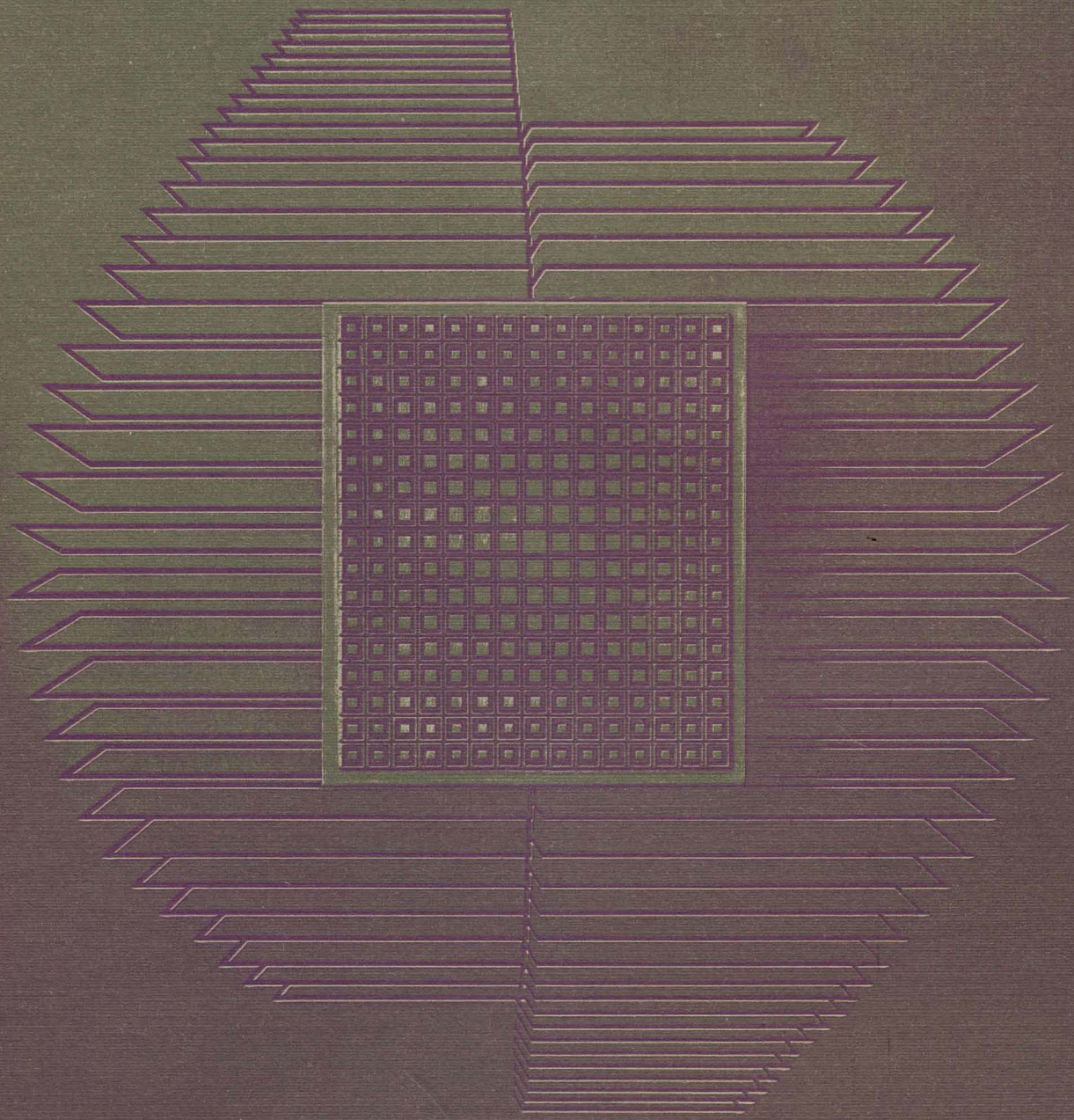
SPERRY UNIVAC

# 1100/90

## Facts and Figures



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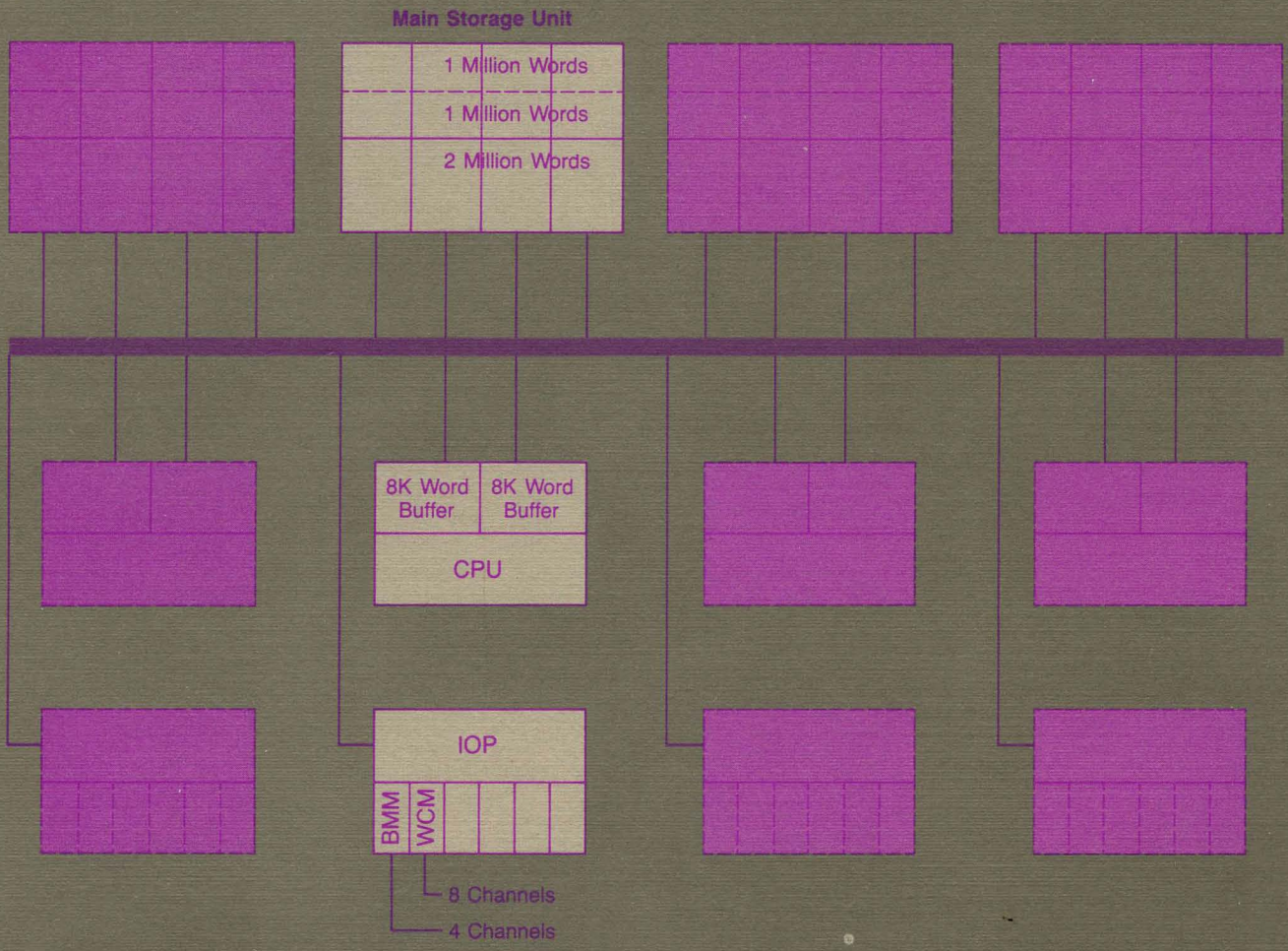
# 1100/90 System Configuration




Master Operator Console

System Support Processor

Subsystem Access Unit

Cooling Unit

Motor Altenator

Auxiliary Operator Consol

Subsystem Power Control

Required

Optional

BMM = Block Multiplexer Module

WCM = Word Channel Module

## Introduction

**High Performance at a Competitive Price...**

Sperry Univac carries on its tradition of superiority with the SPERRY UNIVAC 1100/90 computer system.

This system vastly extends the performance of the proven Series 1100 Family of Systems while continuing a second tradition: complete functional compatibility between all members in the Series 1100 Family.

The 1100/90 system is a general purpose processing system that provides extreme flexibility to handle a wide variety of applications and uses whether running concurrently or in dedicated configurations.

The 1100/90 system is particularly suited to handling a multitude of jobs simultaneously, especially when the tasks involve a mixture of real-time, interactive and batch processing.

As with other members of the Series 1100 Family, the 1100/90 system offers multiprocessing capabilities that can be tailored to fit specific workload and redundancy considerations. Whatever configuration is chosen, the multiprocessing system always operates under a single executive system.

The specifications for instruction speed, memory response and peripheral throughput in handling these tasks make the minimum 1100/90 system very large.

This system can be expanded, increasing instruction processing four times, memory capacity eight times and connections for input/output operations 12 times.

New packaging techniques allow the Central Processing Unit and its accelerators and buffers to be housed in a single cabinet. This approach increases performance by eliminating intercabinet delays and reduces physical requirements, such as power, cooling and floor space. In turn, installation and operating costs are reduced.

The CPU and Input/Output Processor are designed for independent operation. Each unit is targeted to handle one aspect of the job very efficiently and execute its work without interfering with other system components—until a specific pass-off point is reached.

The design of the 1100/90 system provides the highest possible reliability and availability. And it combines proven techniques with new features to enhance fault tolerance and to accelerate the process of locating faults in the system. The result is a much easier to maintain system.

By combining speed, reliability, size and a full suite of software—such as compilers, data base managers, utilities and applications—into a single, large-scale, expandable system, the 1100/90 system is an extremely attractive cost/performance package for top-level system users.

## Principle Features

**Ultramodern Components; High Performance Peripherals...**

The principle features of the 1100/90 systems are:

- Multiple Central Processing Units (CPU) and multiple Input/Output Processors (IOP)
- Two dedicated, very high-speed buffers integrated into each CPU (16K words per CPU)
- 100 percent data through-checking
- Unique clocking synchronization source
- Independent, simultaneous communications processing
- Full software support of an extensive library through a continuously evolving, compatible operating system
- Complete partitioning facilities for concurrent operation and maintenance
- Extensive on-line fault tolerance and isolation
- Increased performance through ultramodern components and design parallelism
- High capacity Input/Output connectivity and throughput capability
- Centralized power control
- Redundant configurations for critical system components
- Peripheral switching and partitioning capability
- Large, modular main storage units with four-way simultaneous access (16 megawords maximum)
- Wide choice of high-performance auxiliary storage and peripheral subsystems
- Standard Extended Instruction Set for efficient character manipulation
- Independent I/O processors with channel program execution and direct, high-speed main storage access
- Expanded user address space with 16 user base registers, 268 megawords maximum
- Source and object code compatibility with other Series 1100 systems.

## Inside The System

**System Configuration...**

The hardware of the 1100/90 systems consist of the following components:

- Central Processing Units
- Input/Output Processors
- Main Storage Units
- Operator Consoles
- System Support Processors
- Cooling Units
- Subsystem Access Units
- Subsystem Power Controllers
- Auxiliary storage and peripheral subsystems.

Each component is contained in its own cabinet and is functionally independent. Each performs its assigned tasks under system control, but free from constraints until a task is completed.

Each component can have multiple access paths to and from other components, a feature that: resolves access conflicts by priority logic; continues system operation if a redundant component fails; allows redundant components to be serviced while the system is operating.

The minimum 1100/90 Central Complex is composed of a Central Processor Unit (CPU), an Input/Output Processor with at least eight word channels and four block multiplexer channels, a Main Storage Unit with 8 megabytes (2 million words) of storage, a master Operator Console and a System Support Processor (SSP). The Central Complex also includes a System Panel, System Clock, Cooling Unit and Motor Alternator.

The Central complex can be expanded by adding features and units. System configurations are essentially free-form. A new system inter-connection architecture, using the Universal Processor Interrupt (UPI), eliminates the need for clusters or other dedicated groupings of CPUs and IOPs. This means that no artificial boundaries constrict the 1100/90 configurations and that no extra units need to be included for any purpose other than higher performance or redundancy.

The instruction execution power of the 1100/90 can be increased by adding additional CPU's. Each CPU is cache buffered so that very efficient multi-processor coupling is achieved. The addition of CPU's can result in 2x, 3x, or 4x multi-processing.

The input/output processor of the 1100/90 system provides for the connection of a larger number of peripherals and extremely high thruput.

Each IOP has space for four channel modules each IOP Expansion provides space for two additional channel modules. Each module consists fo either four block multiplexer channels or eight word channels. Four IOPs can be configured, providing a total of 24 channel modules and up to 176 separate channels.

Main Storage Units (MSU) start at 8 megabytes distributed across four banks. The MSU can be expanded in increments of 4 megabytes (1 million words) up to a total of 16 megabytes (4 million words) in a cabinet. A maximum of four MSUs can be configured, providing a total of 64 megabytes or 16 million words of storage. Redundant Consoles, System Support Processors, Cooling Units, Motor Alternators and Subsystem Access Units can also be included.

The different components of the 1100/90 are:

**The Central Processing Unit (CPU)**
Incorporated in the 1100/90 CPU is LSI technology for maximum speed and cost effectiveness. Architectural extensions to the Series 1100 design, including hardware dedicated to execute specific functions, enhance performance and extend functionality. These extensions are:

- A 32K byte (8K word) high-speed instruction buffer in each CPU. Two instructions are read in 60 nanoseconds. Following a jump instruction, both the next instruction and the "jump to" case can be fetched and ready for execution.
- An instruction pipelining feature that is three deep for executing three instructions concurrently. This overlapping technique is further enhanced by the wraparound of results, a feature that routes intermediate results from one instruction to the appropriate registers when needed by the following instructions.
- A dedicated high-speed operand buffe in each CPU. These buffers are also 32K bytes and operate at a 30 nanosecond cycle. When required, both the operand and instruction buffer fetch 8-word blocks from the Main Storage Units across a 72-bit wide interface.

□ An arithmetic unit that is implemented as three distinct, special-purpose sections: a binary arithmetic section; a high-speed multiply section; and a decimal arithmetic section. Each section is optimized to reduce execution time for its specific type of calculation.

□ A duplicate X file to accelerate operand and instruction address formation. This file provides two copies of the contents of each index register for internal manipulation.

Addressing space in the 1100/90 system has been increased dramatically, with instruction addresses allowing up to 16 megawords in a program bank. To complement this capability, indexing has been extended to 24 bits. Bank protection has been enhanced with access permission bits, a new lock-and-key mechanism.

An expanded base register set allows banks to overlap with address limits fully checked. The user has 16 base registers, each of which may be individually designated during program execution.

Despite the changes to addressing and bank protection, the 1100/90 system remains compatible with previous Series 1100 systems. That's because the new extended addressing and protection features treat previous methods as a subset.

Other features of the 1100/90 CPU are:

□ A Virtual Machine Facility, which offers an exceptional environment for software development. User programs and operating systems can be tested concurrently without interfering with normal operations. This facility reduces overhead by providing the hardware facilities for high performance.

□ An Extended Instruction Set, first introduced as an option on the 1100/60 Family, is a standard feature of the 1100/90 CPU. It provides a 20-to-30 percent increase in processing speed for tasks requiring extensive character data handling.

□ A Central Complex that provides extremely flexible organization. For example, a completely new interrupt structure streamlines the intercommunications between the CPU and Input/Output Processors. A simple request/acknowledge network connects these units. The different components pass messages to each using dedicated mailboxes.

□ An optional Performance Monitor that provides hardware collection registers. These can be read to analyze system performance without incurring undersirable overhead.

**Input/Output Processor (IOP)**

The IOP off-loads the control and execution of input/output activities by reducing CPU involvement in peripheral activity. This new process involves queued I/O, which has the CPU submit a request to the IOP for service. The CPU is then no longer involved in peripheral activity—no matter how busy the disk drive, control unit and channel containing the data are—until the request is completed.

The request for data is passed to the IOP through a Universal Processor Interrupt/ mailbox mechanism. The IOP accepts the request, executes the appropriate channel program, handles path selection and error control and prepares a completion message for CPU notification and handling. This design significantly decreases CPU software path length.

The IOP, using a two-word wide interface, transfers data directly to Main Storage. This high-speed link, coupled with parallel accessing mechanisms in main storage, protects against bottlenecks in the entire input/output complex.

An IOP may be configured a number of ways using two types of input/output channels: Block Multiplexer and Word.

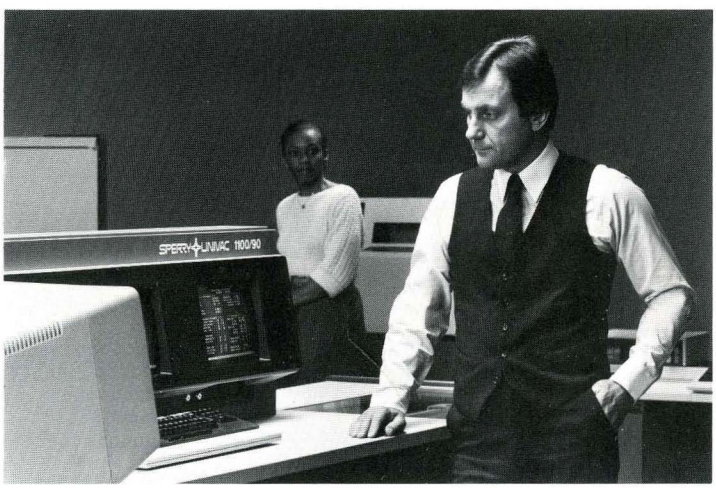
Block Multiplexer Channels are offered in groups of four, called a module. Each channel can transfer up to 4.3 million bytes per second on input and up to 3.7 million bytes per second on output. Each module is capable of transferring at an aggregate rate of 17.2 million bytes a second.

The traditional Series 1100 Word channel module contains eight channels. Data transfer rates are a maximum of 3.7 million bytes per second for each channel and up to 18 million for a module. Each Word channel can run in the Internally Specified Index (ISI) mode for peripheral and subsystem operations and in the Externally Specified Index (ESI) mode, which operates in either half or quarter words for communications multiplexer operations.

Each IOP can handle a total of six modules in any combination of the two channel types. However, at least one must be a block multiplexer module. The five additional modules can be any combination of word channel modules or block multiplexer modules, which means each IOP can handle a maximum of 24 block multiplexer channels or a maximum of 40 word channels.

Each channel can have subchannels up to a total of 4096 for each IOP.

Each channel module is equipped with an internal tester that allows verification and testing of individual channels.

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**Main Storage Unit**
Main Storage in the 1100/90 system consists of Main Storage Units that provide from 2 to 16 million words of memory.

Four MSUs can be configured, each containing a maximum of 4 million words of storage. Minimum storage per cabinet is 2 million words.

Each MSU unit has four storage banks, each of which acts independently. This gives each MSU the ability to handle simultaneously a total of four requests from CPUs and IOPs.

The storage system interfaces to CPU buffers with block (eight word) read/write, with two-word read/write and a partial-word write that can handle any number of contiguous bits.

A number of new features increase performance, including:

- A two- or four-way interleave that automatically allocates consecutive block addresses to separate storage banks when consecutive eight-word blocks are being moved
- A day clock module in the MSU and the transfer of test-and-set logic from the CPU to MSU
- An Initial Program Load (IPL) block as well as a timer to control and initiate re-IPL logic is included in the MSU
- A write request queue that can stack as many as 16 two-word write requests in each CPU. This feature smoothes out the peaks in memory requests by freeing CPUs to continue with other work
- Duplicate tag memories that coordinate the high-speed instruction and operand buffers that reside in different CPUs with the contents of main storage. Duplicate memory records addresses contained in the high-speed and operand buffers in two separate areas, one of which is used for normal content retrieval. The other is used for parallel address searches, which serve to invalidate copies of any changes in words
- A built-in maintenance exerciser that facilitates fault location and allows the MSU to be serviced while other parts of the system are operating.

**Operator Console**
The Operator Console, which consists of two UTS 20 terminals, provides communication between the 1100/90 system and operating personnel. One terminal is required for passing messages to and receiving messages from the 1100 Operating System. The second, optional terminal is for performance monitoring and other status displays.

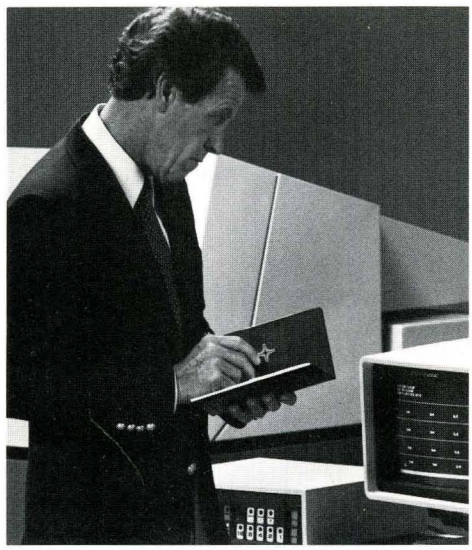
Two other devices are included on the Console. One is a System Panel for controlling initial program load, assigning System Support Processors to application partitions and sounding a system alarm. The second device is a clock calendar that the operating system reads and sets.

Auxiliary consoles can be configured. Each console can be ordered either at a sitting level or at a sitting/standing level.

**System Support Processor (SSP)**
The System Support Processor is a dedicated minicomputer that performs power control, unit initialization, application/maintenance partitioning, initial program load and system maintenance. An 1100/90 system can use two SSPs.

The SSP also performs error handling, one of its most important functions. The SSP monitors each central complex unit, taking recovery and isolation action when errors are discovered. The SSP also logs each error for later analysis.

For maintenance, the SSP performs on-line diagnostic testing, full prognosis and off-line analysis for pinpointing faults.



The SSP uses a microprocessor-based Unit Support Controller to communicate with each central complex unit. Each complex unit contains a Unit Support Controller.

The SSP, a free-standing system, includes 262K bytes of memory, fixed disk storage, a magnetic tape unit and a CRT workstation with printer.

**Cooling Unit**
The high performance technology and component packing in the 1100/90 system is based on an important factor: reliability. Fundamental to the speed and reliability in the design is Large Scale Integration which places a multitude of logic elements on a single semiconductor chip. These are densely placed on printed circuit boards to reduce to a minimum the delay between components.

This densely packed componentry requires liquid cooling and this is provided by a closed-system Cooling Unit that is installed in the computer room. This unit circulates coolant through its internal heat exchanger and through cooling plates in the 1100/90 CPU. Heat dissipation and cooling is accomplished by ordinary chilled water that is cycled through the heat exchanger.

**Subsystem Access Unit (SAU)**
The 1100/90 provides multiprocessing to improve your productivity. With multiprocessing, you effectively have two or more computers doing the same work so if a component fails, you can keep on working. This is especially critical with many of today's demanding on-line applications.

But the 1100/90 adds another dimension to multiprocessing. You can have each processor retain a copy of the operating system to perform separate work and assign peripherals as dedicated units to each processor.

The optional Subsystem Access Unit controls the partitioning of peripheral subsystems, assigning dedicated peripherals to processors.

The SAU uses the Shared Peripheral Interface (SPI), installed in word channel subsystems, and either the Byte Channel Transfer Switch unit or an internal interface for block multiplexer subsystems to partition subsystems.

**Figure 1** General Characteristics of SPERRY UNIVAC Disk Drives

| Characteristic/Model | 8480 | 8470 | 8450 | 8433 | 8430 |
|---|---|---|---|---|---|
| Cabinets per subsystem | 1-8 | 2-32 | 2-32 | 2-32 | 2-32 |
| Disk drives/packs per cabinet | 4 | 1 | 1 | 1 | 1 |
| R/W head-accessor mechanisms per drive/pack | 1 Movable | 1 Movable<br>1 Fixed (option) | 1 Movable<br>1 Fixed (option) | 1 Movable | 1 Movable |
| R/W heads per disk drive/pack | 32 Movable | 32 Movable<br>60 Fixed | 30 Movable<br>60 Fixed | 19 | 19 |
| Tracks per disk surface | 1260 | *1260 | *1120 | 815 | 411 |
| Recording surfaces per disk pack | 16 | *16 | *15 | 19 | 19 |
| Addressable tracks per surface | 1250 (plus 10 spares) | *1250 (plus 10 spares) | *1110 (plus 10 spares) | 808 (plus 7 spares) | 404 (plus 7 spares) |
| Addressable tracks per drive/pack | 20,000 (plus 160 spares) | *20,000 (plus 160 spares) | *16,650 (plus 150 spares) | 15,352 (plus 133 spares) | 7,676 (plus 133 spares) |
| Words per record (36-bit) | 112/448<br>1,792 (cache mode) | 112/448<br>1,792 (cache mode) | 112/448<br>448 (cache mode) | 112<br>N/A | 112<br>N/A |
| Records per track | 40/14<br>4 (cache mode) | 40/14<br>4 (cache mode) | 29/9<br>9 (cache mode) | 20 | 20 |
| Capacity per disk pack (36-bit words) | 89,600,000/<br>125,440,000<br>143,360,000<br>(cache mode) | *89,600,000/<br>125,440,000<br>143,360,000<br>(cache mode) | *54,079,200/<br>67,132,800<br>67,132,800<br>(cache mode) | 34,388,480 | 17,194,240 |
| Minimum access time (milliseconds) | 4 | 4 | 4 | 7 | 7 |
| Average access time—Movable (milliseconds)—Fixed | 23 | 23<br>8.3 | 23<br>8.3 | 30<br>— | 27<br>— |
| Maximum access time—Movable (milliseconds)—Fixed | 46 | 46<br>16.7 | 46<br>16.7 | 55<br>— | 50<br>— |
| Disk pack speed (RPM) | 3,600 | 3,600 | 3,600 | 3,600 | 3,600 |
| Data transfer rate (per second) | 2,097,000 bytes<br>466,000 words | 2,097,000 bytes<br>466,000 words | 1,260,000 bytes<br>280,000 words | 806,000 bytes<br>179,111 words | 806,000 bytes<br>179,111 words |
| Dual access feature | Available | Available | Available | Available | Available |

*Not including fixed head option.

**Subsystem Power Controller (SPC)**
The Subsystem Power Controller is an optional extension of the IOP, providing automatic control of peripheral subsystems without operator involvement.

The SPC centrally controls power on/power off to subsystems and is connected to an IOP and its subsystems. The SPC can manage up to 64 peripheral control units.

The SPC can be controlled manually, but normally takes direction from software running in the SSP.

**Auxiliary Storage and Peripheral Subsystems**
A wide variety of auxiliary storage and peripheral subsystems is available with the 1100/90 system. These are:

- Five different mass storage disk units with associated control units
- High performance Cache/Disk Systems
- Six different magnetic tape units
- Several impact printers
- The 0777 ultra high-speed electrophotographic printer
- A diskette autoloader/reader
- Two free-standing communications systems.

**Disk Storage**
The 1100/90 system supports a variety of advanced, direct-access disk storage devices that combine fast access with the large capacity needed to accommodate today's massive data bases.

Microprogrammed, buffered control units, containing error correction code, command retry and rotational position sensing, connect disk storage units to the 1100/90 system.

Available disk units include:

- The SPERRY UNIVAC 8480 Disk Subsystem, which offers increased capacity at a lower requirement in floor space, power and other environmental requirements. It accomplishes this through the packaging of four disk drives in one cabinet
- The SPERRY UNIVAC 8470 and 8450 non-removable disk units
- The 8433 and 8430 removable disk units.

Specifications for these units are shown in figure 1.

**Cache/Disk**
The Cache/Disk System (C/DS) represents a new design concept in hierarchical mass storage and control. C/DS combines the advantages of intelligent microprogrammed control processors, very large capacity disk drives and fast, reliable semiconductor storage.

The C/DS meets the growing need for faster I/O access to data in large on-line data bases by retaining data accessed frequently from disk storage in fast-access semiconductor cache memory.

The C/DS can also be used as a Solid State Disk that keeps frequently used data permanently stored in semiconductor memory for microsecond handling of data.

The C/DS can operate as both a cache/disk and solid state disk system.

Principal components of the Cache/Disk System are:

- Cache/Disk Processor, which is a special purpose microprogrammed processor tailored to handle the host system's requests for data and to manage the disks and solid state storage containing data.
- Storage Unit, which is a free-standing cabinet containing from 4 to 16.5 million bytes of storage that can be used as cache or long-term storage.
- Disk Storage, which includes 8480/8470/8450 disk drives to retain large volumes of data accessible by moving read/write heads. These units can move data at high transfer rates to the Cache/Disk Processor.

Specifications for these units are shown in Figures 1 and 2.

**Figure 2** SPERRY UNIVAC Cache/Disk System Storage Unit Characteristics

| | |
|---|---|
| Capacity | |
| data segment | 1792 words (8064 bytes) |
| words per module | 512 x 1792 = 917,054 words (4,128,768 bytes) |
| words per unit | 4 x 917,504 words = 3,670,016 words (16,515,072 bytes) |
| Data transfer rate | 1.1 million words per second (5 megabytes per second) |
| Error detection and correction | Double-bit error detection and single-bit error correction |
| I/O to Solid state storage—access time | Less than 0.2 millisecond plus transfer time |
| I/O hit in cache—access time | Less than 1 millisecond plus transfer time |
| I/O miss in cache—access time | Less than 2 ms plus disk time for seek, latency and transfer |


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**Figure 3** UNISERVO Magnetic Tape Subsystem Characteristics

| SUBSYSTEM | UNISERVO 22 | UNISERVO 24 | UNISERVO 30 | UNISERVO 32 | UNISERVO 34 | UNISERVO 36 |
|---|---|---|---|---|---|---|
| Tape Units per Subsystem* | 1-8 | 1-8 | 1-16 | 1-16 | 1-16 | 1-16 |
| Recording Density (bpi) | | | | | | |
| 9 Track NRZI | 800 | 800 | 800 | | | |
| 9 Track PE | 1600 | 1600 | 1600 | 1600 | 1600 | 1600 |
| 9 Track GCR | | | | 6250 | 6250 | 6250 |
| Transfer Rate (KB/sec.) | | | | | | |
| 9 Track NRZI | 60 | 100 | 160 | | | |
| 9 Track PE | 120 | 200 | 320 | 120 | 200 | 320 |
| 9 Track GCR | | | | 470 | 780 | 1250 |
| Tape Speed (inches per set) | 75 | 125 | 200 | 75 | 125 | 200 |
| Tape Length (max feet) | 2400 | 2400 | 2400 | 2400 | 2400 | 2400 |
| Interblock gap time (MSec) | | | | | | |
| 9 Track Nonstop | 8.0 | 4.8 | 3.0 | 8.0 | 4.8 | 3.0 |
| 9 Track Start/Stop | 10.0 | 7.7 | 4.6 | 10.4 | 6.8 | 4.6 |
| Rewind Time (2400 ft) | 2 min. | 2 min. | 45 sec. | 60 sec. | 55 sec. | 45 sec. |

*UNISERVO 22/24 tape units or 30/32/34/36 tape units may be intermixed on their respective control unit.

**Magnetic Tapes**
Several UNISERVO magnetic tape subsystems can be connected to 1100/90 systems. Industry standard PE, NRZI and GCR recording modes are offered at densities up to 6,250 bpi and transfer rates up to 1,250,000 frames per second. Cartridge loading capability, code translation features and dual channel/dual access are offered on all units. The characteristics of each tape unit are contained in Figure 3.

**Printers and Paper Peripherals**
Line Printers on the 1100/90 system offer speeds up to 2,000 lines per minute for a full character set, forms advance rate up to 100 inches, up to 160 print positions and a wide variety of printing fonts and character sets.

The very high-speed SPERRY UNIVAC 0777 printer combines the latest in laser/electrophotographic technology with a reliable paper handling mechanism and a sophisticated control unit processor. The 0777 can print 10,000 lines per minute including forms overlay and special electronically generated images.

Multiple printers can be connected to the 1100/90 I/O Processor channels.

SPERRY UNIVAC card readers and card punches can be connected to the 1100/90 block multiplexer channel.

**Autoload Diskette Subsystem**
The basic diskette subsystem includes a disk drive, an integrated control unit and buffer. Two diskette drives may be attached. Each drive has an input hopper capable of holding 20 diskettes. Several densities and recording modes are possible.

## Communications
The communications equipment and linking software available with the 1100/90 system can be grouped into three areas: Remote Terminal Equipment, Front-end/ Network Processors and Distributed Processing Systems. Each is briefly described below.

Remote Terminal Equipment includes equipment with keyboards, terminal clusters and remote batch input/output stations and include:

- UNISCOPE 200 Display Terminals
- SPERRY UNIVAC Universal Terminal System (UTS 400)
- SPERRY UNIVAC Universal Terminal System 4000 (UTS 4000 Family), which includes UTS 10 and 20 Terminals, UTS 20 Workstation, UTS 40 Terminals and Workstation, and the UTS 4020 and 4040 cluster controllers.
- SPERRY UNIVAC Universal Terminal System 700 (UTS 700) or Business Computer (BC/7)
- SPERRY UNIVAC V77 Minicomputer Systems
- SPERRY UNIVAC System 80
- SPERRY UNIVAC Universal Distributed System (UDS 2000)
- SPERRY UNIVAC Computer Assisted Data Entry (1900 Family).


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Front-end/Network Processors include the Distributed Communications Processor (DCP) family, which is a highly sophisticated computing system designed especially for communications network processing. These systems may be installed on-site connected to the 1100/90 system by input/output channels or connected remotely by high-speed communications lines.

The DCP consists of multiple microprocessors designed to provide maximum availability and reliability while meeting the high performance demands of the communications processor.

There are currently two members of the DCP family: the DCP/40, which is the most powerful and can support 256 communications ports, and the DCP/20, which is the lowest cost and can support 48 communications ports.

Both are totally modular, able to grow in small increments. Both are also self-sufficient, capable of free-standing operation and of supporting mass storage devices, including diskette and large capacity fixed disks and magnetic tapes.

The DCPs can be front-end, remote concentrating and nodal processors in any type of network, from single star to complex distributed networks.

Distributed Processing Systems enable the 1100/90 system to participate in and maintain control of application processing at other locations. The 1100/90 system can be connected to other 1100/90s as well as to other Series 1100 systems, System 80s, Series 90 and V77 systems. All of these systems may create files, copy files, transfer and delete files and submit jobs to other locations. Program-to-program communication between connected systems is also possible.

**Communications/Networking Control**
The Distributed Communications Architecture (DCA) and the DCP/Telcon System provide powerful communications networking capabilities to meet the needs described earlier for the 1100/90 system.

**Distributed Communications Architecture (DCA)**
DCA governs the design of communications systems for existing as well as future SPERRY UNIVAC products, including computers, communications controllers, data links and terminals. DCA is intended to provide the direction for all communications-oriented development for the next 10 years and beyond.

The architecture coordinates the development of network related items such as:

- Host interfaces
- Communications network controllers
- Communications network software
- Terminals
- Data communication links and protocols.

The DCA structure is compatible with emerging standards for computer interconnection and it follows the Open Systems Interconnection model of the International Standards Organization.

**Universal Data Link Control (UDLC)**
The basic linking protocol within DCA is the Universal Data Link Control. It is a superset of ADCCP, HDLC, SDLC and other data link protocols, enabling a DCA-based network to interconnect with many other systems, including public data networks. UDLC is a bit-oriented protocol that provides efficient control of interactive and batch transmissions in a packet-switching network.

**Telcon System**
Telcon is a network communications operating system, designed to transport data and manage DCPs in the network. Designed in accordance with DCA, Telcon incorporates state-of-the-art concepts in communications system design.

Telcon prepares DCPs for interconnecting systems under DCA. This includes supporting packet-switching data transmission and controlling point-to-point, trunk and circuit switching functions. The Telcon software, resident in interconnected DCPs, ensures data integrity, efficiently manages data packets and complete messages and is responsible for system management of the entire network.

**Distributed Data Processing (DDP)**
Beyond transmitting data, DCA meets the needs of applications executing on different computers connecting in a network.

It does this by allowing applications to exchange information as they execute on independent computers.

The layered structure of both DCA and the Open System Interconnect model specify the protocols and procedures that must be followed at this high level of communications. This allows construction of a new type of application, called the

distributed application, which is a related set of programs and data handled simultaneously by independent, but interconnected, computers. These applications receive appropriate assistance from a set of DDP system services, which permit moving and controlling of data and programs among interconnected computers.

The SPERRY UNIVAC DDP approach addresses distributed data base definition and access and provides program development tools and management services for distributed applications. It stresses the importance of interfaces for non-technical users, who in the future will be one of the principal groups of users of a broadened distributed information system.

**Software**

The SPERRY UNIVAC 1100/90 systems are supported by a rich, totally functional operating system. The 1100 Operating System supports an almost limitless range of data processing applications, including interactive, batch, transaction and real-time environments. The components of the 1100 OS are:

- The System Control Software, which includes the Executive and associated support utilities.
- A complete set of industry standard language processors including COBOL, FORTRAN, BASIC, Pascal, APL and PL/I.
- A comprehensive Interactive Processing Facility including CODASYL-based and relational data base management system, a comprehensive ad hoc Query Language and Report Processor, a widely acclaimed forms processing system and a complete set of information, administrative, maintenance and recovery utilities.
- A rich Communications Management System that provides full support to SPERRY UNIVAC communications and network products.
- A series of site management, performance measurement, applications development and control, text processing, symbolic debugging and simulation tools.
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