Unisys V Series

MANAGEMENT SUMMARY

UPDATE: *The Unisys V 510 and V 530 Systems are the newest members of the V Series of medium-scale computers. The new models have a redesigned central processor using Very Large Scale Integration (VLSI) circuitry containing sub-nanosecond Emitter Coupled Logic-Macro Cell Array (ECL-MCA II) chip technology, fault tolerance, expanded pipeline architecture, and the Master Control Program MCP/VS Release 2.0. The new systems support all the software features and benefits of the V Series and use its productivity tools and various line-of-business software application solutions.*

As part of an ambitious plan to round out its entire mid-range product line, Unisys added the two high-end Models V 510 and V 530 to its mid-scale V Series. The first two models, the V 340 and V 380, were first introduced in March 1985, followed a year later by the entry-level Model V 310. The V Series is designed to provide the users of the intermediate B Series mainframes with a much needed upward migration path. The V Series is primarily aimed at financial institutions, health care facilities, distributors, and other businesses with high-volume transaction processing and large batch requirements. To provide for the needs of these users, Unisys expanded the maximum main memory to 40 megabytes on the V 340 and V 380 Systems. And for users with even greater demands for memory and performance capacity Unisys introduced the V 500 Systems. Main memory on the Model V 510 can be expanded from 20 to 80 megabytes, and the memory on the top-of-the-line Model V 530 can be increased from 40 to 160 megabytes in 20-megabyte increments. When upgrading memory capacity, memory interleaving is converted from two to four, to eight paths, providing additional system throughput. To allow users to take advantage of the increased memory capacity, a performance feature called ▷

The Unisys V Series of single-processor, medium-scale mainframes includes five models. The systems operate under the enhanced operating system MCP/VS Release 1.0 and Release 2.0 which is designed to take full advantage of the V Series architecture. The Qwik Disk performance feature has the capability to define a portion of the main memory as a fast-access disk device. This allows the V Series to accommodate both high-volume transaction processing and a heavy batch work load. The V Series is compatible with applications developed for the B 2900, B 3900, and B 4900 Systems, offering a growth path for users of these systems.

**MODELS: V 310-1, V 310-2, V 340, V 380, V 510, and V 530.**
CONFIGURATION: The V Series features a single central processor and one to four I/O processors with up to 64 Data Link Processors. The main memory capacity ranges from 5 megabytes for the V 310-1 to 40 megabytes for the V 530.
COMPETITION: Honeywell DPS 8 and DPS 88, and IBM 4300 Series and System 3090 Model 150E.
PRICE: Purchase prices for basic configurations range from $160,000 for the V 310-1 to $1.77 million for the V 530.

CHARACTERISTICS

MANUFACTURER: Unisys Corporation, P.O. Box 500, Blue Bell, Pennsylvania 19424. Telephone (215) 542-4011. ▷
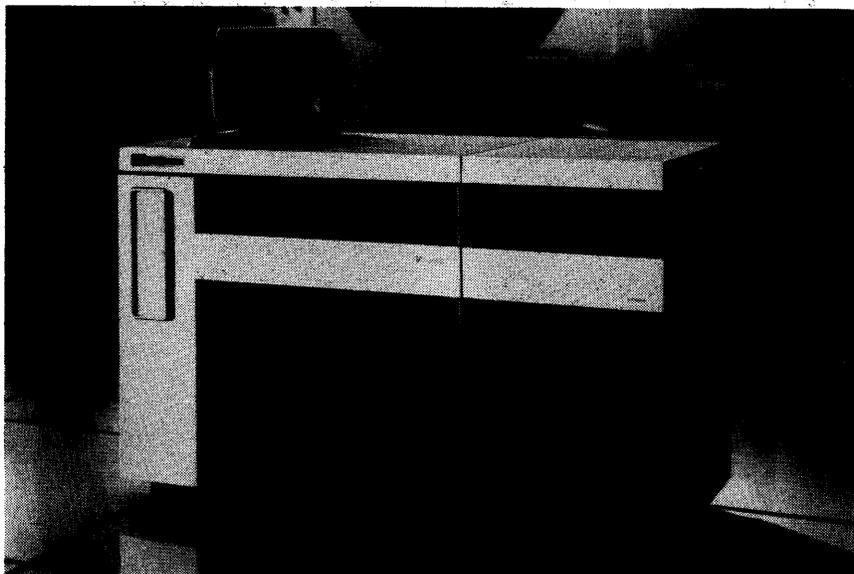
The Unisys single-processor V Series is designed for high-volume batch and transaction processing. Main memory capacity ranges from 10 megabytes to 160 megabytes, expandable in 20-megabyte increments. The high-end V 530 System includes 40K bytes of cache memory.

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▷ Qwik Disk is available for the V Series. The Qwik Disk feature allows often-used files normally resident on disk peripherals to reside in main memory as a file. Under this arrangement, they can be accessed at a much faster rate of speed.

The V Series features the enhanced operating system MCP/VS Release 1.0 for the V 300 Systems and Release 2.0 for the V 500 Systems. The MCP/VS offers a layered composition, multithreading, reentrance of operating system functions, and a new memory management. The character-oriented central processors utilize decimal arithmetic, well suited for business programming languages such as Cobol and RPG.

COMPETITIVE POSITION

The V Series competes with the Honeywell DPS 8/47, DPS 8/62, DPS 8/70, and the DPS 88/861 systems; and the IBM 4381-12, 4381-13, and 3090 Model 150E in the area of business computing requiring high-speed batch and transaction processing. The comparison of the competing systems is based on a single processor configuration, main memory capacity, and price.

The Honeywell DPS 8/47 with 8 megabytes of main memory, upgradable to 32 megabytes in 2-megabyte increments, and with a 32K-byte buffer is priced at $153,000. The Honeywell DPS 8/62 and DPS 8/70 both with 8 megabytes of main memory, upgradable to 64 megabytes, and with a 32K-byte buffer are priced at $550,000 and $700,000, respectively.

The IBM 4381-12 with 8 megabytes of main memory, upgradable to 32 megabytes, and 32K bytes of buffer storage is priced at $330,000. The 4381-13 with 8 megabytes of main memory, upgradable to 32 megabytes, and 64K bytes of buffer storage is priced at $440,000.
The Unisys V 340 for a price of $254,000 includes 10 megabytes of main memory, one I/O module with three DLP bases, two disk DLPs, one line printer DLP, and an operator display terminal. The V 380 is priced at $457,000 and includes the same components as the V 340 but is configured with two I/O modules.

The Honeywell DPS 88/861 with 32 megabytes of of main memory, upgradable to 64 megabytes, and 32K bytes of buffer storage is priced at $1,740,000. The IBM 3090 Model 510E with 32 megabytes of main memory, upgradable to 64 megabytes, and 64K bytes of buffer storage is priced at $1,250,000.

The purchase price of $950,000 for the Unisys V 510 includes 20 megabytes of main memory, upgradable to 80 megabytes, one I/O module with two DLP bases, a data transfer module, a maintenance subsystem, and an operator display terminal. The V 530 is priced at $1,775,000 and includes 40 megabytes of main memory, upgradable to 160 megabytes, 40K bytes of cache memory, two I/O modules with four DLP bases, two data transfer modules, maintenance subsystem, and an operator display terminal. ▷

▶ Canada: Unisys Canada, 2001 Sheppard Avenue East, North York, Ontario M2J 4Z7. Telephone (416) 495-0515.

MODELS: Unisys V 310, V 340, V 380, V 510, V 530.

DATA FORMATS

BASIC UNIT: Memory word size is 48 bits.

FIXED-POINT OPERANDS: Information not provided by vendor.

FLOATING-POINT OPERANDS: Information not provided by vendor.

INSTRUCTIONS: Information not provided by vendor.

INTERNAL CODE: 8-bit EBCDIC is standard. Information in ASCII can also be processed. ASCII is the primary data communications code.

MAIN MEMORY

The V 300 Systems Memory Subsystem consists of one or two 5-megabyte memory modules. Main memory is field expandable to 40 megabytes in 20- or 30-megabyte increments. When upgrading memory capacity to 20 megabytes, memory interleaving is converted from two to four paths. Forty megabytes of memory provide eight-way interleaving further improving system performance.

The V 500 Systems Memory Subsystem includes two separate interfaces to provide concurrent memory access from the CPU and the I/O subsystem. The Memory Control Module and the I/O Memory Control are both attached directly to the memory bus. Main memory is contained on one or two 20-megabyte Memory Data Cards, and can be expanded to a maximum of 160 megabytes in 20-megabyte increments. On the V 530, in addition to the main memory, the Memory Control Module contains 40K bytes of high-speed cache memory for storage of frequently used code and data items.

STORAGE TYPE: Complementary Metal Oxide Semiconductor (CMOS) Memory Data Cards (MDCs) utilizing 256K-bit Dynamic Random Access Memory (DRAM) technology.

CAPACITY: See Table 1.

CYCLE TIME: See Table 1.

CHECKING: Single-bit errors are detected and corrected. All double-bit errors are detected.

RESERVED STORAGE: Not provided.

CENTRAL PROCESSORS

The V Series processors consist of a cluster of several semiautonomous processing elements, each performing a portion of the instruction fetch, decode, and execute function. The processors operate individually with pipeline technology which allows for many processing steps to be overlapped and multiple operations can be performed concurrently. The V Series central processor consists of multiple processor modules. The Execute Module performs the actual arithmetic, logical, and special operations based upon input from the Fetch Modules and the Read/Write bus. The V 300 Systems have one Fetch Module, in the V 500 Systems the functions of the Fetch Module have been divided between an Instruction Fetch Module and an Oper-and Fetch Module. The Fetch Modules perform instruction prefetch, data address calculation, data fetching and manipulation. The modules also contains branch prediction ▶

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TABLE 1. SYSTEM COMPARISON

MODEL	V 310-1/-2	V 340	V 380	V 510	V 530
SYSTEM CHARACTERISTICS					
Date announced	March 1986	March 1985	March 1985	March 1987	March 1987
Date first delivered	Second quarter 1986	Fourth quarter 1985	Fourth quarter 1985	First quarter 1988	Fourth quarter 1987
Field upgradable to	V 340	V 380	V 510	V 530	—
Relative performance	—	2.5*	4.0*	—	—
Number of processors	1	1	1	1	1
Cycle time, nanoseconds	—	—	—	—	—
Word size, bits	48	48	48	48	48
Operating systems	MCP/VS 1.0	MCP/VS 1.0	MCP/VS 1.0	MCP/VS 2.0	MCP/VS 2.0
MAIN MEMORY					
Type	256K-bit RAM	256K-bit RAM	256K-bit RAM	256K-bit DRAM	256K-bit DRAM
Minimum capacity, bytes	5MB/10MB	20MB	20MB	20MB	40MB
Maximum capacity, bytes	20MB	40MB	40MB	80MB	160MB
Increment size	5MB/10MB	10/MB/20MB	10/MB/20MB	20MB	20MB
Cycle time, nanoseconds	—	—	—	—	—
BUFFER STORAGE					
Minimum capacity	Not applicable	Not applicable	Not applicable	Not applicable	40KB
Maximum capacity	Not applicable	Not applicable	Not applicable	Not applicable	40KB
Increment size	Not applicable	Not applicable	Not applicable	Not applicable	—
INPUT/OUTPUT CONTROL					
Number of channels:					
Byte multiplexer	—	—	—	—	—
Block multiplexer	—	—	—	—	—
Word	—	—	—	—	—
Other	Up to 32 DLPs	Up to 32 DLPs	Up to 64 DLPs	Up to 64 DLPs	Up to 64 DLPs

*Relative performance rating based on the B 2925 as 1.0.

▷ The IBM 4300 Systems only include the central processor, main memory, and buffer storage in the listed price. The 3090 Model 150E includes the basic components, plus 16 integrated channels in the purchase price. The Honeywell system, besides the central processor, main memory, and buffer storage, includes an I/O Unit with 36 slots and a system control unit.

ADVANTAGES AND RESTRICTIONS

One of the biggest advantages of any Unisys (Burroughs) system is the MCP operating system, which consistently receives high ratings from the users of Unisys mainframes. Realizing that software is one of the biggest user investments, the vendor has maintained object code compatibility for customers upgrading from the B Series to the V 300 and the V 500 Series. V 310 users can increase their system's power over nine times by moving up from their entry-level system to the high-end Model V 530, with software, data files, peripheral subsystems, and communications networks intact, resulting in substantial savings. According to the vendor, the current V 300 Systems cannot be field upgraded to the new V 500 architecture, but the Model V 510 can be field upgraded to the Model V 530 by swapping processor boards and adding 40K bytes of cache memory. The V 500 Series provides efficiency in space with a footprint of only 19.8 square feet, and an improved cooling scheme which uses heat sinks directly clamped to the ECL-MCA II chip packages to effectively dissipate heat buildup.

USER REACTIONS

Fourteen Unisys V 300 Series users responded to Datapro's 1987 survey of general-purpose computer users. Eight respondents purchased their systems directly from the manufacturer, two systems were rented from the vendor, and ▷

▶ logic based upon an algorithm that predicts which path will be taken by a conditional branch in a program and then begins prefetching the applicable instructions. The Memory Control Module acts as an intermediary between the Fetch and Execute Modules and the Memory Modules.

The Maintenance Subsystem is an integral part of the V 300 System. When combined with special software and a display, it provides a central facility for performing confidence test routines on individual system components. The Maintenance Processor enables the V 300 System to diagnose itself and its environment. If a problem arises, the system can quickly detect, identify, and isolate the malfunction for fast correction. The Maintenance Processor monitors the status of the central processor as it performs each operation cycle and reports that condition to special field engineering software which determines if the central processor performed each operation cycle correctly.

The V 500 System Maintenance Subsystem provides for operator interface and system initialization in addition to maintenance and diagnostic facilities. The Maintenance Subsystem consists of five components: a B27 System that functions as the Maintenance Processor providing access to a broad range of hardware and software diagnostic tools; the System Maintenance Controller, which is responsible for diagnostic and operational interfaces between the Maintenance Processor and the other components of the V 500 System; the Environmental Control Module, which monitors and controls voltage, temperature, and air flow; the Remote Link feature, extending the capabilities of the Maintenance Processor to a remote support center; and a Maintenance Disk, which provides storage for system initialization files, diagnostic and confidence test routines, processor performance and fault data.

SPECIAL FEATURES: The performance feature Qwik Disk enables a defined area of main memory to be declared as a fast disk device. With the Qwik Disk feature, total memory is divided into one area addressable by the operating system and user programs and another area being defined as Qwik Disk. A Qwik Disk memory area appears to the system and the I/O processor as a 100-byte sector disk subsystem. Firmware in the I/O processor will allow an I/O ▶

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four users leased their computers from a third-party vendor. Seven respondents upgraded from older Burroughs systems and six were first-time Unisys V 300 Systems users. The V 300 Systems were operating in a wide variety of installations: financial institutions, government, service bureaus, and retail and manufacturing firms. The principal applications were accounting and billing; banking and check processing; payroll/personnel; order processing and inventory; sales and distribution; and mathematics/statistics.

Five respondents already had the new MCP/VS Release 1.0 operating system installed. And the exclusive programming language was Cobol. The Data Base Management System DMS II was used by only six users, and was rated Good to Excellent for Overall satisfaction and Ease of installation and use by three respondents; the other three respondents gave a rating of Fair to Good to DMS II.

Nine respondents had implemented a disaster recovery plan, while one was in the planning stage. Five users had established an information center, and two users were planning such a center during 1987. When asked about plans concerning future acquisitions, most users listed additional hardware and data communications facilities, as well as software from the manufacturer or other suppliers as priorities for 1987.

As part of the survey, users were asked to rate their computer systems on a scale from Excellent to Poor. A weighted average was then calculated based on the total responses. The users were very satisfied with the MCP operating system and the reliability of the V Series. But again this year, as usual, the areas of Troubleshooting, Education, and Documentation drew complaints from the users. The ratings of the V 300 Systems are summarized in the following table.

	Excellent	Good	Fair	Poor	WA*
Ease of operation	6	8	0	0	3.43
Reliability of system	9	5	0	0	3.64
Reliability of peripherals	1	11	2	0	2.93
Maintenance service:					
Responsiveness	6	7	0	1	3.46
Effectiveness	5	8	1	0	3.29
Technical support:					
Troubleshooting	1	11	1	1	2.86
Education	0	11	2	1	2.71
Documentation	1	6	7	0	2.57
Manufacturers software:					
Operating system	8	6	0	0	3.57
Compiler & assemblers	4	10	0	0	3.29
Application programs	0	6	6	2	2.50
Ease of programming	5	6	1	2	3.33
Ease of conversion	6	6	0	2	3.50
Overall satisfaction	4	8	0	2	3.33

*Weighted Average on a scale of 4.0 for Excellent.

When asked if their computer system performed as expected, all 14 respondents said "Yes," and 13 users would recommend their system to other users, while one respondent was undecided. □

request to directly interface Qwik Disk. This enables an I/O access to Qwik Disk to be completed at memory access speeds and virtually eliminates the I/O wait time associated with current disk technology.

The Shared System Processor (SSP) allows a combination of B 2900, B 3900, B 4900, and V Series systems processors to be linked together to provide for the concurrent access of the same disk files by different programs executing in one to four central systems. Qwik Disk files cannot be shared in a multiple system environment. Each system in a shared system environment can use Qwik Disk, but those files can only be accessed by their associated processor.

The Inter-System Control (ISC) is an input/output channel connection between any number of systems communicating through the use of Burroughs Network Architecture (BNA) or Cobol 74 extensions. Multiple processors operating under independent operating systems and communicating via ISC provide a processing environment which acts as a single system resource.

PHYSICAL SPECIFICATIONS: The dimensions for the V Series systems and optional cabinets are listed in the following chart.

	Width (in.)	Ht. (in.)	Depth (in.)	Wt. (lb.)
V 310-1/V 310-2	67.5	44	29	—
V 340/V 380	67.5	44	29	—
V 510/V 530	90.0	58	32	—
Extension Cabinet	45.0	44	29	—
I/O Cabinet	29.0	44	29	—

Power requirements for a basic V 300 CPU cabinet are 200 to 240 volts, single-phase, 70 amp. Heat dissipation is 20,000 Btu per hour. Power requirements for the extension cabinet are the same as the basic CPU with heat dissipation of only 10,000 Btu per hour.

Electrical requirements for a basic V 500 CPU cabinet are 200 to 240 volts, three-phase, 30 amp per phase. Power consumption is 13 kVA and heat dissipation is 26,960 Btu per hour. The I/O cabinet has a power consumption of 3 kVA and requires 200 to 240 volts, single-phase, 15 amp service. Heat dissipation is 7,700 Btu per hour.

CONFIGURATION RULES

The Model V 310-1 consists of one central processor with 5 megabytes of main memory, one I/O cabinet with one Data Link Processor (DLP) base, one console DLP, and one operator display terminal.

The Model V 310-2 includes one central processor with 10 megabytes of main memory, one I/O cabinet with one DLP base and one additional DLP base, one console DLP, and one operator display terminal.

The Model V 340 consists of one central processor with 10 megabytes of main memory, one I/O processor module, one I/O cabinet with three DLP bases, one console DLP, two host transfer DLPs, one printer DLP, and one operator display terminal.

The Model V 380 includes one central processor with 10 megabytes of main memory, two I/O processor modules, one I/O cabinet with three DLP bases, one console DLP, two host transfer DLPs, one printer DLP, and one operator display terminal.

The Model V 510 consists of one central processor with 20 megabytes of main memory, one I/O cabinet with two DLP bases, one Data Transfer Module, one maintenance processor console, and an operator display terminal.

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▶ The Model V 530 includes one central processor with 40 megabytes of main memory and 40K bytes of cache memory, two I/O cabinets with four DLP bases, two Data Transfer Modules, one maintenance processor console, and an operator display terminal.

INPUT/OUTPUT CONTROL

The V 300 Input/Output Processor (IOP) and the V 500 Data Transfer Module (DTM) perform identical I/O functions. The IOP/DTM transfer data between memory and peripherals concurrently and independently of the central processor, thereby increasing throughput. The IOP/DTM also manage up to 32 separate I/O channels on the V 310, V 340, and V 510 Systems, and up to 64 separate I/O channels on the V 380 and V 530 Systems. The IOP/DTM interface to the peripheral subsystem through microprogrammed DLPs. Each DLP manages data transfer between peripherals and the central system. While a single DLP can drive a peripheral device, multiple DLPs can be attached to an individual subsystem to improve simultaneous data flow and reduce contention for peripherals. The DLPs contain integrated data buffers which can accommodate each peripheral family and efficiently transfer data through fixed record length blocks. Most DLPs have at least two data buffers. While one buffer is used by the sending device, the other buffer is unloading to the receiving device. The buffers are alternated until the entire message is received to minimize I/O interruption to the central system. Data transfer between DLPs and the central system is performed at a transfer rate of 8 megabytes per second on the V 310, V 340, and V 510 Systems and 16 megabytes per second on the V 380 and V 530 Systems.

MASS STORAGE

For information on disk devices for the V Series, please refer to Table 2.

INPUT/OUTPUT UNITS

Please refer to Table 3 for information about tape and printer products for the V Series.

TERMINALS

Terminals and workstations used with the V Series are listed in Table 4.

COMMUNICATIONS

A range of data communications options are available for the V Series to meet a variety of network requirements. The *Uniline DLP* is designed for installations needing limited data communications connections. It provides support for standard communication disciplines and terminal products on a single line. The *B 874 Communications Processor* is designed for smaller networks. It performs network management based on code and tables stored in local memory and may service up to 32 half-duplex lines. The *B 974 Communications Processor* for medium-scale networks provides up to three times the line connectivity of the B 874. Its multiprocessor design balances the processing work load throughout multiple processors. Should a configuration consist of many high-speed lines, the lines can be connected to different internal processors for increased throughput. The *CP 3682* and *CP 3682-1 Data Communications Processors* are designed for large-scale networks off-loading data communications, network generation, and network management functions from the host system and providing a comprehensive, fully integrated *CP 3682 Message Control System (MCS)*. The use of microprogrammed communications interfaces and front-end intelligence enables a single CP 3682 to simultaneously service up to four host processors. With the CP 3682, virtually any terminal can communicate with

virtually any application program in the multihost environment.

The *Peripheral Switch II* handles the switching of peripherals between up to four V Series and B Series systems.

SOFTWARE

OPERATING SYSTEM: The new V Series *Master Control Program (MCP/VS) Release 1.0 and Release 2.0* operating system is compatible with the current B 2900, B 3900, and B 4900 medium mainframes and also serves as a base for future system advances. The new MCP/VS carries forward all the capabilities of the previous operating system and supports several new features such as an on-line interactive debugging facility at both the program and MCPVS levels, automatic tailoring of input/output routines to specific DLPs, multithreading, and reentrance of operating system functions.

The MCP/VS consists of groups of routines organized in three-level, hierarchical fashion. The first level is a kernel routine that fields all interrupt signals and transfers control to the appropriate MCP/VS routines. The second-level routines handle the operating system's major task: dynamic resource allocation of main memory, disk storage, I/O devices, processors, and time among concurrently operating programs. The third-level routines handle utility functions such as job scheduling, control card interpretation, file control, library maintenance, etc. The multilevel MCP/VS also allows processing to continue while faulty hardware is being diagnosed or new system software is tested and debugged.

Jobs are submitted to the MCP/VS through the Operator Display Terminal (ODT) and/or the systems input unit, which can be a card unit or a disk or tape file performing as a "pseudocard unit." As the control statements for each task are analyzed, a partial stack is created on a schedule queue containing the estimated main memory requirements, the priority, the maximum amount of processing time and I/O time, the size and location of the file parameter block, the working storage stack size, and the size and location of code segments. The program scheduling priority ordinarily is specified by the programmer, although a default option automatically assigns a priority of one half the maximum allowable priority.

The MCP/VS maintains a queue of jobs available for initiation. A scheduling routine evaluates the equipment and priority requirements of the programs in the queue and schedules their execution so as to utilize the system's resources efficiently in a multiprogramming mode, using either single or multiple processors. The job sequence is dynamically rescheduled whenever a high-priority job is introduced into the schedule. When the required resources are available (for example, when a job completes processing or suspends itself to await completion of an input/output operation), an available job with the highest priority is added to the processing mix. Jobs submitted from remote terminals are interpreted and entered into the schedule queue and are added to the multiprogramming mix in much the same way as batch jobs.

The MCP/VS maintains control of tasks through the use of stacks, descriptors, and tables that summarize the history and current status of each task in process. A stack is assigned to each job in the system to provide storage for basic program and data references. When a task is activated, four high-speed registers are linked to the task's stack memory area. In addition, an area of high-speed local memory is available to contain additional portions of the active stack for fast access. The contents of the top-of-stack registers are maintained automatically by the central processor hardware according to the requirements of the execut- ▶

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TABLE 2. MASS STORAGE

MODEL	B 9484-12	B 9484-13	B 9494-10	MD4-4	B 9494-12
Cabinets per subsystem	2	2	2	2	1
Disk packs/HDAs per cabinet	1 Removable	1 Removable	2 Fixed	4 Winchester	1 Fixed
Capacity	252MB	252MB	1084MB	491.2MB	868MB
Tracks/segments per drive unit	—	—	—	—	—
Average seek time, msec.	20.2	20.2	21.7	21.7	7.7
Average access time, msec.	28.5	28.5	30	30	16
Average rotational delay, msec.	8.3	8.3	8.3	8.3	8.3
Data transfer rate, sec.	1.2MB	1.2MB	1.2MB	1.2MB	3MB
Controller model	B 9387-51 B 9387-52	B 9387-51 B 9387-52	B 9387-99	—	B 9399 B 9389
Comments	Requires V 304-91 DLP	Requires V 304-91 DLP	Requires V 304-91 DLP	Employs SMD interface	Requires V 304-91 DLP

▶ ing program. Central processors can handle multiple active stacks organized into a tree structure. The tree-structured organization allows program code and program data and variables to be described at different stack levels, thus permitting program code to be reentrant and shared. The tree-structured stack also enables a single task to split itself into two independent tasks by establishing a new link on the stack to make full use of a multiprocessor configuration or to multiprogram independent processes.

Both data and program segments are referenced through descriptors. A Data Descriptor is used to fetch data to the stack or to store data in a storage area outside the stack. Both the absolute address and the length of the data array are specified in the Data Descriptor, along with a Presence Bit which indicates whether the reference data is located in main memory or in disk storage. Segment Descriptors, maintained in a portion of the stack base known as the Segment Dictionary, are the basis for the Burroughs implementation of virtual memory. In contrast to the fixed-page concept utilized in many storage allocation schemes, Burroughs programs can be divided into variable-length segments, which are brought into main memory only as they are needed.

The dynamic memory allocation is a feature of the MCP/ VS. The compilers automatically divide all object programs into logical, relocatable segments. All object programs are reentrant because code is never modified during execution, and two or more jobs can concurrently make use of a single program segment residing in main memory. Program and data segments are automatically transferred from disk storage to main memory when needed. When necessary, the MCP automatically overlays these new segments over other program or data segments that have not been accessed recently. If the old segment contains modifiable data, it is written on a disk file prior to the overlay.

Main memory is allocated to programs in working sets, which represent the amount of memory each program most often requires during execution to process efficiently. The optimum working set size is calculated first by the compiler, and afterward it is recalculated by the MCP/VS each time the program is executed.

Communications between the system operator and the MCP/VS is accomplished through a combination of CRT display units, keyboards, control statements, and a comprehensive system log. The status of the system and of the jobs in progress is presented on the CRT displays. Messages and requests can be keyed by the operator, and the system responses are displayed on the ODT. Jobs are usually submitted to the system in the form of a set of control statements accompani ed by a source-language deck, or alternatively through control statements entered through the console keyboard if the programs have previously been compiled and stored on disk. Jobs to be compiled must be accompanied by a compile statement identifying the compiler to be used and specifying one of three types of compilations: compile and execute, compile for the library, or compile for the syntax. Optional control statements for all jobs contain an execute statement, process time statement, priority statement, core requirement statement, I/O time statement, and I/O statements which associate file labels with specific input/output devices.

Memory protection is provided by a combination of hardware and software features. Two registers associated with the stack mechanism, the Base of Stack register and the Stack Limit register, define the upper and lower limits of the stack. An interrupt is generated if an attempt is made to exceed these limits. When an element in a data array is referenced, an automatic comparison of the index value of the data element and the length of the data area as specified in the Data Descriptor identifies any attempt by a program to reference beyond its designated data area. In addition, control bits in each word prevent a user program from altering program segments, data descriptors, segment descriptors, memory links, control words, and tables maintained by the MCP/VS.

The MCP/VS provides comprehensive input/output and file control facilities. It automatically assigns peripheral devices to symbolic files whenever possible, to minimize operator intervention. Three tables are maintained by the operating system containing label equation and file attribute information such as the access type, peripheral type, and physical unit being used. This allows modification of file specifications at program execution time. Blocking, buffering, label checking, and other standard I/O control functions are performed in accordance with the programmer's specifications. Magnetic tape drives or disk files can be used as backup or "pseudodevices" for card readers, punches, and printer. This makes it unnecessary to delay the processing of a job because a particular I/O unit is not available.

Work Flow Management is an MCP/VS facility that provides enhanced facilities for control of task initiation and resource allocation. The *Work Flow Language (WFL)* enables users to describe each job as a network of interrelated tasks. The WFL compiler accepts these control statements as input and generates machine code to control the tasks within each job as the user prescribes. Facilities provided by the Work Flow Management System include sequencing and synchronizing of related tasks via input from control statements, improved consistency in task restarts after system failures, job summary printouts, multiple job scheduling queues for different levels of service, interfaces for installation-tailored system control programs, and accounting records grouped by job.

PROGRAMMING LANGUAGES: Languages supported on the V Series are Algol, Basic, ANSI Cobol 74 and Cobol 68, Fortran 77, Pascal, BPL, EPLX, and RPG II. ▶

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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.
B 9495-82	9	1600	PE	75	120,000
B 9495-83	9	1600	PE	125	200,000
B 9495-88	9	1600	PE	50	8,000
B 9495-32	9	1600	PE	75	120,000
	9	6250	GCR	75	470,000
B 9495-33	9	1600	PE	125	200,000
	9	6250	GCR	125	780,000
B 9495-24	9	1600	PE	200	320,000
	9	6250	GCR	200	1,250,000
B 9498	9	—	PE	25	40,000

Printers	Printing Speed	Print Positions	Horizontal Spacing, Chars./Inch	Vertical Spacing, Lines/Inch	Form Size, Inches
B 9246-6	650 lpm	132	10	6 or 8	4 to 20 in. wide
B 9246-12	1250 lpm	132	10	6 or 8	15 in. wide
B 9246-21	2000 lpm	132	10	6 or 8	15 in. wide

► DATA BASE MANAGEMENT: *DMS II* is a comprehensive Data Base Management System integrated with the operating system which uses MCP/VS facilities for accessing records in the data base to achieve greater run-time efficiency. Through the MCP/VS facilities, the DMS II data base can be accessed by applications programs operating in multiple processing environments, such as batch, remote job entry, time-sharing, and transaction processing. DMS II incorporates a Data and Structure Definition Language (DASDL) that provides for the logical description of data in sets or subsets and for mapping the logical data into physical structures. A variety of retrieval methods are supported, including indexed sequential, indexed random, and bit vectors. The latter method creates indices that require small amounts of disk storage and permit very fast searches.

DMS II permits multiple indices to be established for accessing a file, and each file can be accessed by any of the available access methods to provide retrieval of information by different applications programs. User-language interfaces to the data management system are provided for the Cobol, Algol, RPG, and PL/1 languages. When multiple programs are accessing the data base, DMS II provides lockout protection at the record level to prevent simultaneous updating of a record. DMS II recovery capabilities include the ability to audit transactions as they are referenced or added to the data base and a checkpoint/restart capability. A recovery utility is automatically initiated by the operating system in the event of system failure to effect recovery of the data base and restart of applications programs. In addition, DMS II permits the data base to be dumped concurrently with updates to the files, so that dumps correspond to the current audit trail.

DMS Inquiry is an optional extension of DMS II and provides an easy-to-use language that enables non-EDP personnel to access the data base via remote terminals. Users can "browse" through information stored in the data base and retrieve it either serially or randomly, without the delays normally associated with programming and debugging an inquiry program. Users with appropriate security clearances can also update information in the data base and add new records or delete existing records. The DMS II audit trail captures a record of all data base maintenance functions to facilitate automatic recovery.

DATA MANAGEMENT: Included in DMS II described above.

DATA COMMUNICATIONS: The special-purpose programming tool *Network Definition Language (NDL)* enables users to define and generate customized Network Control programs for data communications applications. The Network Controller handles line disciplines, buffer management, message queuing, auditing, and supervises the flow of messages between user-coded programs and remote terminals. This enables the user's application programs to deal with remote terminals in the same manner as with conventional on-site peripheral devices. After the programmer defines the custom Network Controller in the NDL syntax, the source statements are processed by the NDL Compiler and converted into the necessary object code and table for the B 874 Systems and Communications Processor.

The software system *Generalized Message Control System (Gemcos)* generates an installation-defined Message Control System (MCS) that manages a transaction-oriented communications network, provides security, handles transaction routing, controls message formatting, and provides a transaction processing interface for application programs. All transaction terminals in the network are controlled by the Gemcos-created MCS and interfaced to the applications programs and the data base. Gemcos enables users to develop transaction processing applications programs independently of the network environment. The input to Gemcos is coded in the Transaction Control Language, a descriptive, free-form language that uses key words to describe both the network environment and the requirements for message routing, message formats, access control, and recovery.

Remote Job Entry (RJE) enables users at remote batch terminals to enter jobs into the computer system in the same manner as if they were on-site in the computer room. RJE allows files to be transferred between remote systems, and enables terminals attached to remote systems to be controlled by the host system.

Burroughs Network Architecture (BNA) software is designed to enhance the interaction of terminals with host CPUs in a network environment. BNA is also designed to facilitate a move into distributed data processing. Through the BNA Architecture, Burroughs processors and terminals can be granted access to data bases throughout a network. Job tasks and information files can be transferred from one point to another, and data processing resources available in a network can be shared among participants regardless of ►

Unisys V Series

▶ location. BNA works with existing Burroughs terminal networks and with the Global Memory multiprocessing facility available on Burroughs large-scale processors. BNA depends on logical links rather than physical links, relying on network tables maintained in the host processor for routing. All routing is through host mainframes. Services provided by BNA include those designated host, and those designated network. Host services include coordination of communication between tasks being executed at various hosts; control of the creation, updating, and transfer of data from host to host; and handling of communication with logical points within the network. Network services perform message routing, linking hosts using the Burroughs Data Link Control (BDLC) bit-oriented protocol. Network services also permit connection of Burroughs processors to packet-switching services using X.25 procedures. Links can also be established to non-Burroughs machines using software such as NDL.

PROGRAM DEVELOPMENT: The *Logic and Information Network Compiler (Linc II)* is a fourth-generation programming language which generates complete on-line, realtime systems, including programs, data base descriptions, screen formats, transaction management, and network management. Where possible, the Linc II Interactive System utilizes menu and checklist formats to provide user guidance in the development process. The central menu is referred to as the Activities Menu and provides access to all areas within the Interactive System. All documentation for Linc II will be available on-line in the Linc II Interactive System. The Linc II Data Dictionary facility provides for the user a new level of project control when developing Linc II applications, and allows the user to specify common data items and their characteristics to ensure consistency whenever those data items are used in Linc II-developed applications. There are two levels within the Data Dictionary facility. The Global level is for data items to be used across multiple Linc II applications, and the Local level is for single Linc II applications. Using Linc II, all screen and report formats are built through an interactive painting process. This process permits a screen or report format to be developed and displayed without requiring a generation, but a generation is still required to put the form into production. The Linc II enhanced generation process using the interactive syntax checking, and screen and report painting features will significantly reduce the previous Linc generation times as well as the number of generations necessary to create the production version. The Linc II Logic Editor is used to enter the specifications for global logic, global setup data items, keywords, profiles, teach/help text for a screen format, and all types of on-line and report logic. Linc II command syntax convention is still required by the Linc II Editor. As a page of logic is entered and the screen is transmitted, the Editor will verify all information for syntax errors and return the page with any errors highlighted. Temporary memory areas may be defined within the Editor to allow the user to store commonly used logic. Up to nine temporary memory areas can be used with each area allowing 23 lines of stored logic. The *Query Mode* facility allows a user to perform generalized interrogations about a Linc II application specification. Essentially, Query provides a higher level "where used" capability which aids the user in remembering particular naming conventions devised for a Linc II application.

The *Command and Edit (Cande)* program enables multiple users at remote terminals to create programs or data files, compile and execute programs, edit and alter programs or files, search files, send messages to other terminals, and perform a variety of other functions. Files created through Cande can be saved and used later by the same user or by other users to whom access is granted. Cande provides the capability for interactive program development and testing concurrently with the execution of application programs. It also provides effective control of the access, security, and charging functions in a computer time-sharing network.

The *Programmer Productivity System (Props)* is an on-line interactive facility for programmers to initiate and complete an entire program development process, including program creation, compilation, source file editing, interactive debugging, output examination, and on-line document retrieval from a single terminal.

The *Screen Design Facility (SDF)* features both screen painting facilities and data entry functions such as field verification, status checking, required field, and many more.

UTILITIES: Standard utility functions provided with the MCP/VS include library maintenance; system log maintenance; conversion of data files from one format to another; and set/change program priorities for processor, memory, and scheduling before or during program scheduling and execution.

The B 1000 Migration Aids include the following utilities: *SSCOPY, SSNAME, MSCOPY, MIGR/ISAM, IS-MUTL, COFLTR,* and *RPGFLT.*

OTHER SOFTWARE: The *Functional Logical Analysis of Machine Effiency (Flame)* is a performance evaluation tool designed to measure both hardware and software performance. Flame collects raw data at specified intervals and writes it out to magnetic tape or disk for subsequent processing by the *Flamer* report program. Additional program modules provide supplementary reports, report summaries, special versions of the System Run Log, disk utilization analysis, and realtime monitoring of the V Series systems.

The *Time Analysis and Billing System II (TABS II)* utilizes the MCP/VS-created system log to analyze computer usage and disburse the costs of the computer and related services according to a hierarchy of charge numbers. The system consists of a series of daily programs that analyze central processor, peripheral, and main memory utilization; multiprogramming performance; and the total number of program executions and time accumulated by each charge number.

Reporter III provides an effective method to retrieve, analyze, and report on information maintained in the system. Reporter III accepts specifications coded in a free-form report description language and generates a Cobol program tailored to produce the required report. The system can retrieve input data from multiple files and/or DMS II data bases, select data based on a wide range of criteria, perform arithmetic and statistical functions, sort data in ascending or descending order according to multiple keys, control access through a password system, produce automatically formatted reports, and create one or more files of extracted data for subsequent processing or reporting. *On-Line Reporter III* is a separate module which provides the ability to enter, generate, compile, and execute report programs from remote terminals.

The *On-Line Data Entry System (Odesy)* is a sophisticated data entry and validation system using multiple on-line visual display units. Odesy provides a generalized and generative "front end" for the existing application packages, and future packages can be designed to its extensive editing facilities and thus reduce development effort by virtually eliminating conventional input control programs. Because of these editing facilities, Odesy is able to produce batches of essentially error-free data for input to application programs.

Host-Link allows users of intelligent workstations such as the ET 2000 to access and utilize host resources. These may be devices directly connected to the host, devices within the host data communication network, or peripherals attached to other intelligent workstations. Host-Link consists of two distinct sets of software and is designed to operate on Unisys (Burroughs) mainframes. The first set of software called Host-Link Client, resides on the ET 2000 and operates ▶

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TABLE 4. TERMINALS

MODEL	ET 1100	ET 2150	B 25
DISPLAY PARAMETERS			
Max. chars./screen	2,080	2,080	—
Screen size (lines x chars.)	24 x 80	24 x 80	29 x 80
Symbol formation	7 x 9 dot matrix	7 x 9 dot matrix	9 x 12
Character phosphor	P39 green	P39 green	P31 green
Total colors/no. simult. displayed	—	—	—
KEYBOARD PARAMETERS			
Style	Typewriter	Typewriter	Typewriter
Character/code set	128 ASCII	128 ASCII	128 ASCII
Detachable	Standard	Standard	Standard
Program function keys	10	10	10
OTHER FEATURES			
Buffer capacity	512K	512K	256K
Tilt/swivel	Standard	Standard	Standard
Graphics capability	No	Yes	No
TERMINAL INTERFACE	RS-232-C, TDI	RS-232-C, TDI	RS-232-C, RS-422, Centronics, parallel

► under MS-DOS. It contains a complete set of programs to manage the ET 2000 part of the connection. The second set of software, called Host-Link Server, resides on the mainframe and is responsible for maintaining all aspects of the system. The major function of Host-Link Server is to provide the various file and device handling services to the ET 2000 Systems in the network.

The *Data Transfer System (DTS)* transmits business information between V Systems and B 20 microcomputers and provides access to sequential files on the mainframe for both input and output transfers.

The *Intelligent Workstation Editor II (IWE II)* is an on-line, interactive program development tool, designed to enhance programmer productivity. Multiple functions can be performed simultaneously in a host-based or shared-resource environment.

PRICING AND SUPPORT

POLICY: The V Series is available for purchase or lease under a one-year, two-year, or five-year lease agreement. The standard lease agreement entitles the customer to unlimited use of the equipment and includes full-time equipment maintenance coverage (24 hours/day, 7 days/week). The standard maintenance agreement for purchased systems covers maintenance of the equipment for eight consecutive hours per day on Monday through Friday only; extended maintenance is available at higher rates.

All maintenance charges listed in this report are for monthly maintenance Metro 1 (city) plan A.

All lease plans may include purchase options that allow 50 percent of the rental paid during the first 36 months to be applied toward the purchase price at any time during the lease period.

SUPPORT: Users can purchase the Unisys (Burroughs) Product Service Agreement (PSA) which provides various Support Service packages. The availability of a particular service package is product dependent. Generally, PSAs provide for ongoing program product service and/or field service. Program product service deals with corrections by the program product design facility. Field service provides program product problem identification assistance via telephone and/or on-site. Five service packages (PSAs) are defined: Software Product Support (PSA 1) for computers and customers who will not require on-site program product problem assistance; Extended Software Product Support (PSA 2) for computers and customers who will require on-

site program product problem assistance; Centralized Software Product Support (PSA 3) for selected program products where only telephone service is needed; Software Product Assistance (PSA 4) for micro and PC products only; and Basic Software Product Support (PSA 5) for certain products for which telephone and on-call services are not generally available.

Mainframe computer systems will be supported from a hardware and operating system (MCP/VS) standpoint for at least seven years from date of last manufacture. Reworked, refurbished, and remarketed models are guaranteed support from a hardware and operating system (MCP/VS) standpoint for a period of five years from date of delivery. Notification of termination of either hardware or MCP/VS support, or both, will be provided at least 24 months in advance of such termination. Unisys will support the current and immediately proceeding version of each major release of the operatilng system and utilities.

All software is unbundled. Program products for the V Series are offered under a plan which provides for the use of the products on a designated system on a month-to-month basis.

EDUCATION: Users can obtain the necessary training by paying for individual courses. The currently available courses range from 1 to 10 days in length, and fall into the following broad categories: Systems Management and Operations, Control Systems, Network Systems, Data Base Systems, Programming Systems, and Applications.

TYPICAL CONFIGURATION: The following systems illustrate three different V Series configurations. They include all necessary hardware, but no software.

V 310:

One central processor with 5MB memory, 1 I/O processor module, 1 I/O cabinet with 1 DLP base, 1 console DLP, 1 operator display terminal	$160,400
1 B9494 disk drive (868MB)	34,450
2 B9495-33/B9499-22 GCR tape units and controller	104,288
1 B9246-21 line printer (2000 lpm)	40,000
1 B874 communications processor with 32-line adapter cluster	23,200
1 communications processor DLP	3,396
6 ET2150 workstations	12,570
TOTAL PURCHASE PRICE:	**$378,304** ►

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▶ **V 380:**

One central processor with 10MB memory, 2 I/O processor modules, 1 I/O cabinet with 3 DLP bases, 1 console, 2 disk packs DLP. 1 line printer DLP, Qwik Disk feature, 1 operator terminal	$457,000
10MB memory increment	100,000
4 868MB fixed disk drives	128,880
1 B9399 dual string controller	26,100
1 B9380 dual storage controller	53,600
4 B9495-33/B9499-22 GCR tape units and controller	270,244
2 B9246-21 line printer (2000 lpm)	80,000
1 B974-6 communications processor, with 1 to 96 data communications lines, includes B974 DLP	67,756
18 ET2150 workstations	62,910
TOTAL PURCHASE PRICE:	**$1,246,490**

V 530:

One central processor with 40MB memory, 2 data transfer modules, 2 I/O cabinets with 4 I/O bases, 1 maintenance processor console, 1 operator terminal	$1,770,000
2 20MB memory increments	280,000
6 B9494 disk drives (868MB)	211,180
2 B9399 dual string controller	52,200
2 B9380 dual storage controller	107,200
8 B9495-33/B9499-22 GCR tape units and controller	237,288
2 X304-90 disk drive DLPs	9,240
5 B9246-21 line printer (2000 lpm)	200,000
5 X246-96 printer/tape DLP	25,000
1 B974-6 communications processor, with 1 to 96 data communications lines, includes B974 DLP	67,756
50 ET2150 workstations	104,750
TOTAL PURCHASE PRICE:	**$3,064,614**

EQUIPMENT PRICES

		Purchase Price ($)	Monthly Maint.* ($)	1-Year Lease** ($)	5-Year Lease** ($)
PROCESSORS AND MAIN MEMORY					
V 310-1	Basic system; one central processor, 5MB main memory, one I/O cabinet with one DLP base, one console DLP, one freestanding operator display terminal, and one 15 ft. ODT cable	160,400	1,150.00	9,702	7,372
V 310-2	Basic system; one central processor, 10MB main memory, one I/O cabinet with one DLP base, one 1st additional DLP base, one console DLP, one freestanding operator display terminal, and one 15 ft. ODT cable	210,000	1,282.00	12,397	9,337
V 340	Basic system; one central processor, 10MB main memory, one I/O processor module, one I/O cabinet with three DLP bases, one console DLP, two host transfer sequential/interlaced DLPs, one printer DLP, one freestanding display terminal, and one 15 ft. ODT cable	254,000	1,404.00	20,378	15,041
V 380	Basic system; one central processor, 10MB main memory, two I/O processor modules, one I/O cabinet with three DLP bases, one console DLP, two host transfer sequential/interlaced DLPs, one printer DLP, one freestanding display terminal, and one 15 ft. ODT cable	450,000	1,520.00	36,044	26,186
V 510	Basic system; one central processor, 20MB main memory, one data transfer module, one I/O cabinet with two DLP bases, one maintenance processor console, and one operator display terminal	950,000	2,400.00	51,052	39,177
V 530	Basic system; one central processor, 40MB main memory, 40K-bytes cache, two data transfer modules, two I/O cabinets with four DLP bases, one maintenance processor console, and one operator display terminal	1,770,000	3,100.00	93,338	71,150
V 362	10MB to 15MB Memory Increment	60,000	100.00	3,148	2,273
V 363	10MB to 20MB Memory Increment	100,000	200.00	5,266	3,808
V 364	15MB to 20MB Memory Increment	50,000	100.00	2,648	1,919
SYSTEM OPTIONS					
V 323	B 4925 to V 340 Upgrade; includes one I/O processor upgrade and one backplane upgrade	140,000	—	7,638	5,410
V 333	B 4955 to V 380 Upgrade; includes one I/O processor upgrade and one backplane upgrade	140,000	—	7,638	5,410
V 343	B 4925 to V 380 Upgrade; includes ibe I/O processor upgrade and one backplane upgrade	395,000	—	21,509	15,260
V 312	V 310 to V 340 Upgrade Kit; (V 310 must have minimum of 10MB memory and three DLP bases)	160,000	90.00	8,133	5,803
V 309-91	First Additional DLP Base; (V 310 only)	15,000	32.00	797	582
V 309-92	Second Additional DLP Base: (V 310 only)	15,000	32.00	797	582
V 352	V 340 to V 380 Upgrade	345,000	—	18,630	13,196
V 395-95	First Expansion Cabinet with one DLP base	51,100	72.50	2,261	1,871
V 395-96	Second Expansion Cabinet with one DLP base	51,000	72.50	2,261	1,871
V 309-94	First Add-On DLP Base for first expansion cabinet	15,000	32.00	835	565

*For five-day, 8-hour service.
**Includes 7-day, 24-hour maintenance coverage.
NC—No charge.

▶

Unisys V Series

EQUIPMENT PRICES

		Purchase Price ($)	Monthly Maint.* ($)	1-Year Lease** ($)	5-Year Lease** ($)
SYSTEM OPTIONS (Continued)					
V 309-95	Second Add-On DLP Base for first expansion cabinet	15,000	32.00	836	566
V 309-97	First Add-On DLP Base for second expansion cabinet	15,000	32.00	836	566
V 395-60	V 300 Expansion Cabinet Panel Upgrade	1,995	—	115	80
V 312-BPU	Backplane Upgrade	2,550	—	156	113
V 312-IOU	I/O Processor Upgrade	14,850	—	874	621
B 9321-5	Hub 16; (includes 2 port capability)	5,985	61.50	400	309
B 9321-6	Hub Expansion; (provides additional 1 port capability)	735	6.50	49	39
B 9321-9	Hub Independent Auxiliary Cabinet; (required for Hub 16)	30,135	146.00	1,770	1,318
DATA LINK PROCESSORS					
X 320-2	Inter System Connect (ISC) DLP/B974 (for A 15IIC/II2)	12,495	70.00	741	554
X 304-95	SMD DLP II	9,345	49.00	555	435
X 304-96	SMD DLP II; (100 bytes)	9,345	49.00	555	435
X 304-97	XSMD DLP	14,500	49.00	816	631
X 304-99	SMD Expander	1,890	19.00	115	88
X 246-96	Printer/Tape DLP	5,000	34.00	300	238
V 351-94	Universal Uniline/ODT DLP	4,443	45.00	233	209
X 110-90	BCL Card Reader DLP	3,700	46.00	231	193
V 337-90	Reader Sorter DLP-3	8,409	60.00	355	311
V 338-90	Reader Sorter DLP-3	9,702	60.00	407	355
X 112-90	BCL Card Punch DLP	3,700	46.00	231	193
X 246-91	Printer DLP; (B9246-10/12)	4,725	46.00	268	220
X 246-92	Printer DLP; (B9246-21)	4,725	46.00	268	220
X 247-93	Printer DLP; (B9247-14/15)	5,433	46.00	166	144
X 247-91	Printer DLP; (B9247-13/16)	5,433	46.00	166	144
X 293-30	Nonimpact Printer DLP	4,725	46.00	268	220
X 393-90	NRZ Magnetic Tape DLP	7,560	46.00	379	301
X 395-91	PE Magnetic Tape DLP	7,560	46.00	379	301
X 395-92	GCR/PE Magnetic Tape DLP	7,560	46.00	379	301
X304-90M	Disk Pack Drive DLP (medium systems)	4,851	46.00	209	182
X 304-91	Host Transfer Dequential/Interlaced DLP	7,560	46.00	379	301
V 373-90	Disk File DLP-3 (B9470)	4,620	50.50	217	190
V 303-90	Systems Communications Processor DLP-2 (B874)	3,396	41,50	160	143
X 368-90	CP3680 DLP	4,851	58.00	205	179
X 376-95	Shared System Processor DLP	13,230	75.00	621	491
Shared System Processor					
X 376-94	Host Interface Adapter	2,717	35.00	135	123
X 376-96	Port Interface Adapter	2,717	35.00	135	123
Peripheral Switch II					
B 9420-1	Peripheral Switch II (B 9190-1/2, B 9290-30)	4,200	34.00	274	212
B 9420-1U	Peripheral Switch II upgrade kit (B 9220-1/2, B 9195, B 9290-30)	3,675	26.50	234	179
B 9420-2	Peripheral Switch II (B 9246-6/12/20/21)	4,200	34.00	274	212
B 9420-2U	Peripheral Switch II upgrade kit (B 9246-6/12/20/21)	3,675	26.50	234	179
B 9420-3	Peripheral Switch II (B 9247-15, B 9116, B 9212/13)	4,200	34.00	274	212
B 9420-3U	Peripheral Switch II upgrade kit (B 9247-15, B 9116, B 9212/13)	3,675	26.50	234	179
B 9420-DC	Data Communications Kit for up to three master switch units	1,837	8.50	111	83
B 9420-DCU	Data Communications Upgrade for each add-on Peripheral Switch II master switch unit	367	2.00	25	20
MASS STORAGE					
B 9484-12	Removable Disk Pack Drive; 252 megabytes, single spindle	33,000	137.00	1,550	1,298
B 9484-13	Removable Disk Drive; 252 megabytes	33,000	127.50	1,539	1,150
B 9494-10I	Fixed Disk Drive; 1048 megabytes, dual spindle interlaced	50,400	220.00	3,131	2,345
B 9494-10S	Fixed Disk Drive; 1084 megabytes, dual spindle sequential	60,000	210.00	3,658	2,746
B 9494-12	Fixed Disk Drive; 868 megabytes, single spindle, thin-film head	34,450	120.00	—	1,495
B 9387-51C	Controller; 1 x 8 spindle, one interface, cable, I/O databus kit	15,750	71.00	747	563
B 9387-52C	Controller; 2 x 8 spindle, two interfaces, cables, I/O databus kits	21,000	105.00	990	742
B 9389	Dual Storage Controller	53,600	176.00	—	2,448
B 9389-DH	Dual Host Option	5,450	19.00	—	251
B 9399	Dual String Controller	26,100	85.00	—	1,192

*For five-day, 8-hour service.
**Includes 7-day, 24-hour maintenance coverage.
NC—No charge.

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EQUIPMENT PRICES

		Purchase Price ($)	Monthly Maint.* ($)	1-Year Lease** ($)	5-Year Lease** ($)
MAGNETIC TAPE UNITS					
B 9495-82	Magnetic Tape Unit; 75 ips, 120KB, PE only	16,000	186.00	797	626
B 9495-83	Magnetic Tape Unit; 125 ips, 200KB, PE only	22,447	173.00	926	724
B 9495-32	Magnetic Tape Drive; 75 ips, 470/120KB, GCR/PE	17,750	197.00	992	713
B 9495-33	Magnetic Tape Drive; 125 ips, 780/200KB, GCR/PE	19,000	208.00	1,126	806
B 9495-24	Magnetic Tape Drive; 200 ips, 1250/320KB, GCR/PE	36,225	294.00	1,417	1,143
B 9499-22	Controller; 2 x 8, GCR/PE, includes with two signal and one communications cable	85,288	535.00	3,185	2,539
B 9499-42	GCR/PE Exchange; 2 x 16, for B 9499-22, one communications cable	7,571	30.00	306	239
PUNCH CARD EQUIPMENT					
B 9116	Card Reader; 600 cpm, 80 column	11,372	118.00	511	400
B 9113	Card Punch; 300 cpm	31,085	583.00	1,351	1,097
PRINTERS					
B 9246-12	Band Printer; 1250 lpm, with HSS interface	44,625	440.00	1,745	1,448
B 9246-21	Train Printer; 2000 lpm, wilth HSS interface	40,000	779.00	3,488	2,840
COMMUNICATIONS					
B 874-4	Systems and Communications Processor; includes microprogrammed 4.0MHz processor, 16,384 bytes control storage, integrated host interface, 32 apter cluster	23,200	260.00	1,530	1,192
B 974-CP	Communications Processor System; includes cabinet, 64KB memory, inbuilt disk, dual adapters, ISC local Hub and adapter cable, B 974 DLP, dual channel port kit, extended backplane	64,530	420.00	3,849	2,908
CP 3682	Data Communications System; includes one processor, system cabinet, firmware set, 512KB memory, 20MB disk cartridge subsystem with interface, realtime clock, dual channel port controller, diagnostic modem and adapter	56,513	551.00	2,923	2,301
TERMINALS					
ET 1100	Terminal Workstation; 14-inch, with keyboard, RS-232-C/TDI data communications	1,659	21.50	113	85
ET 2150	Terminal Workstation; 14-inch, monochrome, with keyboard, bit-mapped graphic capabilities, 512K-bit RAM	2.095	27.00	237	191
B 25	Workstation; 12-inch, monochrome, with keyboard, 80186 processor, 256K-bit, RAM.	3,060	30.00	—	—

*For five-day, 8-hour service.
**Includes 7-day, 24-hour maintenance coverage.
NC—No charge.

SOFTWARE PRICES

		Limited Time-Plan	Annual Product Service Agreements	
		Monthly License Fee ($)	PSA 2 ($)	PSA 1 ($)
Product Description				
V 310 SSF	Software Facility includes one Master Control Program MCP/VS, one Data Communications option, utilities, Workflow Language (WFL), Program Binder (BND), SMF II Site Analysis (SMS)	800	3,840	1,560
V 340 SSF	Software Facility includes one Master Control Program MCP/VS, one Data Communications option, utilities, Workflow Language (WFL), Program Binder (BND), SMF II Site Analysis (SMS)	1,220	5,520	2,525
V 380 SSF	Software Facility includes one Master Control Program MCP/VS, one Data Communications option, utilities, Workflow Language (WFL), Program Binder (BND), SMF II Site Analysis (SMS)	1,320	5,520	2,525
V 510 SSF	Software Facility includes one Master Control Program MCP/VS, utilities, Workflow Language (WFL), Program Binder (BND), SMF II Site Analysis (SMS)	2,000	8,160	3,840

*Six months' allowance for use of this software, excluding PSA.

Unisys V Series

SOFTWARE PRICES

		Limited Time-Plan	Annual Product Service Agreements	
		Monthly License Fee ($)	PSA 2 ($)	PSA 1 ($)

Product Description (Continued)

V 530 SSF	Software Facility iIncludes one Master Control Program MCP/VS, utilities, Workflow Language (WFL), Program Binder (BND), SMF II Site Analysis (SMS)	3,150	12,852	6,048
V 300 DCC	Development Center-Cobol includes Cobol 74 compiler (COB), Props (WPC), Screen Design Facility (SDF), Data Management System II (DM2), DMS II Inquiry (DM1)	1,620	9,145	4,954
V 300 DCR	Development Center-RPG II includes RPG II compiler (RPG), Interactive RPG Utility (IRP), Screen Design Facility (SDF), Data Management System II (DM2), DMS II Inquiry (DM1)	730	5,255	3,044
V 300 DCL	Development Center-Linc II includes Cobol 74 compiler (COB), Linc II (LN2), Data Management System II (DM2), DMS II Inquiry (DM1)	2,650	21,825	11,034
V 300 IPF	Image Printer Facility includes VSID Protocols, IP Diagnostics, Forms Manager, Print Utility, Basic Font Library	160	850	425
V 300 COB	Cobol 74 Compiler	121	690	399
V 300 RGP	RPG II Compiler	121	690	399
V 300 FR1	Fortran 77 Compiler	132	480	156
V 300 PAS	Pascal Compiler	121	444	144
V 300 LN2	Linc II	2,650	18,000	8,820
V 300 CE1	Cande	83	470	272
V 300 WPC	Props	1,200	4,320	2,160
V 300 SDF	Screen Design Facility	175	1,000	580
V 300 IRP	Interactive RPG Utility	75	430	250
V 300 NDL	Network Definition Language	205	1,584	360
V 300 MCB	Gemcos-Basic	290	1,584	360
V 300 MCA	Gemcos-Advanced	506	2,690	1,557
V 300 MCT	Gemcos-Total	651	3,458	2,002
V 300 DCS	Data Communications Software	317	4,800	—
V 300 SCS	Standby Communications Software	158	—	—
V 300 ND8	Network Definition Language (B874)	97	512	297
B 974 CSP	Communications Software Package	227	1,200	240
V 300 DM2	Data Management System II	440	2,508	1,452
V 300 DM1	DMS II Inquiry	110	627	363
V 300 MAF	B 1000 to V 300 Progression Assistance Software	*396	2,260	1,310
V 300 FLM	Flame Monitor	220	502	290
V 300 TA2	Time Analysis and Billing System	72	264	120
V 300 DES	Data Entry System	236	1,254	726
V 300 DE2	Odesy	219	1,163	673
V 300 RP3	Reporter III	465	1,560	780
V 300 OR3	On-Line Reporter III	55	120	240
V 300 HLS	Host-Link-V 300	300	600	300
V 300 ITS	IBM to Burroughs Translation	228	—	—
V 300 UTS	Univac to Burroughs Translation	228	—	—
V 300 HTS	Honeywell to Burroughs Translation	228	—	—

*Six months' allowance for use of this software, excluding PSA. ∎