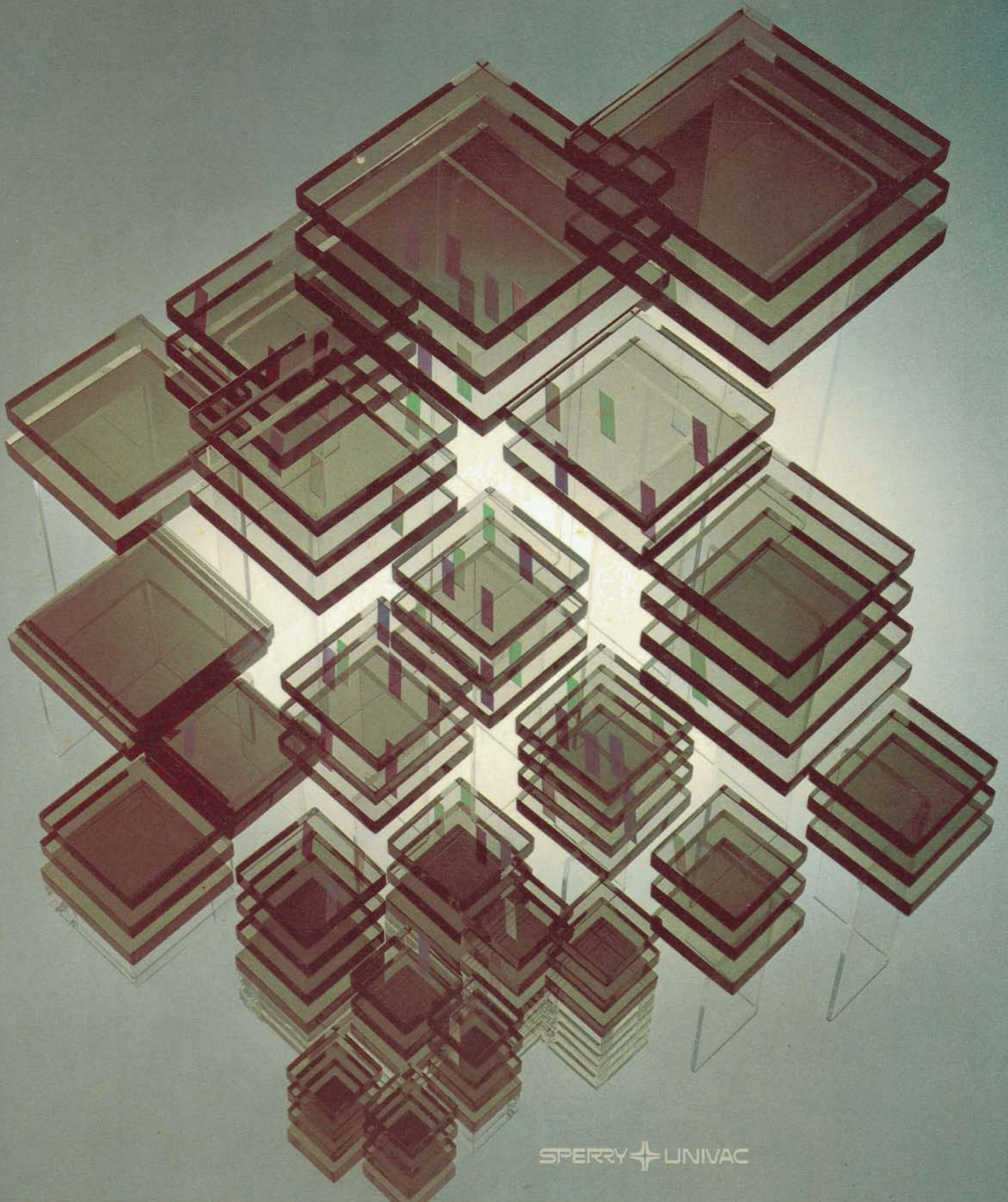


SPERRY UNIVAC

Series V77 Minicomputer Systems

Power, Performance, Productivity



SPERRY  UNIVAC

The V77 Family

The Maximum in Multilevel Minicomputers

The SPERRY UNIVAC Series V77 minicomputers offer multiple capability levels, with high performance at each. They think like mainframes and use field-proven software, compatible within the series.

The versatile V77 family allows for a unique variety of configurations fitting virtually all business and scientific needs. It is also possible to couple more than one Series V77 minicomputer into communications, shared memory, or distributed network configurations. These possible combinations of the V77-200, -400, -600 and -800 systems give all the power needed for any application, while still allowing for later system growth. That's effectiveness with economy.

A variety of large-system features makes these minicomputers think like mainframes. Every member of the SPERRY UNIVAC V77 Series has shared memory, up to sixty-four vectored interrupts, and extensive direct-memory-access capabilities. The V77-800 features a new high-speed central processor, an integral cache memory and an optional, high-speed floating point processor with a new optimized ANS'77 FORTRAN . . . The V77-600 features cache memory and memory mapping . . . The V77-400 has a unique direct-memory-access capability that, when coupled with dual-port memory, makes multiprocessing simple . . . The V77-200 is a powerful computer-on-a-board, built to stand alone or serve in memory-sharing concert with other family members.

The multilevel V77 minicomputer family, working with the SUMMIT or VORTEX Operating Systems and a wide selection of peripheral and data communications hardware, can give you all needed to build powerful, stand-alone systems—or extensive multiprocessor and distributed-processing networks.

Modularly designed SPERRY UNIVAC V77 hardware and software work together to provide easy-to-use tools for building cost-effective, readily expandable systems. The four members of the family share the same architecture and software and each uses a unique microprogrammed architecture. The architecture allows upward compatibility at both the software and hardware level, allowing the selection of a system for any required performance level. An organization can easily move up to a higher-level system as greater capability is needed.

Software for the V77 family, includes an extensive library of existing V77 programs for Transaction Processing, Remote Job Entry, Data Base Management and Distributed Data Processing. Language processors include PASCAL, FORTRAN '77, FORTRAN IV, ANS COBOL, RPG II and others.



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The V77-200

The Versatile Single-Board Processor

The SPERRY UNIVAC V77-200 Minicomputer can function as either a stand-alone processor—for handling large volumes of high-speed computation and data collection—or in a multitiered system, such as a Distributed Processing Network.

This smallest member of the V77 family features fully micro-programmed architecture, an 8-register CPU and 32-bit arithmetic capability. This permits the handling of 8-, 16-, or 32-bit data for applications where the memory requirement does not exceed 64K 8-bit bytes. Although it is a single-board processor, the V77-200 is actually a very powerful mini-computer. It operates with the same instruction set as the larger V77 models and can execute a 16-bit signed multiply in 4.9 microseconds. The single processor board may be packaged in a chassis, along with a single memory module, I/O controllers and an integral power supply, including a data-save feature,

and the hardware system is similar to that of V77-400. It uses the same memory module (16K, 32K or 64K bytes).

Other features of the V77-200 include an integral Teletype/CRT controller, hardware multiply/divide, Real-Time clock, a direct-memory-access bus compatible with the V77-400, -600 and -800 and automatic program loaders.

The complete VORTEX operating system, supporting a 64K byte main memory and compatible with the entire V77 family, is offered for the V77-200 and applications software written for the V77-200 is also compatible throughout the V77 family.



The V77-400

For Multiprocessing and Distributed Processing

The SPERRY UNIVAC V77-400 Mini-computer offers eight programmable registers and 32-bit arithmetic, permitting processing of 8-, 16-, or 32-bit data.

It is ideal, with dual-port memory capability, for multiprocessing applications and Distributed Processing systems. Its micro-programmed architecture provides a cost-effective structure for a broad range of applications.

The dual-port, 660-nanosecond, semiconductor memory is available in 16K, 32K, or 64K byte modules with optional byte parity. For a V77-400 system, using up to 64K bytes of main memory, the SPERRY UNIVAC VORTEX Operating System provides full foreground and background capability. VORTEX II is used with larger memory, along with the MEGAMAP Memory Management System.

The memory system for the SPERRY UNIVAC V77-400 Minicomputer, working with dual-port memory, makes the V77-400 easy to use in closely coupled, shared-memory multiprocessor arrangements, linked with other V77-400's, or with either V77-200 computers, V77-600 computers, or both.

The V77-400 uses the same powerful instruction set as the larger V77-600, complemented by a Writable Control Store using a 32-bit microinstruction format with a 220-nanosecond cycle time. Standard SPERRY UNIVAC V77-400 Minicomputer features include a fast hardware signed, multiply/divide, Real-Time clock, power-fail/restart, multi-device automatic program loaders, Teletype/CRT controller, memory protect and

virtual console logic, with the capabilities of a programmer/maintenance panel. The virtual console feature allows the system operator to control the computer from a Teletype or display keyboard, by examining registers, memory locations, or entering data.

An optional operator's console includes controls for AC power, program loading and sense and reset functions.

Most VORTEX and VORTEX II Operating System software available for the V77-600 and -800 runs compatibly on the V77-400. Applications software written for the V77-400 is also upward compatible throughout the family of SPERRY UNIVAC V77 minicomputers.



The V77-600

Powerful Member of the Family

The SPERRY UNIVAC V77-600, offers features and performance expected in only more expensive mainframes.

Eight registers, all accessible by the programmer, provide 32-bit arithmetic and superior processing power. The arithmetic unit, working with the comprehensive V77 family instruction set, permits processing of 8-, 16-, or 32-bit data. The balance of effective memory use and memory addressing is optimized by a combination of 16-bit and 32-bit instructions.

The dual-port, 660-nanosecond, semiconductor memory (with optional byte parity, or hardware error correction) is available in 32K, 64K, 128K, or 256K byte modules. Users can place up to four modules in a 7-inch chassis, for 512KB, 8-bit bytes. MEGAMAP, the SPERRY UNIVAC V77 Memory Management System, provides access to more than two million bytes of main memory, with memory protection applied to each 1024 byte page.

For a high level of performance, the V77-600 includes a high-speed cache memory, effectively halving the average memory access time. Cache does this by storing, separately, up to 2048 of the most frequently used instructions and data bytes, accessed in cache, twice as fast as in main memory. Because more than 90 percent of all data requested from memory is found in the cache, when executing a typical applications program, there is continual savings in processing time.

Like MEGAMAP, cache memory is completely transparent to all applicable software, with no special programming considerations needed.

The V77-600 features microprogramming facilities combining firmware with a Writable Control Store (using a 64-bit microinstruction format and 190-nanosecond cycle time) to permit simultaneous, parallel, high-speed operations.

For a wide range of commercial—as well as scientific—applications, the V77-600 is supported by the new SUMMIT multi-terminal operating system. With a complete set of terminal management and control facilities, SUMMIT supports remote and local terminal networks, as well as Distributed and Transaction Processing Networks. For computational applications, the floating-point processor performs single- and double-precision floating-point arithmetic. The floating-point processor uses direct memory access to speed data transfer and is fully supported by the SUMMIT and VORTEX Operating Systems and FORTRAN IV compiler.

For scientific and engineering applications, the FORTRAN IV compiler meets large mainframe standards and is optimized to work with the floating-point processor. The compiler generates overlays, processes up to seven dimensional

V77 Family Features

	V77-800	V77-600	V77-400	V77-200
MOS ERCC Memory 128KB Modules, 600NS	■			
MOS Memory 256KB Modules, 600NS	■			
MOS Memory 16KB Modules, 660NS			■	■
MOS Memory 32KB Modules, 660NS		●	■	■
MOS Memory 64KB Modules, 660NS		●	●	■
MOS Memory 128KB Modules, 660NS		●		
MOS ERCC Memory 128KB Modules, 660NS		■		
MOS ERCC Memory 256KB Modules, 660NS		■		
MEGAMAP Memory Management	●	■	■	
Cache Memory	●	●		
Dual-Port Memory Access		●	●	
Multiport Memory Bus	●			
Writable Control Store	■	●	■	
Scientific Firmware	■	■	●	
Commercial Firmware	■	■	■	
Direct Memory Access	●	●	●	●
Priority Memory Access		■		
Error Correcting Memory	●	■		
Memory Parity		■	■	■
Floating Point Processor	■	■		
Automatic Program Loader(s)	●	●	●	●
Hardware Multiply/Divide (signed)	●	●	●	●
Real-Time Clock	●	●	●	●
Memory Protect	●	●	●	●
Power Fail/Restart	●	●	●	■
Data Save	■	■	■	■
Programmer's Console		●		
Operator's Console	■		■	■
Virtual Console Logic	●		●	●
TTY/CRT Controller	●	●	●	●
Programmed I/O	●	●	●	●
Priority Interrupts	Up to 64	Up to 64	Up to 64	Up to 64
Memory Expansion	Up to 2048KB	Up to 2048KB	Up to 2048KB	Up to 2048KB

■ Optional ● Standard

arrays and works with double-precision integers and floating-point data. Special firmware, using the Writable Control Store, accelerates performance by providing array indexing, parameter passing, floating compare, square root and DO loop termination.

Commercial applications may also take advantage of the SPERRY UNIVAC V77 family ANS COBOL Compiler and TOTAL® Data Base Management System. A commercial

firmware package for COBOL and TOTAL speeds performance by facilitating decimal operations, loading and storing multiple registers, moving and comparing blocks in memory on a byte-by-byte basis, using 32-bit integer mathematics further improving the efficiency of COBOL-generated code.

The SPERRY UNIVAC V77-600 Minicomputer also has a wide variety of additional hardware features—including an integral Teletype/

CRT controller, full programmer's console, Real-Time clock, power fail/restart, hardware interrupt system, memory-protect with privileged instruction mode and multidevice automatic program loaders.

With all these features, the V77-600 is fully upward compatible with other members of the family in terms of software, applications programming, peripherals and communications.



The V77-800

Leader of the Family

The SPERRY UNIVAC V77-800, leader of the family of minicomputers, is an evolutionary extension of the V77 Minicomputer product line.

As the newest and most powerful of the family, the V77-800 is designed for the high-performance commercial and scientific data processing user.

The V77-800 features a new high-speed central processor, integral cache memory and a new high-speed floating point processor compatible with a new optimized ANS'77 FORTRAN.

The 600-nanosecond, 16 bit MOS memory is available in 128K or 256K byte modules—up to a maximum of 2048K bytes. Multiple V77-800's are capable of sharing a common memory.

The V77-800 features memory error detection and correction. The error correcting hardware automatically corrects and reports all one-bit errors and detects all two-bit errors. Uncorrectable memory errors are reported to the operating system for user resolution.

MEGAMAP, the SPERRY UNIVAC V77 Memory Management System is standard on the V77-800 and provides access to 2048K bytes of main memory.

For the highest level of performance, the V77-800 includes an integral 150ns high-speed cache memory. The V77-800 has a cycle time of 600ns for a two byte fetch, and 750ns for a four byte fetch.

Like MEGAMAP, cache memory is completely transparent to all applicable software.

The V77-800 includes a powerful, full-supported microprogramming facility combining firmware with a Writable Control Store (using a 48-bit

microinstruction format and 150-nanosecond cycle time) to allow simultaneous, high-speed operations.

For scientific and engineering applications, the 64-bit floating point processor performs single and double precision floating point arithmetic. The floating point processor uses direct memory access to speed data transfer and is fully supported by the SUMMIT (Sperry Univac Minicomputer Management of Interactive Terminals) operating system, as well as FORTRAN IV and ANS'77 FORTRAN compilers.

The SUMMIT Operating System allows fast, efficient terminal operations. For programmers this means shorter development time; and for operations personnel this means more inquiries and updates handled per hour.

Commercial applications can take advantage of the SUMMIT ANSI'74 Level 1 COBOL; and industry standard PASCAL—fully supported as part of the Structured Programming System. Additional SUMMIT features include Distributed Transaction Processing, Data Base Management and an inquiry subsystem.

The SPERRY UNIVAC V77-800 Minicomputer also has a wide variety of additional hardware features—including an integral TTY/CRT controller, Four byte (32-bit) Memory Fetch, multidevice automatic program loaders, hardware interrupt system, Real-Time clock, power fail/restart and programmed I/O.

With all these features, the V77-800 is upward compatible with the V77-600 and V77-400 in terms of software, communications and peripherals.



High-Speed, Low-Cost Memory

Main Memory

Main memory in SPERRY UNIVAC V77 Minicomputers employs high-speed Semiconductor Technology. The memory features low-cost, high-speed reliability, is small in physical size and low in power demand.

Memory for the V77-800 is available in 128K byte and 256K byte increments up to a maximum of 2 megabytes. The memory features hardware error detection and correction for maximum system reliability and data integrity. Memory cycle time is 600 nanoseconds for two bytes.

Memory for the SPERRY UNIVAC V77-600 is available in modules storing 32K, 64K, 128K or 256K bytes.

Each memory module features a dual-port for shared-memory multiprocessing applications, or data transfer to and from high-speed peripherals. V77-600 memory features optional byte parity or hardware error detection and correction. Memory cycle time is 660 nanoseconds for two bytes.

The SPERRY UNIVAC V77-200 and -400 use interchangeable memory modules storing 16K, 32K or 64K bytes. The V77-400 memory timing and control subsystem features dual-port capability for multiprocessor applications.

MEGAMAP

A two million-byte memory allows for storage of larger, more powerful programs—or many different programs—without time-consuming loading and reloading. It also retains more data in the system for high-speed retrieval and manipulation. MEGAMAP, working with the VORTEX II Operating System in a SPERRY UNIVAC V77-400, -600 or -800 minicomputer, allows expansion of main memory to a maximum of two million bytes.

Page-by-page memory access protection is provided throughout the entire memory and Memory Mapping software is transparent to the system programmer.



The SUMMIT and VORTEX II Operating Systems assign the program and related data to available memory pages, contiguous or not, and keep track of the assignments and control functions. Hardware performs address translation and control with little or no overhead on the effective cycle time.

Mapping hardware provides 16 independent user maps—contrasting with other systems offering only two or four. These additional sets of maps reduce the overhead time involved in context (text or program) switching.

Dual-Port Memory

Dual-port memory systems are standard in the SPERRY UNIVAC V77-400 and -600 Minicomputers. This capability is used in implementing shared-memory multiprocessor systems, or for direct-memory links with high-speed peripherals.

In the -600, timing and control circuits on each memory module establish priority and prevent simultaneous access to both ports. Up to 16 memory modules can be chained on two memory busses, with one bus for each set of ports.

The -400 works with a dual-port memory timing and control board, controlling up to eight 64K byte memory arrays. Two processors can share one or more modules to create flexible multiprocessor systems.

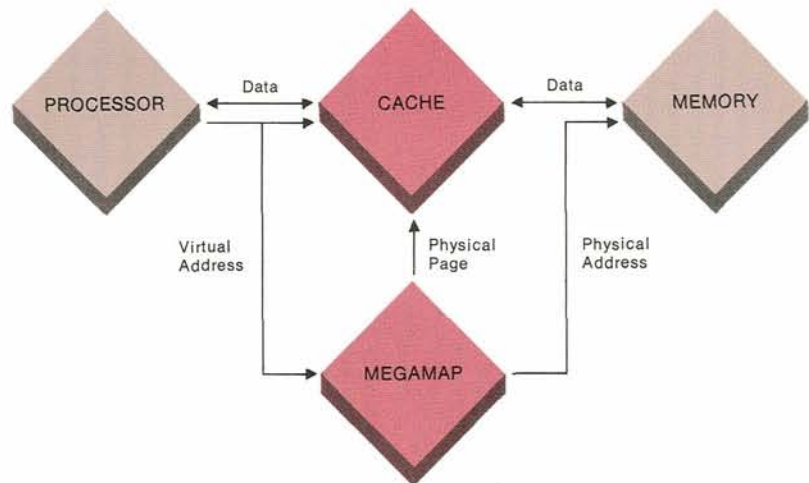
High-speed peripherals, such as disk systems, can be linked directly to the memory bus through the second memory port, bypassing the processor. Data can be transferred at rates greater than two million bytes per second over this second memory port.

Cache Memory

Cache memory, integral to the V77-800 (1024 bytes) and optional with the V77-600 (2048 bytes), can almost double processing speed in most typical applications. The cache holds 1024 bytes of the most-recently-used instructions and data in the high-speed, bipolar memory.

If the addressed 16-bit word memory location is in cache when the processor requests it, it is transferred to the processor at the high speed of cache memory. When the word is in the more economical main memory, it is transferred at the main memory speed.

In a typical program, more than 90 percent of memory transfers are made from cache instead of the main memory, speeding processing and system throughput.



SPERRY UNIVAC V77 Microprogramming

For Efficiency and Effectiveness

The Technique

Microprogramming is a technique using a single program instruction to execute multistep operations. Microprogramming reduces the number of time-consuming memory-access cycles needed to fetch program instructions and permit the performance of a number of simultaneous operations.

SPERRY UNIVAC V77 Minicomputers employ microprogrammed architecture—optimized for each of the four available processors—to achieve the highest throughput, proper memory utilization and best overall performance. In each system, a common instruction set is implemented by microinstructions stored in Read-Only Memory (ROM).

The SPERRY UNIVAC V77-800 employs a highly efficient 48-bit microinstruction. The optional control store can accommodate 2048 microinstructions, implemented through

Writable Control Store (WCS), and contains provisions for 1024 microinstructions implemented through Programmable Read Only Memory (PROM). The microinstruction cycle time for the V77-800 is 150 nanoseconds.

In the SPERRY UNIVAC V77-600 minicomputer, the microinstruction is 64 bits wide and is able to control a larger number of simultaneous operations. The control store can contain up to 4096 addressable microinstructions with a microinstruction cycle time of 165 nanoseconds, with macroinstruction executed in two or three microcycles.

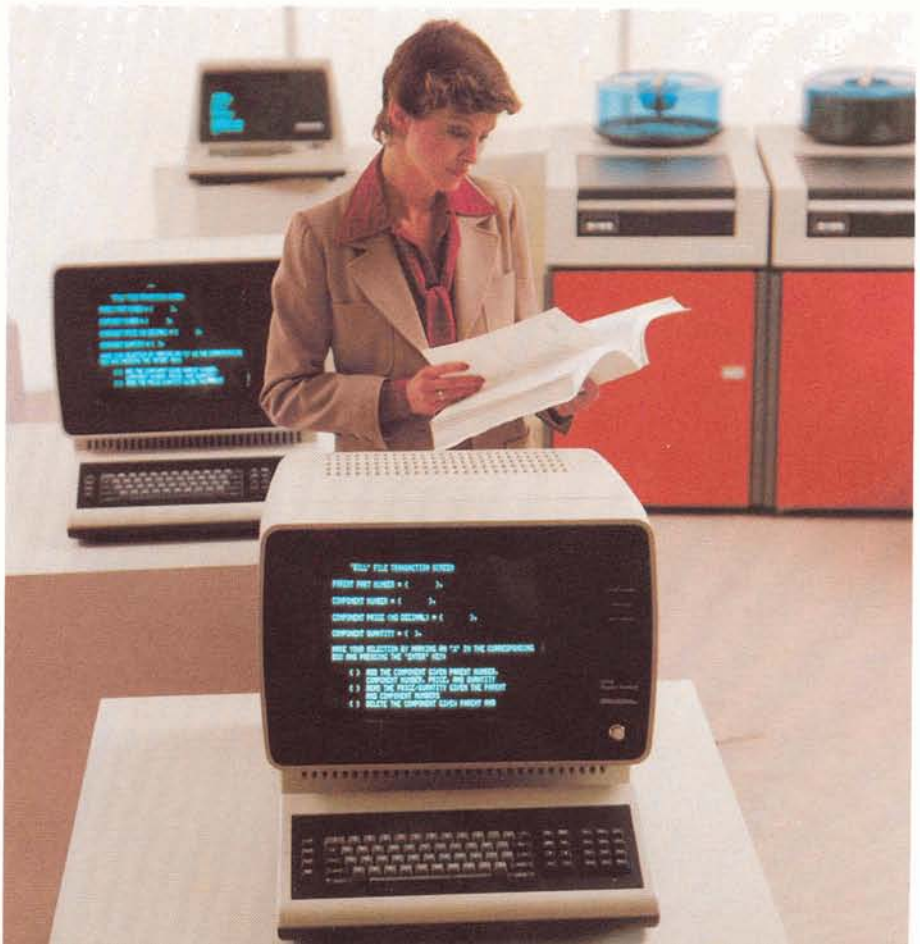
The microprogram architecture of the -400 uses a 32-bit microinstruction. The average two- or three-microcycle execution of a macroinstruction allows full utilization of the bandwidth of the 660-nanosecond main memory. A

system may be configured with up to 3072 user-programmable microinstructions.

Microprogram architecture optimized in the SPERRY UNIVAC V77-200 uses a 24-bit microinstruction and executes a typical macroinstruction in three or four 165-nanosecond microcycles.

Each microinstruction, whether 64, 48, 32, or 24 bit wide, contains multiple fields decoded to select the next microinstruction address and can concurrently:

- ▣ read two registers onto the adder input busses
- ▣ shift or manipulate bytes in a selected register
- ▣ perform logical or arithmetic functions in the adder
- ▣ store adder output in several destinations, or
- ▣ start a memory cycle or I/O operation.



Effective Performance

The standard SPERRY UNIVAC V77 instruction set can be readily expanded by adding firmware to the V77-400, -600 and -800. The additional firmware microinstructions are stored in a Writable Control Store (WCS) bipolar memory that can be loaded and changed by the computer program to provide a dynamic microprogramming capability. High-speed firmware subroutines, for example, can be called from main memory for execution as needed. The WCS contains a 16-level subroutine stack for efficient handling of microsubroutines.

Provided with the V77-600 and -800 WCS hardware are the microassembler, simulator and utility software aids used in firmware development. A number of special microprograms are also available for the -400, -600 and -800. The firmware packages include Operating System accelerators and a floating point accelerator to substantially increase the execution speed of a FORTRAN program and microprograms to enhance systems using COBOL, TOTAL and PASCAL.

WCS modules are available in five models. One for the SPERRY UNIVAC V77-800 provides storage for 2048 microinstructions and an additional provision for 1024 microinstructions implemented through PROM. Two for the V77-600 provide storage for 1024 or 2048 user-written microinstructions. The fourth for the -600 has storage for 512 microinstructions, plus two additional elements, allowing the user to redefine both the machine-instruction decoding procedure and the nature of the microinstructions controlling I/O functions. The fifth model of the WCS provides storage for 1024 microinstructions for the SPERRY UNIVAC V77-400. Up to three WCS's can be attached to a -400, providing capability for 3072 microinstructions.

Interrupt System

An important feature of the SPERRY UNIVAC V77 family is their ability to support up to 64 externally vectored interrupts. External interrupts are driven by the I/O devices with interrupt addresses determined by the device type.

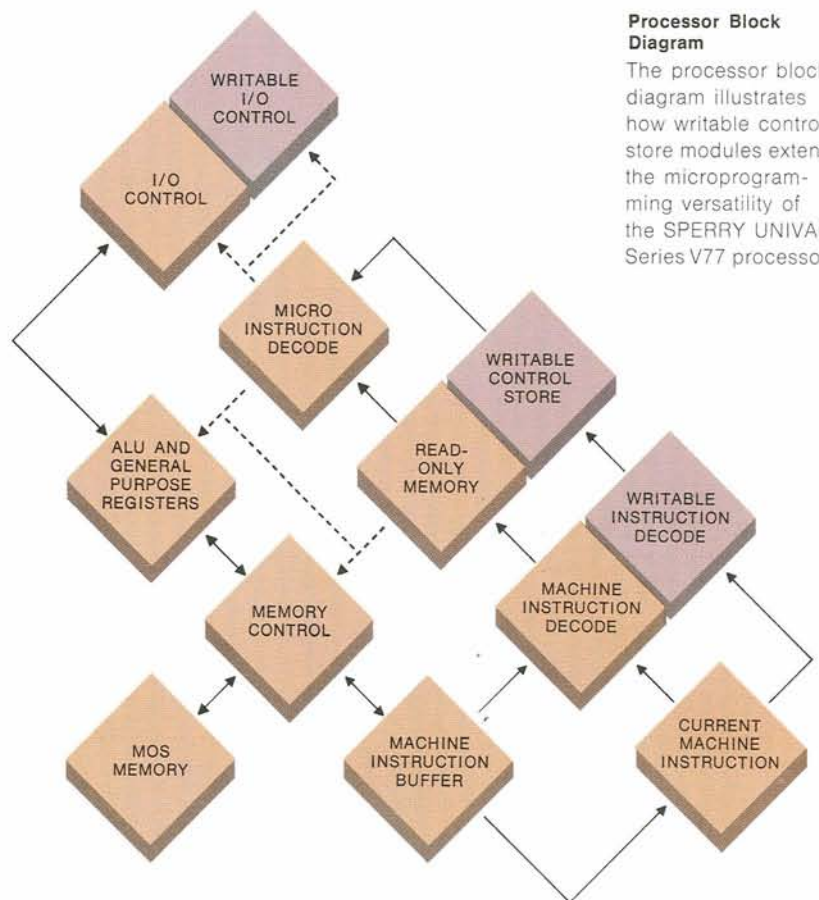
A number of internal interrupts, with fixed vectors and priorities, are generated by CPU hardware and do not affect the I/O bus. Internal interrupts include memory protect, power-fail/restart, memory error, real-time clock, floating-point processor and console. Interrupt servicing identifies device and vectors to a device handler to perform functions such as saving machine state, switching stacks and updating priority. In the SUMMIT and VORTEX Operating Systems, peripheral interrupts are serviced by a common interrupt handler, eliminating the need to perform interrupt servicing.

Multiple I/O Structure

SPERRY UNIVAC V77 minicomputer systems offer a combination of compatible multi-I/O techniques for building extensive I/O systems. Standard programmed I/O uses separate program instructions for each character or word transfer.

Direct Memory Access (DMA) uses a cycle-stealing sequence to transfer blocks of data at high rates.

Using the SPERRY UNIVAC V77-600 optional Priority Memory Access (PMA) channel, high-speed data transfer bypasses both the I/O bus and the CPU to communicate directly with a memory module at rates approaching two million bytes per second. Direct-memory-channel interfaces are available to allow direct transfer to memory at rates approaching the effective memory transfer rate.



Processor Block Diagram

The processor block diagram illustrates how writable control store modules extend the microprogramming versatility of the SPERRY UNIVAC Series V77 processor.

SPERRY UNIVAC V77 Multiprocessing

**Availability, Speed
and Growth**

Sperry Univac provides three different methods to build multiprocessor systems in the Minicomputer family—through shared memory, intercomputer I/O bus connections and serial communications channels. Because they are designed especially for multiprocessing applications, the systems offer hardware redundancy for high network availability, load sharing to speed throughput and modularity for easy growth at minimum cost.

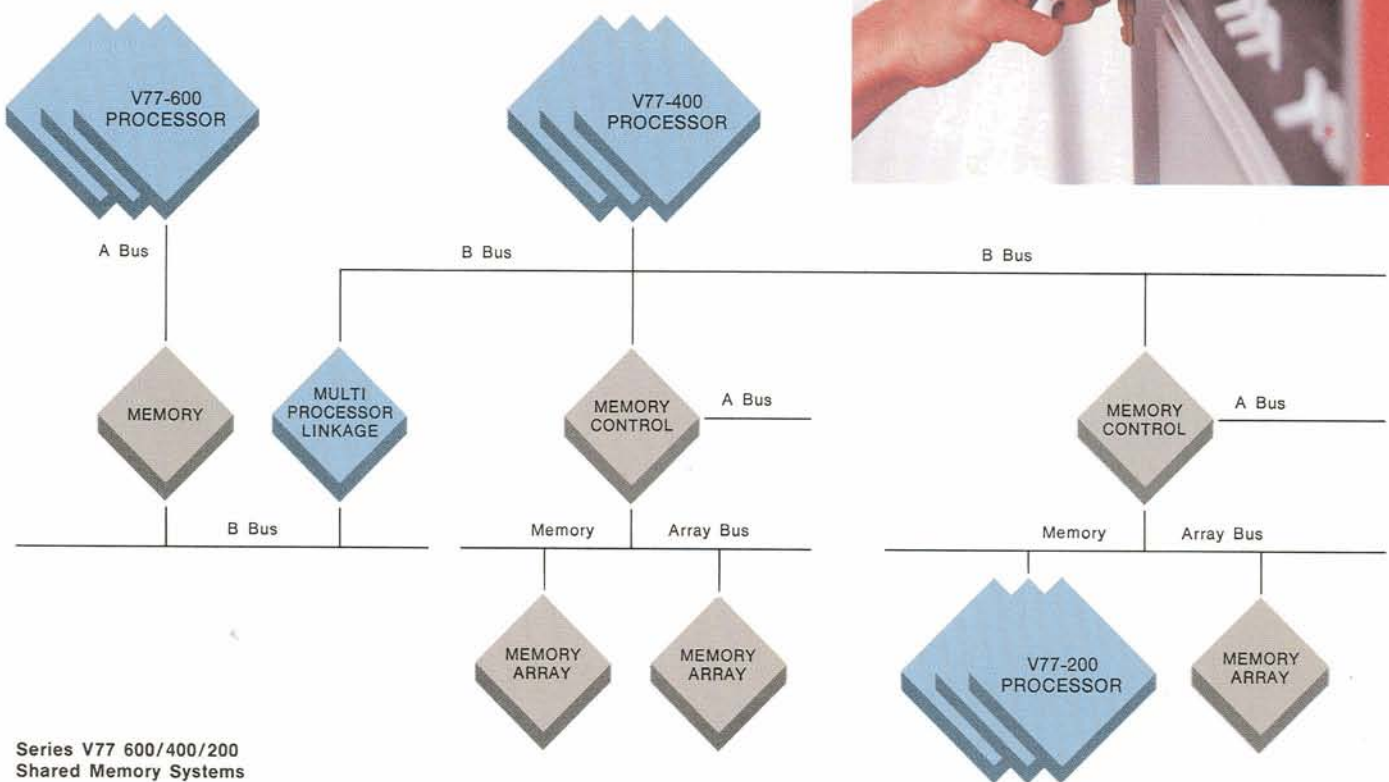
Intercomputer I/O Bus Connection

Interprocessor I/O bus interfaces allow two independent SPERRY UNIVAC V77 systems to coordinate and control data transfer. Data is transferred through direct-memory-access channels to obtain very high throughput rates.

Shared Memory

The system architecture is designed to serve in complex networks of tightly coupled computer systems. The processor's dual-bus structure is used to interconnect combinations of SPERRY UNIVAC V77 Minicomputer Systems.

These configurations permit executive processing at each level to monitor and control multiple satellite processors. Similar arrangements are used to obtain failsoft reliability, with one processor assuming the critical task of another processor which may have failed.



Series V77 600/400/200
Shared Memory Systems



SPERRY UNIVAC
V77 Communications

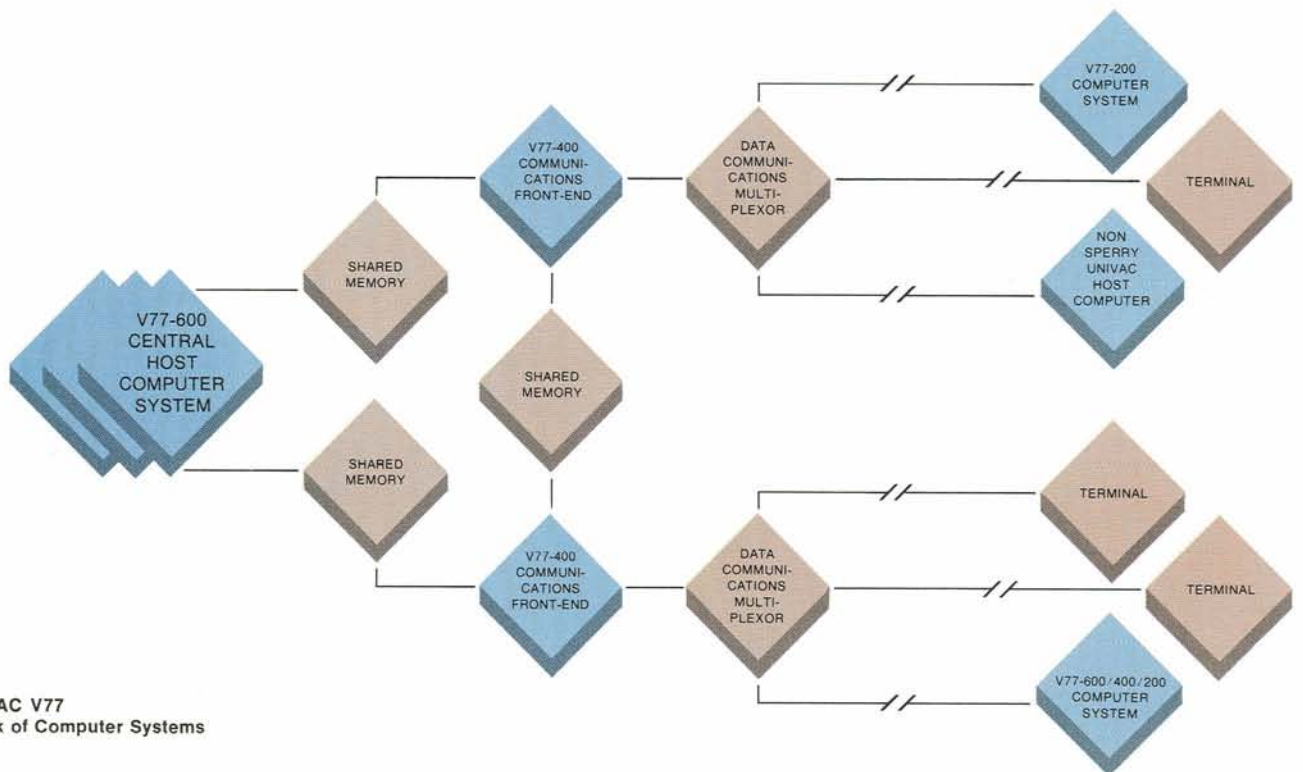
Distributed Processing networks can be easily built with multiple SPERRY UNIVAC V77 Minicomputer Systems interconnected through data communications links. Combining shared memory multiprocessing with Data Communications Networks can provide powerful data-handling capabilities.

In a multi-tiered example, the SPERRY UNIVAC V77-600 acts as the host machine, distributing programs and data to the other systems in the

network. Through shared-memory interfaces, the -400's provide communications front-end facilities for the -600. Each -400 manages the communications resources for its subnetwork of other SPERRY UNIVAC V77 Minicomputer systems, terminals, or other computers.

Hardware supporting the mini-computer's communications systems includes the Data Communication Multiplexer (DCM) and its associated line adapters. These units provide a universal communications hardware interface for the systems.

The SPERRY UNIVAC V77 family minicomputer DCM serves as an interface for up to 64 communication lines—synchronous, bisynchronous or asynchronous. Each DCM includes multiplexer, multiplexer bus and one or more line adapters. Line adapters handle character assembly, disassembly, parity generation and checking, modern control and buffering. The DCM transfers data through the system at rates up to 60,000 bytes per second.





SPERRY UNIVAC V77 Software

Tested and Effective

Sperry Univac offers a wide choice of efficient and thoroughly tested software packages integrated with the SUMMIT, VORTEX, or VORTEX II Operating Systems. Software development costs can be significantly reduced by using the common commands and compatible files within the SPERRY UNIVAC V77 software systems.

Standard software packages with SPERRY UNIVAC Operating Systems include ANS and industry standard language processors, telecommunications and transaction processing, remote job entry, multifile access techniques (including the TOTAL Data Base Management System) and a comprehensive set of system utilities.

The SUMMIT Multi-Terminal Operating System

The SPERRY UNIVAC SUMMIT Operating System is a multi-task, terminal-oriented operating system providing a stage for many concurrent applications environments. SUMMIT (Sperry Univac Minicomputer Management of Interactive Terminals), fully supports remote and local terminal networks, as well as distributed and transaction processing. A key feature of SUMMIT is a complete set of terminal management and control capabilities. These features include:

- ▣ Time sharing
- ▣ Transaction processing
- ▣ On-line program development
- ▣ Remote Job Entry
- ▣ Remote processor access from any terminal
- ▣ On-line data base inquiry and update
- ▣ A unique, comprehensive security system, allowing access to data and applications programs based on a set of personal terminal/user ID's and passwords.

Four Modes of Terminal Operation

All of these features are available to all SPERRY UNIVAC display terminal models. Each terminal has been selected to provide terminal users, regardless of application, with a unique set of communications and applications oriented features. SUMMIT supports four modes of terminal operation:

- ▣ Asynchronous, block mode operation
- ▣ Asynchronous, character mode operations
- ▣ Binary-synchronous, block mode operations (3270 emulation)
- ▣ Synchronous, block mode operation with SPERRY UNIVAC UNISCOPE® and the intelligent UTS 400.

SUMMIT supported terminal operation is efficient, concise and engineered for fast, trouble-free use. This design allows the programmers and terminal operators to be more productive from the start.

The terminal is the "window" to the system and SUMMIT provides each terminal with an unparalleled amount of system visibility. Depending on the security scheme designed into a particular configuration, any terminal may utilize any SUMMIT system resource, regardless of where that terminal is located. A terminal may, at any specific time, be used for On-Line program development, or data base inquiry and update, or access a transaction processing program.

SUMMIT supported terminals may access a SPERRY UNIVAC Series 90 or 1100 Series system, a remote SPERRY UNIVAC V77 minicomputer, or an IBM 370 system. SUMMIT supports these functions with optional Distributed Processing Modules or with the DCA Communications System, designed to interface with Sperry Univac advanced DCA networks.

SPERRY UNIVAC SUMMIT Language Processors

A comprehensive set of programming languages are supported by SUMMIT, allowing the user a choice of the most appropriate language available. In addition, microprogramming is supported to enhance hardware and software performance. Sperry Univac high level language processors are designed to industry standards, providing compatibility with a broad range of application software systems currently on the market.

COBOL is an efficient implementation of the 1974 ANSI COBOL Standard. It includes all Level 1 features, plus many from level two, making COBOL a powerful and flexible COBOL offering in the minicomputer market. Program source entry and compilation can be performed from any SUMMIT supported terminal and the COBOL programmer has the capability to interactively edit a COBOL program from the terminal. The extensive trace and diagnostic features available under SUMMIT, and the terminal facilities, combine to aid in a fast and efficient program development cycle.



FORTRAN IV is a fully implemented superset of ANSI Standard FORTRAN. A full set of SUMMIT subroutines is available to facilitate the writing of a variety of Real-Time FORTRAN IV application programs. FORTRAN IV also has the capability to operate concurrently in memory with other SUMMIT supported languages. The FORTRAN IV compiler is a fast and efficient one-pass compiler accepting source input from any medium.

ANSI '77 FORTRAN is available on the powerful, new SPERRY UNIVAC V77-800 with accelerator firmware and Floating Point Processor. SUMMIT supported '77 FORTRAN provides unparalleled speed for mathematical and scientific computation using 32 bit single precision and 64 bit double precision numbers.

SUMMIT also supports RPG II. This commercial language is in wide use throughout the industry and is appropriate for a variety of applications. The efficient RPG II compiler is a one-pass type and provides a complete set of diagnostic error codes to ease program development. The compiler also provides alphabetical lists of all field names and all labels used in calculation specifications. The SUMMIT supported RPG II compiler is industry compatible, making system conversions fast and painless.

SUMMIT supported PASCAL is a high level, general purpose language, applicable to a wide range of numeric

and non-numeric problems. It is a language of moderate complexity and size, combining the best features of several languages. PASCAL has the data structuring capabilities of COBOL, the block-structured organization of ALGOL, and the compact arithmetic expressions of PL/1. However, it is the variety of control structures and the extensive data structuring features setting PASCAL apart from the mainstream of high level languages. PASCAL helps the user to think in a logical manner and plan the program before coding commences. PASCAL control structures are conducive to top down design and structured programming techniques. In PASCAL, arrays may be multidimensional and may include arrays of arrays. Different data types may be aggregated into a single entity and stored as one logical component and PASCAL also allows the user to define new data types.

In the SUMMIT environment, PASCAL is supported as a component of the Structured Programming System (SPS). SPS allows the user to enter, edit and compile powerful PASCAL programs for execution under SUMMIT. SPS also includes a diagnostic scheme allowing the PASCAL programmer to execute a line at a time, a paragraph at a time, or the entire program with powerful diagnostic aids indicating both error conditions and performance information. SPS also includes a set of documentation aids speeding and simplifying the process of documenting a software component or a whole system. SPS dramatically increases a programmer's effectiveness and productivity.

Data Base Management System

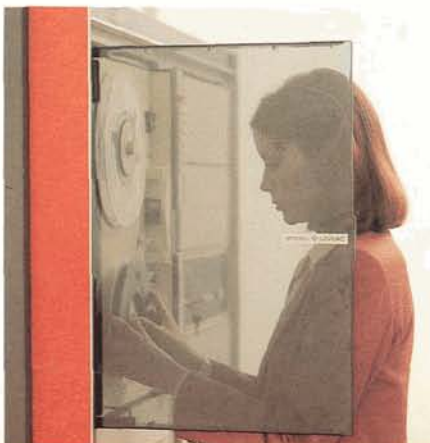
One of the most important features in any computer system is the ease of accessibility of the data residing on that system. In fact, the manner in which that data is manipulated should be a prime consideration in system selection. SUMMIT supports a data management system and inquiry language that are among the most versatile and easy to use in the industry.

TOTAL is one of the most widely acclaimed Data Base Management Systems available. Sperry Univac goes beyond merely supporting a TOTAL compatible system by marketing and providing TOTAL as a fully integrated sub-system of SUMMIT. Every data item in the TOTAL data base may be accessed from an applications program written in any of the programming languages supported by SUMMIT. TOTAL data base logging and recovery procedures, data base generation and access schemes are all part of the overall SUMMIT design.

SUMMIT also provides a new file structure, capable of supporting extremely large files. This feature expands the limits and flexibility of non-data base files. SUMMIT also supports standard direct access and sequential file access techniques compatible with the VORTEX II operating system.

QL/77 is the inquiry-update language supported by SUMMIT. In conjunction with the TOTAL Data Base Management System. QL/77 provides a means of handling data that may be used by anyone within an organization.

QL/77 was designed with the SUMMIT terminal environment in mind. Any terminal user who satisfies the security requirements built into the system, may access any TOTAL data base accommodating QL/77. QL/77's ease of use was one of its prime design requirements and the command structure of QL/77's concise, following a thoroughly logical path.



Software

QL/77 allows anyone with an informational need access to pertinent data. Management, for example, may select specific data and format a specialized report, without having to rely on the traditional program development loop. This is especially important because most information requirements of management are time-critical. QL/77 is truly the cornerstone of a decision-oriented data base management system.

QL/77 procedures may be cataloged and saved. This feature of QL/77 is particularly interesting. Depending on the specific processing requirements, traditional applications programming may not be needed. A QL/77 procedure may be cataloged and moved to a file set aside for QL/77 cataloged procedures. These procedures may then be used as one would use a normal applications program. This feature can greatly reduce the amount of applications programming.

SUMMIT provides a complete and comprehensive set of utilities, editors and other development tools designed to simplify the problems of system conversion and system development.

These features and the other SUMMIT facilities, provided by Sperry Univac, insure the user ease of installation and use, as well as a high level of flexibility and efficiency.

The VORTEX Multitask Operating Systems

VORTEX (V77 Omnitask Real-Time Executive) is a multiprogramming system offering special features designed for Real-Time applications. Many different tasks may be stored in main memory, or on a rotating-memory device. These tasks are scheduled by a resident executive program assigning highest priority to real-time "foreground" programs. Lower-priority "background" programs are executed during the idle time intervals embedded in most Real-Time operations. The effect of VORTEX is to provide the utility of two computers for the price of one.

VORTEX also increases the efficiency of any system in which the computer is to operate on a number of different programs in sequence . . . simply establish the order in which the jobs are to be executed. Using a comprehensive job control language, the system automatically schedules and runs the programs without further operator intervention.

VORTEX II has all the features of VORTEX, plus automatic control of MEGAMAP, a Memory-Mapping System addressing more than two million bytes.

VORTEX II maintains a constantly updated map of computer memory, assigning 1024 byte pages to specific application programs currently in memory. As new programs and data are added to memory, VORTEX II assigns new pages—not necessarily contiguous. This means, a task can be allotted space in memory, without waiting, even if a contiguous space its size is not available. Memory is thus used more efficiently, because any task uses only the number of pages necessary to contain it. This technique also provides complete protection between each of the tasks in memory at any given time.

Foreground and Background Tasks

Non-resident foreground tasks are initiated when an external interrupt jumps and marks to Real-Time Executive (RTE). RTE evaluates priority and directs Load Module Loader to transfer nonresident foreground task from rotating memory to main memory for execution. Resident foreground tasks are executed immediately, or according to priority set by RTE.

Background tasks are executed when RTE senses time is available (following an initial operator request). The Job Control Processor (JCP) is read into the background area of the main memory. The JCP responds to a directive from the system input device and loads a background task from rotating memory, or the system input device.

CP-77

SPERRY UNIVAC CP-77 is a general purpose multi-terminal timesharing system for the Series V77 minicomputers.

To the user of character-mode terminals, CP-77 provides facilities for entering and editing source code; submitting job streams to the background job queue; and executing and debugging tasks directly from the terminals.

As a compatible extension to the VORTEX II operating system, CP-77 operates with local or remote terminals. As such, it provides an extremely flexible basis for operation of small to medium size multi-terminal systems.

SPERRY UNIVAC VORTEX Language Processors

With the VORTEX Operating Systems, application tasks can be programmed in a wide selection of languages, including FORTRAN IV, COBOL, RPG II, DASMR macroassembler and MIDAS microassembler. Because the system's high-level language processors are built to industry standards, large libraries of application programs are available in the marketplace.

VORTEX File and Data Management

The SPERRY UNIVAC VORTEX Operating Systems offer a variety of software modules for storing and accessing data records. VORTEX supports several data-access techniques, in addition to the commonly-used sequential and direct-access methods.

The TOTAL Data Base Management System, is fully integrated with VORTEX II and is accessible from the system host languages, including FORTRAN IV, COBOL, RPG II and the DASMR assembler. TOTAL allows local or remote terminal users access to a central data base, using a network data organization. Individual data items may be accessed by multiple association of paths or characteristics to provide virtually unlimited flexibility to the applications programmer.

ISAM (Indexed Sequential Access Method) permits sequential or random file access by record name (key) from any starting point. ISAM provides a scheme of tables (indexes) for random access, reducing search time, while keeping records in a logical collating order for sequential access.

QSAM (Queued Sequential Access Method) provides blocking/unblocking, multibuffering and dynamic disk file extension for sequential files stored in any VORTEX-supported I/O device.

VIDEO (V77 Interactive Data Entry Operation) is an On-Line entry program for creating RPG II-compatible indexed files. VIDEO will define a large number of data input formats, capture data, verify previously input data, sort data, accumulate batch totals and produce simple reports from existing files. VIDEO is a highly interactive program prompting the operator to proper responses, often making a separate report program unnecessary.



SPERRY UNIVAC
V77 Peripherals

Economy and Performance

Peripheral devices and I/O interfaces for SPERRY UNIVAC V77 Minicomputer systems (tested in thousands of installations) offer an optimum balance of economy and high performance.

Every standard peripheral subsystem is an integrated unit, including the device itself, interconnecting cables, I/O controller and software for its operation. Standard peripherals are supplemented by other models and types of peripherals available on special order.

Moving Head Disks—models for 10 million byte cartridge units; units up to 232 million byte disk pack systems, advanced technology drives, featuring high track and bit densities, data and command chaining; write-verify, dual access and overlap-seek capabilities.

Diskette—storage of 0.5 MB per drive, up to four transports per controller.

Magnetic Tape—nine-track, densities up to 1600 bpi and speeds to 75 ips; read-after-write; up to four transports per controller.

Keyboard/CRT Displays—for consoles, or remote interactive intelligent terminals. Included are SPERRY UNIVAC Uniscope terminals, IBM 3270 compatible terminals and a comprehensive line of buffered and character-mode asynchronous terminals with advanced editing features.

Line Printers—300 or 600 lines per minute, up to 132 characters per line, buffered, ASCII Code, 64 alpha-numeric characters and symbols, matrix printer, 200 characters per second.

Card Readers/Punches—read at 300 cards per minute; punch at 35 cards per minute.

Teletypes—ASR 33, ASR 35, KSR 35.

High-Speed Paper Tape—punch rates up to 75 characters per second; read rates up to 300 characters per second.

Relay Interfaces—contact inputs and mercury-wetted contact outputs; 0.5A to 3A; up to 400V.

General-Purpose Interfaces—buffer interface controller, buffered I/O controller; digital I/O controller; universal serial asynchronous controllers with RS232C or current loop; and IEEE—488 interface bus.

Intercomputer Channel Adapters—interface to SPERRY UNIVAC V77 Minicomputers and other computer systems, including SPERRY UNIVAC, IBM and Burroughs.



SPERRY UNIVAC
Series V77 Minicomputers

**Sold and Serviced
Around the World**

Expert service is provided for SPERRY UNIVAC Series V77 Minicomputer systems—through the SPERRY UNIVAC World Wide Service organization.

There are a variety of service plans to choose from for routine preventive maintenance and fast emergency repairs; full-service contracts—per call maintenance programs—continuous on site maintenance—or whatever suits the business situation the best.

It is also possible to take advantage of the Sperry Univac full range of programming and maintenance

courses—taught by an expert faculty—to develop or sharpen any staff.

Whatever V77 maintenance plan chosen, Sperry Univac will help keep the system up and doing its job.

And whatever SPERRY UNIVAC V77 Minicomputer system member is chosen, will put your business ahead in power, performance and productivity.

Contact your local Sperry Univac Minicomputer representative for more information.



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- 77-400 Computer System
- 77-600 Computer System
- 77-800 Computer System
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- Distributed Network System
- Data Base Management
- Data Communications
- Interactive Terminal Operating System
- Real-Time Operating System
- Peripherals _____
- Other _____

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- 6 Months 12 Months

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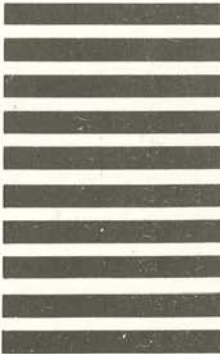
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