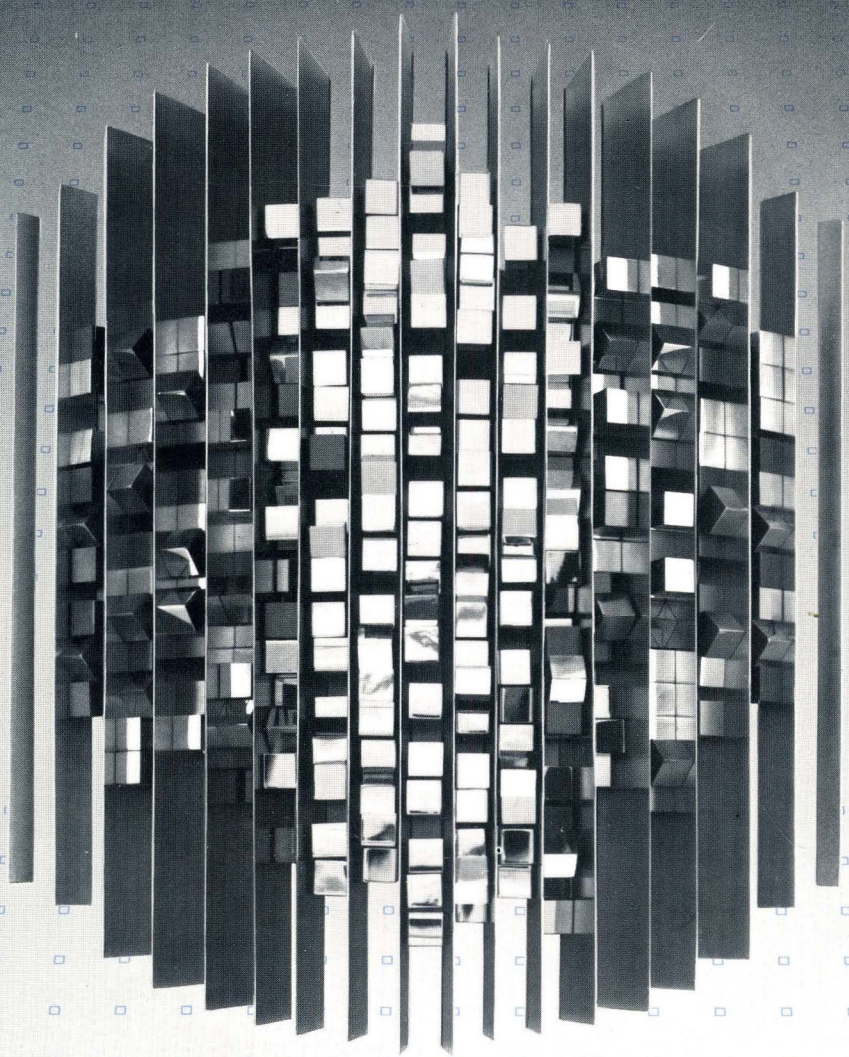
SPERRY

System 1100/70

Facts and Figures



SPERRY

Figure 1: 1100/71 Unit Processing System Models B1, C1, C2, E1, E2, H1, H2

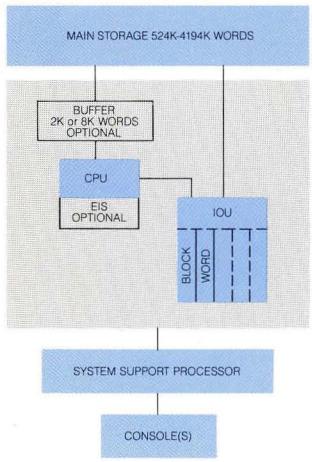


Figure 2: 1100/70 Dual Processing System Models E1, E2, H1, H2

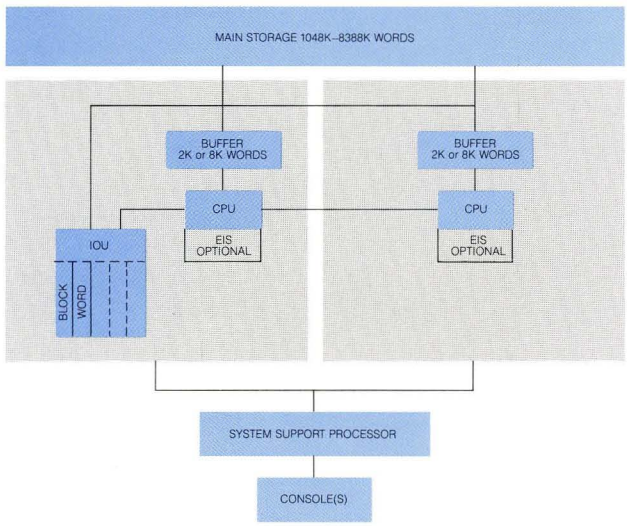


Figure 3: 1100/72 Multiprocessing System Models E1, E2, H1, H2

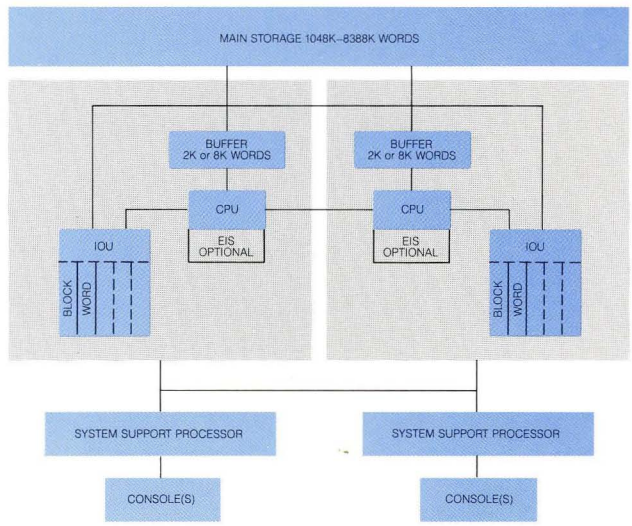
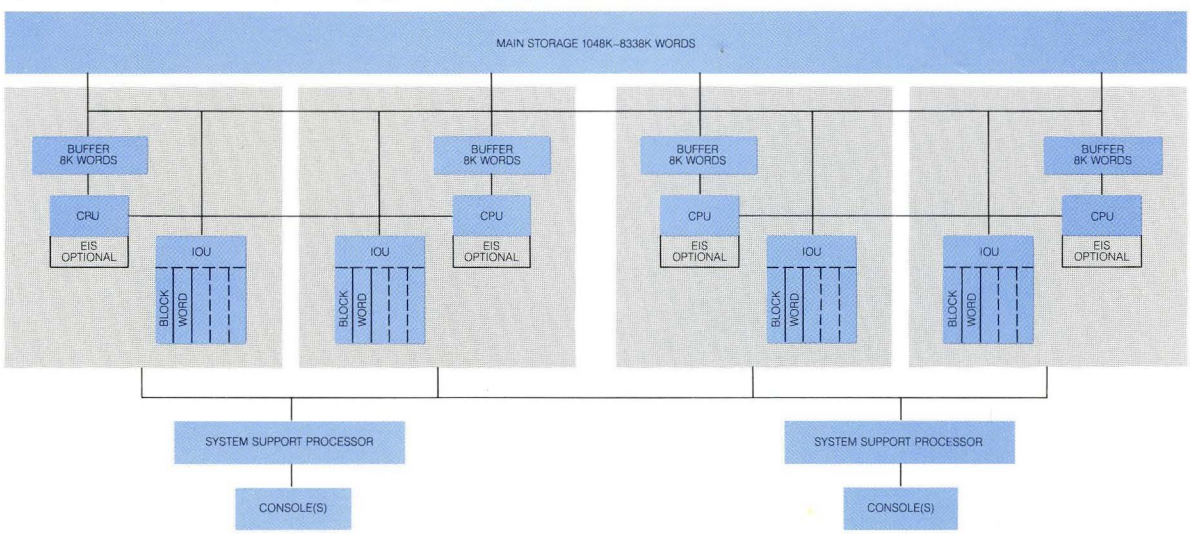


Figure 4: 1100/73, 1100/74 Multiprocessing System Models H1, H2



Introduction

The SPERRY System 1100/70 family is one of the most powerful and versatile lines of computer systems available today. Built upon the tradition of excellence established by the Series 1100, the 1100/70 models offer full, large-scale functionality and complete compatibility with all other Series 1100 systems. The 1100/70's are general-purpose processing systems featuring the latest advances in systems design, packaging techniques and programming technology.

The central processor and input/output unit are functionally independent units housed in a single cabinet, resulting in low floor space, cooling and power requirements. Main storage is integrated with the central processing cabinet. Unit or single processor system expansions include the addition of main storage; a high speed buffer to increase performance; an extended instruction set designed to enhance the performance of high-level languages and system software; and expansion to completely redundant, tightly coupled multiprocessing systems.

The 1100/70 models contain many features designed to provide extremely high reliability and availability. The system support processor, for example, contributes to a substantial reduction in computer room operational costs by providing automatic operation of the 1100/70. These features, coupled with a new concept in maintenance and the comprehensive repertoire of software and application packages, make the 1100/70 models the most cost-effective offering in their performance range.

The principal features of the 1100/70 models are:

- multiple central processing units (CPUs) and multiple input/output units (IOUs)
- common access to most system components in multiple CPU/IOU systems
- independent IOUs
- byte-oriented input/output (I/O) channels
- word-oriented I/O channels
- large, modular, semiconductor main storage (8388K words—32MB—maximum)
- semiconductor buffer storage [2K or 8K (32K bytes) words per CPU]
- optional extended instruction set (excluding Model B)
- wide choice of high-performance auxiliary storage and peripheral subsystems
- independent, simultaneous communications processing
- redundancy among system components
- system partitioning capability
- peripheral switching capability
- dynamic adjustment to a mix of batch, interactive and transaction processing modes
- extensive software library
- many language processors
- partial-word, full-word and double-word addressability
- storage protection
- program address relocation
- a continuously evolving, series-compatible operating system

System Configuration

An 1100/71 unit processing system, the entry level 1100/70 model, is composed of a central processing unit (CPU), an input/output unit (IOU), a system support processor, optional buffer storage, and main storage that is integrated with the central processing cabinet. Unit processing systems may be configured with from 524K words minimum to 4194K words (2MB-16MB) (See Figure 1).

Unit processing systems may be expanded by adding 2K or 8K words (8K or 32K byte) of buffer storage and the extended instruction set feature. Dual processing configurations begin with the 1100/70E, which consists of two tightly coupled CPUs and one IOU in two cabinets. These configurations may be enhanced with EIS and with additional buffer memory (see Figure 2).

Additional central complexes composed of a CPU, IOU, and buffer storage may be added to a maximum of two in an 1100/72 multiprocessor configuration (see Figure 3). The 1100/72 multiprocessing system provides a performance growth potential of more than six times the entry level 1100/71 Model B1 system.

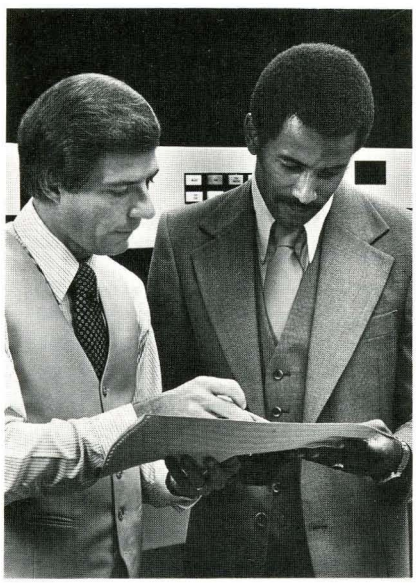
An 1100/72 Model E multiprocessing system provides a fully redundant central complex composed of two central processing units, two input/output units, two 2K word (8K byte) buffers, and two system support processors. Main storage can be configured with from 4MB to 32MB words.

The system may be expanded to 8K words (32K bytes) of storage in each buffer (1100/72 Model H). The extended instruction set feature may be installed in each CPU.

The 1100/70 dual processing system (E or H models) introduces the concept of clustering two 1100 CPUs and one IOU (2x1). This new feature enhances Sperry's multiprocessing philosophy initially introduced in 1965. Memory for the 1100/70 dual processing system is available as internal memory and is incremented from 1048K words (4M bytes) up to 8388K words (32M bytes) per configuration. The extended instruction set is optional.

Additional growth, power and redundancy are offered by the three and four processor configurations of the 1100/73 and 1100/74.

These systems feature tightly coupled but partitionable multiprocessors that can include two, three or four I/O units (see Figure 4). Each processor includes an 8K (32K byte) buffer. Memory up to 8M words (32M bytes) is offered in two external cabinets, each of which holds a maximum of 4M words.



No matter where you start in the series, a simple field upgrade to another model gives you the extra computing power that you require.

Figure 5 shows the long and incremental growth path of the SPERRY System 100/70. It offers a family of systems that will satisfy your short term computing requirements with a growth path unmatched in the industry today.

Each of the components of SPERRY System 1100/70 is discussed in the following section.

The Central Processor Unit (CPU)
The 1100/70 CPU design incorporates LSI microprocessor chips and features microprogrammed control and arithmetic chips. Paralleled arithmetic logic unit (ALU) chips are used to gain design flexibility, reduced size, and reliability. The 1100/70 instruction set is microprogrammed, utilizing a separate random access control store as the storage media. Reliability is enhanced through the use of duplex checking, extensive parity generation and checking, control store error correction and instruction retry.

An optional extended instruction set (excluding the 1100/71 Model B), designed to increase the efficiency of high-level, business-oriented languages and system software, may be added to the central processor. This hardware/firmware feature improves the character string manipulation ability of the 1100/70 models in a COBOL and COBOL-oriented data base/data communications computing environment.

Standard with the SPERRY System 1100/70 is the ability to perform double precision floating point instructions.

An optional performance monitor feature provides a CPU with the capability to collect system profile hardware data and software performance data. The hardware data will provide utilization of individual hardware modules such as CPU busy and individual I/O channel activity, as well as interdependencies between them. The software-related data will provide system or user software state information. Software utilities are provided to reduce the data collected and generate reports designed to assist in tuning a system for maximum performance.

The Input/Output Unit (IOU)
The 1100/70 IOU controls all transfers of data between the peripheral devices and main storage. Transfers are initiated by the CPU and executed by the IOU under a special channel program control. The IOU includes independent control paths to the CPU and data-transfer paths to main storage. Input/output is through either byte channels or word channels. The basic IOU contains one block multiplexor channel and one word channel module containing four word channels. Expansion features allow the addition of two block multiplexor channels and one word channel module, two word channel modules and one block multiplexor channel or four block multiplexor channels. This provides a maximum channel capacity of either two block channels and 12 word channels, three block channels and eight word channels, or five block channels and four word channels.

Buffer Storage
Buffer storage on the 1100/70 models (optional on 1100/71) consists of either 8K or 32K bytes of high-speed storage, dedicated to interfacing its associated CPU with main storage. This buffer provides a transparent, high-speed storage interface, increasing the effective speed of the workload.

Main Storage (Integrated)
The 1100/70 main storage unit contains 524K (2MB) words of semiconductor storage, expandable in increments of 524K words to a maximum of 4194K (16MB) words per unit. Multiprocessor configurations may expand to 8388K (32MB) words of storage.

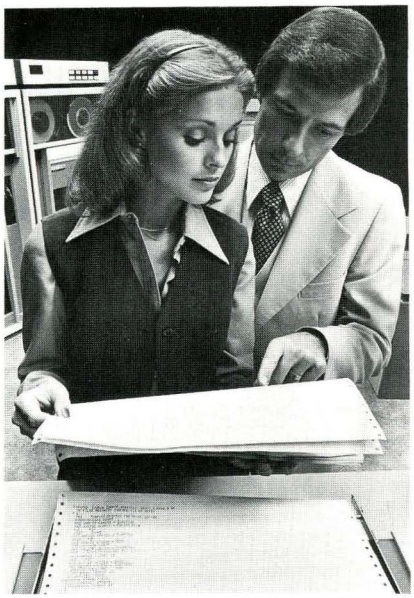
Main Storage (External)
The external storage unit for the 1100/73 and 1100/74 systems contains 1M words (4M bytes) of semiconductor storage, expandable in increments of 1M words to a maximum of 4M words (16M bytes). Up to two external storage units can be used.

System Support Processor (SSP)
The SSP is a separate miniprocessor dedicated to performing support functions for the central processing complex. The principal functions of the SSP are to diagnose and maintain the central complex, handle the system console(s), and control partitioning of the system.

Figure 5 General Relative Performance—Commercial Processing

1100/74 H1,H2		9.9-11.9
1100/73 H1,H2		7.6-9.3
1100/70,72 H1,H2		5.2-6.4
1100/70,72 E1,E2		3.5-4.2
1100/71 H1,H2		2.6-3.3
1100/71 E1,E2		1.8-2.2
1100/71 C1,C2		1.2-1.6
1100/71 B1		1.0

Due to the variety of configurations and processing environments, the relative performance can vary from those shown.



The System Console
The system console of the 1100/70 models provides the means for communication between the operator and the 1100 Operating System. It consists of a visual display unit with an alphanumeric keyboard in typewriter configuration, cursor-control keys, special function keys and a 200-character-per-second bidirectional printer. Up to three system consoles may be supported by each system support processor.

System Partitioning
The 1100/70 partitioning capability may be used to electrically isolate a component or group of components for maintenance or, in the case of fully redundant multiprocessor systems, to divide the system into two operating entities.

Partitioning of central complex components (CPU, IOU, buffer, main storage) is a standard feature of the 1100/70 models. Partitioning of peripheral subsystems is accomplished by adding optional partitioning features to the system.

Disk Storage
1100/70 models support a wide range of advanced, high-capacity direct-access disk storage devices to provide users with the data-handling power and the massive data base storage required for many applications.

Disk subsystems are attached to 1100/70 models by the 5056 and 5057 high-performance microprogrammed control units supporting an intermix of disk types, error-correction code (ECC), command retry and rotational position sensing (RPS). Dual channel and dual access are also supported, allowing up to four access paths from the central complex to the disk units.

Available disk units include:

- the SPERRY 8430 and 8433 removable disk units
- the SPERRY 8450, 8470, and 8480 non-removable disk units. Figure 5 details the characteristics of each of these disk units.

Semiconductor Storage Family
The Semiconductor Storage Family (SSF) combines advantages of intelligent 5057 microprogrammed control processors, large capacity disk drives, and fast, reliable semiconductor technology. SSF represents a totally new design concept in hierarchical mass storage and control.

The SSF meets the need for faster input/output access to data required by today's large, online data base systems. Data accessed frequently from disk storage is held in semiconductor cache memory. Upon request, this data is transferred to the host system without the relatively long seek and latency time of disk.

Its flexible design lets the SSF operate as a cache/disk, as Semiconductor Auxiliary Storage (SAS) or as a combination of both.

Cache/disk is the primary mode of operation. In this mode frequent requests for information are processed with significant improvement in I/O response time over conventional methods.

In the SAS mode, cache memory operates as permanent storage, just as a disk, except access and response time improve significantly.

The principal components of the cache/disk system are:

- Cache/Disk Processor—the 5057 microprogrammed I/O processor can be tailored to handle requests for information that resides either in cache memory or on disk.
- Storage Unit—a free-standing cabinet (type 7053) containing random access memory (RAM) to be used as cache or permanent data. Characteristics of the storage unit are contained in Figure 6.
- 8470/8480/8450 Disk Storage—permanent storage media for user information providing the latest state-of-the-art storage to match the high transfer rate requirement of the Semiconductor Storage Family.

  The 5057, one of which is included with the 1100/70, can be used with just the 8450/8470/8480 line of disk drives. Additional semiconductor storage components can be added later.

Figure 5 General Characteristics of SPERRY 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	1 Movable 1 Fixed (option)	1 Movable	1 Movable
R/W heads per disk drive/pack	32 Movable	32 Movable	30 Movable 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 1,792 (cache mode)	112/448 1,792 (cache mode)	112/448 448 (cache mode)	112 N/A	112 N/A
Records per track	40/14 4 (cache mode)	40/14 4 (cache mode)	29/9 9 (cache mode)	20	20
Capacity per disk pack, depending on prep factor (36-bit words)	89,600,000/ 125,440,000 143,360,000 (cache mode)	89,600,000/ 125,440,000 143,360,000 (cache mode)	*54,079,200/ 67,132,800 67,132,800 (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	23 8.3	30 —	27 —
Maximum access time—Movable (milliseconds)—Fixed	46	46	46 16.7	55 —	50 —
Disk pack speed (RPM)	3,600	3,600	3,600	3,600	3,600
Data transfer rate (per second)	2,097,000 bytes 466,000 words	2,097,000 bytes 466,000 words	1,260,000 bytes 280,000 words	806,000 bytes 179,111 words	806,000 bytes 179,111 words
Dual access feature	Available	Available	Available	Available	Available

*Not including fixed head option

Figure 6 SPERRY Semiconductor Storage Family 7053 Storage Unit Characteristics

Capacity:	
data segment	1792 words (8064 bytes)
words per module	512 x 1792 words = 917,504 words (4,128,768 bytes)
words per unit	4 x 917,504 words = 3,706,016 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 cache storage access time	Less than 0.5 millisecond plus transfer time
I/O hit in cache time	Less than 1 millisecond plus transfer time
I/O miss in cache time	Less than 2 ms plus disk time for seek, latency, and transfer

Magnetic Tapes
A variety of UNISERVO magnetic tape subsystems is available for use on 1100/70 models. PE, NRZI and GCR recordings are available, with densities of up to 6250 bpi and transfer rates up to 1,250,000 frames per second. Both 7-track and 9-track tape units are available, along with translate features, cartridge capability, and dual channel/dual access support.

Figure 7 contains the characteristics of each of these tape units.

Paper Peripherals
A complete line of paper peripherals can be connected to your 1100/70 models via the block multiplexer channel. These include the 0716 Card Reader, 0776/0770 impact printer, the 0777 laser printer and the 0604 Card Punch. The excellent characteristics of each are available on request.

Communications Equipment
There are many available methods for communicating with the 1100/70 models.

For remote communications:

- SPERRY Universal Terminal System (UTS 400)
- SPERRY Universal Terminal System UTS 4000 Family
- SPERRY System 80 Systems
- SPERRY Universal Distributed System (UDS 2000)
- SPERRY Computer Assisted Data Entry (1900 Family)
- SPERRY Series 1100 System

Communications Networking
The Distributed Communications Architecture (DCA) and the DCP/Telcon System provide a powerful communications networking capability that meets all data transmission and switching needs in a Series 1100 environment. Simple or complex networks, including one or more Series 1100 systems and terminal and small computer configurations, are supported.

Distributed Communications Architecture
DCA is a total system design plan for any communications network, including computers, communications controllers, data links and terminals.

DCA governs the design of communications systems for existing as well as future SPERRY products. It is intended to provide the direction for communications-oriented development for years to come.

Figure 7 UNISERVO Magnetic Tape Subsystem Characeristics

SUBSYSTEM UNISERVO	14	22	24	26	28	30	32	34	36
Tape Units per Subsystem*	2-8	1-8	1-8	1-8	1-8	1-16	1-16	1-16	1-16
Density (bps)									
7 Track NRZI	800/556/200					800/556/200			
9 Track NRZI	800	800	800			800			
9 Track PE	1600	1600	1600	1600	1600	1600	1600	1600	1600
9 Track GCR				6250	6250		6250	6250	6250
Transfer Rate (KB)									
7 Track NRZI	48/33/12					160/111/40			
9 Track NRZI	48	60	100			160			
9 Track PE	96	120	200	120	200	320	120	200	320
9 Track GCR				470	780		470	780	1250
Speed (ips)	60	75	125	75	125	200	75	125	200
Length (max feet)	2400	2400	2400	2400	2400	2400	2400	2400	2400
Interblock time (MS)									
7 Track Nonstop	12.5					3.75			
7 Track Start/Stop	6					5.35			
9 Track Nonstop	11	8.0	4.8	4	2.4	3.0	8.0	4.8	3.0
9 Track Start/Stop	6	10.0	7.7	7.1	4.4	4.6	10.4	6.8	4.6
Rewind (2400 ft)	2.8 min.	2 min.	2 min.	95 sec.	95 sec.	45 sec.	60 sec.	55 sec.	45 sec.

UNISERVO 30, 32, 34 and 36 tape units may be intermixed on the same control unit.

UNISERVO 22, 24, 26 and 28 tape units may be intermixed on the same control unit.

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

- Host interfaces
- Communications network controllers
- Communications network software
- Terminals
- Data communications links and protocols
- Communication with other vendors

The DCA structure is compatible with emerging standards for computer interconnection. It will follow the Open Systems Interconnection model of the International Standards Organization.

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

Telcon Software System
The Telcon Software System is an advanced communications control system developed for the implementation of DCA. It provides the hardware and the software for the Distributed Communications Processor family and can be used to develop central networks ranging from simple star to fully distributed multihost systems.

Distributed Communications Processor (DCP) Family
The DCP family is a highly sophisticated computing system designed especially for the tasks of communications network processing.

Physically, the DCP is a system of multiple microprocessors designed to provide maximum availability and reliability and meet the high performance demands of the communications processor.

There are currently three members of the DCP family. The DCP/40 is the most powerful, capable of supporting 256 synchronous communications lines.

The DCP/20 is the medium sized member of the family and can support 48 synchronous communications lines.

The DCP/10 is the smallest and lowest in cost. It can support 5 synchronous communications lines.

The DCPs can be front-end, remote concentrating, and nodal processors in any type of network, from single star to complex distributed networks. They are totally modular, able to grow in small increments.

Each is self-sufficient, capable of freestanding operation, and each supports numerous mass storage devices, from diskette to large capacity fixed disks to magnetic tapes.

Distributed Data Processing (DDP)
Beyond transmitting data, DCA meets the needs of applications executing on different computers connected 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 communication. This allows construction of a new kind of application, the distributed one, 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.

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

Distributed processing is currently available between different Series 1100 systems, between Series 1100 and System 80 systems and between Series 1100 and UTS 4000 intelligent terminal systems.

Software

The SPERRY Series 1100 systems are supported by a rich, totally functional operating system. The 1100 operating system supports an almost limitless range of information and 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 that provides a single, easy-to-use, end user view of the system, including a powerful command/response language, full screen editing, distributed data processing and several additional end user facilities
- Extensive information management facilities for Decision Support and Development including a CODASYL-based data base management system, a comprehensive ad hoc query language and report processor, MAPPER 1100 software, a widely acclaimed forms processing system, and a complete set of information, administration, maintenance and recovery utilities
- A rich communications management system that provides full support to SPERRY communication and network products.

For further information on these and other Series 1100 software products, ask for the 1100 OS Facts and Figures brochure.

We understand how important it is to listen.

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