WANG

Wang DS Data Storage Cabinet

INTRODUCTION

The Wang DS Data Storage Cabinet Peripherals introduce a new generation of cost-effective, large capacity disk/tape storage units to the CS series of computer systems.

The DS Data Storage Cabinet (see Figure 1) must be ordered with either a 320-KB or a 1.2-MB diskette drive. The compartments in the cabinet can accommodate a variety of Wang storage devices according to the storage requirements. As processing needs change, the DS Data Storage Cabinet can easily be upgraded to meet them. Wang DS storage devices include a removable 10-MB hard disk drive, a 45-MB streaming tape cassette drive, and fixed hard disk drives with storage capacities from 20 MB to 140 MB. Up to three DS cabinets may be attached to a single CS system.

The choice of diskette, tape cassette, and disk cartridge, provide flexibility for backup and data exchange, and make the off-line storage capacity of the DS Data Storage Cabinet virtually unlimited.

Table 1 illustrates the maximum number and types of Wang storage devices a single DS Data Storage Cabinet can accommodate.

Disk Processing Unit

To speed processing and provide extensive error detection and correction, the DS Data Storage Cabinets are controlled by an intelligent Disk Processing Unit (DPU) contained within the cabinet. The DPU board also contains 256 KB of cache memory (1,024 sectors).

Cache Memory

The DS Data Storage Cabinet caches up to 1,024 sectors in RAM memory in order to optimize system performance. The caching algorithm makes use of sector access order and frequency of use to determine which sectors should remain buffered in memory. Subsequent accesses to these sectors are read from memory instead of disk and therefore perform much faster.

RAM Disk

The DPU allows users to set aside a portion of the cache memory for use as a RAM disk. Once the RAM disk has been established, it is accessed as a normal disk platter and supports all normal disk commands. The RAM disk is not permanent storage since its current contents are lost if the RAM disk is deallocated, or if there is a loss of power to the DS cabinet. RAM disk is best utilized for frequently accessed programs or data files whose contents remain constant. As many as 990 sectors (256 bytes/sector) of cache memory may be allocated for use as a RAM disk. A RAM disk allocation utility (along with other DS utilities) comes with the DS Data Storage Cabinet.

BENEFITS

• Provides low-cost, efficient backup through either a 320-KB or 1-MB diskette, an optional 45-MB streaming tape cassette drive, or an optional 10-MB removable hard disk

• Provides up to 316 MB of data storage per DS Data Storage Cabinet

• Provides a large, high-speed, intelligent cache memory to increase throughput

• Allows cache memory to be used as a high-speed RAM disk that can hold frequently accessed read-only data or programs and provides a high-speed, CPU-to-CPU communications path
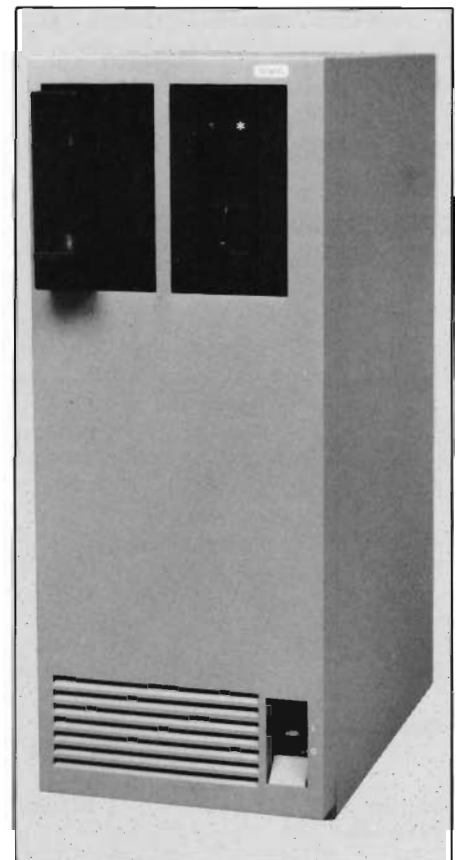

Figure 1. DS Data Storage Cabinet

Table 1. DS Data Storage Cabinet - Number of Storage Devices Allowed

320-KB or 1-MB Diskette*	10-MB Removable Hard Disk	20-MB Fixed Hard Disk	32- or 64-MB Fixed Hard Disk	140-MB Fixed Hard Disk	Streaming Tape Cassette
1	0	3 or	3 or	2	0
1	0	1	2	0	0
1	0	3	0	0	0
1	1	0	0	2	0
1	0	1	2	0	1
1	0	3 or	3 or	2	1
1	1	1	2	0	1
1	1	0	0	2	1

* A diskette is mandatory.

- Provides menu-driven utilities for backup, for allocating cache memory to the RAM disk, and for monitoring RAM disk and cache performance

- Allows use of more than one CPU by utilizing the 2275 MUX Multiplexer

PHYSICAL DESCRIPTION

The DS Data Storage Cabinet is a compact, attractive peripheral device for use in the office environment.

Standard equipment for the DS Data Storage Cabinet includes the Disk Processing Unit (DPU), connectors for the drives, and the power supply. The compartments in the cabinet can be installed with drives according to data storage requirements (see Figure 2) and the allowable cabinet configurations shown in Table 1. (Table 2 provides a comparison of the drives, Table 3 lists storage devices and logical surfaces.)

A recessed ON/OFF switch is located at the lower right corner of the front panel of the cabinet.

Diskette Drive

The Data Storage Cabinet uses either a 5 1/4-inch, 320-KB or a 1-MB double-sided double-density (DSDD) diskette drive. The CS system utilizes a 256 bytes per sector format for program and data storage. The diskette also supports the Professional Computer (PC) 512-byte sector

Table 2. Drive Comparison Chart

	320-KB Diskette	1-MB Diskette	Removable Hard Disk	20-MB Hard Disk	32-MB Hard Disk	64-MB Hard Disk	140-MB Hard Disk
Disk Platters	1	1	1	2	2	4	14 or 7
Capacity/ Platter	320-KB (360-KB for PC)	1-MB (1.2-MB for PC)	10-MB	10-MB	16-MB	16-MB;	10-MB or 16-MB
Sectors/ Platter	1,280 (1,440 for PC)	4,160 (4,800 for PC)	38,912	38,912	65,024	65,024	38,912 or 65,024
Bytes/Sector	256 (512 for PC)	256 (512 for PC)	256	256	256	256	256
Average Access Time	100 ms	100 ms	95 ms	68 ms	45 ms	27 ms	27 ms
Data Transfer Rate	250 KB/sec	500 KB/sec	5 MB/sec	5 MB/sec	5 MB/sec	5 MB/sec	5 MB/sec

format so that data can be easily interchanged between the Wang CS and PC systems. The 512-byte sectoring is transparent to the CS Operating System. (The system maps two 256-byte logical sectors into one 512-byte physical sector.) BASIC-2 accesses diskettes with the PC format as if the diskette were formatted with 256-byte sectors. All BASIC-2 disk operations can be performed. Although the 512-byte format provides more diskette capacity, it is not recommended for normal CS operations since disk write is considerably slower than with the 256-byte sector format.

Diskettes formatted by a 320-KB diskette drive with 256-byte sectors result in a diskette with 320 KB of storage; when formatted with 512-byte sectors, the capacity is 360 KB. Diskettes formatted by a 1-MB diskette drive with 256-byte sectors result in a diskette with 1 MB of storage; when formatted with 512-byte sectors, the capacity is 1.2 MB. The 1-MB diskette drive cannot format 320-KB nor 360-KB diskettes. Both 320-KB and 360-KB diskettes can be read by the 1-MB diskette drive; however, writing is not advisable. 320-KB and 360-KB diskettes written by a 1-MB diskette drive may not be read by a 320-KB drive.

Fixed Hard Disk Drive
The fixed hard disk (Winchester) is the primary storage device in the DS Data Storage Cabinet, providing rapid access to stored data and programs. Hard disk
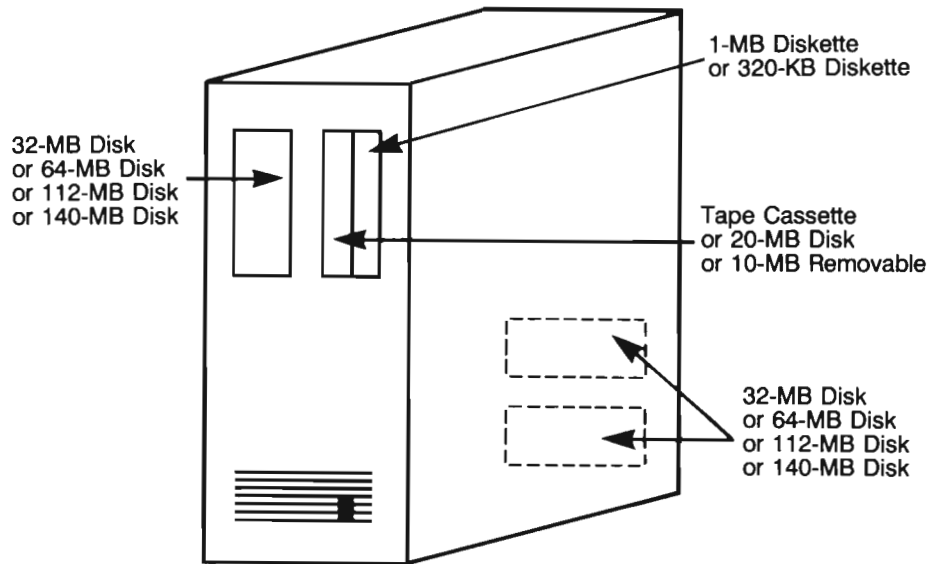

Figure 2.   DS Data Storage Cabinet

Table 3.   DS Data Storage Cabinet Devices with Logical Surfaces

Device	Height	Description
DS-1.2	Half	1-MB 5 1/4" DSHD diskette drive
DS-320	Half	320-KB 5 1/4" DSDD diskette drive
DS-TS	Half	Streaming tape cassette drive
DS-10R	Half	10-MB 5 1/4" removable disk cartridge
DS-20	Half	20-MB fixed hard disk; two, 10-MB logical surfaces
DS-32	Full	32-MB fixed hard disk; two, 16-MB logical surfaces
DS-64	Full	64-MB fixed hard disk; four, 16-MB logical surfaces
DS-112*	Full	112-MB fixed hard disk; seven, 16-MB logical surfaces
DS-140*	Full	140-MB fixed hard disk; fourteen, 10-MB logical surfaces

*The DS-112 and DS-140 are the same physical drive configured differently.

drives reside in specific compartments of the DS Data Storage Cabinet (see Table 3). Several different hard disk drives are available in order to meet varying storage capacity requirements. (See Table 4 for fixed hard disk storage capacities).

It is possible to lose information from a fixed hard disk through hardware failure, software problems, or operator error. Therefore, it is important to periodically backup important data recorded on the fixed hard disk. The principle backup device is

the Streaming Tape Cassette Drive although the Removable Hard Disk Drive can also be used. Diskettes can be used for backing up smaller fixed hard disks.

Removable Hard Disk Drive

The Removable Hard Disk Cartridge can store up to 10 MB of data, the equivalent of approximately 4,000 typewritten pages, on a 5 1/4-inch hard disk (Winchester). The 5 1/4-inch hard disk resides in a disk cartridge that can be easily inserted or removed from the DS Data Storage Cabinet.

The disk cartridge is reliable and safe media for storing electronic information. However, if a cartridge is not handled properly, information can be partially or totally lost.

Streaming Tape Cassette Drive

The Streaming Tape Cassette Drive (STCD) is a mass storage backup and recovery device for the CS and 2200 MicroVP systems. The STCD can back up an entire hard disk, up to 45 MB, on a single, inexpensive, 450-foot data cassette. When used with the Backup and Restore Utilities, it provides a fast and convenient means of backing up and restoring the contents of the disk drives in the DS Data Storage Cabinet.

The STCD records in a nine-track serpentine format which requires no rewinding between tracks. The drive records data on one track, reverses tape direction, and records data on the next logical track until all nine tracks are used.

Table 4. Fixed Hard Disk Drive Storage Capacities

Data Storage Type	Number of Available Logical Disk Surfaces	Amount of Available Storage Per Surface	Total Available Storage
DS-20	2	10-MB	20-MB
DS-32	2	16-MB	32-MB
DS-64	4	16-MB	64-MB
DS-112*	7	16-MB	112-MB
DS-140	14	10-MB	140-MB

*DS-112 is a DS-140 with SW.1 or SW.2 switches set by a Wang service representative for DS-112 operation.

The STCD records at a density of 8000 bits per inch (bpi), and reads and writes at a speed of 90 inches per second (ips). This allows for data transfer rates of up to 5.2 MB per minute.

Compartments

The DS Data Storage Cabinet has four compartments that contain the following:

Compartment 1 — One or two half height drives

Compartment 2 — One full height or two half height drives

Compartment 3 — Fixed Media Only

Compartment 4 — Fixed Media Only

The two upper compartments are visible and accessible from openings in the front panel. The two lower interior compartments are covered by the front panel (see Figure 2).

The combination of possible devices in a single DS Data Storage Cabinet is determined by several factors: 1) available compartments; 2) power requirements; 3) cabling and addressing constraints; and 4) system code. Maximum storage for one DS Data Storage Cabinet is 316 MB plus the tape streamer. Either a 320-KB diskette or 1-MB diskette is required in any configuration.

Cables

Cables for the STCD, a Winchester removable, and a daisy chain cable are assigned within the DS Data Storage Cabinet to handle up to four fixed hard disk drives. Each fixed drive in a DS cabinet uses one address per logical disk surface and is configured by two sets of switches. The maximum number of logical fixed disk surfaces (addresses) per DS cabinet is 28.

Surface Adressing

Two eight position switches are used to assign addresses to fixed disks. SW.1 is used for drives 1 and 2; SW.2 for drives 3 and 4. The maximum number of logical

disk surfaces for SW.1 and SW.2 is 14 each. Table 5 illustrates DS device addressing on the CS.

CONNECTIONS TO CS SYSTEMS

The DS Data Storage Cabinet can be cabled to either a disk, disk/printer, or triple (disk/printer/terminal) controller in an I/O slot of the CPU. If a DS cabinet is multiplexed with other CS or 2200 CPUs, it can plug into the 2275MUX controller board.

The DS cabinet is connected through a 36-pin disk interface cable (part no. 220-0105-4) to the appropriate CS or 2200MicroVP using a 22C03, 22C11, 22C32 controller or 2275MUX multiplexer. The base disk address for the DS Data Storage Cabinet is set on the controller. The user configures the CS system to include the unit disk address in the device table (see Table 5).

System Compatibility
Wang CS, MicroVP, and 2200 MVP/LVP-type systems.

ORDERING SUPPLIES AND ACCESSORIES

Contact WangDirect to order the supplies and accessories listed in Table 6.

Table 5. DS Device Addressing on the CS

Device		Unit 10	Unit 20	Unit 30
Master Devices-40 Bit Off				
Diskette		/D10	/D20	/D30
SW.1	Fixed Hard Disks	/D11 thru /D1E	/D21 thru /D2E	/D31 thru /D3E
Removable Hard Disk		/D1F	/D2F	/D3F
Slave Addresses-40 Bit On				
DPU RAM Disk		/D50	/D60	/D70
SW.2	Fixed Hard Disks	/D51 thru /D5E	/D61 thru /D6E	/D71 thru /D7E
Streaming Tape Cassette	(STCD)	/D5F	/D6F	/D7F

Table 6. Supplies and Accessories

Item	Order Number
DS-1.2 Wang Double Sided, High Density Diskette (DSHD)	725-0233
DS-320 Wang Double Sided, Double Density Diskette (DSDD)	177-0080
DS-10R Wang Disk Cartridge	725-0196
DS-TS Wang Cassette Tape	725-1482

CABINET SPECIFICATIONS

Physical Dimensions

Height
   23.0 in. (58.40 cm)
Width
   9.50 in. (24.13 cm)
Depth
   15.75 in. (40.00 cm)
Weight (standard unit without storage devices)
   35.00 lb (15.75 kg)

Cable Lengths

Data
   12.0 ft (3.6 m)
Power
   6.0 ft (1.8 m)

Power Requirements

347 W
1185 Btu/hr
115 Vac, 60 Hz
3.15 A
230 Vac, 50 Hz
1.57 A

Environmental Requirements

Temperature
   50° to 90°F (10° to 32°C)
Humidity
   10% to 80% relative humidity, noncondensing
Noise Level
   Running continuous - 35 dB(A)

Standard Warranty Applies

Wang Laboratories, Inc., reserves the right to change specifications without prior notice.