

Unisys 1100/90

MANAGEMENT SUMMARY

UPDATE: Although Unisys has made no enhancements to the 1100/90 processors this year, the company has added several new peripherals. Two new disk subsystems, the 8481 and 8490, were introduced. Both models can be configured as standard disk subsystems, or as part of a cache/disk subsystem. Unisys also added an optical disk system, a new model of the 0770 printer, and a new version of the Uniservo 36 Magnetic Tape Subsystem.

Currently the most powerful system in the Unisys 1100 line, the 1100/90 is targeted at manufacturing, government, airline, communication, aerospace, petrochemical, and scientific data processing sites. Because the 1100/90 architecture is designed to process multiple jobs simultaneously, running realtime, batch, and interactive applications presents no problem to the user.

The 1100/90 can be configured with up to four central processors in a tightly coupled or loosely coupled arrangement. System components are functionally independent, and each component can have multiple access paths to and from other components.



Unisys' 1100/90 SV models offer 1100/60 and 1100/70 users a lower entry point into the 1100/90 Series. The uniprocessor 1100/91 SV is rated at 5.5 MIPS, while the dual-processor 1100/92 SV is rated at 10.2 MIPS.

Representing the top of the 1100 Series product line, the 1100/90 is completely software-compatible with the smaller 1100/70 and 1100/60 systems. The 1100/90 offers from 8 to 64 megabytes of main memory, and features up to 160 word channels and 96 block multiplexer channels.

MODELS: 1100/91 SV, 1100/91, 1100/92 SV, 1100/92, 1100/93, and 1100/94.

CONFIGURATION: From 1 to 4 CPUs, 2 to 16 million words of main memory, 1 to 4 I/O processors, and 12 to 176 I/O channels.

COMPETITION: Amdahl 580 Series, Control Data Cyber 180/860, Honeywell DPS 88/82, IBM 308X Series, NAS AS/9080.

PRICING: A basic system can be purchased for \$2,005,962.

CHARACTERISTICS

MANUFACTURER: Unisys, P.O. Box 500, Blue Bell, Pennsylvania 19424. Telephone (215) 542-4011. In Canada: Sperry, Inc., 55 City Centre Drive, Mississauga, Ontario.

MODELS: 1100/91 SV, 1100/91, 1100/92 SV, 1100/92, 1100/93, and 1100/94.

DATA FORMATS

BASIC UNIT: 36-bit word. In main storage, each word location includes four additional parity bits.

FIXED-POINT OPERANDS: One 36-bit single precision word. Addition and subtraction can also be performed upon two-word (72-bit) double precision operands and upon 18-bit half-words and 12-bit third-words; the leftmost bit holds the sign in each case. Moreover, partial words of 6, 9, 12, or 18 bits can be transferred into and out of the arithmetic and control registers. The 1100/90 can also perform decimal addition and subtraction operations on 9-bit bytes, packed 4 to a word.

FLOATING-POINT OPERANDS: One word, consisting of 27-bit-plus-sign fraction and 8-bit exponent for single precision; or two words, consisting of 60-bit-plus-sign fraction and 11-bit exponent for double precision. The range for single precision is from 10 to the 38th power to 10 to the minus 38th power with 8-digit precision; for double precision, the range is 10 to the 307th power to 10 to the minus 308th power with 18-digit precision. The sign is the most significant bit in single precision (bit 35) and double precision (bit 71). Negative floating-point numbers are represented by the one's complement of the entire corresponding positive floating-point number. Single precision negative exponents are biased by 128, while double precision negative exponents are biased by 1024.

INSTRUCTIONS: One word, consisting of 6-bit Function Code, 4-bit Partial-Word or Immediate-Operand Designator, 4-bit Control Register Designator, 4-bit Index Register Designator, 1-bit Index Modification Designator, 1-bit Indirect Address Designator, and 16-bit Address Field. In extended Instruction Set mode, the Address Field is 12 bits

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➤ The basic 1100/91 Processor Complex consists of a central processor with 16K words (64K bytes) of buffer storage, a Main Storage Unit (MSU) with 2 million words (8 million bytes) of main memory, an Input/Output Processor (IOP) with four block multiplexer channels and eight word channels, a System Support Processor (SSP), a master operator console with system panel, and a processor cooling unit. When configured with two, three, or four CPUs, the system becomes an 1100/92, 1100/93, or 1100/94, respectively. The 1100/90 also supports a maximum of four IOPs, four operator consoles, and two SSPs. Optional equipment includes up to two Subsystem Access Units that control the partitioning of peripheral subsystems and up to four Subsystem Power Controllers that automatically control the power to peripheral controllers connected to the IOPs. All 1100/90 systems can have up to four MSUs, each of which can house up to four million words (16 million bytes) of memory for a total system capacity of 16 million words (64 million bytes).

The 1100/90 processors feature a number of enhancements over the previously introduced 1100/60, 1100/70, and the now discontinued 1100/80 processors. High density packaging and subnanosecond ECL circuits provide greater logic density and higher switching speeds. The package density of the 1100/90 is 10 times greater than that of the 1100/80. The gate switching speed is 0.37 nanosecond per gate.

The Integrated Scientific Processor (ISP) provides users with the ability to process scientific, engineering, and academic applications on the same machine used to process payroll and accounts receivable. Capable of supporting both high-speed scalar and vector calculations, the ISP connects to the 1100/90 mainframe and accesses its job queue and data directly from the host's main memory. A channel interface is not needed for this access. The ISP is capable of processing at speeds of 133 million floating-point operations per second (MFLOPS), according to Unisys. Combined with an 1100/90 host, the ISP offers the user a single data processing environment capable of general-purpose and scientific computing applications.

With the addition of two entry-level machines, the 1100/91 SV and 1100/92 SV, Unisys has provided its 1100/60 and 1100/70 users with an economical entry into large-scale mainframe computing, and also provides complete upward compatibility for peripherals, software, and communications. The 1100/91 SV comes with one central processor, 8 megabytes of main storage (expandable to 64 megabytes), and 64K bytes of buffer storage. It is upgradable to the 1100/92 SV by the addition of a second processor. It can also be field upgraded to the more powerful 1100/91 as user needs dictate. The dual-processor 1100/92 SV can be upgraded to a standard 1100/92. All software and peripherals used on the 1100/91 and 92 SV are upward compatible with the rest of the 1100/90 Series. According to Unisys, the SV models have the same architecture and internal logic as the other models in the 1100/90 Series, but are slowed down

➤ long, and a 5-bit Base Register Select Field and an 18-bit Index Register Format Selector Field are also included.

INTERNAL CODE: Unisys (Sperry) communications terminals and other I/O units can employ a 6-bit Fieldata code, EBCDIC, compressed code, or standard ASCII code. The 1100 processors are not code-sensitive and can manipulate data in 6-bit, 9-bit, 12-bit, or 18-bit codes.

MAIN MEMORY

STORAGE TYPE: N-channel metal oxide semiconductor (MOS) using 64K-bit chips.

CAPACITY: From 2,097,152 words (8 million bytes) to 16,777,216 words (64 million bytes). Memory is divided into four independent 524,288-word or 1,048,596-word banks that can simultaneously service four different requests.

CYCLE TIME: 360-nanosecond double-word read/write cycle, 600-nanosecond partial-word and block (eight-word) read cycle, and 660-nanosecond block write cycle. Memory refresh takes 360 nanoseconds. Two- or four-way interleaving automatically allocates consecutive block addresses to separate storage banks when consecutive eight-word blocks are being moved. A write request queue can stack up to 16 double-word write requests in each central processor.

CHECKING: The Main Storage Unit (MSU) contains circuitry for single-bit error detection and correction and detection of double-bit errors. Memory errors are detected using a 7-bit hamming code generated for all read and write operations. The MSU also detects single-bit address errors and out of bounds addresses.

RESERVED STORAGE: Not specified by the vendor.

CENTRAL PROCESSORS

The 1100/90 Instruction Processor (central processor) features high-density packaging and subnanosecond emitter-coupled logic (ECL) circuits with a gate switching speed of 0.37 nanosecond. The packaging technology, which Unisys terms High-Performance Packaging (HPP), provides 10 times the density of the 1100/80 system. The HPP technology uses liquid cooling to maintain a constant conservative temperature. Cold plates placed between the circuit cards conduct the generated heat to a circulating liquid coolant. The coolant flows to an external cooling unit that serves as a heat exchanger between the coolant and the customer-supplied chilled water system. The cooling unit also monitors temperature, pressure, and leak sensors. Each cooling unit can support up to two processors, and dual porting of the processors and cooling units allows complete redundancy.

The instruction processor arithmetic unit is divided into three sections: a binary arithmetic section, a binary high-speed multiply section, and a decimal arithmetic section. Each section is optimized to reduce execution time for its specific type of calculation. The arithmetic unit performs 36-bit single-length shifting or 72-bit double-length shifting. Addition and subtraction of fixed-point numbers can be performed on half- or third-words simultaneously. In addition, there are nine special internal registers that define arithmetic operational rules and exceptions.

Other instruction processor features include an instruction pipelining feature that permits the concurrent execution of three instructions, a wraparound feature that routes intermediate results from one instruction to the appropriate registers when needed by the following instructions, a duplicate index file that accelerates operand and instruction address formation, an address range of 16 million words, 24-bit indexing, and a Universal Processor Interface that provides interprocessor communications.

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TABLE 1. SYSTEM COMPARISON

MODEL	1100/91 SV	1100/92 SV	1100/91	1100/92	1100/93	1100/94
SYSTEM CHARACTERISTICS						
Date announced	April 1985	April 1985	July 1982	July 1982	July 1982	July 1982
Date first delivered	—	—	December 1983	December 1983	December 1983	December 1983
Field upgradable to	1100/91	1100/92	1100/92	1100/93	1100/94	—
Relative performance (MIPS)*	5.5	10.2	7.5	13.3	20.0	25.0
Number of processors	1	2	1	2	3	4
Cycle time, nanoseconds	—	—	—	—	—	—
Word size, bits	36	36	36	36	36	36
Operating systems	1100 OS					
MAIN MEMORY						
Type	64K-bit NMOS					
Minimum capacity, bytes	8M (2097K words)					
Maximum capacity, bytes	64M (16,777K words)					
Increment size	4MB (1024K words)					
Cycle time, nanoseconds	360	360	360	360	360	360
BUFFER STORAGE						
Minimum capacity, bytes	64K	64K per IP	64K	64K per IP	64K per IP	64K per IP
Maximum capacity, bytes	—	—	—	—	—	—
Increment size	—	—	—	—	—	—
INPUT/OUTPUT CONTROL						
Number of channels:						
Byte multiplexer	—	—	—	—	—	—
Block multiplexer	4 to 96					
Word	0 to 160					
Other	—	—	—	—	—	—

*Millions of instructions per second; based on information supplied by Sperry Corporation

Input/output operations on the 1100/90 systems are off-loaded from the central processor to the independent Input/Output Processor (IOP). The CPU sends a request to the IOP through the Universal Processor Interface that consists of a send request/acknowledge pair and a receive request/acknowledge pair. The IOP accepts the request, executes the appropriate channel program, handles path selection and error control, and prepares a completion message for CPU notification and handling. Data is transferred from the IOP to main storage via a two-word-wide interface.

Mass storage devices available for the 1100/90 system include the 8450, 8470, 8480, 8481, and 8490 fixed-disk drives, and a variety of magnetic tape drives in both 7- and 9-track models. Also available are four line printer models with speeds ranging from 760 to 2,000 lines per minute and a laser printer with a print speed of 10,500 to 21,000 lines per minute.

The 1100 Operating System is the standard operating system for all members of the 1100 Series, and furnishes comprehensive supervisory and control facilities for three distinct modes of multiprogrammed operation: batch, interactive, and transaction processing. It provides a wide range of operating facilities including dynamic storage allocation, reentrancy, multiprocessing, dynamic reconfiguration, automatic recovery, multilevel prioritization, and system optimization.

Software facilities that operate under the control of the 1100 Operating System include processors for the Cobol, Fortran, Algol, Basic, Pascal, PL/1, APL, RPG, and Assembly languages, plus a variety of utility routines and applications packages.

Each 1100/90 system includes a system clock unit that provides synchronized clock signals for the central processors, I/O Processors, and Main Storage Units. A motor alternator that provides the system with 400-hertz power is required. An optional Performance Monitor is available for analyzing system performance.

The 1100/90 system includes a number of Availability, Reliability, and Maintainability (ARM) features. These include transient-free design, extensive error detection and recovery, error logging and analysis, on-line fault analysis, diagnostic software, and a remote maintenance interface. Failure in the System Support Processor (SSP) will not cause a system failure, and if the system console fails, the SSP can function as a system console.

The 1100/90 processor contains two sets of *program-addressable registers*: the General Register Set (GRS) and the Base Register Set. The GRS includes 128 control registers. User programs can make use of a Non-Indexing Register, 11 Index Registers, 4 Overlapped Registers that can be used as either Index Registers or Accumulators, 12 Accumulators, 4 Unassigned Registers that are available as temporary storage locations, and 32 Jump History Registers. Also available are 16 Special Registers, including a Latent Parameter Register, a Repeat Count Register, a Mask Register, and User Registers that can be used as loop counters, transient registers, or storage for intermediate values or constants. A duplicate set of Executive control registers is accessible only by the operating system.

The Repeat Count Register controls repeated operations such as block transfer and search instructions. The Mask Register is used with the search command in determining which portions of words are to be compared in repeated masked search and test operations. The Jump History Register holds the recent 24-bit absolute addresses of jump instructions.

The Base Register Set consists of 32 registers, each containing a virtual address. In basic instruction mode, only base registers B12 to B15 are available. In extended instruction

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➤ In addition, Unisys places a strong marketing emphasis on data base and data communications software. The Universal Data System (UDS) 1100 is designed to provide a single, unified data management subsystem. Data communications software includes the Communications Management System (CMS) 1100, which provides the communications interface to a DCA-based DCP/Telcon network, and the Processor Common Communication System (PCCS), which enables applications programs to utilize the communications system.

Unisys' consistent concern with data communications is apparent in the strong emphasis across the entire 1100 product line. The DCP/40 Communications Processor can handle from 16 to 156 communications lines and contains from 512K to 4096K bytes of memory. The DCP/40 can be used as a front-end processor, nodal processor, or remote concentrator, and is supported by Telcon software. The DCP/40 will handle data rates of 45 to 1.3 million bps as well as automatic answering and dialing. The DCP/40 supports UDLC, bisynchronous, synchronous, and asynchronous transmission.

The DCP/10A and DCP/20 are smaller versions of the DCP/40. Both models support 512K to 2048K bytes of memory. The DCP/10A can have 8 communications lines, while the DCP/20 can have up to 48 lines. The DCP/20 also supports from 1 to 3 I/O processors.

Unisys' Distributed Communication Architecture, first announced in November 1976, continues to be a viable technology in the vendor's overall communications philosophy. Under the DCA concept, according to Unisys, continued compatibility of present and future products will be ensured by specifying interfaces and functions of all components and providing guidelines for the building of communications networks. DCA can accommodate a broad range of host processors and terminal attachments, including other manufacturers' equipment. Adaptable to both simple and complex networks, DCA is said to permit the design of networks that fulfill many specialized requirements, such as maximum-security, ultrasilient, and low-overhead systems.

COMPETITIVE POSITION

Although the 1100/90 is the top of the 1100 Unisys main-frame product line, it is not competitive with the high-end systems offered by IBM, Honeywell, and the other main-frame vendors. While the rest of the industry has emphasized larger chip densities and increased memory capacities, Unisys is still using 64K-bit chips and a maximum main memory capacity of 64 megabytes on the 1100/90. In comparison, the IBM 3090 has up to 128 megabytes of main memory and 512 megabytes of expanded memory, the Honeywell DPS 90 is equipped with 256 megabytes, and both the Amdahl 5890 and the NAS XL Series can have up to 512 megabytes. What's more, a basic 1100/91 configuration with 8 megabytes of memory costs more than an entry-level IBM 3090 Model 150 with 32 megabytes of memory.

➤ mode, either the first 16 base registers or all 32 base registers are available, depending on the current processor privilege level. User programs can address base registers B0 to B15 only. Base registers B16 to B31 are executive base registers accessible only to the operating system.

A processor state or condition is maintained for each program activity. The processor state consists of the internal registers of the central processor that are required for system operation, including the addressing state, the register state, the activity state, and the instrumentation state. The addressing state consists of the Base Register Set, while the register state consists of the GRS.

The activity state includes the registers required for operational control of an activity. The activity state consists of the following: the Program Address Register, which contains the virtual address of the current instruction; the Designator Register, which controls the basic operational modes and conditions of the processor; the Indicator/Key Register, which contains mid-execution control indicators, the current access key value, and pending interrupt indicators; two Quantum Timers; and four Interrupt Status words.

The instrumentation state includes the Breakpoint Register, the Jump History Register, and software monitoring controls.

The 1100/90 *instruction set* is nearly identical to that of other 1100 Series systems in order to maintain compatibility. To utilize the full capabilities of the 1100/90, additional privileged instructions and an extended mode of operation with several new instructions have been included.

The 1100/90 has 271 instructions. Of these, 26 are available in basic mode only and 30 are available in extended mode only. The instruction set includes 16 load instructions, 20 store instructions, 30 fixed-point arithmetic instructions, 15 floating-point instructions, 16 search and masked search instructions, 7 data type conversion instructions, 37 test instructions, 12 shift instructions, 28 conditional and unconditional jump instructions, 6 interbank jump instructions, 4 logical instructions, 24 miscellaneous instructions, 11 character manipulation instructions, 2 stack instructions, 12 address space management instructions, 12 activity control instructions, 8 dayclock instructions, 4 universal processor interface instructions, and 5 recovery and partitioning control instructions.

An interrupt suspends the current instruction sequence and initiates an instruction sequence starting at an address found at a fixed location relative to the B16 base register. The address of this location replaces the value in the Program Address Register. Except for instructions explicitly named as interruptible, the central processor honors an interrupt only after the current instruction is completed and only if the interrupt is allowed.

All external interrupt requests, such as those generated by an I/O processor, are presented to each central processor in the system. Therefore, an interlocked synchronization mechanism is provided to ensure that only one CPU actually accepts the request. There are 64 interrupt priority levels.

The 1100/90 *master operator console* is a UTS 60 terminal equipped with a clock calendar and a system panel used to control initial program load, assign SSPs to application partitions, and sound a system alarm. A printer and up to six auxiliary consoles can be added. The UTS 60 has a 12-inch screen and a typewriter-style keyboard with function keys and numeric keypad.

SPECIAL FEATURES: All 1100/90 systems must include at least one *System Support Processor (SSP)*, a freestanding unit that includes 256K bytes of memory, fixed-disk storage,

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TABLE 2. MASS STORAGE

MODEL	8450	8470	8480	8481	8490
Cabinets per subsystem	1 to 32	1 to 32	1 to 8	1 to 4	1 to 4
Disk packs/HDA's per cabinet	1 HDA	1 HDA	4 HDA's	4 HDA's	4 to 8 HDA's
Capacity*	243MB	403MB	1.6GB	2.5GB	2.5GB to 5.1GB
Tracks/segments per drive unit	16,800	20,160	80,000	67,328	—
Average seek time, msec.	14.7	14.7	14.7	16	18
Average access time, msec.	23	23	23	29.9	26.3
Average rotational delay, msec.	8.3	8.3	8.3	13.9	8.3
Data transfer rate	1.26M bytes/sec.	2.09M bytes/sec.	2.09M bytes/sec.	1.8M bytes/sec.	1.8M bytes/sec.
Controller model	5040	5056	5056	5057	5090
Comments	Can be configured as part of a cache/disk subsystem	Can be configured as part of a cache/disk subsystem	Can be configured as part of a cache/disk subsystem	Can be configured as part of a cache/disk subsystem	Can be configured as part of a cache/disk subsystem

*Capacity based on 112-word records

➤ Thus, the 1100/90 Series competes more directly with older systems such as IBM's 308X Series. In terms of price/performance comparisons, the single-processor 1100/91 is targeted at the 3083 Model Group JX, the dual-processor 1100/92 at the 3081 Model Group GX, the three-processor 1100/93 at the 3081 Model Group KX, and the four-processor 1100/94 at the 3084 Model Group QX. Although Unisys matches the number of central processors featured on the 3084, it provides only half the memory capacity of the IBM 308X Series models.

Other manufacturers' systems competing with the Unisys at this level are the Amdahl 5868 and 5880 systems; the Control Data Cyber 180/860; the Honeywell DPS 88/82; and the NAS AS/9080.

The Amdahl multiprocessor Models 5868 and 5880 both offer 128 megabytes of main memory and up to 48 I/O channels. Although the Unisys system has a slight edge in price over its Amdahl counterpart, it has only half the main memory capacity. The Control Data Cyber 180/860 is lower in price, offers 128MB of main memory, and has up to 24 I/O channels. With the addition of a CyberPlus Multi-Parallel Processor, the CDC machine has the supercomputing capability of the Unisys 1100/94 with an Integrated Scientific Processor (ISP). The Honeywell DPS 88/82 also offers 128 megabytes of main memory, supports two central processors, and has up to 128 I/O channels. While the DPS 88/82 has twice the main memory capacity of the 1100/94, the Honeywell machine carries a price tag of almost twice that of Unisys' offering. The NAS AS/9080, like the DPS 88/82, has a purchase price higher than the 1100/94, but it closely mirrors the 1100/90 in main memory (64MB) and I/O channel capacity (32). Like the CDC CyberPlus, adding an AS/91X0 array processor to the AS/9080 yields the scientific/engineering computing capability of an 1100/94 with an ISP.

ADVANTAGES AND RESTRICTIONS

Intended to provide a growth path for current 1100 Series users, the 1100/90 offers upward mobility and increased functionality. Within the 1100/90 product line, growth is accomplished by simply adding components in the areas required, whether it's CPUs, memory, peripherals, or communications.

➤ a magnetic tape unit, and a CRT workstation with printer. The SSP interfaces to the CPU, I/O Processor, and MSU. It performs power control, unit initialization, system partitioning, initial program load, and system maintenance. The SSP monitors each central complex unit, taking recovery and isolation action when errors are discovered. Errors are logged for later analysis. For maintenance, the SSP performs on-line diagnostic testing, full prognosis, and off-line analysis for pinpointing faults.

The partitioning function provides the ability to assign individual central complex units of a system to either one of two independent smaller systems, or to isolate a unit from either application for off-line concurrent maintenance. Partitioning is supported via partitioning panel displays. The SSP also defines special system protection modes such as realtime and maintenance modes.

The partitioning function also indicates the operational status of each central complex unit. These status conditions are available to system software for configuration control. The ability to control the partitioning of subsystems through the Subsystem Access Unit is also provided.

The *Subsystem Access Unit (SAU)* is an optional unit that controls the partitioning of peripheral subsystems via commands from the SSP. The SAU allows a peripheral subsystem to be accessible or inaccessible to any application. Peripheral subsystems can be dedicated to a particular application or shared among applications.

The *Subsystem Power Controller (SPC)* is an optional unit that automatically controls dc power to the peripheral subsystems connected to an I/O processor. The SPC can control up to 64 peripheral control units. It can be operated manually, but usually operates under the control of the SSP.

CONFIGURATION RULES

The basic 1100/91 Processor Complex consists of an Instruction Processor (IP) with 16K words (64K bytes) of buffer storage, a Main Storage Unit (MSU) with 2 million words (8 million bytes) of main memory, an Input/Output Processor (IOP) with four block multiplexer channels and eight word channels, a System Support Processor (SSP), a master operator console with system panel, and a processor cooling unit. The system can be expanded to include three additional IOPs, a second SSP, three additional operator consoles, and six auxiliary consoles per operator console. The 1100/91 also supports one Subsystem Power Controller (SPC) and up to two Subsystem Access Units (SAUs).

➤ The 1100/92 includes the basic Processor Complex plus an additional IP and cooling unit, an additional IOP, and an additional SSP. The 1100/92 supports two additional IOPs, up to four operator consoles and up to six auxiliary consoles per operator console, two SPCs, and up to two SAUs.

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➤ The design of this system offers increased performance over earlier systems. According to Unisys, performance is increased three to four times for an 1100/91 versus 1100/81 or 1100/94 versus 1100/84. To lessen the amount of overhead carried by the central processing unit, all input/output functions are handled by the Peripheral Processing Units. The 1100/90's design is modular and can be easily partitioned into smaller systems for maintenance without disrupting the entire system. The packaging techniques built into the 1100 Series allow the CPU and its accelerators and buffers to be housed in a single cabinet. This approach increases performance by eliminating intercabinet delays and reduces physical size, power, and cooling requirements. In turn, installation and operating costs are reduced. Remote maintenance using the System Support Processor communicating with Unisys' TRACE (Total Remote Assistance Center) adds to system maintainability.

All 1100 Series systems use the 1100 Operating System, thus providing a high degree of program and data compatibility. The 1100/90 is both source and object code compatible with the rest of the 1100 Series. In addition, nearly all of the peripheral devices that run on one 1100 Series system will run on any other 1100 Series system.

As mentioned above, the 1100/90 has a fairly small main memory capacity compared to competitive systems. Perhaps in an attempt to offset this limitation, Unisys offers a wide variety of auxiliary storage products, including high-capacity disk subsystems, cache/disk systems, and a relational data base system for use with the 1100/90 system.

USER REACTION

Datapro's 1986 survey of general-purpose computer users yielded five responses from 1100/90 system users. Three of these users had installed 1100/92 systems; the others did not specify the model. The average age of the systems was 13.4 months. Three of the five respondents had converted from another system—one from an 1100/74 and two from an 1100/80.

Three of the survey respondents were in manufacturing, one was in transportation, and one represented a public utility. Primary applications included accounting/billing (4 responses), payroll/personnel (3 responses), purchasing (3 responses), sales/distribution (3 responses), and order processing/inventory control (3 responses).

We asked the users if they had implemented a disaster recovery plan and if they had established an information center. Three 1100/90 users answered "yes" to both questions. We also asked the users about plans for expanding their systems. All five indicated that they planned to add proprietary software from other suppliers and to expand their data communications facilities. Four users also said they would add more hardware and software from Unisys.

The users were asked to rate their systems in 14 categories. Their ratings for the 1100/90 are summarized in the table below.

➤ The 1100/93 includes the basic Processor Complex plus two additional IPs and cooling units, two additional IOPs, and one additional SSP. The 1100/93 supports one additional IOP, up to four operator consoles and 16 auxiliary consoles, up to three SPCs, and up to two SAUs.

The 1100/94 consists of the basic Processor Complex plus three additional IPs and cooling units, three additional IOPs, and one additional SSP. The 1100/94 supports up to four operator consoles and 16 auxiliary consoles, up to four SPCs, and up to two SAUs.

All 1100/90 systems can have up to four MSUs, each of which can house up to four million words (16 million bytes) of memory for a total system capacity of 16 million words (64 million bytes). The processor cooling units can be expanded to one per processor or restricted to one for each two processors.

Minimum peripheral equipment to complete an 1100/90 system includes an 0776 printer subsystem, a disk subsystem with one control unit and one 8470 disk unit, and a magnetic tape subsystem with one control unit and two Uniservo 22 or 24 magnetic tape units.

As an alternative, a minimum peripheral system can include one 0770 printer subsystem, a disk subsystem with one control unit and one 8480, 8450, 8434, 8433, or 8430 disk unit, and a magnetic tape subsystem with one control unit and two Uniservo 30, 32, 34, or 36 magnetic tape units.

INPUT/OUTPUT CONTROL

The basic 1100/90 Processor Complex contains one Input/Output Processor (IOP). The IOP consists of a central control module (CCM) and up to six channel modules. The CCM provides independent control paths to up to four CPUs and up to two SSPs and data paths to/from up to four MSUs and the channel modules. The CCM processes all I/O instructions, passes control information to the channel modules, controls main storage requests, updates control words and format status words, and generates all interrupt requests.

Each channel module consists of either four block multiplexer channels or eight word channels. Channels can be intermixed in the IOP, but the first channel module must be a block multiplexer channel module. The basic IOP includes a CCM with one block multiplexer channel module and one word channel module. The IOP can be expanded by adding two additional channel modules of either type to the basic cabinet. An IOP expansion cabinet is available to provide space for two more channel modules. Thus, each IOP can include a maximum of 24 block multiplexer channels or 40 word channels in two cabinets. A fully configured 1100/90 system with four IOPs can have up to 96 block multiplexer channels or 160 word channels.

Individual word channels operate in one of three modes: 36-bit Internally Specified Index (ISI), 18-bit Externally Specified Index (ESI), or 9-bit ESI. The ISI mode word channel has one subchannel assignment. The ESI mode word channel has up to 64 subchannels, while the block multiplexer channel has up to 256 subchannels for concurrent operation. Each IOP can support up to 4,096 subchannels.

The maximum block multiplexer channel data rate is 4.3 million bytes per second on input and 3.7 million bytes per second on output. The maximum word channel data rate is 3.7 million bytes per second in ISI mode. Maximum aggregate transfer rates are 17.2 million bytes per second per block multiplexer channel module and 18 million bytes per second per word channel module.

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TABLE 3. INPUT/OUTPUT UNITS

Magnetic Tape Units	Number of Tracks	Recording Density, Bits/Inch	Encoding	Tape Speed, Inches/Sec.	Transfer Rate, Bytes/Sec.
Uniservo 22	9	800	NRZI	75	60,000
	9	1600	PE	75	120,000
Uniservo 24	9	800	NRZI	125	100,000
	9	1600	PE	125	200,000
Uniservo 26	9	1600	PE	75	120,000
	9	6250	GCR	75	470,000
Uniservo 28	9	1600	PE	125	200,000
	9	6250	GCR	125	780,000
Uniservo 30	7	200	NRZI	200	40,000
	7	556	NRZI	200	111,000
	7	800	NRZI	200	160,000
	9	800	NRZI	200	160,000
	9	1600	PE	200	320,000
Uniservo 32	9	1600	PE	75	120,000
	9	6250	GCR	75	470,000
Uniservo 34	9	1600	PE	125	200,000
	9	6250	GCR	125	780,000
Uniservo 36	9	1600	PE	200	320,000
	9	6250	GCR	200	1,250,000
Printers	Printing Speed	Print Positions	Horizontal Spacing, Chars./Inch	Vertical Spacing, Lines/Inch	Form Size, Inches
0770-06	2000 lpm	136	10	6 or 8	4 to 20 wide, 8 to 22 long
0776-00	760 lpm	136	10	6 or 8	4.0 to 18.75 wide, 24 long
0776-02	900 lpm	136	10	6 or 8	Same
0776-04	1200 lpm	136	10	6 or 8	Same
0777 Laser Printer	10,500 to 21,000 lpm	136, 164, or 204	10, 12, or 15	6, 8, or 12	6.5 to 15.8 wide, 7 to 14 long

	Excellent	Good	Fair	Poor	WA*
Ease of operation	1	2	1	0	3.00
Reliability of system	2	2	0	0	3.50
Reliability of peripherals	2	2	0	0	3.50
Maintenance service:					
Responsiveness	4	1	0	0	3.80
Effectiveness	2	3	0	0	3.40
Technical support:					
Troubleshooting	3	1	1	0	3.40
Education	2	2	1	0	3.20
Documentation	1	2	1	1	2.60
Manufacturers software:					
Operating system	3	1	1	0	3.40
Compiler & assemblers	2	2	1	0	3.20
Application programs	1	3	0	0	3.25
Ease of programming	0	4	0	1	2.60
Ease of conversion	0	3	1	1	2.40
Overall satisfaction	1	3	1	0	3.00

*Weighted Average on a scale of 4.0 for Excellent.

We asked the users if their system did what they expected it to. For the 1100/90, four users said the system performed

➤ One input or output operation on each I/O channel can occur simultaneously with computation in each instruction processor. Moreover, the ESI mode permits multiple remote communications devices to transmit data to and from main storage in multiplexed fashion over a single I/O channel. All installed processors and IOPs can operate simultaneously and independently, with interference occurring only when two or more of those units simultaneously attempt to access the same storage module.

MASS STORAGE

Disk subsystems supported on the 1100/90 are listed in Table 2.

Unisys' *Cache/Disk System* is available in three versions: the original 8450/8470/8480 Cache/Disk System, the 8481 Cache/Disk System, and the 8490 Cache/Disk System. The first two are essentially the same, except for the disk drives supported.

The Cache/Disk Systems are hierarchical mass storage systems that provide a level of memory between the 1100/90 processor and the appropriate disk drives. The 8450/8470/ ➤

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▷ as expected and one user was undecided. We also asked if users would recommend their system to others. Three said they would recommend the 1100/90, one was undecided, and one didn't answer the question. □

▶ **8480 Cache/Disk System** consists of one or two 5057-XX Cache/Disk or Solidstate Disk (SSD) Processors, up to four 7053 Storage Units, and up to sixteen 8450, 8470, or 8480 disk units. The 8481 Cache/Disk System consists of two 5057-XX Cache/Disk or SSD Processors, up to four 7053 Storage Units, and up to four 8481 disk units.

The 5057 Cache/Disk Processor controls all data access functions, including indexing, searching, buffering, storage management, staging and destaging of data to and from disk, and error recovery. The 7053 Storage Unit contains 917,504 words (4 megabytes) of semiconductor memory. It can be configured as cache memory, as a solidstate disk, or both.

In Cache/Disk mode, data is automatically transferred from the disk to the 7053 Storage Unit. The host computer accesses data as if it were stored on the disks. A separate indexing feature, the Segment Descriptor Table (SDT), is required in one of the 7053 units. The SDT contains a list of disk addresses that point to cache storage areas containing duplicates of data in recently referenced disk space. When an index find occurs, data transmission between the cache and the host CPU begins in about one millisecond. If an index miss occurs, the 5057 processor issues a seek to disk and disconnects for other activity.

In Solidstate Disk (SSD) mode, the 5057 SSD Processor manages storage consisting of up to four 7053 cache storage units to be used exclusively in the solidstate disk mode. No caching or disk attachment is provided. In SSD mode, the 7053 is directly addressed by the host processor. The access time in this mode is approximately 0.2 millisecond. In both Cache/Disk and SSD modes, the response time is improved by eliminating the seek and latency time required by the disk drives.

The 8490 Cache/Disk System performs in a similar manner to the systems described above, but it does not use the 7053 storage unit. The basic 8490 Cache/Disk System is available with two 5090 control units, eight disk modules providing 5 gigabytes of storage, and a cache/disk capability. An SSD unit and controller and a standard disk subsystem are also available.

Unisys also offers the *5071/8652 Optical Disk System*, which includes a 2.6-gigabyte optical disk unit and a controller. An optical disk library provides an automatic disk changer (jukebox style) that supports up to 32 disk cartridges. The optical disk system provides automated electronic storage of millions of documents.

The *Shared System* is based on Britton-Lee's relational data base machine. The system is designed to offload the 1100 Series mainframe and provide faster access to information. The basic Shared System includes a data base processor with 2 megabytes of memory, an 1100 host interface, a data base administrator's workstation, and 600 megabytes of disk storage. The system can be expanded to include 6 megabytes of memory, 2 host interfaces, 15 workstations, and 5 gigabytes of disk storage. Interfaces are available to permit the 1100 Series processor to communicate with an IBM mainframe or with Unisys (Sperry) personal computers.

INPUT/OUTPUT UNITS

For magnetic tape units and printers available for the 1100/90, please refer to Table 3.

TERMINALS

See Table 4 for the terminals that can be connected to the 1100/90.

COMMUNICATIONS

Unisys' DCP/Telcon is an intelligent communications system that provides basic hardware, software, and peripherals for users with large communications networks. The system can operate as a front-end processor for 1100/90 and other 1100 Series host processors, as a network nodal processor, or as a remote concentrator. As such, it provides networks that support realtime, time-sharing, remote job entry, and message switching applications. The major components of Telcon are the Distributed Communications Processor (DCP) and the Telcon network software. Multiple DCPs can be combined to form a node of high throughput and processing capability.

Three DCP models are available: the DCP/10A, DCP/20, and DCP/40. The entry-level DCP/10A includes a processor, 512K bytes of memory, and communications line modules. The DCP/10A supports 8 half- or full-duplex communications lines.

The DCP/20 system consists of a processor with 512K to 2048K bytes of memory, one to three I/O processors, and communications line modules. The main processor performs both generalized communications processing and input/output processing; the I/O processors perform input/output processing only.

Each DCP/20 I/O processor provides programmed control for up to 16 data paths, which can be a combination of serial lines to remote equipment, channels to peripheral devices, or channels to on-site host Series 1100 or Series 90 processors. Each operational port on the I/O processors requires one line module, which provides an interface to a line and performs various communications functions such as control character recognition and line timing. DCP/20 accommodates asynchronous, synchronous, and wideband transmission at up to 64K bits per second. It supports Universal Data Link Control (UDLC) as well as character-oriented communications protocols.

The DCP/40 system includes a processor with 512K to 4096K bytes, expandable in 512K-byte increments. A maximum DCP/40 may include up to 16 I/O processors, each of which provides program control for up to 16 communications channels. Each can handle a mixture of remote lines, parallel interfaces, and host channel connections. Each I/O processor is programmed separately using a set of over 60 macroinstructions and each handles, in addition to data transmission and receipt, remote terminal polling, error checking and recovery, dynamic buffer allocation, reporting of line status, and recording of error and traffic statistics.

The increased memory permits larger and more complex user applications to be included in a single DCP. In addition, the DCP/40 may front-end either 1100 Series or 90 Series mainframes, and supports up to 256 half- or full-duplex communications lines.

The DCPs are modular hardware systems that can be tailored to meet the needs of a broad range of users. The network software, Telcon, like the hardware, is also modularly structured and readily tailored by the user. A repertoire of over 285 instructions is available to the user for the generation, assembly, and loading of message handling routines.

The Telcon-controlled system performs all message control operations. As users access the system (network), predetermined routing paths are followed, or alternate routes are

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TABLE 4. TERMINALS

MODEL	UTS 10	UTS 20	UTS 40
DISPLAY PARAMETERS			
Max. chars./screen	1,920	1,920	1,920
Screen size (lines x chars.)	24 X 80	24 X 80	24 X 80
Symbol formation	7 X 11 dot matrix	7 X 11 dot matrix	7 X 11 dot matrix
Character phosphor	P31 green	P31 green	P31 green
Total colors/no. simult. displayed	—	—	—
KEYBOARD PARAMETERS			
Style	Typewriter	Typewriter	Typewriter
Character/code set	128 ASCII	96 ASCII	96 ASCII
Detachable	Standard	Standard	Standard
Program function keys	12 std.	22 std.	22 std.
OTHER FEATURES			
Buffer capacity	1,920 characters	4,000 characters	4,000 characters
Tilt/swivel	Optional	Optional	Optional
Graphics capability	—	—	—
TERMINAL INTERFACE	EIA RS-232-C, CCITT V.24, Current Loop (using TTY protocol)	EIA RS-232-C, CCITT V.24, (using UNISCOPE protocol)	EIA RS-232-C, CCITT V.24, (using UNISCOPE protocol)

selected using predefined table search routines should established paths become unavailable. Specialized I/O controllers (frequently microcoded modules) handle specific functions, including terminal interfaces and line, trunk, or channel control.

Software and firmware terminal handlers in the DCPs are available for most standard Unisys (Sperry) terminal devices, as well as for several non-Sperry terminals including Teletype and IBM 3270 and 2780/3780 batch. Other software modules handle particular line protocols, such as the UDLC trunk lines, or access links to/from X.25 packet switching services.

DCP message switching can be achieved through user-coded applications which use the message routing facilities inherent in the Telcon software. Message routing among terminals, host systems, and network-resident applications is achieved either through user definition in the network generation process or by a dynamic selection through network management services.

If multiple DCPs are configured in the network, each is assigned both specific and network-common responsibilities. For example, all messages remain the responsibility of the originating DCP until accepted by another DCP or end user. Under normal conditions, main memory is used to maintain message queues and buffers, with disk storage used for overflow. Terminal and line handlers are placed as close to the terminals or gateway links as possible, usually in the nearest DCP. This philosophy permits as much of the network as possible to consist of high-speed trunk lines, and allows the low-speed lines running a variety of different terminal protocols, character codes, transmission speeds, and modes to be minimized.

In addition to off-loading the host, the DCP affords a degree of network reliability and resiliency to the user. The stand-alone capability of a single network DCP may permit continued message acceptance and storage of data during periods of temporary inaccessibility to a given host or terminal. Similarly, multiple DCPs may be redundantly configured to maximize network uptime or to increase network throughput. The user is free to mix and match all of the communications processors and subsystems thus far discussed into an efficient communications network. Cost may be a limiting factor in providing increased sophistication.

The Telcon operating system supports local disk and magnetic tape storage for their respective DCPs. This support

permits functions including store and forward message switching, logging, journalization, file management, and monitoring.

Peripherals available for the DCPs include hard disk subsystems, diskette subsystems, magnetic tape subsystems, and printers. The DCPs require an operator console, which can be a UTS 20 terminal, an SVT-1121 terminal, or a UTS 400 terminal attached to a communications line.

SOFTWARE

OPERATING SYSTEM: All 1100 Series systems utilize the *1100 Operating System*, which supports batch, transaction, realtime, and interactive processing in multiprogramming, multiprocessing, and distributed processing environments. The heart of the 1100 Operating System is the Executive, which supports user program processing.

Batch processing jobs can be submitted either locally or remotely. A scheduling routine selects the runs to be initiated in accordance with user-assigned priorities and deadlines.

The demand processing facilities of the 1100 Operating System permit interactive use of the system by multiple users at remote terminals. By means of the Executive Control Language, demand-mode users can compile and execute programs, use library facilities, and communicate with the computer center and with other terminals. (More comprehensive facilities for interactive operations are provided by the Interactive Processing Facility, Conversational Time-Sharing, and High-Volume Time-Sharing systems, described later in this report.)

Realtime and communications programs, which are subject to specific time constraints, receive top-priority handling by the 1100 Operating System. Realtime programs receive privileged access to system resources, such as central processors, memory, and input/output channels, and have a priority higher than any other processing except for Executive interrupt processing. Interrupt processing routines can be defined for each realtime communications line; they execute at a higher priority than all other processing. Communications control facilities for transaction processing are provided by the Communications Management System and the Transaction Interface Package, described later in this report.

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► Multiprocessing is handled as a logical extension of the 1100 Executive's multiprogramming capabilities. The system maintains a list of processor activities currently waiting to be performed. Each processor inspects this list, selects a task, and executes it. One processor can interlock the others while referencing critical areas of common data, and various other techniques are employed to guard against interprocessor interference.

A number of *system management tools* are available for Executive system management, upgrading, and testing. These include the Customer On-site Maintenance and Installation System (COMUS), the Quota system, and Fault Location by Interpretive Testing (FLIT).

COMUS facilitates the installation and maintenance of the Executive software and program products. COMUS provides a high-level interface that directs an automatic system generation process. COMUS also supports an interface for installing all software into the system libraries. Augmenting COMUS is the Symbolic Stream Generator (SSG). Directions and models for building the desired stream images are conveyed to SSG through a skeleton program. The resulting symbolic output streams can be placed in a user-specified file, printed, and dynamically added for execution after SSG terminates. SSG also helps to maintain symbolic input files that may be printed, corrected, and updated for later use.

The Quota System enables 1100 Series installations to control the use of system resources by both batch and demand users. Each installation can establish account and individual limits through user identification codes for use of system resources. With the Quota System, installations can prevent users from requesting the use of system resources beyond an account budget or a preassigned limit, control the number of concurrent demand and batch runs executing in the system, and define limits to be applied to resources available to demand and/or batch jobs at specified times.

Fault Location by Interpretive Testing (FLIT) provides the capability to execute and diagnose the Executive while running as a normal user program under Executive control. Thus, a new version of the Executive or a planned new configuration can be studied and tested in a "virtual" environment prior to its use as the production Executive system. FLIT may also be used to debug programs.

In addition, the 1100 Executive can dynamically monitor and record system activity. The Software Instrumentation Package (SIP) provides a tool for system throughput and response optimization.

Unisys offers a number of *system processors*, including: the Site Administration Package (SIMAN), Checkpoint/Restart, Memory Allocation Processor, Post-Mortem Dump Processor (PMD), Element Processor (ELT), Procedure Definition Processor (PDP), File and Program Utility Processor (FURPUR), and Data Processor.

- SIMAN provides a single interface for the site administrator to define users' quota limits, Terminal Security System (TSS) data, and system security data. TSS permits each installation to establish a file of valid remote system users through user identification codes, passwords, and other pertinent information. SIMAN allows installation passwords to be changed dynamically and enables users to be selected as masters or submasters to allow delegation of authority in creating and updating identifications and passwords in the TSS file. Each installation can define the action to be taken in the event of an attempted security violation. SIMAN also is a security control processor that is used to create and maintain a user security profile data base, which is then used to control user access to files and certain privileged functions.

- Checkpoint/Restart snapshots a run or program and creates a checkpoint that may be used for restarting at a later time if, desired.
- The Memory Allocation Processor provides for the collection and interconnection of relocatable elements produced by the compilers to produce an executable program.
- The Postmortem Dump Processor is a user debugging aid that produces edited dumps of the contents of main storage if the program terminates abnormally. Optionally, a dump can be produced when a program terminates normally.
- The Element Processor is used to insert symbolic, relocatable, absolute, or omnibus elements into a program file from images in the runstream.
- The Procedure Definition Processor processes symbolic elements that may contain Assembler, Fortran, or Cobol procedures and produces entries in the table of contents of a program file.
- The File and Program Utility Processor consists of a set of file maintenance routines that provide for the management and manipulation of cataloged or temporary files containing data or programs.
- Data Processor provides data handling capabilities at the file level.

PROGRAMMING LANGUAGES: The 1100/90 supports Cobol, Fortran, APL, Pascal, Algol, Basic, PL/1, and RPG. Also available is the Macro general-purpose processor, which extends host languages through its ability to process character strings.

DATA BASE MANAGEMENT: *DMS 1100* is a comprehensive data base management system developed under the guiding principles of the CODASYL Data Base Task Group. It is designed to satisfy the need for standardized data management techniques that provide: 1) separation of the data definition and data manipulation functions, 2) an acceptable degree of data independence, 3) data base protection and integrity, and 4) alternate data access methods. DMS has four principal components: a Data Description Language, a Data Manipulation Language, a Data Management Routine, and a Data Recognition Utility.

The Data Description Language is a standalone language whose record descriptions are compatible with those of Cobol. The Data Manipulation Language consists of commands embedded in Cobol, Fortran, and PL/1 to allow these host languages to manipulate the data base via DMS 1100. The Data Management Routine, the key operational component of DMS 1100, maintains the data base and preserves its integrity. The Data Reorganization Utility provides for optimization of the physical placement of records within an existing data base without the need for tailored unload and reload programs.

QLP 1100 is an English-language inquiry system that allows inquiries to be made to data bases generated under DMS 1100. QLP 1100 has the ability to access standard data files and incorporates extended reporting capabilities. It uses a command language designed around a simplified English syntax and requires a minimum knowledge of the DMS 1100 data base structure. QLP can operate either in demand or batch mode, although the primary mode is interactive. Its two major component modules, the Scan Parser, which analyzes incoming commands, and the Task Translator, which accesses the data base, are both reentrant. Through the use of the QLP command languages, users can inquire into the data base, update records, add new records, or delete records. QLP 1100 uses a Subschema Data Definition Language (QLPSDDL) similar to the DMS

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► 1100 DDL. Access to the data base via QLP is regulated by the Data Base Administrator through use of SDDL. QLP also provides a report writer and procedural facilities.

DATA MANAGEMENT: The *Universal Data System (UDS 1100)* is designed to provide 1100 Series users with a single unified data subsystem that furnishes the data management services for all components of the 1100 Operating System. UDS 1100 components include the UDS 1100 Control, Data Management System (DMS 1100), Processor Common Input/Output System (PCIOS), Relational Data Management System (RDMS 1100), Data Dictionary System (DDS 1100), Define File Processor (DFP), Integrated Recovery Utility (IRU), and File Administration System (FAS).

The UDS 1100 Control is the on-line data manager of the UDS system, which provides a complete range of data structures, utility programs, and support programs. UDS 1100 Control integrates these different programs and manages the movement of data between data models. It also centralizes functions such as audit trails and administration.

PCIOS is designed to ensure compatible data file formats. It supports sequential, indexed sequential, and multikeyed sequential access methods for APL, PL/1, ASCII Cobol, ASCII Fortran, RPG, Sort, and QLP.

RDMS 1100 provides definition and access for both host language programming and end-user interface software. Relational data bases are defined by the data manipulation language used for retrieval and updating of data. The Relational Transformation Language provides relational views of other data bases, such as DMS 1100.

DDS 1100 provides a means for the centralized description, location, and control of the various elements within a user data base environment. DDS 1100 consists of a data base of information, called the meta-data base, about the entities in the user data base environment, as well as a set of processors that access the meta-data base for the purpose of creating, updating, and reporting information.

The Define File Processor provides a data file description external to the program processing the file. Using DFP, programs written in Fortran, Cobol, PL/1, APL, and RPG are file-format-independent and can share common files.

The Integrated Recovery Utility provides the user with English-language commands to initiate a variety of integrity features and capabilities. IRU can be used to control user access to selected TIP or TIP/DMS files or to provide partial file access. It can also be used to compare complete or partial records between files.

The File Administration System is a functional successor to Unisys' file administration processor, Secure. FAS provides extensive file handling and control within an Interactive Processing Facility system environment. FAS includes capabilities for mass storage file backup, archiving, and reporting. It also provides for the administration of hierarchical files and directories.

The *Information Management System (IMS) 1100* is an interactive transaction processing system compatible with the IMS 90 used on the Sperry 90 Series computers. It provides defined record management and access to both data and conventional files.

The *Remote Processing System (RPS) 1100* is an interactive data management and file processing system that provides access to system resources by a nonprogramming-oriented user interface through a Uniscope 100 or Uniscope 200 CRT display terminal. RPS 1100 data base files are created and maintained under DMS 1100, and the system interfaces with TIP for transaction interfacing and control. RPS 1100

provides a set of generalized system functions which can be invoked by the user via the terminal. These include commands to ENTER, BUILD, DESTROY, or FORM a file; to process a file through SEARCH, MATCH, or SORT; to build an INDEX structure to line item data and data fields for faster access; to perform computations on specified fields; and to request printing of reports in user-specified formats. RPS 1100 provides tutorial assistance to end users by displaying a choice of functions for user selection and utilizing "fill-in-the blanks" techniques to permit users to enter commands.

DATA COMMUNICATIONS: The 1100 Operating System supports two communications processing packages: the Communications Management System (CMS 1100) and the Processor Common Communication System (PCCS 1100), as well as the Distributed Communications Architecture (DCA).

The *Communications Management System* is the communications network interface for all 1100 Series processors to a DCA-based DCP/Telcon network. It has been separated from the 1100 system generation process, thus allowing the entire terminal network configuration to be generated, checked, and corrected without generating a full system. CMS has cognizance of all terminals in an 1100 Series computer network. It acts as the communications "front-end" to the Transaction Interface Package (TIP), and handles polling, parity checking, data blocking, data packing and unpacking, message envelope formatting, message acknowledgement, message queuing, and other message control procedures. The message queue can be maintained in main and/or auxiliary storage; this common data pool is then accessed by the Transaction Interface Package. A Protocol function determines what the current activity on each circuit should be in terms of overall system loading, availability of facilities, user-specified priorities, type of circuit or device, and activity response level from the terminal.

CMS handles the standard Unisys (Sperry) terminals, as well as "alien" terminal devices. For alien devices the user must supply a skeletal communications control routine that interfaces into the device-control master service routine of CMS. Typical main storage residence requirements for CMS are 10K to 12K words.

The *Processor Common Communication System* provides a means by which application programs developed in high-level languages such as Cobol and PL/1 can utilize the Series 1100 communications system. Programs using PCCS 1100 can communicate with other communication programs, terminal users, remote batch systems, and certain host computers.

The *Distributed Communications Architecture (DCA)* describes the currently-available communications hardware and software components through which networking of Unisys processors and terminal devices is achieved.

Whether network control is host-dependent or host-independent, there are still certain hardware components and subsystems required to implement a DCA network. Inherently, a DCA node or host must contain several software components that provide it with the network interface.

The capability of completely separating communications management from applications processing is a key characteristic of DCA. The off-loading of communications processing permits the host or hosts to concentrate their energies on applications processing, their primary function. Another characteristic of DCA is its ready acceptance of non-Sperry terminals, processors, and networks. ►

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► Unisys offers an extensive library of modular network management applications. User programming for tailored communications functions (such as message switching) is also fully supported.

A minimal DCA network requires a DCA host with a communications subsystem. The host may be either an 1100 mainframe running under the 1100 operating system, or a 90 Series CPU, Model 60 or 80, running the VS/9 operating system.

A DCA terminal is generally one for which a standard terminal handling module is available from Unisys. In DCA, each terminal might be operating with different character codes (ASCII, EBCDIC), transmission modes (start/stop asynchronous, character synchronous), or terminal protocols (U100, IBM 2780). It is the responsibility of the DCP closest to the terminal to translate its data format into a common trunk language—typically UDLC.

UDLC is a bit-oriented, synchronous protocol designed for full-duplex operation. Devices connected by UDLC trunks can utilize either switched or nonswitched, voice grade or digital lines. UDLC, like its SDLC, HDLC, and ADCCP predecessors, uses bit sequences for control codes rather than whole characters. (Hence the nomenclature “bit-oriented.”) This characteristic permits much more control information to be contained in the same or smaller amount of message space.

PROGRAM DEVELOPMENT: *Mapper 1100* is a realtime report processing system for multiple terminal systems. Data is collected and updated via the CRT display units in free-form or prescribed report formats. Functions such as record and page display, update, search, sort, and report generation can be developed into saved programs for on-line application development. A forms generation capability allows implementation of data bases and related report processing and generating services without applications programming.

ADVISE 1100 provides a set of easy-to-use tools for data definition, data interaction, and application development. ADVISE 1100 furnishes the query, update, and application development interface to RDMS 1100, so that users can design and access relational data bases.

CTS 1100 is a modular software system that provides users at remote terminals with a human-machine interface. The system consists of the CTS Control module, interactive syntax analyzers for Basic, Fortran, and Cobol, and access to the compilers for Basic, Fortran, Cobol, Algol, and APL. CTS provides the user with a simplified command language editor. Although still available, CTS has effectively been superseded by the newer Interactive Processing Facility, which is described below.

The Interactive Processing Facility supports both batch and time-sharing operations. It provides a user interface to the system through a procedural command language and an English-language response language. IPF 1100 is designed for ease of use by users with little or no data processing background, as well as by computer professionals. Functional capabilities can be expanded by adding user-developed program modules or by modifying or adding commands. IPF 1100 includes data management capabilities, security features, and session control capabilities.

IPF consists of eight separately priced modules. The IPF Command Language is the primary interface for using IPF. It is based on CODASYL specifications. The development of command language subroutines and macros is accomplished through the IPF Procedures module. The Distributed Data Processing module supports file transfers and job submissions from 1100 Series to 1100 Series systems. The

Edit 1100 module is an input and update editor that provides access to a variety of file formats, works in an easy-to-use full-screen mode, and can be used from a terminal or called from a program. The User Assistance module manages responses to the terminal user, as well as HELP and explanation processing.

SX 1100 is a Unix System V-based 1100 OS application program designed to provide a set of software development tools for applications developers as well as for the execution of standard applications. It features debugging tools, on-line documentation, a file management system, access to 1100 OS demand processing, and the ability to access and write 1100 OS formatted files.

The Programmer's Advanced Debugging System (PADS 1100) is a language-independent debugging tool. PADS was designed primarily for debugging programs written in high-level languages such as Cobol, Fortran, and PL/1, but it may also be used for programs written in Assembler.

UTILITIES: The 1100 Operating System supports a number of utility packages, including CULL, Sort/Merge, Log Analyzer, Performance Analysis Routines, and the On-Line System Activity Monitor.

CULL produces an alphabetically sorted, cross-referenced listing of all symbols in a specified set of symbolic elements. Each symbol processed by CULL can contain up to 12 alphanumeric characters plus the dollar sign. An interactive version, IACULL, is also available.

The Sort/Merge package provides three sort options and a standard merge option. The sort options are record sort, selection sort, and tag sort. Up to 26 files can be merged, and up to 40 keys can be specified.

The Log Analyzer (LA) is designed to assist the user in monitoring the resource utilization of an 1100 Series system. *The Performance Analysis Routines (PAR)* package is a reporting system for data collected by the Software Instrumentation Package embedded in the operating system. *The On-Line System Activity Monitor (OSAM)* provides an on-line, realtime display of system activity. OSAM can be used in conjunction with LA and PAR.

OTHER SOFTWARE: *The Transaction Interface Package (TIP)* serves as the “middleman” between the 1100 Operating System and the user's application programs in a transaction-oriented on-line data processing system. TIP's functions are stimulated by the incoming transaction messages stored in the common data pool maintained by CMS. The TIP transaction scanner, Transcan, analyzes each message, determines which application program is required to process it, and arranges for the Executive to load and execute that program. One application program can also call another application program via TIP, through program action based on data parameters. The application programs can be written in Cobol, Fortran, Assembly Language, or PL/1 and can be reentrant. TIP's features include on-line debugging aids, a batch-mode checkout capability, interprogram protection facilities, and comprehensive system recovery provisions. User-written routines can be accommodated by TIP to perform installation-specified functions such as prioritizing messages and other special message manipulation. The integrated recovery feature supports synchronized recovery of the communications messages and data base updates in a transaction processing environment. Once an input message is received, the requested transaction will be executed regardless of any component failure.

The Display Processing System (DPS) 1100 provides for screen handling and the management of display-oriented transactions in an on-line environment. The system operates in conjunction with the Transaction Interface Package or the

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► **Conversational Time-Sharing System.** DPS 1100 includes an interactive screen generator and a screen handler. Additional functions are provided for data editing and validation, applying passwords to screens or separate fields of screens, and controlling access to multipage screens.

The *Array Processor Emulation Package (APEP)* permits programs written for the 1100/80 Array Processor to be run on the 1100/90 Integrated Scientific Processor.

Performance Execution Evaluation Routing (PEER) uses statistical sampling analyses to evaluate the amount of scalar versus vector processing occurring in a Fortran program. PEER also tells which routines require the most processing time.

Unisys provides a number of application packages for the 1100/90, including the following: Unis 1100, a manufacturing package that includes bill of materials processor, inventory control, and planning and scheduling modules; the Unidis distribution system with freight waybill, wholesale, transportation equipment, and message switching packages; the Unifacs 1100 financial system; Sufics 1100 (Sperry Univac Financial Integrated Control System 1100); the MSA 1100 accounting system; and ICES (Integrated Civil Engineering System).

PRICING AND SUPPORT

POLICY: The 1100/90 is available for purchase or a one-year or five-year lease. All software except the operating system is unbundled. Unisys also offers a seven-year lease to state and local governments and to educational institutions. Educational institutions are eligible for an additional 10 percent discount. The discount does not apply to maintenance service charges.

SUPPORT: On-site operating system support can be obtained for a flat monthly fee. Support is available for some unbundled software at a separate monthly charge.

The standard Unisys 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 between the hours of 7 a.m. and 6 p.m., Monday through Friday. Extended periods of maintenance are available at premium rates. The premiums for additional coverage are a percentage of the base maintenance rate and are as follows:

HOURS OF COVERAGE

	4	8	9	10	12	16	18	20	24
Monday through Friday	—	—	100	105	110	115	120	125	130
Saturday	5	8	9	—	11	15	—	14	15
Sunday and Holidays	7	10	12	—	14	16	—	18	20

Maintenance service performed outside the contracted maintenance period is subject to the following rates:

	Monday through Friday (\$)	Saturday, Sunday and Holidays (\$)
Min. charge per call	228	258
Each addl. hour	114	129

Users who elect not to contract for maintenance with Unisys pay the same rates on a per-call basis.

Unisys has initiated a remote hardware maintenance concept through its facility in Roseville, Minnesota. The Total Remote Assistance Center (TRACE) is available to 1100/90 system customers via a dedicated WATS number 24 hours per day and seven days per week. Via TRACE, a user's system may be monitored and controlled using on-site and remote library testing programs. TRACE also provides support for a wide range of Unisys (Sperry) terminals connected to dial-up lines. Various data files in Roseville contain information on approved hardware changes, references to solutions for problems encountered with diagnostic test software in field use, and operating system enhancements and problems. Other files contain a history of how the system should operate properly, and can be utilized for comparison purposes during diagnostic testing.

EDUCATION: Unisys offers a variety of courses, both self-study courses and lecture courses. Instruction is available for both hardware and software systems. Lecture course held at a Unisys site range in price from about \$100 to \$2,800 per student. Group rates are available.

TYPICAL CONFIGURATION: The following systems illustrate three 1100/90 configurations. All necessary control units and features are included in the indicated prices, but software is not included.

1100/91 SYSTEM:

1100/91 Processor Complex with 2M words of main memory, IOP with 4 block mux channels and 8 word channels, SSP, motor alternator, master operator console, and power and cooling unit	\$2,435,811
Two K3125-00 MSU Expansions (2M words, for system total of 4M words)	80,000
One 5057-35 Disk Control	48,125
One 8481 Disk Storage Unit (2.5GB)	79,640
One Uniservo 24 Subsystem with control and 2 drives	78,720
Four Uniservo 24 Tape Drives (1600/800 bpi)	218,880
One 0770-06 Printer and Control (2000 lpm)	60,000
One 0776-02 Printer and Control (900 lpm)	41,340
One 0770 Print Cartridge	462
One 0776 Print Cartridge	1,270

TOTAL PURCHASE PRICE: \$3,044,248

1100/92 SYSTEM:

1100/91 Processor Complex with 2M words of main memory, IOP with 4 block mux channels and 8 word channels, SSP, motor alternator, master operator console, and power and cooling unit	\$2,435,811
One Instruction Processor Expansion	1,104,410
One 7052-99 MSU (2M words)	216,000
Four K3125-00 MSU Expansions (4M words, for system total of 8M words)	160,000
One I/O Processor	228,000
One SSP	45,000
One Operator Console	37,500
One 5057-35 Disk Control	48,125
Two 8481 Disk Storage Units (5GB)	159,280
One Uniservo 30 Control	36,214
Eight Uniservo 36 Tape Drives (6250/1600 bpi)	236,000
Two 0770-06 Printers and Controls (2000 lpm)	120,000
Two Print Cartridges	924

TOTAL PURCHASE PRICE: \$4,827,264

Unisys 1100/90

1100/94 SYSTEM:

1100/91 Processor Complex with 2M words of main memory, IOP with 4 block mux channels and 8 word channels, SSP, motor alternator, master operator console, and power and cooling unit	\$2,435,811	Seven Block Multiplexer Channel Modules (28 channels)	378,000
Three Instruction Processor Expansions	3,313,230	One SSP	45,000
Three IP Cooling Units	142,000	Three Operator Consoles	112,500
One Motor Alternator	46,400	One 5057-35 Disk Control	48,125
Three 7052-99 MSUs (6M words)	648,000	Four 8481 Disk Storage Units (10GB)	318,560
Eight K3125-00 MSU Expansions (8M words, for system total of 16M words)	320,000	One Uniservo 30 Control	36,214
Three I/O Processors	684,000	One Tape Drive Expansion Feature for 16 drives	668
Four Word Channel Modules (32 channels)	216,000	16 Uniservo 36 Tape Drives	472,000
		Two 0770-06 Printers and Controls (2000 lpm)	120,000
		Two Print Cartridges	924
		TOTAL PURCHASE PRICE:	\$9,338,232

EQUIPMENT PRICES

		Monthly Charges*			
		Purchase	Monthly	1-Year	5-Year
		(\$)	Maint.	Lease	Lease
		_____	(\$)	(\$)	(\$)
		_____	_____	_____	_____
PROCESSOR COMPLEX					
3054-67	1100/91 SV Processor Complex; includes Instruction Processor (IP) with cooling and power unit, Main Storage Unit (MSU) with 2 million words of memory, I/O Processor (IOP) with 4 block multiplexer channels and 8 word channels, System Support Processor (SSP), motor alternator, and master operator console with CRT display, printer, system clock, and system panel	2,005,962	4,996	80,937	60,718
3054-99	1100/91 Processor Complex; includes IP with cooling and power system, MSU with 2 million words of memory, IOP with 4 block multiplexer channels and 8 word channels, SSP, motor alternator, and master operator console with CRT display, printer, system clock, and system panel	2,435,811	5,551	98,281	73,729
3054-76	1100/91 Scientific Complex; includes IP with cooling and power unit, Integrated Scientific Processor (ISP), MSU with four million words of memory, IOP with 4 block multiplexer channels and 8 word channels, SSP, motor alternator, and master operator console with CRT display, printer, system clock, and system panel	5,000,000	14,034	208,334	138,890
PROCESSOR UPGRADES & FEATURES					
3054-63	1100/91 SV Expansion; expands 1100/91 SV 1 x 1 configuration to an 1100/92 SV 2 x 2 configuration	811,010	2,281	32,760	24,576
2035-99	1100/91 SV to 1100/91 Upgrade	429,849	555	17,344	13,011
2035-98	1100/92 SV to 1100/92 Upgrade	723,249	809	29,195	21,902
3054-87	Instruction Processor Expansion; maximum of three per 1100/90 system; 3rd IP in system requires addition of a motor alternator and an IPCU	1,104,410	2,535	44,611	33,467
1954-01	Instruction Processor Cooling Unit (IPCU); provides cooling for up to two IPs; required when three or more IPs are included in the configuration	47,600	145	1,921	1,441
F3378-00	Instruction Processor Performance Monitor; if used, one is required for each IP in the system	5,000	11	202	151
7052-99	Main Storage Unit (MSU); provides cabinet interfaces, and 2M words of memory in four banks; expands to 4M words by the addition of two F3125-00 storage expansions; maximum 16M words per system	216,000	575	8,715	6,538
K3125-01	MSU Storage Expansion; 1M words; maximum of 2 per MSU	40,000	170	1,614	1,211
3068-99	Integrated Scientific Processor (ISP) Complex Upgrade; upgrades standard 1100/90 system to an ISP system; includes 7055 ISP/MSU, IPCU, Meta-Assembler Procedures (MASP), and ISP Assembler	3,450,145	9,006	143,756	95,838
3068-97	ISP Processor Upgrade; includes ISP, IPCU, MASP, and ISP Assembler; for 1100/90 systems that already include a 7055 ISP/MSU	2,400,145	6,255	100,006	66,671
3068-98	Second ISP Processor; provides second ISP for a standard 1100/90 system; includes an IPCU, a Multiple Unit Adapter (MUA), and two second memory ports	2,640,355	6,884	110,015	73,343
7055-00	ISP Memory Expansion; includes eight 0.5M-word banks of storage	1,050,000	2,751	43,750	29,167
0987-00	ISP Multiple Unit Adapter (MUA); provides interface between ISP and 7055 memory expansion	160,000	419	6,667	4,444
F3671-00	Second ISP Memory Port	40,105	105	1,671	1,114
F4064-00	ISP Extended Monitor Interface	20,000	52	833	556

*Lease charges do not include maintenance.

**Field Installation Charge.

Unisys 1100/90

		Monthly Charges*			
		Purchase	Monthly	1-Year	5-Year
		(\$)	Maint.	Lease	Lease
		(\$)	(\$)	(\$)	(\$)
PROCESSOR UPGRADES & FEATURES (Continued)					
3067-00	I/O Processor; provides cabinet, channel controller, and interfaces to main storage; includes one block multiplexer channel module and space for 3 additional block multiplexer or word channel modules in any combination; maximum of 3 per system	228,000	486	9,199	6,901
K3675-00	Word Channel Module; 8 channels	54,000	128	2,179	1,634
K3676-00	Block Multiplexer Channel Module; 4 channels	54,000	128	2,179	1,634
0986-00	Inter-Processor Channel Coupler; interconnects an 1100 Series system and a VS/9 system via block multiplexer or selector channels	20,000	55	440	375
F3953-00	FIPS I/O Compatibility; provides one block multiplexer channel with compliance to Federal Information Processing Standard 60-1; one required for each channel for which compliance is necessary	3,000	6	121	91
1964-00	IOP/Expansion Cabinet; provides housing for two block multiplexer or word channel modules in any combination; one channel must be ordered	30,000	64	1,210	908
F3938-00	IOP Performance Monitor; if used one is required for each IOP in the system	5,000	11	202	151
4026-99	Operator Console; includes 4-color CRT display, keyboard, clock calendar, and printer; provides 37-inch high cabinets with work surface and storage; may be expanded by the addition of a console CRT expansion and up to 4 auxiliary consoles	37,500	160	1,513	1,135
4026-97	Operator Console; same as 4026-99, except cabinet is 28 inches high	37,500	160	1,513	1,135
3660-99	Console CRT Expansion; adds secondary monochrome display to 4026 console	2,500	5	101	76
3562-93	Auxiliary Color Console; attaches to operator console; maximum of 4	6,500	55	262	197
3660-97	Auxiliary Monochrome Console; attaches to operator console; maximum of 4	5,000	14	200	150
0429-79	Auxiliary Console Printer; 400 cps	5,100	40	224	149
F3697-00	Transition/Storage Cabinet; 28 inches high; attaches to master console, 4026-97, or F3699-01	2,556	—	103	77
F3697-01	Transition/Storage Cabinet; 37 inches high; attaches to master console, 4026-99, or F3699-03 and/or printer	2,556	—	103	77
F3699-00	Work Surface; 28-inch table, 36 inches wide	1,218	—	49	37
F3699-01	Work Surface; 28-inch table, 60 inches wide; attaches to console and/or F3697-00	1,518	—	61	46
F3699-02	Work Surface; 37-inch table, 36 inches wide	1,218	—	49	37
F3699-03	Work Surface; 37-inch table, 60 inches wide	1,518	—	61	46
1980-99	Subsystem Power Control (SPC); provides remote power control; includes 2 IOP interfaces and an SSP interface	26,457	56	1,068	801
K3728-00	SPC Expansion; provides 4 control unit interfaces; may be expanded to 64 interfaces via F3729-00	16,000	34	646	484
F3729-00	SPC Interface Expansion; expands the number of control unit interfaces by 6; requires 1980-99 or K3728-00; maximum of 10 per SPC	1,600	3	64	48
F3947-00	SPC/SSP Interface; maximum of one F3947-00 per SPC	900	2	36	27
0985-00	Subsystem Access Unit (SAU); provides capability to control subsystem partitioning via commands from 1 or 2 SSPs	56,000	170	2,335	1,695
F3832-00	SAU SPI Interface; provides an additional 32 SPI interfaces; maximum of 3 per SAU	11,850	25	478	359
F3833-00	SAU Byte Channel Transfer Switch (BCTS) interfaces; provides interfaces to 2 units; maximum of 2 per SAU	10,000	21	403	303
F3834-00	SAU/SSP Interface; provides 2 additional interfaces to SSPs; maximum of one per SAU	10,000	21	403	303
2533-00	Byte Channel Transfer Switch; controls and monitors 4 channels	32,900	105	1,370	915
8513-00	Motor Alternator; provides power to central complex; one required for configuration with 3 or more IPs; may also be used to provide redundant power	46,400	124	1,872	1,405
3058-92	System Support Processor (SSP); for multiprocessor applications to provide for system partitioning and redundancy; maximum one per system	45,000	192	1,816	1,362
3058-20	SSP; same as 3058-92, but is for an 1100/90 system that includes an ISP	45,000	192	1,816	1,362
MASS STORAGE					
5040-91	8430/8433/8450 FIPS Control; connects via 1100 FIPS block multiplexer channel; controls up to 16 8450 disk drives with F2719-02 installed, eight 8450 and eight 8430/8433 drives with F2719-03 installed, or 16 8430/8433 drives with F2836-02 installed	76,500	555	2,700	1,800
5040-89	Dual Disk Control; same as 5040-91, but with 2 controls	132,336	969	5,015	3,260
F2719-02	8450 Capability/Conversion; provides 5040-91 or -89 with capability to control 16 8450 drives	**300	—	—	—
F2719-03	8430/8433/8450 Capability/Conversion; provides 5040-91 or -89 with the capability to control up to eight 8430/8433 drives and eight 8450 drives	**300	—	—	—
F2836-02	8430/8433 Capability/Conversion; provides 5040-91 or -89 with the capability to control up to 16 8430/8433 drives	**300	—	—	—

*Lease charges do not include maintenance.

**Field Installation Charge.

Unisys 1100/90

		Monthly Charges*			
		Purchase	Monthly	1-Year	5-Year
		(\$)	Maint.	Lease	Lease
		(\$)	(\$)	(\$)	(\$)
MASS STORAGE (Continued)					
8450-95	8450 Disk Storage; includes 2 drive units, each with 54M words of storage; conforms to FIPS 63, Class B	49,950	346	2,439	1,583
8450-93	8450 Disk Storage; same as 8450-95 but also includes 194K words of fixed-head storage	63,550	382	2,521	1,677
F2717-98	Fixed-Head Conversion; converts 8450-95 to 8450-93	13,600	34	264	211
5056-83	8470/8480 Disk Control; provides control for up to eight 8470 disk drives (a FIPS version is available)	43,750	258	1,255	930
F2994-00	Four Channel Capability for 5056-83	6,472	40	188	138
F3192-00	8430/8433 Attachment; allows up to eight 8430/8433 drives on 5056 control unit; up to 3 are allowed	9,840	58	305	226
F3192-01	8450 Attachment; allows up to eight 8450 drives on 5056 control unit; up to 3 are allowed	9,840	58	305	226
F3192-02	8470/8480 Attachment; allows up to 8 additional 8470 or two 8480 drives on single control unit; up to 3 are allowed	3,200	21	105	78
F2837-00	Power Control Expansion; required on control unit when over 16 drives are configured	6,575	56	222	144
8470-99	8470 Disk Drive; 90M words of storage	27,360	119	809	599
F2718-00	8470 Dual Access Feature; provides dual access and simultaneous read/write, read/read, write/read, and write/write	1,920	17	57	42
8480-97	8480 Disk Storage Unit; contains 4 spindles with a total capacity of 360M words	76,500	475	1,932	1,607
8480-99	8480 Disk Storage Expansion; contains 4 spindles with a total capacity of 360M words; includes dual access feature	83,700	497	2,113	1,761
F2718-02	8480 Dual Access Feature; provides dual access and simultaneous read/write, read/read, write/read, and write/write	7,200	22	181	154
5057-75	8450/8470/8480 Cache/Disk Processor; manages up to four 7053 Cache Storage Units plus up to eight 8450 disk units and up to eight 8470 or two 8480 disk units; connects via word channel (a FIPS version is available)	52,960	355	2,207	1,471
5057-77	Disk Control Processor; controls up to eight 8450 disk units and up to eight 8470 or two 8480 disk units; can be upgraded to 5057-75 Cache/Disk Processor	48,125	355	2,005	1,337
5057-87	Solid-State Disk (SSD) Processor; manages up to four 7053 Cache Storage Units used only in solid-state disk mode	41,715	355	1,738	1,159
F3948-97	Processor Upgrade; converts 5057-77 Processor to 5057-75 Cache/Disk Processor	4,835	—	202	134
F4025-98	SSD Upgrade; converts 7057-87 SSD Processor to 5057-75 Cache/Disk Processor	11,245	—	469	312
F3567-00	8450 Capability Expansion; permits sixteen 8450 drives on cache/disk control; precludes attachment of 8470 drives	9,345	55	290	215
F3568-00	8470/8480 Capability Expansion; permits sixteen 8470 drives or four 8480 drives on cache/disk control; precludes 8450 drives	9,345	55	290	215
F2994-00	Four-Channel Capability; expands channel interface capability to 4 word channels; one required per control	6,472	40	188	138
5057-31	8481 Cache/Disk Processor; manages up to four 7053 Cache Storage Units and up to four 8481 disk units; cache and SSD can be intermixed; connects to word channel	52,960	355	2,207	1,471
5057-29	8481 Dual Cache/Disk Processor; same as 5057-31, but provides 2 processors in a single cabinet for dual access control; connects to 2 word channels	105,920	710	4,414	2,942
5057-23	8481 Dual Cache/Disk Processor; same as 5057-29, but connects to 2 block multiplexer channels with FIPS compatibility	105,920	710	4,414	2,942
5057-35	8481 Disk Control Processor; controls up to four 8481 disk units; connects via word channel; can be expanded to 5057-31 Cache/Disk Processor	48,125	355	2,005	1,337
5057-33	8481 Dual Disk Control Processor; same as 5057-35, but includes 2 processors for dual access control; can be expanded to 5057-29 Dual Cache/Disk Processor	96,250	710	4,010	2,674
5057-25	8481 Dual Disk Control Processor; same as 5057-33, but connects via 2 block multiplexer channels with FIPS compatibility; can be expanded to 7057-23 Dual Cache/Disk Processor	96,250	710	4,010	2,674
5057-39	Solid-State Disk (SSD) Processor; manages up to four 7053 Cache Storage Units used only in solid-state disk mode; connects to word channel	41,715	355	1,738	1,159
5057-37	Dual SSD Processor; provides 2 processors in one cabinet for dual access control	83,430	710	3,476	2,318
5057-27	Dual SSD Processor; same as 5057-37, but connects to 2 block multiplexer channels with FIPS compatibility	83,430	710	3,476	2,318
F4025-96	Cache/Disk Capability; converts a 5057-39 SSD Processor to a 5057-31 Cache/Disk Processor	11,245	—	469	312
F4025-95	Cache/Disk Capability; converts a 5057-37 SSD Processor to a 5057-29 Cache/Disk Processor	22,490	—	938	624
F4025-94	Cache/Disk Capability; converts a 5057-27 SSD Processor to a 5057-23 Cache/Disk Processor	22,490	—	938	624
F3948-95	Cache/Disk Capability; upgrades a 5057-35 Disk Control Processor to a 5057-31 Cache/Disk Processor	4,835	—	202	134
F3948-94	Cache/Disk Capability; upgrades a 5057-33 Disk Control Processor to a 5057-29 Cache/Disk Processor	9,670	—	404	268
F3948-93	Cache/Disk Capability; upgrades a 5057-25 Disk Control Processor to a 5057-23 Cache/Disk Processor	9,670	—	404	268

*Lease charges do not include maintenance.

**Field Installation Charge.

Unisys 1100/90

		Monthly Charges*			
		Purchase (\$)	Monthly Maint. (\$)	1-Year Lease (\$)	5-Year Lease (\$)
MASS STORAGE (Continued)					
8481-00	8481 Disk Storage Unit; contains 4 spindles with a total capacity of 595.6M words	79,640	235	3,318	2,212
8481-99	8481 Disk Storage Unit; same as 8481-00, except it includes dual access and simultaneous read/write, read/read, write/read, and write/write capability	86,840	235	3,618	2,412
F2718-04	Dual Access Feature; provides dual access capability for 8481-00 disk unit	7,200	—	300	200
7053-97	First Cache Storage Unit; provides 917,504 words of RAM; functions as SSD or cache/disk; requires Segment Descriptor Table for operation in cache/disk mode	72,000	469	2,130	1,600
7053-96	Cache Storage Expansion Unit; provides additional 917,504 words of RAM; up to 3 can be added	72,000	469	2,130	1,600
F3117-02	Segment Descriptor Table; provides 64K words of RAM for cache memory index for 7053	8,200	30	275	250
K3351-00	7053 Memory Expansion; 917,504 words of RAM	36,000	185	1,065	800
F3118-00	7053-97 Dual Access Feature	4,416	16	138	123
F3118-01	7053-96 Dual Access Feature	4,416	16	138	123
5090-99	8490 Dual Solidstate Disk (SSD) Controllers; 2 control units with a 2M-word SSD module; can be expanded up to 64M words of SSD storage; requires 7059 uninterruptible power supply (UPS)	166,210	592	6,926	4,617
5090-97	SSD Subsystem; same as 5090-99, except it includes 7059 UPS	194,610	734	8,109	5,405
5090-95	8490 Disk Subsystem; includes two 5090 controllers and 5GB of disk storage; can be expanded to a cache/disk system	296,500	730	12,354	8,236
5090-93	8490 Disk Subsystem; includes two 5090 controllers and 2.5GB of disk storage; can be expanded to 3.75GB or 5GB	224,500	650	9,354	6,236
5090-91	8490 Cache/Disk Subsystem; same as 5090-95, except it also includes cache/disk capability with 2M words of memory	366,500	1,100	15,271	10,180
5090-89	8490 Cache/Disk Subsystem; same as 5090-93, except it also includes cache/disk capability with 2M words of memory	294,500	1,050	12,271	8,180
8490-99	First 5GB Disk Expansion Unit; for 5090-95 or 5090-91; can be used in 5090-93 or 5090-89 if they are first expanded to 5GB	150,000	400	6,250	4,166
8490-97	Disk Expansion Unit; same as 8490-99, except it provides second or third 5GB expansion unit	150,000	400	6,250	4,166
8490-95	First 2.5GB Disk Expansion Unit; for 5090-95 or 5090-91; can be used in 5090-93 or 5090-89 if they are first expanded to 5GB	90,000	310	3,750	2,500
8490-93	Disk Expansion Unit; provides second or third 2.5GB expansion unit	90,000	310	3,750	2,500
F4976-99	Disk Expansion, 2.5GB; for 5090 or 8490 cabinet with only 2.5GB installed	90,000	310	3,750	2,500
F4976-98	Disk Expansion, 1.25GB; for partially populated cabinets	54,000	160	2,250	1,500
F4979-99	Four-Channel Expansion; expands the 4 word channels in a 5090 subsystem to 8 channels	12,945	45	540	360
F4983-99	Disk to Cache Upgrade; provides cache capability to disk-only units; includes 2M words of memory, expandable to 8M words	70,000	400	2,916	1,944
F4984-99	SSD Capability; adds SSD to disk-only units; includes 2M words of memory, expandable to 10M words	72,800	280	3,033	2,022
F4983-98	Disk/SSD to Cache Upgrade; converts F4984-99 SSD module, which has been added to a disk-only system, to a cache/disk module	10,000	120	416	277
F4984-98	Second SSD Module; requires F4984-99; can also add SSD capability to a cache/disk subsystem or add a second SSD module to an SSD-only system	72,800	280	3,033	2,022
F4982-99	Memory Expansion, 2M words; for cache or SSD module	60,000	80	2,500	1,666
F4985-99	Data Save Feature; provides 64M words of data save capability for SSD module; requires freestanding UPS	16,710	42	696	464
7059-99	Freestanding Uninterruptible Power System (UPS); provides 15 minutes of power for the dual control units, data save unit, and SSD memory	44,500	142	1,854	1,236
5071-00	Optical Disk Control; provides control for up to 4 optical string controllers in optical disk cabinet	36,000	135	1,500	1,000
F0487-00	Optical Disk Control Expansion; provides second control module, housed in 5071-00 cabinet	26,700	102	1,113	742
F0486-00	Dual Channel Interface for 5071-00	3,960	17	165	110
F0486-01	Dual Channel Interface for F0487-00	3,960	17	165	110
8652-99	Optical Disk Unit; includes optical disk string control, 2.6GB optical disk drive, optical disk cartridge, operator panel, power supply, and space for up to 3 additional optical disk units	50,860	210	2,119	1,413
F0488-00	Optical Disk Drive Expansion; provides additional 2.6GB optical disk drive	25,560	106	1,065	710
F0489-00	String Switch; provides capability to switch data path of 8652-99 string between control modules of 5071-00 and F0487-00; housed in 8652-99	4,680	20	195	130
8654-99	Optical Disk Library; includes optical string control, optical library disk drive, optical disk cartridge, operator panel, power supply, and automatic disk changer for 32 disk cartridges	110,860	390	4,619	3,079
F0488-02	Optical Disk Library Expansion; provides an additional optical library disk drive; maximum of one per 8654	25,560	106	1,065	710
F0489-02	String Switch for Optical Library Unit; provides capability to switch data path of 8654 between control modules of 5071 and F0487; housed in 8654	4,680	20	195	130
F4761-00	Optical Disk Cartridge; 2.6GB	460	—	—	—

*Lease charges do not include maintenance.

**Field Installation Charge.

Unisys 1100/90

		Monthly Charges*			
		Purchase	Monthly	1-Year	5-Year
		(\$)	Maint.	Lease	Lease
			(\$)	(\$)	(\$)
MASS STORAGE (Continued)					
5070-99	Shared System; a relational data base system consisting of a processor, a data accelerator, 2MB of main storage, block multiplexer interface, RS-232 interface, disk controller, 8457 disk cabinet with 2 drives, console with printer, and a data base administrator's terminal with printer	250,000	1,200	—	—
F4554-00	Main Storage Expansion, 1MB; maximum of 4	9,000	65	—	—
F4556-01	Block Multiplexer Interface Expansion; provides for attachment of a second 1100 Series or IBM host block multiplexer channel	17,300	60	—	—
F4619-01	RS-232 Interface Expansion; provides for attachment of up to 8 additional RS-232 Sperry Personal Computers (or equivalent) to the Shared System	8,000	60	—	—
F4557-00	Disk Control Expansion; provides additional control for up to four 8457 disk drives; maximum of 3	10,200	65	—	—
F4555-00	Mirrored Disk Support; provides support for data duplication on separate disk drives	12,000	75	—	—
8457-99	Disk Subsystem; includes cabinet with two 344MB disk drives; one included in basic Shared System; up to 3 more cabinets can be added	30,000	190	—	—
F4552-99	8457 Disk Expansion; provides 2 additional 344MB disk drives for 8457-99 cabinet	26,000	190	—	—
8457-98	Disk Subsystem; includes cabinet with four 344MB disk drives; maximum of 4 per Shared System	56,000	380	—	—
MAGNETIC TAPE UNITS					
5058-00	Uniservo 22 Subsystem; includes 2 Uniservo 22 tape drives and control for up to 8 Uniservo 22 or Uniservo 24 drives	71,040	411	2,235	1,659
5058-02	Uniservo 22 Magnetic Tape Drives; includes 2 dual-density PE/NRZI drives; 1600/800 bpi, 9-track, 75 ips	47,040	267	1,386	1,029
5058-06	Uniservo 24 Subsystem; includes 2 Uniservo 24 tape drives and control for up to 8 Uniservo 24 or Uniservo 22 drives	78,720	455	2,466	1,827
5058-08	Uniservo 24 Magnetic Tape Drives; includes 2 dual-density PE/NRZI drives; 1600/800 bpi, 9-track, 125 ips	54,720	311	1,617	1,197
F0825-00	Dual Channel Feature; provides nonsimultaneous operation on 2 channels of one processor or one channel on each of 2 processors	4,272	34	110	89
F2627-00	Translation Feature; translation is ASCII/EBCDIC, Fielddata/EBCDIC, or Fielddata/ASCII	1,728	15	52	36
F2627-01	Second Translation Feature	1,728	15	52	36
F3820-00	Dual Access Feature	2,016	16	56	44
5055-99	Uniservo 26/28 Control; controls up to 8 Uniservo 26 and 28 tape units; also controls Uniservo 22 and 24 tape units with F2451-00 installed	22,700	140	635	470
F2451-00	Adds 9-track NRZI to 5055-99	3,170	16	82	63
F3738-00	Dual Channel Feature for the 5055-99; provides nonsimultaneous access to the control from 2 block multiplexer channels	1,000	4	34	25
F3739-00	Translation Feature; ASCII to/from EBCDIC	3,600	18	94	72
O884-00	Uniservo 26 Magnetic Tape Unit; dual-density GCR/PE, 6250/1600 bpi, 9-track, 75 ips	22,000	180	595	440
O884-02	Uniservo 28 Magnetic Tape Unit; dual-density GCR/PE, 6250/1600 bpi, 9-track, 125 ips	24,750	190	675	500
F3737-00	Dual Access Feature	900	5	27	20
O876-97	Uniservo 22 Magnetic Tape Unit; attaches to 5055 control unit with F2451-00 installed	19,190	110	525	389
O876-93	Uniservo 24 Magnetic Tape Unit; attaches to 5055 control unit with F2451-00 installed	21,215	121	694	532
5042-00	Uniservo 30 Control for up to 8 9-track, dual-density (GCR/PE) Uniservo 30, 32, 34, or 36 drives	36,214	399	1,290	953
F2131-00	Adds 9-track NRZI to 5042-00; prerequisite for Uniservo 30 drives and all 7-track NRZI features	3,171	26	88	66
F2585-00	Translation Feature for 9-track drives on 5042 control; translation is in both directions involving ASCII/EBCDIC, Fielddata/EBCDIC, and Fielddata/ASCII	1,785	15	49	38
F2585-01	Second 9-track Translator; F2585-00 required	1,785	15	49	38
F2584-99	Adds 7-track NRZI to 5042-00; includes ASCII to BCD translator and data conversion	1,617	13	44	34
F2584-98	Translator is ASCII to fielddata	1,617	13	44	34
F2584-97	Translator is fielddata to BCD	1,617	13	44	34
F2135-00	Dual Channel Feature for the 5042-00; provides nonsimultaneous access to the control from 2 block multiplexer channels; not software supported	4,185	44	138	104
F2137-00	Drive Expansion Feature for the 5042-00; provides for up to 16 Uniservo 30, 32, 34, or 36 drives to be attached to the 5042-00	668	5	23	16
O872-00	Uniservo 30 Magnetic Tape Drives; 9-track, dual-density, PE/NRZI, 1600/800 bpi, 200 ips	27,300	251	903	631
O872-02	Uniservo 30 Magnetic Tape Drive; 7-track, NRZI, 800/556/200 bpi, 200 ips	27,300	251	903	631
F2123-00	Conversion Feature; converts O872-02 to O872-00	3,287	—	91	68
O873-00	Uniservo 32 Magnetic Tape Drive; 9-track, dual-density, GCR/PE, 6250/1600 bpi, 75 ips	24,800	227	839	573

*Lease charges do not include maintenance.

**Field Installation Charge.

Unisys 1100/90

		Monthly Charges*			
		Purchase	Monthly	1-Year	5-Year
		(\$)	Maint.	Lease	Lease
		(\$)	(\$)	(\$)	(\$)
MAGNETIC TAPE UNITS (Continued)					
0873-02	Uniservo 34 Magnetic Tape Drive; 9-track, dual-density, GCR/PE, 6250/1600 bpi, 125 ips	28,300	261	962	654
F2125-00	Conversion Feature; converts 0873-00 to 0873-02	3,675	34	129	85
0874-00	Uniservo 36 Magnetic Tape Drive; 9-track, dual-density, GCR/PE, 6250/1600 bpi, 200 ips	29,500	279	1,031	700
5042-91	Uniservo 36-II Subsystem; includes cabinet with control unit and one Uniservo 36-II tape drive, plus a second cabinet with one tape drive and power supply for both cabinets	81,690	957	3,404	2,269
F4849-00	Dual Channel Feature; provides nonsimultaneous access to the control from 2 block multiplexer channels	4,408	44	187	122
F4847-00	Dual Access 8 Feature; provides dual access capability for up to 8 tape drives; requires 2 control units	5,990	25	250	166
F4848-00	Dual Access 16 Feature; provides dual access capability for up to 16 tape drives; requires 2 control units	5,990	25	250	166
F4850-00	9-Track Translation Feature; translates data from ASCII to EBCDIC and from EBCDIC to ASCII	1,785	15	74	50
0874-22	Uniservo 36-II Magnetic Tape Drive; 9-track, dual-density, GCR/PE, 6250/1600 bpi, 200 ips	25,000	279	1,042	694
PRINTERS					
0770-06	Line Printer and Control; 2000 lpm with 48-character set	60,000	685	2,500	1,667
Print Cartridges for 0770 Printer:					
F4836-00	48-character Alphanumeric Business/Commercial	462	—	—	—
F4836-01	48-character Alphanumeric Scientific	462	—	—	—
F4836-06	48-character OCR-A Alphanumeric	462	—	—	—
F4837-00	94-character ASCII	462	—	—	—
F4837-03	68-character ISO Universal OCR-B	462	—	—	—
F4837-04	68-character OCR H-14 Universal	462	—	—	—
F4837-05	58-character Cobol/Fortran/Business	462	—	—	—
F4837-06	177-character International	462	—	—	—
F4837-11	68-character ISO Universal OCR-A	462	—	—	—
F4837-12	68-character Universal ECMA-11 OCR-B	462	—	—	—
F1537-13	68-character Universal IBM 407	462	—	—	—
F4837-14	63-character Modified Fortran	462	—	—	—
F4837-15	63-character Modified ASCII	462	—	—	—
F4837-19	162-character American Library Association	462	—	—	—
F4837-21	73-character OCR-A	462	—	—	—
F4837-22	63-character Alphanumeric	462	—	—	—
F4837-23	94-character Optimized ASCII	462	—	—	—
F4837-24	63-character Optimized IOS Universal OCR-B	462	—	—	—
(Cartridges are also available for languages other than English)					
0776-00	Line Printer and Control; 760 lpm with 48-character set	36,570	284	1,006	803
0776-02	Line Printer and Control; 900 lpm	41,340	340	1,134	907
0776-04	Line Printer and Control; 1200 lpm	48,000	388	1,431	1,145
F2217-00	Printer Upgrade; 0776-00 to 0776-02	4,770	56	128	104
F2245-00	Expanded Character Set Control; required for character sets with more than 64 characters	1,910	5	50	40
Print Cartridges for 0776 Series Printers:					
F2216-00	48-character Alphanumeric Business/Commercial	1,270	—	34	26
F2216-01	48-character Alphanumeric Scientific	1,270	—	34	26
F2216-07	24-character Numeric	1,270	—	34	26
F2216-08	63-character Modified Fortran	1,270	—	34	26
F2216-09	63-character Modified ASCII	1,270	—	34	26
F2216-10	48-character OCR-A	1,270	—	34	26
F2215-00	94-character ASCII	1,270	—	34	26
F2215-03	68-character ISO Universal OCR-B	1,270	—	34	26
F2215-04	68-character OCR H-14 Universal	1,270	—	34	26
F2215-05	58-character Cobol/Fortran/Business	1,270	—	34	26
F2215-11	68-character Universal OCR-A	1,270	—	34	26
F2215-12	68-character Universal ECMA-11 OCR-B	1,270	—	34	26
F2215-13	68-character Universal Univac 77L	1,270	—	34	26
F2215-20	94-character Optimized ASCII	1,270	—	34	26
F2215-21	68-character Optimized IOS Universal OCR-B	1,270	—	34	26
F2215-23	128-character OCR-A	1,270	—	34	26
0777-97	On-Line Laser Printer, Model I; up to 21,000 lpm; includes forms splicing station and diskette with 15 character sets (limited availability)	270,000	1,026	—	8,283

*Lease charges do not include maintenance.

**Field Installation Charge.

Unisys 1100/90

Monthly Charges*

PRINTERS (Continued)		Purchase (\$)	Monthly Maint. (\$)	1-Year Lease (\$)	5-Year Lease (\$)
0777-87	On-Line Laser Printer, Model II; same as 0777-97 but includes 2 diskettes with 15 character sets each	170,700	942	7,115	4,740
F3380-00/ -01	Additional Character Sets; for 0777-97	30	—	—	—
F2874-00	Character Font Expansion; up to 255 characters; for 0777-97	3,640	18	109	82
F3815-00	Character Font Expansion; up to 255 characters; for 0777-87	3,640	18	109	82
F3816-00	Character Font Expansion; up to 1,024 characters; for 0777-87	14,560	84	500	344
F3816-02	Character Font Expansion; up to 3,200 characters; for 0777-87	43,680	254	1,500	1,033
F3816-99	Character Font Upgrade; expands an 0777 printer with 1,024-character font storage to 3,200-character font storage	29,120	170	1,000	689
F3816-98	Character Font Expansion; same as F3816-00, but for field installation only on 0777-97	14,560	84	500	344
F3816-97	Character Font Expansion; same as F3816-02, but for field installation only on 0777-97	43,680	254	1,500	1,033
F3935-XX	Alternate Developer Station; for 0777-97	14,500	26	810	613
F2876-00	Forms Overlay Capability	11,700	34	352	261
F3426-00	Overlay Transparencies	35	—	—	—
1963-00	Burster/Trimmer/Stacker	40,196	181	1,278	900
F3595-00	Forms Counter for 1963-00	1,580	5	40	34
F3598-00	Center Slitter for 1963-00; provides lengthwise separation of forms	900	11	21	18
F3601-00	One-Wide Roll Imprinter; for special printing on forms before bursting; requires 1963-00	1,060	29	25	21
F3601-01	Two-Wide Roll Imprinters; same as F3601-00, but provides two-wide printing	1,520	29	45	38
TERMINALS					
3560-64	UTS 10 Buffered CRT; includes 12-inch screen, RS-232 or current loop interface, expanded keyboard with function keys, program cartridge, and bit serial output peripheral interface	1,720	—	—	—
3660-60	UTS 20 CRT; includes 12-inch screen, 16K RAM, RS-232-C/CCITT V.24 interface, 3270 compatibility, tilt/rotate base, program cartridge, and bit serial output peripheral interface	2,115	31	100	66
3561-80	UTS 40 Programmable CRT; includes 12-inch screen, system RAM, and RS-232-C CCITT V.24 interface	2,333	43	104	69
DISTRIBUTED COMMUNICATIONS PROCESSORS					
1986-75	Distributed Communications Processor/10A (DCP/10A); includes cabinet with space for additional DCP/10A, processor with 512K bytes of storage, power supply, power distribution, cooling, operator panel, active line indicators, microprograms, multiple device line module, and integrated diskette drive with controller; requires F1946-02 or F1947-03 host interface	14,950	159	623	415
1986-73	DCP/10A; same as 1986-75, except that processor includes 1MB of storage	20,450	229	852	568
1986-71	DCP/10A; same as 1986-75, except it also includes a 10MB rigid disk drive	17,750	210	740	493
1986-69	DCP/10A; same as 1986-75, except it includes a processor with 1MB of storage and a 10MB rigid disk drive	23,250	280	939	646
2005-75	DCP/10A; same as 1986-75, except cabinet is not included	13,716	152	587	386
2005-73	DCP/10A; same as 2005-75, except processor has 1MB of storage	19,216	222	816	539
2005-71	DCP/10A; same as 2005-75, except it also includes integrated 10MB rigid disk drive	16,516	203	704	464
2005-69	DCP/10A; same as 2005-75, except it includes a processor with 1MB of storage and an integrated 10MB rigid disk drive	22,016	273	903	617
F3891-03	Storage Expansion; expands processor storage from 512KB to 1MB	10,400	70	433	289
F4427-00	Storage Expansion; expands processor storage from 1MB to 1.5MB or from 1.5MB to 2MB	10,400	70	433	289
F3895-00	Power Supply Expansion; provides additional power for remote configurations	882	5	26	21
F1947-03	8-Bit Host Interface	4,000	23	105	85
8597-78	Data Communications Processor/20 (DCP/20); includes cabinet, processor with 512KB of storage, power supplies, power distribution, cooling, maintenance panel, operator panel, active line indicators, microprograms, and integrated diskette drive	35,000	229	1,458	972
8597-76	DCP/20; same as 8597-78, except processor includes 1MB of storage	42,110	355	1,755	1,170
2024-96	Storage Expansion; expands processor storage from 512KB to 1MB	12,250	126	510	340
8597-01	Expansion Cabinet; contains processor capable of performing I/O functions only; provides mounting for 8 line modules; maximum of 2 per DCP/20 system	24,000	119	656	525
F2894-00	Line Module Expansion; provides 8 additional line modules for 8597-01	12,000	60	460	250
8596-79	Distributed Communications Processor/40 (DCP/40); preconfigured system including 512KB of main storage, 4.6MB rigid disk subsystem, integrated diskette drive, 1100 Series interface, 8-bit peripheral interface, and active line indicators; accommodates up to 11 communications line modules; requires a UTS 20 or UTS 400 console	102,675	584	2,809	2,225
8596-77	DCP/40; same as 8596-79, except it accommodates up to 27 communications line modules and has 14MB disk; includes second I/O processor	119,651	674	3,324	2,629

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**Field Installation Charge.

Unisys 1100/90

Monthly Charges*

DISTRIBUTED COMMUNICATIONS PROCESSOR (Continued)

		Purchase (\$)	Monthly Maint. (\$)	1-Year Lease (\$)	5-Year Lease (\$)
8596-96	DCP/40; includes processor with 512KB of main storage, I/O controller module, first I/O processor, and microprograms; requires an integrated diskette plus either an 8409 disk subsystem with an F3878 line module or an 8408 cartridge disk subsystem with an F1948 line module; also requires communications line modules and a UTS 20 or UTS 400 console	84,245	452	2,305	1,843
K1930-01	Storage Expansion; provides additional 512KB of storage; maximum of 3	15,600	126	410	325
1945-99	Expansion Cabinet; provides power supply and power controller; accommodates up to 4 I/O processors and up to 4MB of main storage; maximum of 3 per DCP/40 system, only one of which can contain storage	27,060	146	740	593
F2942-01	Storage Controller; provides a storage controller and 512KB of storage; mounts in expansion cabinet; can be expanded to 2MB by the addition of up to 3 K1930-01 storage expansion features and expanded up to 4MB with the addition of a 2036-99 and 3 K3930-01 features; maximum of one per system	26,880	145	735	588
2036-99	Storage Controller Expansion; includes 512KB of storage; can be expanded to 2MB with the addition of up to 3 K1930-01 storage expansion features to create the second 2MB of storage in the 1945-99 expansion cabinet	13,950	77	365	290
F1933-00	I/O Processor Controller Module; provides expansion cabinet with first IOP and space for mounting 3 additional IOPs and a storage port expander	14,680	78	399	320
F2941-99	Second IOP Expansion; provides second IOP for 8596-96 or 1945-99; includes power for 2 more IOPs	14,920	81	410	326
F1932-99	Third IOP; mounts in 8596-96 or 1945-99; includes storage port expander	14,185	76	389	310
F1932-98	Fourth IOP	10,635	57	294	231
F1928-00	Operator Station; a freestanding work surface that can be used for the local console	1,200	—	30	25
F1825-05	Active Line Indicator; provides a visual display of line activity on up to 16 communication line modules in a single IOP	960	4	26	21
F4987-01	1100/90 ISI Interface; provides a full-duplex 32-bit interface; maximum of 4 per DCP/40	4,000	23	110	89
Features for the DCP/10A, DCP/20, and DCP/40:					
F1936-00	DCP/20-DCP/40 Storage Port Expander; provides a multiplexed interface to a single local storage access port for up to 4 requestors	3,550	19	95	75
F1946-02	1100 Series ISI Interface; provides a full-duplex ISI interface to a word channel; maximum of 1 per DCP/10A cabinet, 2 per DCP/20 cabinet, or 4 per DCP/40 cabinet	4,000	23	110	89
F1947-02	Series 90 Byte Interface; provides interface to Series 90 byte or block multiplexer channel; maximum of 1 per DCP/20 cabinet or 2 per DCP/40 cabinet (not available for DCP/10A)	4,000	23	105	85
F3878-00	Byte Interface Line Module; provides 8-bit interface to the 8409 disk subsystem	1,900	11	56	45
F1948-01	16-bit Peripheral Interface; provides interface to a peripheral subsystem; allows operation in 8- or 16-bit mode (for DCP/20 and DCP/40)	3,000	16	84	68
F1941-00	Full-Duplex Interface to Asynchronous Data Sets; conforms to EIS RS-232-C and CCITT V.24 and V.28; data set rates up to 2400 bps	960	3	25	20
F1942-00	Full-Duplex Interface to Synchronous Data Sets; conforms to EIA RS-232-C and CCITT V.24 and V.28; data set rates up to 9600 bps	960	3	26	21
F3163-00	Full-Duplex Interface to Synchronous or Asynchronous Modems; conforms to EIA RS-232-C and CCITT V.24 and V.28; operates with Bell DDS up to 9600 bps or at data set rates up to 19,200 bps	1,275	8	35	30
F3163-01	Full-Duplex Interface to Public Data Networks; conforms to CCITT X.21 and X.25; operates at rates up to 19,200 bps	2,500	14	63	50
F3163-04	Full-Duplex Interface to Synchronous Modems; conforms to RS-449; up to 9600 bps	1,920	11	50	40
F3164-00	Full-Duplex Interface to Bell 303 Modem; up to 64K bps	7,200	38	188	150
F3164-01	Full-Duplex Interface to Carrier Facilities; conforms to CCITT V.35; operates with UDLC protocol data formats (64K bps), V.35 facilities (48K bps), and Bell DDS and DSDS facilities (56K bps)	3,745	21	100	80
F3165-01	Multiline Asynchronous Line Module; provides full-duplex interfaces to up to 4 data sets; conforms to RS-232-C and CCITT V.24 and V.28; up to 2400 bps	2,880	14	79	63
F3837-00	Multiline Synchronous Line Module; provides up to 4 full-duplex interfaces to data sets or direct connect terminals; conforms to RS-232-C and CCITT V.24 and V.28; up to 9600 bps	2,250	11	62	49
F3835-00	Remote Partitioning Capability; maximum of 1 on DCP/20 or 4 on DCP/40 (not available for DCP/10A)	960	5	25	20
F1945-00	Auto Dialing Line Module; interfaces to Bell 801 Automatic Calling Units or those conforming to CCITT V.24 and V.25	1,005	4	25	20
8590-00	Remote Control Module (RCM); provides the capability to control power on/off and other functions of up to 4 DCP processors; requires RCM Adapter, F3163-00 or F3163-04 and/or 1 or 2 F3556-00 and F3557-00	13,526	61	355	280
F3898-00	Remote Control Adapter for DCP/10A; provides interface between the RCM and the DCP	1,915	11	50	40
F2893-00	Remote Control Adapter for DCP/20	1,824	11	48	38
F1937-00	Remote Control Adapter for DCP/40	1,824	11	48	38

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**Field Installation Charge.

Unisys 1100/90

		Monthly Charges*			
		Purchase	Monthly	1-Year	5-Year
		(\$)	Maint.	Lease	Lease
		(\$)	(\$)	(\$)	(\$)
DISTRIBUTED COMMUNICATIONS PROCESSOR (Continued)					
2523-00	Line Switch Module (LSM); provides the capability to switch communication lines and/or peripherals from a local or remote source; requires 1 switch feature; up to 6 switch features supported	28,750	112	748	597
1962-00	LSM Auxiliary Cabinet for DCP/20 and DCP/40; provides mounting for up to 10 switch features	6,872	39	197	143
F3557-00	RCM/LSM Microcode	350	1	9	7
F3556-00	RCM/LSM Local Control Interface; provides one loadable line module for the RCM and LSM and one for the DCP	3,600	16	95	75
F3105-00	Modem Expander; enables a second RCM or LSM to share a single RS-232-C modem	1,440	4	38	30
F3109-00	RS-232-C Switch; provides the capability to switch 8 RS-232-C communications lines from one communications controller to another	4,930	22	132	102
F3110-00	CCITT V.35 Switch; up to 8 lines	9,325	43	245	195
F3112-00	RS-449 Switch; up to 4 lines	6,000	27	156	125
F3113-00	16-bit Parallel Interface Switch; up to 4 interfaces (for DCP/20 and DCP/40)	7,200	33	188	150
F3559-00	Bell 303 Switch; up to 4 lines (for DCP/20 and DCP/40)	16,800	82	440	350
F1939-00	Integrated Diskette Subsystem for DCP/20 and DCP/40; includes 256KB diskette and controller	1,920	12	53	42
8408-02	Cartridge Disk Control; controls up to 2 F2380 drives (for DCP/20 and DCP/40)	5,564	32	146	109
F2380-04	Fixed/Removable Cartridge Disk Drive; five megabytes fixed, five megabytes removable	17,750	124	461	330
F2187-00	Second I/O Interface for dual F2380 configuration	1,568	9	39	29
8409-99	Disk Subsystem; includes cabinet, control, and one 4.6MB disk drive; requires Byte Interface Line Module (F3878-00)	9,650	82	378	280
8409-97	Disk Subsystem; same as 8409-99, except it includes a 14MB drive	10,746	94	478	354
F3900-00	Disk Drive Expansion; provides a second disk drive with 4.6MB capacity; maximum of one	3,777	54	158	117
F3900-01	Disk Drive Expansion; provides a second disk drive with 14MB capacity; maximum of one	4,207	66	188	139
F4085-00	Disk Drive Expansion; expands the capacity of one 4.6MB drive to 14MB	1,096	12	100	74
F3881-00	Dual Disk Control; provides a second DCP interface	2,000	9	65	50
8441-79	Disk Subsystem; includes cabinet, controller, and 30MB disk drive; connects to DCP/10A	4,200	28	175	116
F4228-98	Disk Expansion; provides additional 30MB disk drive for 8441-79	2,710	26	112	75
8441-81	Disk Subsystem; includes cabinet, controller, and 30MB disk drive; connects to DCP/20 and DCP/40	4,200	28	175	116
F4228-99	Disk Expansion; provides additional 30MB disk drive for 8441-81	2,710	26	112	75
O871-01	Uniservo 10 Magnetic Tape Unit; PE/NRZI, 1600/800 bps, 25 ips (for DCP/20 and DCP/40)	13,962	93	318	239
F2721-00	Uniservo 10 Controller; controls up to 2 drives	10,320	56	284	215
F2879-00	AC Power Switch; provides remote control of second Uniservo 10	1,200	5	32	25
3660-51	UTS 20L Console; includes 12-inch screen, host interface, security keylock, and bit serial output peripheral interface; requires F3982-00 keyboard (for DCP/10A and DCP/20)	1,562	31	69	46
F3982-00	Low Profile Keyboard	360	4	20	13
F3574-01	Tilt/Rotate Base	160	—	9	7
3612-95	SVT-1121 Console; includes 14-inch screen, keyboard, setup menu in 6 languages, full-duplex auxiliary port, security keylock, and power cord	895	—	—	—
O425-93	Data Processing Quality Printer for SVT-1121; 160 cps	1,275	38	55	45
O425-92	High Definition Quality Printer for SVT-1121; 160/40 cps	1,395	44	60	50
O472-99	Bidirectional Printer for SVT-1121; 160 cps in data processing mode, 32 cps in near letter quality mode	695	—	—	—
O445-99	Data Processing Quality Printer; 160 cps; connects to DCP/20 or DCP/40	775	17	35	23
O445-97	High Definition Quality Printer; 160/40 cps; connects to DCP/20 or DCP/40	895	20	49	27
F4224-00	Paper Roll for O445 Printers	45	1	3	2
F4109-00	Forms Tractor	50	1	3	2
F3977-00	Printer Stand for O445 Printers	230	—	10	8

*Lease charges do not include maintenance.
**Field Installation Charge.

Unisys 1100/90

SOFTWARE PRICES

	Single Extended Term Charge* (\$)	
System Processors		
6163-98	Terminal Security System	12,368
6167-98	Sentry Security Control Processor	41,555
6158-98	Quota Input Processor (QUIP)	12,524
6162-98	Checkpoint/Restart	7,556
6133-98	Data Processor	3,571
6203-98	Fault Location of Interpretive Testing (FLIT)	6,624
Language Processors		
6165-98	General Syntax Analyzer	5,445
6172-98	APL 1100	28,980
6171-98	UBasic	7,193
6178-98	UBasic Syntax Analyzer	3,571
6153-98	ASCII Cobol	17,078
6149-98	Cobol Syntax Analyzer (BCOB)	7,193
6154-98	ASCII Fortran	25,047
6150-98	Fortran Syntax Analyzer (BFTN)	7,193
6151-98	PL/1	14,335
6164-98	RPG 1100	6,521
6243-97	RPG II Group	7,400
6160-98	MACRO	7,193
Data Base Management & Data Management		
6292-98	Universal Data System (UDS) 1100 Control	14,231
6700-98	UDS Data Management System (DMS) 1100	68,310
6298-98	UDS Query Language Processor (QLP) 1100	24,219
6298-97	UDS QLP with PCIOS Interface	28,204
6293-98	UDS Relational Data Management System (RDMS) 1100	85,388
6299-98	UDS Data Dictionary System	42,694
6177-98	Define File Processor	3,571
6175-96	Integrated Recovery Utility (IRU)	24,426
6175-95	IRU Version II	25,513
6175-94	IRU Version III	28,670
6291-98	File Administration System (FAS)	17,078
6155-98	Data Management System (DMS) 1100	62,618
6176-98	Data Dictionary	21,787
6152-98	Processor Common Input/Output System (PCIOS)	4,295
6244-98	Information Management System (IMS) 1100	11,126
6157-96	Query Language Processor (QLP) 1100	24,219
6156-98	Remote Processing System (RPS) 1100	14,335
Data Communications		
6169-89	Communications Management System (CMS) 1100 DCP/10 and DCP/20	15,680
6169-90	CMS 1100 DCP/40	31,309
6159-98	Processor Common Communications System (PCCS)	7,193
6136-92	DCP/10 Operating System	6,750
6136-95	DCP/20 Operating System	9,000
6136-01	DCP/40 Operating System	16,425
6276-00	BSC 3270 Terminal Handler	6,750
Program Development		
6146-97	Mapper 1100	68,310
6290-98	Advanced Information Service (Advise) 1100	17,078
6239-98	Programmers Advanced Debugging System (PADS) 1100	12,524
6170-98	Conversational Time-Sharing System (CTS) 1100	19,924
6147-98	High-Volume Time-Sharing (HVTS)	36,173
6262-98	Interactive Processing Facility (IPF) Command Language	15,680
6260-98	IPF Control	11,385
6263-98	IPF Procedures	19,924
6245-98	Edit 1100	15,008
6264-98	User Assistance	4,295
6261-98	Distributed Data Processing (DDP) 1100	5,693
7623-98	SX 1100; 32 users	29,000
7623-97	SX 1100; 64 users	40,000
7623-96	SX 1100; 128 users	64,000

*License for a 5-year period.

**Monthly charge.

Unisys 1100/90

		Single Extended Term Charge* (\$)
Utilities		
6271-98	CULL Processor	1,449
F3859-98	Interactive CULL (IACULL)	1,449
6135-98	Sort/Merge	8,539
6246-98	Log Analyzer	6,831
6161-98	Performance Analysis Routines	16,508
6274-98	On-line System Activity Monitor (OSAM)	14,231
Integrated Scientific Processor Program Products		
7670-99	UCS Fortran Compiling System	17,235
7671-00	UCS Fortran Vectorizer	90,000
7672-00	Extended Math Library	31,500
7779-00	Array Processor Emulation Package (APEP)	22,500
7669-00	Performance Execution Evaluation Routing (PEER)	11,250
Miscellaneous Products		
F6131-00	Transaction Interface Package (TIP)	85,388
6237-98	Display Processing System (DPS) 1100	19,924
F3791-98	Univac Printer Interface Software (UPRINTS); provides interface to 0777 Printer	11,385
6753-99	Percon Control; provides support for peripheral devices such as printers	2,846
F6110-99	Percon 0777; provides support for 0777 laser printer; requires 6753-99	4,455
F6115-99	Percon 0770 and 0776; provides support for 0770 and 0776 printers as an alternative to standard device handlers; requires 6753-99	3,726
F3793-98	Cache Disk Interface Software (CADIS)	22,770
7666-00	Shared System Control	60,000
F3790-00	Compatible Channel Interface Software (COMPCIS)	22,770
8759-99	Optical Disk Support System; provides the capability to store data or retrieve data from the 5071 Optical Disk Subsystem	11,880
8760-99	Optical Disk Direct Read Package; includes all the capabilities of 8759-99, plus a callable subroutine that provides for direct/random reads within the previously written portion of an optical disk cartridge	15,180
6704-99	1100/91 Programming Aids/Local Support Services (LSS)	**925
6704-98	1100/92 Programming Aids/LSS	**1,300
6704-97	1100/93 Programming Aids/LSS	**1,500
6704-96	1100/94 Programming Aids/LSS	**1,620
6704-95	1100/90 SV Programming Aids/LSS (single IP)	**770
6704-94	1100/90 SV Programming Aids/LSS (dual IPs)	**1,080

*License for a 5-year period.

**Monthly charge. ■