42
Dialog Spec. Language	The Dialog Specification Language Translator (DSLT) compiles statements written in Dialog Specification Language (DSL) and generates "Dialogs" for workstation and terminal applications. PPS U7014.	31
BASIC	Beginners All-Purpose Symbolic Instruction Code (BASIC) Compiler. Compatible with the Dartmouth Time Sharing System BASIC and meets ANSI Standard for minimum BASIC. Includes extensions. PPS U7008.	74
Data Mgt. System	An implementation of CODASYL Data Base Specification. Includes Data Description Language, Data Manipulation Language, Data Base Management System and data base utilities. COBOL-1974 (6222-00) or COBOL-68 6034-00/6236-00 and Extended System Software (6211-98) are prerequisites. PPS U7001.	184
ICAM Terminal Support	Communication routines which control Communication Adapter(s) (CA). Required for access to any terminal/system connected thru a CA—PPS U7024.	95
DDP Transfer Facility	A facility to initiate/monitor job execution on a DDP Network Node; also to transfer sequential files between network systems. Extended System Software (6211-98) and ICAM Terminal Support Facility (6231-00) are prerequisites. PPS U7011.	84
Nine Thousand Remote	Enables system to communicate with a Series 1100 System as a remote batch terminal. ICAM Terminal Support Facility (6231-00) is a prerequisite. PPS U7012.	26

Univac 90/25, 90/30, and 90/40

SOFTWARE PRICES

SUPPORT SERVICE FEE

		Monthly Rental
Support Service Fee	Series 90 OS/3 Systems	105

PROGRAM PRODUCTS

			Monthly Rental
UNIS/90			
6501-00	UNIS/90 OS/3 MDP	UNIS/90 OS3 Master Data Processor (MDP) provides for maintenance of the standard manufacturing data files, and for procession capabilities in the areas of Bill of Materials Retrievals and Standard Routings. This module includes MDP Model Installation Programs.	$ 75
6501-02	Inventory Management	The Inventory Management subsystem of UNIS/90 adds capabilities to the areas of: inventory control; statistical forecasting; requirements planning; order recommendation; order allocation; ABC analysis and statistics. Used with 6501-00 which is prerequisite.	75
6501-04	UNIS/90 OS3 PPS/WOM	UNIS/90 OS3 Production Planning and Scheduling and Workorder Management. PPS provides for backward and forward scheduling, splitting, overlapping and reduction of wait times. It employs priority calculations of realistic start and calculation of realistic end dates. The Work Order Management subsystem of UNIS/90 adds capabilities to inventory management (6501-02) for order release and order control. Order release functions include: on-hand availability control; creation of on-hand reservations and shortage reporting. Order control includes: work order status update; work in progress quantity and reservation control. Used with 6501-00 and 6501-02 which are prerequisite.	125
6501-97	UNIS OS/3 MDP INV	Provides the two combined modules, Master Data Processor MDP and Inventory Management INV described in 6501-00 and 6501-02.	150
6501-98	UNIS OS/3 INV PPS/WOM	Provides the two combined modules, Inventory Management INV and Production Planning and Scheduling/Work Order Management PPS/WOM described in 6501-02 and 6501-04. 6501-00 is a prerequisite.	200
6501-99	UNIS OS/3 MDP INV PPS/WOM	Provides the combined three modules, Master Data Processing MDP Inventory Management INV, and Production Planning and Scheduling/Work Order Management PPS/WOM described in 6501-00, 6501-02, 6501-04.	275
6509-00	OS/3 BEM Monitor	Provides the interfaces to OS/3 components such as ICAM and File Management for the Interactive Application Processors listed below. Multiple terminals are supported as well as several different terminal types. An Operator Communications Interface is also provided.	75
6509-01	OS/3 EDT	Adds the capability to perform interactive text editing of programs and data contained in OS/3 Library files. Commands are provided to retrieve old text, save new text, print to the terminal, locate, update, insert, delete and change. Requires BEM Monitor (6509-00.)	50
6509-02	OS/3 BASIC	Adds the capability to compile and execute programs written in the Beginners All Purpose Symbolic Instruction Code (BASIC). The compiler operates in a conversational mode allowing each terminal user to create, correct, save, retrieve and run BASIC programs. Requires BEM Monitor (6509-00).	60
6509-03	OS/3 RSP	The RSP System of OS/3 BEM utilizes the Uniscope Terminal features to provide access to the contents of the OS/3 Spool File. Reports and compilation listings can be scanned at the Uniscope. Card Image JCL and Input Data may be created or changed in the Spool File.	50
OS/3 Accounting Control System			
6514-00	OS/3 Accounts Payable	Provides control of expenditures by furnishing Vendor Disbursements Journal. Cash Requirement, Aged Analysis of Accounts Payable, Checks and Remittance Data, Check Register, Vendor Purchase Analysis and General Ledger Distribution Summary.	25
6514-01	OS/3 Accounts Receivable	Provides control of cash flow and readily available credit information on customer accounts by furnishing Invoice and Adjustment Registers, Aged Analysis of Receivables, Cash Receipts Register using the Open Item and/or the Balance Forward Method, Cash Expectancy Forecast and Sales Analysis Reports.	25
6514-02	OS/3 General Ledger	Provides Trial, Detail, and Consolidated Balance Sheets, Detail, Consolidated and Comparative Income Statements, lists of Debit/Credit entries and Account Balance before posting to General Ledger chart of accounts. Accepts input from Accounts Payable, Accounts Receivable, Payroll and Inventory Systems.	25
6514-03	OS/3 Payroll	Processes salaried, hourly, or piece-work employees. Computes, remits, and reports taxes, deductions, and fringe benefits. Furnishes payroll checks and stubs, journal entries to general ledger, job labor costs and labor distribution reports.	30
6130-00	UTS 400 COBOL (OS/3)	A COBOL compiler conforming to ANSI X3.23-1974 Standards which compiles programs for execution on a properly configured UTS 400. Compiled programs, together with a Micro Programmed Interpreter, are down line loaded to a UTS 400 for execution or for storage on a local load device. OS/3 systems require a minimum of 131K memory to support the compiler.	65
Information Collection System 90			
6521-00	ICS/90 (OS/3)	Provides the user with the capability of entering, validating, correcting and verifying data according to pre-defined formats, on-line. The data is validated as it is keyed in and stored on disk. It can be retrieved for verification and editing by batch number and record number within the batch. Only when validated and verified satisfactorily is the record released for processing by external programs.	80