Sun StorEdge™ MultiPack, FlexiPack, and UniPack Systems

Just the Facts

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Positioning

Introduction

As the cost of magnetic media continues to drop, the amount of on-line data grows at accelerating rates. Existing and emerging applications such as databases, imaging, and multimedia are demanding ever-increasing capacity and performance from storage products. The Sun StorEdge™ MultiPack, Sun StorEdge FlexiPack, and Sun StorEdge UniPack systems are desktop storage systems that complement the Sun storage product line and bring a host of competitive features to the desktop.

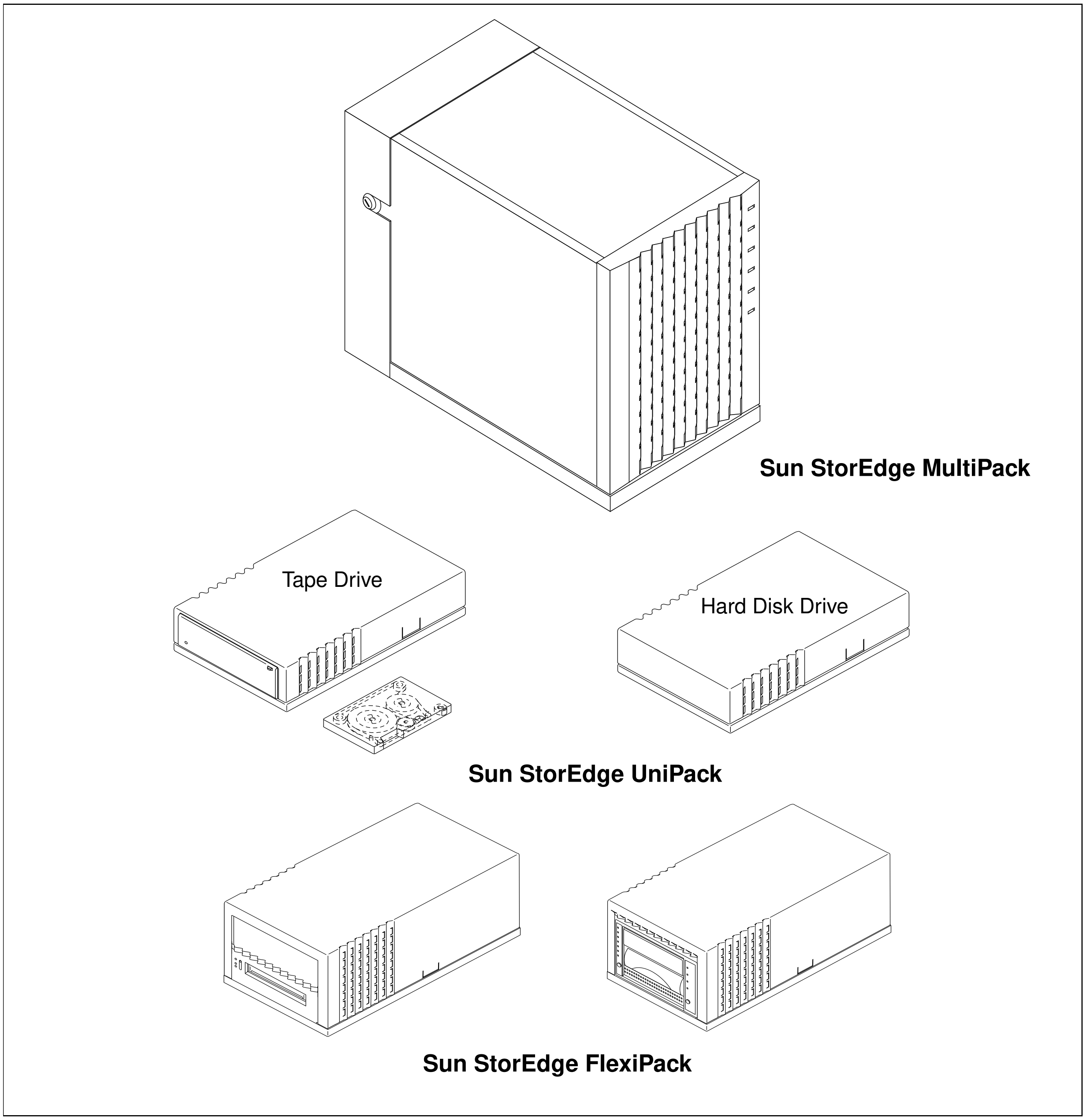


Figure 1. Sun StorEdge desktop storage enclosures

Sun StorEdge MultiPack

The Sun StorEdge MultiPack storage system accommodates six single-connector attachment (SCA) UltraSCSI drives. The individual drives can have either a 1.0-inch or 1.6-inch high form factor. The Sun StorEdge MultiPack system replaces the older 12-drive SPARCstorage™ MultiPack system and provides UltraSCSI functionality.

The Sun StorEdge MultiPack system complements Sun's mass-storage product line and brings competitive features to the desktop. Geographical SCSI addressing simplifies SCSI ID selection. Hot-pluggable drives using the SCA-2 connector give customers high reliability and ease-of-use. The signature packaging complements the Sun StorEdge UniPack system, desktop workstations, and servers.

The Sun StorEdge MultiPack system is configured with two, four, or six 1-inch high, 9.1-, 18.2-, or 36.4-GB, 10000-rpm UltraSCSI drives. Additional X-option drives may be ordered to customize the Sun StorEdge MultiPack system to meet users' needs.

Key Messages

- Maximum 216 GB of storage capacity
- Multiple UltraSCSI-capable drives in a single desktop enclosure
- Low cost/MB
- Good price/IOPS (input/output operations per second) option
- Hot-swappable drives with multiple active spindles
- Geographical addressing
- Easily serviced and expanded

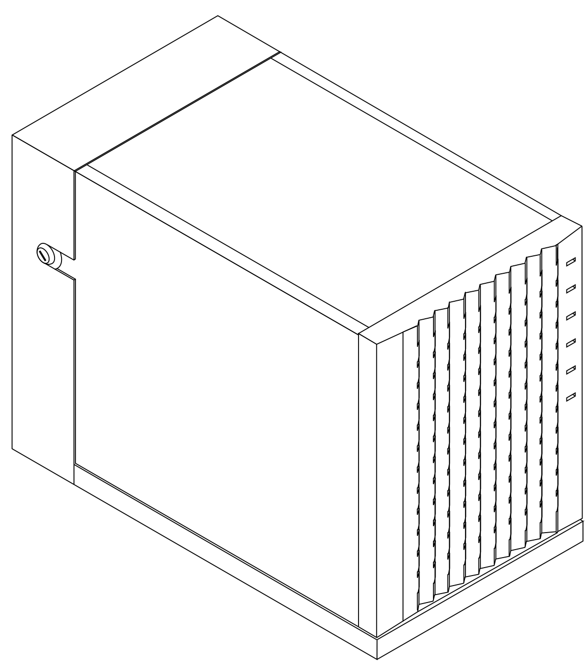


Figure 2. Sun StorEdge MultiPack storage system

Availability

The Sun StorEdge MultiPack storage system began shipping February 1998.

Target Users

- Customers needing large-capacity add-on storage and high performance on the desktop
- Customers requiring additional desktop storage
- Customers in the growing database, imaging, and multimedia markets

Key Features and Benefits

Features	Benefits
• Maximum 216-GB capacity	• Easy modular growth for desktop servers and power-user workstations
• UltraSCSI	• 16-bit data bus provides users with up to 40 MB/second burst transfer rates
	• Sustained transfer rates of over 15.2 MB/second
• Price/performance	• Good IOPS/dollar
	• Low cost/MB
	• Multiple active spindles, overlapped seeks, and optimum SCSI-bus bandwidth provide excellent performance
• Hot-plug-ready drives	• On-line, user-serviceable drives make it easy to configure and service
• Single-connector drives	• Offers better reliability with fewer internal cables and connections
• Geographical SCSI addressing	• Simplifies address selection
• Key-locking door	• Deters inadvertent removal of devices and protects user’s data
• 10000-rpm disks	• Improves I/O performance by approximately 25 percent as compared to 7200-rpm disks of similar capacities

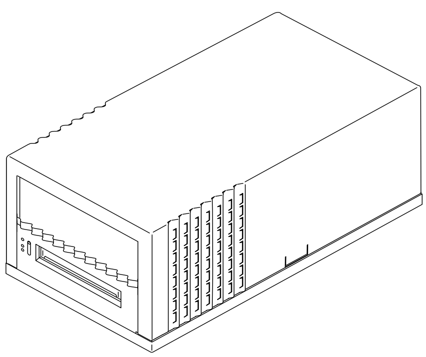
Sun StorEdge FlexiPack

Sun StorEdge FlexiPack storage system is a desktop device enclosure that accommodates either one full-height or two half-height removable-media devices. Sun StorEdge FlexiPack desktop storage products offer external storage and backup solutions for Sun's workstations and servers.

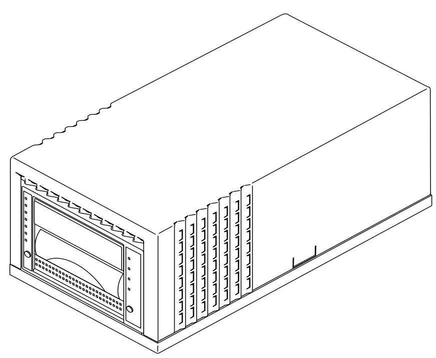
Key Messages

- Accommodates 5.25-inch half-height or full-height devices with industry-standard bezels
- Can configure different tape drives within the same unit
- Can accommodate both fast SCSI and fast/wide SCSI devices in the same unit
- Narrow footprint
- Easy to open and service
- Acoustically engineered
- Available with the following devices:
  - Sun StorEdge DLT 7000 or Sun StorEdge DLT 4000
  - 72-GB to 144-GB, 4-mm DDS-3 autoloader
  - 20-GB to 40-GB, 8-mm tape drive
  - 7-GB to 14-GB, 8-mm tape drive

The Sun StorEdge FlexiPack system complements the storage product line and brings competitive features to the desktop. While it was designed with the intention of holding full-height devices like DLT drives, its incredible flexibility enables the user to have multiple configurations which could include multiple half-height tape drives, tape drive, or a 4-mm DDS-3 autoloader. Users now have the ability to store up to 144 GB on the desktop. The signature packaging complements Sun StorEdge MultiPack and UniPack storage system, desktop workstations, and servers.



FlexiPack system with half-height drive (lower bay) and filler panel (upper bay)



FlexiPack system with full-height DLT 7000 drive

Figure 3. Sun StorEdge FlexiPack storage system

Availability

The Sun StorEdge FlexiPack storage system configurations with the Sun StorEdge DLT 7000 autoloader, Sun StorEdge DLT 4000 autoloader, and the 72-GB to 144-GB, 4-mm DDS-3 autoloader became available in February 1998.

Target Users

External devices provide additional desktop storage with fast/wide SCSI performance, doubling the throughput of typical fast SCSI devices. The digital world is driving up storage capacity requirements because image and graphics data files are typically very large. The higher capacity and flexibility of the Sun StorEdge FlexiPack system enables significant desktop and deskside backup/archive ability. The fast/wide devices support burst transfer rates of 20 MB/second and data rates up to 10 MB/second per device, depending on how well the data can be compressed.

Desktop backup solutions have made advances in capacity and performance. Unattended backups of up to 144 GB (compressed capacity if the data can be compressed 2:1) are now possible using the DDS-3 autoloader with six cartridges in the Sun StorEdge FlexiPack system. The 8-mm tape drives and DLT drives are higher end solutions for the desktop and can also serve desktop and workgroup servers because of their performance and capacity.

Key Features and Benefits

Features	Benefits
• Configuration flexibility	• Can configure one full-height drive in a Sun StorEdge FlexiPack system or multiple options of different half-height tape drives to meet users' needs • Can accommodate fast/wide and fast/narrow devices within the same enclosure
• Fast/wide SCSI capable	• Provides 20 MB/second burst rates, twice that of the fast/narrow enclosures, making it ideal for transferring large sequential files
• Narrow footprint	• Saves desktop space (same width as the Sun StorEdge UniPack storage system)
• Easy-to-open enclosure	• Saves service time • Easily serviced by customer
• Acoustically engineered	• Makes the office quieter when fan operation is not necessary

Sun StorEdge UniPack

Sun StorEdge UniPack desktop storage products offer external storage and backup solutions for Sun's workstations and servers. These products are easily connected to a workstation or server through the built-in SCSI host adapter port or through a SCSI/SBus adapter.

Key Messages

- UltraSCSI (hard disk versions) or fast/wide SCSI (for tape) capable
- Narrower footprint
- Easy to open and service
- Single-connector attachment (SCA) disks
- Acoustically engineered
- Available with the following devices
  - 9.1-GB UltraSCSI, 10000-rpm hard disk
  - 18.2-GB UltraSCSI, 10000-rpm hard disk
  - 36.4-GB UltraSCSI, 10000-rpm hard disk
  - 4-GB to 8-GB (compressed), SLR tape drive
  - 12-GB to 24-GB (compressed) 4-mm DDS-3 tape drive
  - 20-GB to 40-GB (compressed), 4-mm DDS-4 tape drive
  - 7-GB to 14-GB (compressed), 8-mm tape drive
  - 20-GB to 40-GB (compressed), 8-mm tape drive

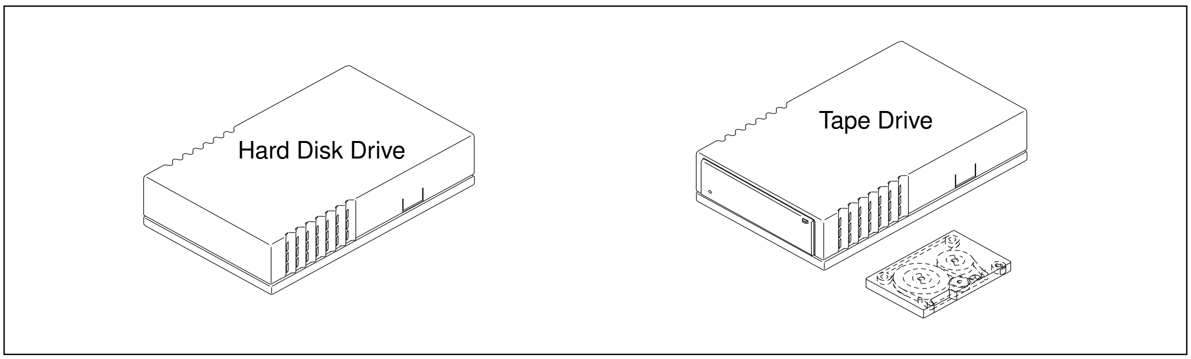


Figure 4. Sun StorEdge UniPack desktop storage products

Availability

The Sun StorEdge UniPack storage system began shipping in February 1998.

Target Users

External disks provide additional on-line storage with increased performance for NFS™ software, multimedia, database, and Internet applications. Image and graphics data files are typically very large, driving up disk-capacity requirements in the ever-expanding digital world. The higher performance of the Sun StorEdge UniPack system improves application performance because there is more data movement

Positioning

and processing. The UltraSCSI disks support burst transfer rates of 40 MB/second and data rates averaging 15.2 MB/second per disk. It is possible to scale the storage performance on a bus using the new, higher performance UltraSCSI drives to a sustained transfer rate of over 15.2 MB/second with multiple spindles.

Desktop backup solutions have made advances in capacity and performance. Unattended backups of up to 40 GB (compressed) are now possible. The 20-GB to 40-GB, 4-mm tape drives continue to be a popular backup solution for the desktop. The 7-GB to 14-GB and 20-GB to 40-GB, 8-mm tape drive is a high-end solution for the desktop, offering greater performance and capacity.

Key Features and Benefits

Features	Benefits
• UltraSCSI-capable disks	• Provides 40 MB/second burst rates, twice that of the fast/wide enclosures, making it ideal for transferring large sequential files
• Narrower footprint	• Saves desktop space
• Single-connector disks	• Makes it easy to replace disks; one connection for power, interface and SCSI ID • Improves system reliability; fewer internal cables used
• Easy-to-open enclosure	• Saves service time
• Acoustically engineered	• Makes the office quieter when fan operation is not necessary

Enabling Technology

Hot-plug Capability

Key Innovation: Single-connector Drive

Sun Microsystems co-invented a type of drive-connector scheme called the single-connector attachment (SCA). In the SCA design, all electrical signals for SCSI interface, power, and jumpers are passed through one small connector, which is integrated directly onto the disk drive's printed circuit board. The drive plugs directly into the Sun StorEdge™ MultiPack system backplane with no cables or jumpers to set. This design improves reliability and serviceability.

The second-generation version of this connector, called the SCA-2, includes hot-plug features. The drive is grounded before signal pins make contact through the use of hot-plug pins. The drives also reserve two pins to carry signals that indicate whether all pins have successfully connected. The single-connector design has been made available to the disk industry's Small Form Factor Committee and is produced by multiple disk-drive manufacturers (spec SFF8046).

Many disk subsystems offer hot-plug disks. Unfortunately, they are inherently unreliable and cumbersome. To be pluggable, a standard disk drive is enclosed in a metal or plastic canister. Internal connections use multiple flex cables, jumpers, and other wires—parts that increase the likelihood of failures. These pluggable-drive schemes cause a disk subsystem to be *less* reliable.

Therefore, SCA-2 gives Sun customers many benefits, the most important being higher reliability. Using SCA-2 provides other valuable advantages:

- SCA-2 is one of the keys to the higher storage density of the Sun StorEdge MultiPack system
- SCA-2 costs less than other drive-carrier schemes
- SCA-2 is more customer-serviceable

With other pluggable-drive schemes, removing the failed drive from the carrier and replacing it with a new drive is tedious and fraught with risks and potential mistakes.

Hot Plug Defined

Annex A of the SCSI-3 Parallel Interface (SPI) document draft proposal (X3T10/855D revision 15a *Removal and insertion of SCSI devices*) outlines four cases of plugging devices:

- Case 1: Power-off during removal or insertion
- Case 2: RST signal asserted continuously during removal or insertion
- Case 3: Current I/O processes not allowed during insertion or removal
- Case 4: Current I/O processes allowed during insertion or removal

Hot Plug in the Sun Environment

The Sun StorEdge MultiPack system conforms to all SCSI-3 SPI specifications for Case 4 at the disk-interface level. Activity on the SCSI bus can continue without interruption while a device is being removed or inserted. However, drives should not be pulled out randomly. The Sun StorEdge MultiPack storage system design is intended to allow users to replace failed drives in redundant (mirrored or RAID) configurations. If there is activity against a drive, users need to stop the activity before removing the drive.

This can be done without bringing down the operating system or powering down the Sun StorEdge MultiPack storage system. The *Installation Supplement* of the *SPARCstorage MultiPack Product Note* contains detailed information for removing, replacing, and adding drives.

Hardware Considerations

The Sun StorEdge MultiPack storage system fully supports hot-plugging. The SCA-2 drive connector eliminates the use of internal drive cables and allows for hot-plugging drives. Sun has done extensive electrical evaluation of the hot-plug operation to prove that there is no signal or power disturbance during hot-plug. However, Sun cannot guarantee that hot-plugging will never result in the corruption or loss of data any more than Sun can guarantee that any SCSI bus will never experience a double-bit error (which would be undetectable with parity detection). In mission-critical data areas, it is still recommended that a user suspend all operations over the SCSI bus during hot-plug.

Software Considerations

When supported by high-availability software solutions (such as VERITAS Volume Manager or Solstice DiskSuite™ software) the disk drives are hot-pluggable. Without the protection of a RAID implementation, outstanding data requests to a removed device may not complete. The *SPARCstorage MultiPack Product Note* has detailed information for various scenarios, including instructions for removing, replacing, and adding drives.

Configuration Considerations

The Sun StorEdge MultiPack system uses geographic addressing, which means that devices inserted into the enclosure assume the SCSI ID of the slot occupied. For example, if a device is removed from the ID 4 slot and replaced by a new drive, the new drive ID is 4.

Hot Plug in the Solaris™ Operating Environment

Several levels of device plugging are defined in the Solaris™ Operating Environment. The operations required to support these features are listed below.

Hot Reconfiguration	**Tasks**
Adding disk drive to increase capacity	• Quiesce the SCSI bus into which the drive will be inserted • Select a slot for the new disk drive • Add the disk drive • Configure the Solaris Operating Environment to recognize the drive • Configure the application to recognize the drive
Replacing a failed disk drive while the system is running	• Identify the failed drive at the system level • Detach the drive from the application using it • Map the device to a physical drive and determine its physical location • Quiesce and spin down the drive • Remove the drive • Insert the replacement drive • Configure the replacement drive to be similar to the failed drive at the system level • Reattach the replacement drive to the application • Rebuild the data on the new drive if possible

Hot Reconfiguration	Tasks
Removing a disk drive from a system that no longer needs it	• Identify the drive to be removed • Detach the drive from any applications that are using it • Map the device to a physical drive and determine its location • Quiesce and spin down the drive • Remove the drive • Reconfigure the Solaris Operating Environment to recognize that the drive is no longer available

System Architecture

Sun StorEdge™ MultiPack Technology Overview

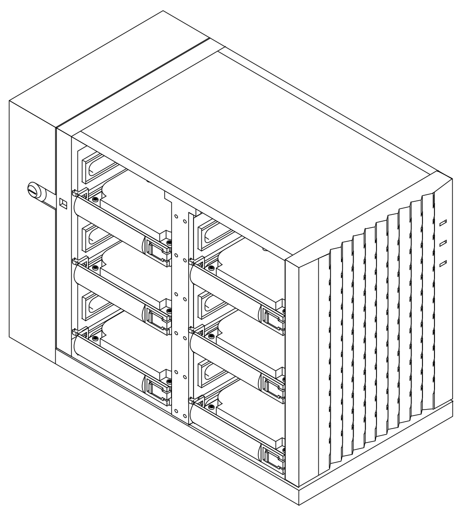
The Sun StorEdge™ MultiPack storage system drive enclosure uses 3.5-inch form factor, and UltraSCSI SCA-2 disk drives. The maximum number of disks per enclosure is six one-inch or 1.6-inch high drives.

For UltraSCSI functionality, the host or host adapter connected to the Sun StorEdge MultiPack unit must be capable of UltraSCSI speeds. A Sun StorEdge MultiPack system enclosure can be connected to a host adapter capable of fast/wide or narrow SCSI, but in such a case the Sun StorEdge MultiPack unit performs at the lower speed.

Geographical Addressing

Each drive bay in the Sun StorEdge MultiPack storage system is preassigned a SCSI ID to eliminate the chance of setting duplicate IDs. This feature also eliminates using external ID switches, minimizes the risk of breaking internal cables, and increases the reliability of the drive enclosure.

The Sun StorEdge MultiPack storage system has two sets of pre-selected SCSI IDs. The user can choose to use IDs 1, 2, 3, 4, 5, and 6 or IDs 9, 10, 11, 12, 13, and 14. A switch allows customers to select IDs 1–6 or IDs 9–14, allowing daisy-chaining of Sun StorEdge MultiPack systems on a fast/wide SCSI bus.



Address ID switch in the 1–6 position:

SCSI ID 1	SCSI ID 4
SCSI ID 2	SCSI ID 5
SCSI ID 3	SCSI ID 6

Address ID switch in the 9–14 position:

SCSI ID 9	SCSI ID 12
SCSI ID 10	SCSI ID 13
SCSI ID 11	SCSI ID 14

Figure 5. Sun StorEdge MultiPack system enclosure

Power Supply

The 180-Watt auto-ranging power supply.

Easy to Open and Service

The Sun StorEdge MultiPack system is designed with a key-locking door that gives users quick access to the drive bays while protecting valuable data from inadvertent removal. Engaging the lock is not required to keep the door shut.

Single-connector Attachment (SCA) Disks

All disk drives use the single-connector attachment (SCA) interface. The SCA interface eliminates the need for internal cables, improving reliability and serviceability. The tape drives continue to use the standard three-cable/connector interface.

Sun StorEdge FlexiPack System Architecture

Sun StorEdge FlexiPack Technology Overview

The Sun StorEdge FlexiPack storage device enclosure is designed for either one full-height or two half-height removable-media devices.

Highly Configurable

Designed to hold any two half-height devices, users can configure numerous options within a Sun StorEdge FlexiPack system, including different assortments of tape drives. In addition, if the user prefers, a full-height device such as the Sun StorEdge DLT 7000 tape drive or DDS-3 autoloader can be placed in the Sun StorEdge FlexiPack storage system.

Fast/wide SCSI Capable

The Sun StorEdge FlexiPack device is designed for 20 MB/second fast/wide SCSI-2 tape drives with two 68-pin SCSI P-type connectors. However, both *fast/wide* and *fast* SCSI-2 modes are supported even within the same enclosure. The drive connections are all made internally, and then the Sun StorEdge FlexiPack system has a 68-pin (fast/wide) SCSI connection out the back of the enclosure.

Auto SCSI Termination

Auto-termination eliminates the need for external terminators. Circuitry in the enclosure automatically terminates an 8-bit or 16-bit SCSI bus if the Sun StorEdge FlexiPack unit is the last device on the bus. It also *split-terminates* in the middle of the bus and adapts to the change from a 16-bit to an 8-bit bus.

Narrow Footprint

The width of the Sun StorEdge FlexiPack storage system is the same as the Sun StorEdge UniPack storage system. The narrow width allows for more effective use of desktop space. The dimensions are 190 mm (7.48 inches) wide, 392 mm (15.43 inches) deep, and 134 mm (5.28 inches) high.

Easy to Open and Service

The Sun StorEdge FlexiPack storage system opens easily once the lock block on the rear is removed. The enclosure lid is removed by depressing the two latches on either side and lifting up. Removable media devices are mounted on a metal sled that makes them very easy to slide out.

Acoustically Engineered

Fan speed control circuitry helps make the office environment quieter while providing drive reliability in hotter environments.

Technical Facts

Below are product features of the Sun StorEdge FlexiPack drive and removable subsystems.

Tape Drive Options	**DLT 7000**	**DLT 4000**	**7–14 GB, 8 mm**	**20–40 GB, 8 mm**	**4-mm DDS-3 Autoloader**
Formatted capacity (uncompressed)	35 GB	20 GB	7 GB	20 GB	72 GB
Formatted capacity (compressed [1])	70 GB @ 2:1	40 GB @ 2:1	14 GB @ 2:1	40 GB @ 2:1	144 GB @ 2:1
Tape speed	100+ ips	100+ ips	0.872 ips	0.43 ips	0.41 ips
Burst data rate (max.)	12 MB/sec. (asynch) 20 MB/sec. (synch)	10 MB/sec.	3 MB/sec.	7 MB/sec. (asynch) 20 MB/sec. (synch/native)	3 MB/sec. (asynch) 10 MB/sec. (synch)
Transfer rate (uncompressed)	5 MB/sec.	1.5 MB/sec.	500 KB/sec.	3 MB/sec.	1 MB/sec.
Transfer rate (compressed [1])	10 MB/sec.	3 MB/sec.	1 MB/sec.	6 MB/sec.	2 MB/sec.
Buffer	—	—	256 KB	4 MB	2 MB

[1] Actual compression ratio achieved is dependent on data type and applications; therefore, each customer's results may vary.

Sun StorEdge UniPack Technology Overview

The Sun StorEdge UniPack single-device enclosure is designed for either UltraSCSI SCA-2 disk drives with a 3.5-inch form factor, or fast/wide SCSI removable devices.

UltraSCSI Capable

The disk Sun StorEdge UniPack storage system is designed for UltraSCSI applications. It has two 68-pin SCSI P-type host connectors. However, fast/wide and fast SCSI-2 modes are also supported. The tape drive Sun StorEdge UniPack system is designed for fast SCSI-2 applications only.

Auto SCSI Termination

Auto-termination eliminates the need for external terminators. Circuitry in the enclosure automatically terminates an 8-bit or 16-bit SCSI bus if the Sun StorEdge UniPack unit is the last device on the bus. It also split-terminates in the middle of the bus and adapts to the change from a 16-bit bus to an 8-bit bus.

Narrower Footprint

The footprint is smaller than the desktop storage pack. The narrower width allows for more effective use of desktop space. The dimensions are 190 mm (7.5 inches) wide, 310 mm (12.2 inches) deep, and 70 mm (2.8 inches) high.

Easy to Open and Service

The Sun StorEdge UniPack storage system opens easily once the lock block on the rear is removed. The enclosure lid is removed by depressing the two latches on either side and lifting up. Disk and tape drives are mounted on a metal sled that makes them very easy to slide out.

Single-Connector Attachment (SCA) Disks

All disk drives use the single-connector attachment (SCA) interface currently used in the Ultra™ 2, Ultra 30, and Ultra 60 systems, as well as Sun Enterprise™ 2, 250, 450, 3000, 4000, 3500, and 4500 servers and Sun StorEdge A1000, D1000, and A3500 array subsystems. The SCA interface eliminates the need for internal cables, improving reliability and serviceability. The tape drives continue to use the standard three-cable/connector interface.

Acoustically Engineered

Fan speed control circuitry helps make the office environment quieter while providing drive reliability in hotter environments.

Technical Facts

Below are product features of the Sun StorEdge UniPack drive and removable subsystems.

Disk Drives	**9.1 GB**	**18.2 GB**	**36.4 GB**
Average seek read	7.5 ms	8.0 ms	8.0 ms
Average seek write	8.3 ms	9.0 ms	9.0 ms
Average latency	3.0 ms	3.0 ms	3.0 ms
Interface data transfer rate	40 MB/sec.	40 MB/sec.	40 MB/sec.
HDA data transfer rate	12.5 MB/sec.	12.5 MB/sec.	12.5 MB/sec.
Rotational speed	10,000 rpm	10,000 rpm	10,000 rpm
Buffer	512 KB	512 KB	512 KB

Tape Drive	**4-mm DDS-3**	**4-mm DDS-4**	**20–40 GB, 8 mm**	**7–14 GB, 8 mm**
Formatted capacity (uncompressed)	12 GB	20 GB	20 GB	7 GB
Formatted capacity (compressed [1])	24 GB@ 2:1	40 GB@ 2:1	40 GB @2:1	14 GB @ 2:1
Tape speed	0.41 ips	0.41 ips	0.43 ips	0.872 ips
Burst data rate (max.)	10 MB/sec. (synch) 3 MB/sec. (asynch)	40 MB/sec. (synch) 6 MB/sec. (asynch)	10 MB/sec. (synch) 7 MB/sec. (asynch)	5 MB/sec.
Transfer rate (uncompressed)	1 MB/sec.	3 MB/sec.	3 MB/sec.	500 KB/sec.
Transfer rate (compressed [1])	2 MB/sec.	6 MB/sec.	6 MB/sec.	1 MB/sec.
Buffer	2 MB	8 MB	4 MB	1 MB

[1] Actual compression ratio achieved is dependent on data type and applications; therefore, each customer's results may vary.

Physical Specifications

Specification	Sun StorEdge MultiPack		Sun StorEdge FlexiPack		Sun StorEdge UniPack	
	U.S.	Metric	U.S.	Metric	U.S.	Metric
Height	8.86 in.	225 mm	5.28 in.	134 mm	3.8 in.	70 mm
Width	7.48 in.	190 mm	7.48 in.	190 mm	7.5 in.	190 mm
Depth	15.55 in.	395 mm	15.43 in.	392 mm	12.2 in.	310 mm
Weight (enclosure)	24.0 lb.	10.9 kg	—	—	5.0 lb.	2.3 kg
Weight (9.1-GB drives)	24.0 lb. 1.6 lb. per drive (6)	10.9 kg 0.7 kg per drive (6)	—	—	1.6 lb. (device alone)	0.7 kg (device alone)
Weight (18.2-GB drives)	28.2 lb. 2.3 lb. per drive (6)	12.8 kg 1.0 kg per drive (6)	—	—	2.6 lb. (device alone)	1.2 kg (device alone)
Weight (DLT 7000)	—	—	15 lb. 5 oz.	6.7 kg	—	—
Weight (DLT 4000)	—	—	14 lb. 12 oz.	6.4 kg	—	—
Weight (DDS-3 autoloader)	—	—	14 lb. 3 oz.	6.2 kg	—	—
Weight (DDS-4 tape drive)	—	—	11 lb. 8 oz.	5.0 kg	2.2 lb. (device alone)	1.0 kg (device alone)
Weight (7- to 14-GB, 8-mm tape drive)	—	—	11 lb. 11 oz.	5.1 kg	2.6 lb. (device alone)	1.2 kg (device alone)
Weight (20- to 40-GB, 8-mm tape drive)	—	—	11 lb. 14 oz.	5.2 kg	3.0 lb. (device alone)	1.36 kg (device alone)

Electrical Specifications

Specification	Sun StorEdge MultiPack	Sun StorEdge FlexiPack	Sun StorEdge UniPack
Input voltage	100–240 VAC	100–240 VAC	100–240 VAC
Maximum input current	3.0 A	0.6 A	0.6 A
Maximum input VA	300 VA	60 VA at 100 VAC, 82 VA at 240 VAC	60 VA at 100 VAC, 82 VA at 240 VAC
Maximum input power	265 Watts	36.5 Watts	36.5 Watts
Maximum heat output	900 BTU/hour	125 BTU/hour	125 BTU/hour

Environmental Specifications

Specification	Sun StorEdge MultiPack	Sun StorEdge FlexiPack and Sun StorEdge UniPack
AC power	100 to 240 VAC, 47 to 63 Hz	100 to 240 VAC, 47 to 63 Hz
Operating range	5 to 40˚C (41 to 104˚F), 20 to 80% RH, max. wet bulb 27%	• Disk drive (UniPack only): 5 to 40˚C (41 to 104˚F), 10 to 90% RH, max. wet bulb 26% • Removable devices (UniPack): 5 to 35˚C (41 to 95˚F), 20 to 80% RH, max. wet bulb 26% • Removable devices (FlexiPack): 10 to 35˚C (50 to 95˚F), 20 to 80% RH, 27˚C max. wet bulb
Non-operating range	–40 to 60˚C (–40 to 140˚F), 93% max. RH, noncondensing	• Disk drive (UniPack): –30 to 65˚C (–22 to 149˚F), 95% max. RH, noncondensing • Removable devices (UniPack): –30 to 60˚C (–22 to 140˚F), 95% max. RH, noncondensing • Removable devices (FlexiPack): –30 to 60˚C (–22 to 140˚F), 90% RH, noncondensing
Operating acoustic noise	6.2 bels (at 23˚C) for 4 and 18 GB 6.9 bels (at 23˚C) for 9 GB	• Disk drive: max. 6.0 bels (at 23˚C) • Removable devices (UniPack): max. 5.8 bels (at 23˚C) • Removable devices (FlexiPack): max. 5.3 bels
Idling acoustic noise	5.3 bels (at 23˚C) for all disks	• Disk drive: max. 5.3 bels (at 23˚C) • Removable devices (UniPack): max. 4.7 bels (at 23˚C) • Removable devices (FlexiPack): max. 4.6 bels
Operating altitude	0 to 3 km (0 to 10,000 ft.)	0 to 3 km (0 to 10,000 ft.)
Non-operating altitude	0 to 12 km (0 to 40,000 ft.)	0 to 12 km (0 to 40,000 ft.)

Regulations

The Sun StorEdge MultiPack, FlexiPack and UniPack storage systems each pass the following specifications:

Category	**Sun StorEdge MultiPack, UniPack, and FlexiPack**
Safety	UL 1950; CSA-C22.2 No.950-M89 EN 60950 CB-Scheme with Nordic Deviations; Low Voltage Directive (73/23/EEC)
RFI/EMI	47 CFR Part 15, Subpart J C108.8-M1983 VCCI Requirements EN 55022; EN 60555-2 EMC Directive (89/336/EEC)
Immunity	EMC Directive (89/336/EEC) IEC 801-2, -3, -4, -5 EN 55082-1
Product label	UL, ULc, GS (TUV) FCC Class B Canadian Class B VCCI Class 2, CE

Requirements and Configuration

Sun StorEdge™ System Support

The Sun StorEdge™ storage subsystems are supported on the systems shown in the table below. The Sun StorEdge FlexiPack storage system is supported on the platforms that support each specific drive used in the Sun StorEdge FlexiPack storage system. However, in general, the drives typically used with the Sun StorEdge FlexiPack system are listed here.

Sun StorEdge MultiPack	Sun StorEdge UniPack	Sun StorEdge FlexiPack
Netra™ t 1120 server	Netra t 1120 server	Netra t 1120 server
Netra t 1125 server	Netra t 1125 server	Netra t 1125 server
Ultra™ 2 workstation	Ultra 2 workstation	Ultra 2 workstation
Ultra 5 [1] workstation	Ultra 5 [1] workstation	Ultra 5 [1] workstation
Ultra 10 [1] workstation	Ultra 10 [1] workstation	Ultra 10 [1] workstation
Ultra 60 workstation	Ultra 60 workstation	Ultra 60 workstation
Sun Enterprise™ 2 server	Sun Enterprise 2 server	Sun Enterprise 2 server
Sun Enterprise 250 server	Sun Enterprise 250 server	Sun Enterprise 250 server
Sun Enterprise 450 server	Sun Enterprise 450 server	Sun Enterprise 450 server
Sun Enterprise 3000 / 4000 servers	Sun Enterprise 3000 / 4000 servers	Sun Enterprise 3000 / 4000 servers
Sun Enterprise 3500 / 4500 servers	Sun Enterprise 3500 / 4500 servers	
	Sun Enterprise 10000 [2] server	

[1] A SunSwift™ PCI host adapter is required.

[2] Sun StorEdge UniPack systems (one or more) are available as internal (in-cabinet boot disk drive), factory configured or X-options for the Sun Enterprise 10000 server.

Additionally, Sun StorEdge FlexiPack storage system configurations for the Sun StorEdge DLT 7000 autoloader, and 20-GB to 40-GB, 8-mm tape drives are supported on the Sun Enterprise 5500, 6500, and 10000 servers.

SCSI ID Conflict

The Sun StorEdge MultiPack system has fixed SCSI IDs. Therefore, if additional external devices are daisy-chained with a Sun StorEdge MultiPack system on the same SCSI bus, a SCSI ID conflict can result.

SCSI ID	Device Assigned to SCSI ID
SCSI ID 0	First internal disk on an embedded SCSI interface of Sun Ultra 1 and later platforms is assigned to ID 0
SCSI ID 1	Second internal disk on all platforms is usually assigned to ID 1 if there is a second internal disk installed
SCSI ID 3	First internal disk on SPARCstation™ and Ultra 1 platforms is usually assigned to ID 3
SCSI ID 4	Tape drive is usually assigned ID 4
SCSI ID 6	CD-ROM devices are usually assigned ID 6
SCSI ID 7	The initiator (SCSI host adapter) is always address 7 for narrow and wide interfaces
No SCSI ID reserved	No address IDs are reserved for any of the SBus/PCIbus SCSI option cards

Sun StorEdge MultiPack Under Solaris™ 2.x Operating Environment

The Sun StorEdge MultiPack is supported on Solaris™ 2.5.1 Operating Environment and later releases. In order to address SCSI ID 8 and above, a wide on-board host or host bus adapter (such as the SunSwift PCI or US2S) is required.

Sun StorEdge FlexiPack Software Requirements

Sun StorEdge FlexiPack Drive	Solaris 1.x Operating Environment Support	Solaris 2.x Operating Environment Support
7-GB to 14-GB, 8-mm tape drive	Solaris 1.1.1 (SunOS™ 4.1.3) and later releases	Solaris 2.3 and later releases
4-mm DDS-3 tape drive 4-mm DDS-3 autoloader SLR tape drive	Solaris 1.1.2 and later releases	Solaris 2.4 and later releases
Sun StorEdge DLT 4000 tape drive	N/A	Solaris 2.4 and later releases
20-GB to 40-GB, 8-mm tape drive Sun StorEdge DLT 7000 tape drive	N/A	Solaris 2.5 and later releases

All Sun StorEdge FlexiPack configurations are supported by most of the leading data management software packages such as Solstice Backup™ software.

Please reference applicable documents (for example, *Just The Facts*, *Product Brief*, customer presentations, and so on) associated with the specific devices you are using in the Sun StorEdge FlexiPack storage system in order to get more detailed information on software requirements for a particular device. These associated documents are available in SunWIN.

Sun StorEdge UniPack Software Requirements

The 9.1-, 18.2-, and 36.4-GB Sun StorEdge UniPack storage systems are supported on Solaris 2.5.1 Operating Environment and later releases.

The 7-GB to 14-GB, 8-mm tape is supported on Solaris 1.1.1 Operating Environment (SunOS 4.1.3) and later releases, and on Solaris 2.3 Operating Environment and later releases. The 4-mm DDS-3 tape and 4-GB SLR tape drives are supported on Solaris Operating Environment versions 1.1.2 and 2.4 and later releases. The 20-GB to 40-GB 8-mm tape is supported on Solaris 2.5 Operating Environment and later releases.

Sun StorEdge MultiPack, FlexiPack, and UniPack System Configuration Guidelines

The daisy-chain configuration rules depend on whether the user installs the Sun StorEdge MultiPack, FlexiPack, or UniPack storage device, which workstation or server platform host is used, and which host bus adapter is used.

Wide SCSI and UltraSCSI support up to 15 target devices, whereas narrow SCSI supports up to seven target devices. In all cases, the total length of the SCSI bus must be taken into account when daisy-chaining multiple devices on a bus. The maximum allowable accumulated bus length is six meters. However, in order to operate reliably, the following maximum daisy-chain configurations must not be exceeded.

External Subsystem Daisy-Chain Configurations	UltraSCSI Onboard Host or Host Bus Adapter	UltraSPARC™ Fast/Wide Onboard Hosts	Fast/Wide Host Bus Adapter (SWIS/S, SunSwift)	Fast/Narrow Onboard Hosts	Fast/Narrow Host Bus Adapter
MultiPack	1 MultiPack only	1 MultiPack + 1 UniPack	2 MultiPack + 1 UniPack	1 MultiPack + 1 UniPack [1]	1 MultiPack + 1 UniPack [1]
9.1-, 18.2-, or 36.4-GB 10000-rpm UniPack	4 [2]	4	4	4	4
Tape UniPack	—	4 [3]	4 [3]	4 [3]	4 [3]
Tape FlexiPack	—	4 [3]	4 [3]	4 [3]	4 [3]

[1] A maximum of seven devices are allowed on a SCSI bus (including internal devices).

[2] Mixing with tape devices will result in loss of UltraSCSI performance.

[3] When mixing disk and tape devices on a SCSI chain, a maximum of only two tape devices are allowed.

Available Sun StorEdge MultiPack SCSI IDs

Depending on how systems are configured, specific SCSI IDs pre-selected in the Sun StorEdge MultiPack system may not be used. SCSI ID 0 and 1 may be assigned to installed internal hard drives in Ultra 1 and later systems. SCSI ID 1 and 3 may be assigned to installed internal hard drives in SPARCstation and Ultra 1 systems. SCSI ID 4 and 6 may already be assigned to a CD-ROM or tape drive.

Sun StorEdge MultiPack	Enclosure SCSI ID	Host SCSI ID	SCSI IDs Remaining
One MultiPack	1, 2, 3, 4, 5, 6 or 9, 10, 11, 12, 13, 14	7	0, 8, 9, 10, 11, 12, 13, 14, 15 or 0, 1, 2, 3, 4, 5, 6, 8, 15
Two daisy-chained MultiPacks	1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 14	7	0, 8, 15

Sun StorEdge MultiPack SCSI

For UltraSCSI functionality, the user needs one of the following host adapters:

- UltraSCSI onboard host adapter
- US2S host bus adapter
- SunSwift PCI host bus adapter

For fast/wide SCSI functionality, the user needs one of the following host adapters:

- Wide onboard host adapter
- SWIS/S host bus adapter
- SunSwift host bus adapter

The Sun StorEdge MultiPack is supported on the following SCSI host adapters as well as on all onboard host adapters on currently shipping workstation and server platforms.

Host Adapters	**Sun StorEdge MultiPack 9.1, 18.2, or 36.4 GB**
Onboard fast/narrow HA	✔ Address switch to 1–6
Onboard fast/wide HA	✔ Address switch to 1–6 or 9–14
Onboard UltraSCSI HA	✔ Address switch to 1–6 or 9–14
SBus fast SCSI-2/buffered Ethernet (FSBE/S)	✔ Address switch to 1–6
SBUS single-ended, fast/wide, intelligent SCSI-2 (SWIS/S)	✔ Address switch to 1–6 or 9–14
Single-ended, fast/wide SCSI-2, 10/100 Mbps Ethernet (SunSwift/SBus)	✔ Address switch to 1–6 or 9–14
PCI UltraSCSI host adapter (SunSwift/PCI)	✔ Address switch 1–6 or 9–14
PCI UltraSCSI dual channel host adapter (US2S)	✔ Address switch 1–6 or 9–14

Sun StorEdge MultiPack SCSI Host Adapters Support

The Sun StorEdge MultiPack products are supported on the following SCSI host adapters, as well as on all onboard host adapters on currently shipping workstation and server platforms:

- For fast/wide SCSI functionality, the SWIS/S or Sunswift host adapter is required. The 2.5-GB QIC, 4-mm tape, and 8-mm tape are supported on the SWIS/S card with the Solaris 2.5 Operating Environment, but still run in narrow mode.
- For UltraSCSI functionality, the SunSwift PCI or US2S host adapter is required.

Sun StorEdge MultiPack Cabling

All Sun StorEdge MultiPack products must be ordered with a separate 68-to-68-pin or 50-to-68-pin SCSI cable and power cord kit. Cabling guidelines are as follows:

68-to-68-pin Cable Connection

The 68-to-68-pin SCSI cable kit with power cord (X3856A) allows connections to other Sun StorEdge MultiPack systems, to a fast/wide host adapter (SWIS/S or SunSwift), or to an UltraSCSI host adapter (SunSwift PCI or US2S). Always connect the fast/wide or UltraSCSI devices *first* when using a 68-pin host adapter. When cabling fast/narrow devices on a wide bus, the 50-pin devices should be cabled last and need to be actively terminated.

50-to-68-pin Cable Connection

The 50-to-68-pin SCSI cable kit with power cord (X3857A) allows connections to 50-pin onboard host adapters offered on older desktop products such as any SPARCstation model, Ultra 1 Model 170 or the older 50-pin storage enclosures.

Sun StorEdge MultiPack System on an UltraSCSI Onboard Host or Host Bus Adapter

One Sun StorEdge MultiPack six-drive enclosure can be connected to a single UltraSCSI bus. Select SCSI ID addresses 9-14. For UltraSCSI operation, do not use the external terminator. The on-board auto-terminator functions in the UltraSCSI mode.

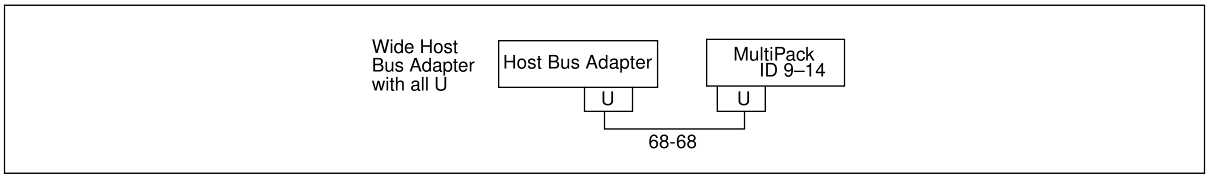


Figure 6. Sun StorEdge MultiPack system on an UltraSCSI onboard host or host bus adapter

Sun StorEdge MultiPack System on a Wide Onboard Host

Only one Sun StorEdge MultiPack six-drive enclosure can be connected to a single SCSI bus. Select SCSI ID addresses 9–14.

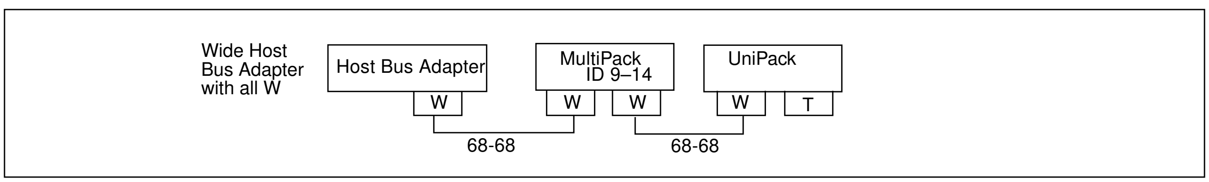


Figure 7. Sun StorEdge MultiPack system on a wide onboard host

Sun StorEdge MultiPack System on a Wide Host Bus Adapter

Two Sun StorEdge MultiPack six-drive enclosures can be connected to a single SCSI bus, provided there are no conflicts with internal devices. Select SCSI ID addresses 1–6 and 9–14.

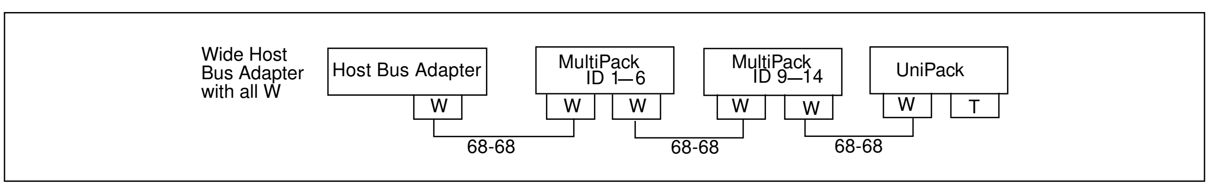


Figure 8. Sun StorEdge MultiPack system on a wide host bus adapter

Sun StorEdge MultiPack System and Narrow Devices on a Fast/Wide Bus

When mixing Sun StorEdge MultiPack system with a narrow drive or tape device on a wide SCSI bus, chain the narrow devices last with an external terminator. In general, a 50-to-68-pin cable kit with power cord (X3857A) is required.

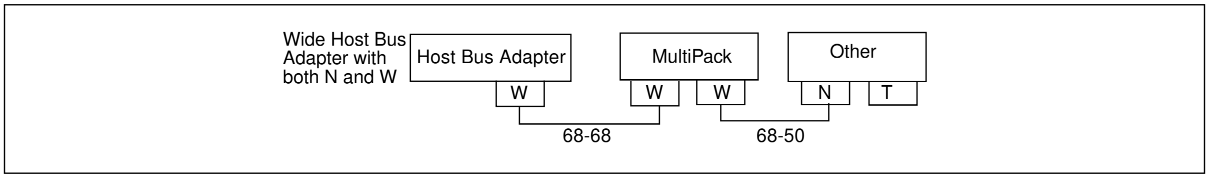


Figure 9. Sun StorEdge MultiPack system and narrow devices on a fast/wide bus

Chaining Sun StorEdge MultiPack System to Narrow Host Interfaces

One Sun StorEdge MultiPack drive enclosure may be chained to a narrow host adapter. The address-select switch must be set to 1–6 and a 50-to-68-pin cable is required.

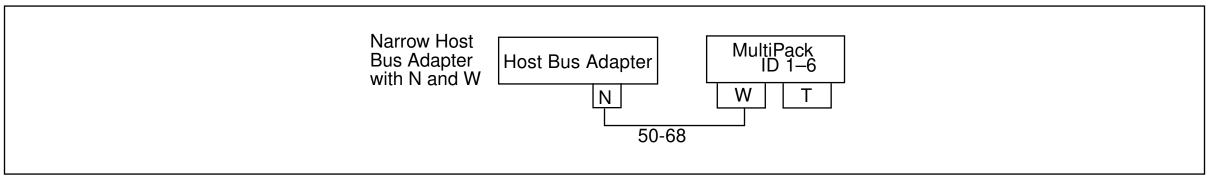


Figure 10. Chaining Sun StorEdge MultiPack system to narrow host interfaces

Requirements and Configuration

Sun StorEdge FlexiPack System Configuration

Sun StorEdge FlexiPack System Configuration Guidelines

The Sun StorEdge FlexiPack system has the following host adapter and cable restrictions.

Sun StorEdge FlexiPack SCSI Host Adapters Support

The Sun StorEdge FlexiPack products are supported on the following SCSI host adapters, as well as on all onboard host adapters on currently shipping Sun workstation and server platforms.

For fast/wide SCSI functionality, the SWIS/S host adapter is required. The 4-mm tape drives and autoloader, 7-GB to 14-GB, 8-mm tape drive, and Sun StorEdge DLT 4000 autoloader tape drive are supported on the SWIS/S card with Solaris 2.5 Operating Environment, but still run in narrow mode.

Sun StorEdge FlexiPack Cabling

All Sun StorEdge FlexiPack products must be ordered with either a 68-to-68-pin or 50-to-68-pin SCSI cable and power-cord kit (the Sun StorEdge FlexiPack system does not come with any cables included). Cabling guidelines are as follows:

- **68-to-68-pin cable connection**

  The 68-to-68-pin SCSI cable with power cord kit (X3856A) allows connections to other Sun StorEdge FlexiPack systems, UniPack systems, or a fast/wide host adapter (SWIS/S or SunSwift). Always connect the fast/wide devices first when using a 68-pin host adapter. When cabling fast/narrow devices on a wide bus, the 50-pin devices should be cabled last and need to be actively terminated.

- **50-to-68-pin cable connection**

  The 50-to-68-pin SCSI cable with power cord kit (X3857A) allows connections to

  – 50-pin onboard host adapters offered on some current desktop products or

  – The older 50-pin storage enclosures

When cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge FlexiPack storage system to a narrow (50-pin) onboard host adapter, the Sun StorEdge FlexiPack systems must always be put at the end of the SCSI chain. This provides auto-termination to the SCSI bus.

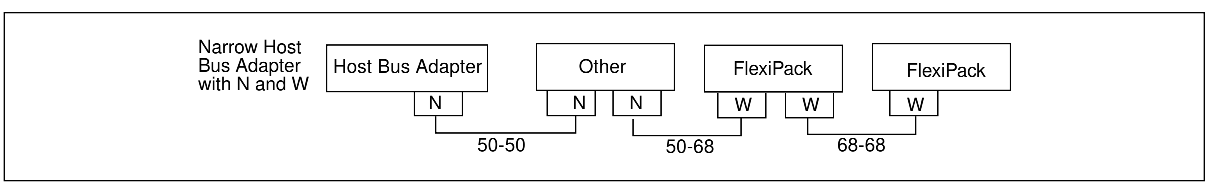


Figure 11. Cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge FlexiPack systems to a narrow (50-pin) onboard host adapter

When cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain, the fast/wide devices must be chained first. The last device on a bus needs to be actively terminated. Use a 50-to-68-pin cable to connect fast/wide (68-pin) to a fast/narrow (50-pin) device.

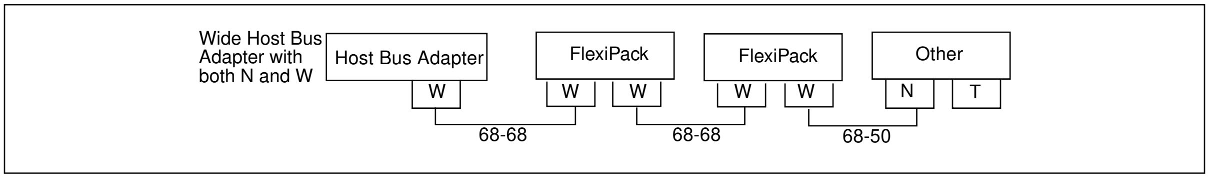


Figure 12. Cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain

Sun StorEdge UniPack System Configuration

Sun StorEdge UniPack System SCSI Host Adapters Support

The Sun StorEdge UniPack products are supported on the following SCSI host adapters, as well as on all onboard host adapters on currently shipping workstation and server platforms:

- For fast/wide SCSI functionality, the SWIS/S or SunSwift host adapter is required. The 4-mm tape, and 8-mm tape drives are supported on the SWIS/S card with Solaris 2.5 Operating Environment, but still run in narrow mode.
- For UltraSCSI functionality, the SunSwift PCI or US2S host adapter is required.

Sun StorEdge UniPack System Cabling

All Sun StorEdge UniPack products must be ordered with a separate 68-to-68-pin or 50-to-68-pin SCSI cable and power cord kit (the Sun StorEdge UniPack system does not come with any cables included). Cabling guidelines are as follows:

68-to-68-pin Cable Connection

The 68-to-68-pin SCSI cable kit with power cord kit (X3856A) allows connections to other Sun StorEdge UniPack systems, to a fast/wide host adapter (SWIS/S or SunSwift), or to an UltraSCSI host adapter (SunSwift PCI or US2S). Always connect the fast/wide or UltraSCSI devices *first* when using a 68-pin host adapter. When cabling fast/narrow devices on a wide bus, the 50-pin devices should be cabled last and need to be actively terminated.

50-to-68-pin Cable Connection

The 50-to-68-pin SCSI cable kit with power cord kit (X3857A) allows connections to 50-pin onboard host adapters offered on older desktop products such as any SPARCstation model, Ultra 1 Model 170 or the older 50-pin storage enclosures.

Sun StorEdge UniPack System on an UltraSCSI Onboard Host or Host Bus Adapter

Up to four Sun StorEdge UniPack system enclosures can be connected to a single UltraSCSI bus. The Sun StorEdge UniPack system is auto-terminated. Do not add tape devices to an UltraSCSI bus.

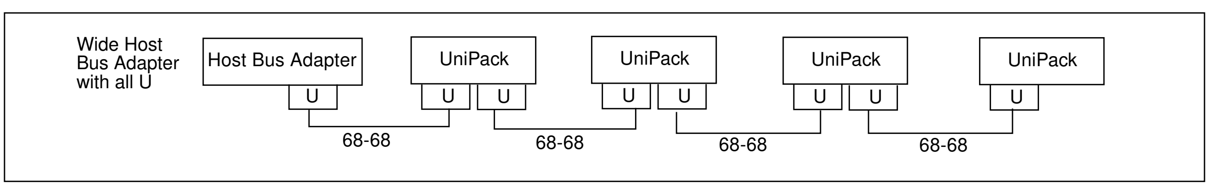


Figure 13. Sun StorEdge UniPack system on an UltraSCSI onboard host or host bus adapter

Requirements and Configuration

Sun StorEdge UniPack System on a Wide Onboard Host or Host Bus Adapter

Up to four Sun StorEdge UniPack system enclosures can be connected to a single SCSI bus. The Sun StorEdge UniPack is auto-terminated.

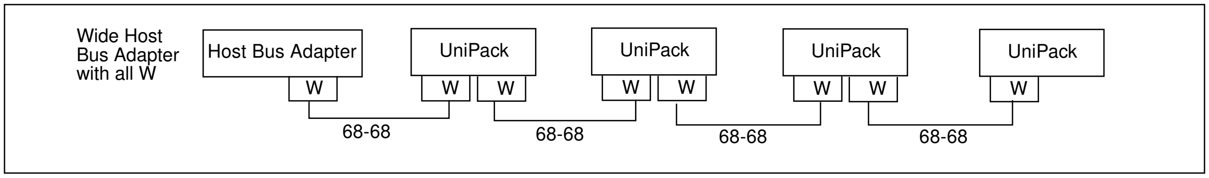


Figure 14. Sun StorEdge UniPack system on a wide onboard host or host bus adapter

Sun StorEdge UniPack System on Narrow Host Interfaces

When cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge UniPack systems to a narrow (50-pin) onboard host adapter, the Sun StorEdge UniPack systems must always be put at the end of a SCSI chain. This provides auto-termination to the SCSI bus.

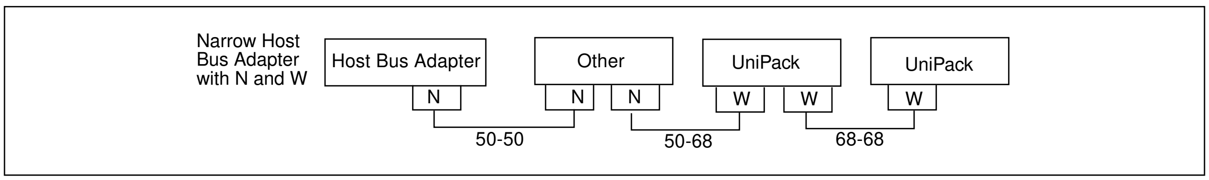


Figure 15. Cabling a daisy chain of fast/narrow SCSI devices and Sun StorEdge UniPack systems to a narrow (50-pin) onboard host adapter

Sun StorEdge UniPack System and Narrow Devices on a Fast/Wide Bus

When cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain, the fast/wide devices must be chained first. The last device on a bus must be actively terminated. Use a 50-to-68-pin cable to connect a fast/wide (68-pin) to a fast/narrow (50-pin) device.

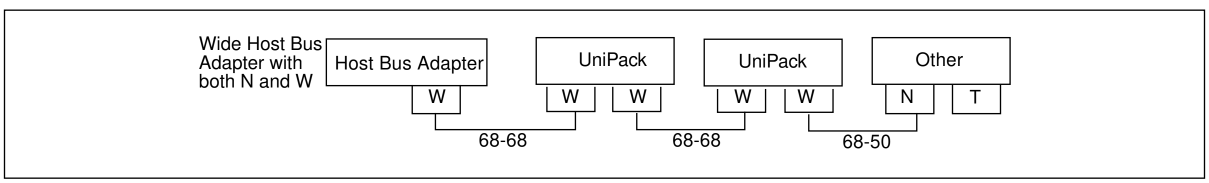


Figure 16. Cabling devices to a fast/wide host adapter with fast/wide and fast/narrow devices on a SCSI chain

Sun StorEdge Configuration Cable Lengths

Internal Cable Lengths for Supported Systems

The following table lists the internal cable lengths of supported systems.

Product	**Cable Length (meters)**
Sun StorEdge UniPack disk	0.3
Sun StorEdge UniPack tapes	0.4
Sun StorEdge FlexiPack (with DLT 7000, DLT 4000, or DDS-3 autoloader)	0.6
Sun StorEdge FlexiPack (all other devices)	0.8
Sun StorEdge MultiPack	0.9
Desktop disk pack	0.3
Desktop storage disk pack	0.3
Sun Ultra systems	0.9
SPARCstation 5	1.6
Other desktops	~ 0.9
SBus cards, SunSwift PCI	0.1
Two-channel PCI adapter	0.2
Interconnect cables	0.3 to 2.0

Ordering Information

Sun StorEdge™ MultiPack Marketing Part Numbers

Part Number	Option Description	Maximum Number Supported	Comments
SG-XDSK020C-18G	Sun StorEdge™ MultiPack, 2 x 9.1-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK040C-36G	Sun StorEdge MultiPack, 4 x 9.1-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK060C-54G	Sun StorEdge MultiPack, 6 x 9.1-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK020C-36G	Sun StorEdge MultiPack, 2 x 18.2-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK040C-72G	Sun StorEdge MultiPack, 4 x 18.2-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK060C-109G	Sun StorEdge MultiPack, 6 x 18.2-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK020C-72G	Sun StorEdge MultiPack, 2 x 36.4-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK040C-144G	Sun StorEdge MultiPack, 4 x 36.4-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus
SG-XDSK060C-216G	Sun StorEdge MultiPack, 6 x 36.4-GB, 10000-rpm, UltraSCSI disks	2 1	On fast/wide SCSI bus On UltraSCSI bus

Sun StorEdge FlexiPack Marketing Part Numbers

Part Number	Option Description	Maximum Drives per FlexiPack
SG-XTAPDLT-021A	Sun StorEdge FlexiPack, DLT 7000	1
SG-XTAPDLT-020A	Sun StorEdge FlexiPack, DLT 4000	1
SG-XTAP8MM-021A	Sun StorEdge FlexiPack, 20-GB to 40-GB, 8-mm tape drive	2
SG-XTAP8MM-020A	Sun StorEdge FlexiPack, 7-GB to 14-GB, 8-mm tape drive	2
SG-XTAP4MM-031A	Sun StorEdge FlexiPack, 4-mm DDS-3 autoloader	1
SG-XTAP4MM-021A	Sun StorEdge FlexiPack, 4-mm DDS-3 tape drive	2

Sun StorEdge UniPack Marketing Part Numbers

Part Number	Option Description
SG-XDSK010C-9G	Sun StorEdge UniPack, 9.1-GB, 10000-rpm, UltraSCSI disks
SG-XDSK010C-18G	Sun StorEdge UniPack, 18.2-GB, 10000-rpm, UltraSCSI disks
SG-XDSK010C-36G	Sun StorEdge UniPack, 36.4-GB, 10000-rpm, UltraSCSI disks
SG-XTAP8MM-011A	Sun StorEdge UniPack, 20-GB to 40-GB, 8-mm tape drive
SG-XTAP8MM-010A	Sun StorEdge UniPack, 7-GB to 14-GB, 8-mm tape drive

Part Number	Option Description
SG-XTAP4MM-011A	Sun StorEdge UniPack, 4-mm DDS-3 tape drive
SG-XTAP4MM-012A	Sun StorEdge UniPack, 4-mm DDS-4 tape drive

Sun StorEdge™ MultiPack Drive and Cable X-options

Part Number	Option Description	Maximum Number Supported	Comments
X5234A	9.1-GB, 10000-rpm, internal X-option UltraSCSI disk drive	4	Plus the first two installed drives
X5237A	18.2-GB, 10000-rpm, internal X-option UltraSCSI disk drive	4	Plus the first two installed drives
X5242A	36.4-GB, 10000-rpm, internal X-option UltraSCSI disk drive	4	Plus the first two installed drives
X5243A	36.4-GB, 10000-rpm, internal X-option UltraSCSI disk drive with barrier plate	4	Plus the first two installed drives
X3856A	68-pin to 68-pin SCSI cable kit with power cord	—	0.8 meter cable
X3857A	50-pin to 68-pin SCSI cable kit with power cord	—	0.8 meter cable
X901A	68-pin, 0.8-meter, external SCSI cable	—	0.8 meter cable
X902A	68-to-68-pin, 2.0-meter, external SCSI cable	—	
X903A	50-to-68-pin, 1.2-meter, external SCSI cable	—	
X904A	50-to-68-pin, 2.0-meter, external SCSI cable	—	

Configuration Guidelines

- On a Sun StorEdge™ MultiPack, two-drive subsystem may be expanded with up to four additional X5234A, X5237A, X5342A, or X5243A X-option drives.
- The 68-to-68-pin cable kit with power cord is required when chaining the Sun StorEdge MultiPack system to an UltraSCSI or fast/wide onboard host adapter (like most Sun workstations and servers) or another external 68-pin connector device (such as other Sun StorEdge FlexiPack, UniPack, or MultiPack devices).
- The option with 50-to-68-pin cables is required when chaining the Sun StorEdge MultiPack to a narrow onboard host adapter or another external 50-pin connector device (such as desktop storage module tape drives).
- The SunCD™ 32X is not supported in the Sun StorEdge UniPack or FlexiPack systems.

Sun StorEdge FlexiPack System Options

Configuration Guidelines

The Sun StorEdge FlexiPack enclosure is initially configured with one of the following options:

- One DLT 7000
- One DLT 4000
- One 72-GB to 144-GB, 4-mm DDS-3 autoloader
- One 20-GB to 40-GB, 8-mm tape drive with Sun-light-gray standard bezel and an open bay with filler panel in Sun light-gray

- One 7-GB to 14-GB, 8-mm tape drive with Sun-light-gray standard bezel and an open bay with filler panel in Sun light-gray

The 68-to-68-pin cable kit with power cord is required when chaining the Sun StorEdge FlexiPack system to a fast/wide onboard host adapter (like most Sun workstations and servers) or another external 68-pin connector device (such as other Sun StorEdge FlexiPack, UniPack, or MultiPack devices).

The 50-to-68-pin cable kit with power cord is required when chaining the Sun StorEdge FlexiPack system to a narrow onboard host adapter or another external 50-pin connector device (such as desktop storage module tape drives).

The half-height drives in a Sun StorEdge FlexiPack system base configuration are always installed in the lower storage bay of the Sun StorEdge FlexiPack system with the upper storage bay being open (no drive installed) and covered by a filler panel. This open bay can be filled by another half-height drive, thereby fully populating the Sun StorEdge FlexiPack. The options available for this upper storage bay are listed below.

Sun StorEdge FlexiPack System Options for the Upper Storage Bay

The following X-options are for use in the available upper storage bay of the Sun StorEdge FlexiPack system. When ordering the Sun StorEdge FlexiPack system with a half-height drive, the option includes the enclosure and one drive located in the lower storage bay. The upper storage bay is covered by a filler panel initially, but any of the following field-installable options may be ordered for use in the upper storage bay:

Part Number	**Option Description**
X6282A	4-mm DDS-3 internal tape drive
X6212A	7-GB to 14-GB, 8-mm internal tape drive
X6236A	20-GB to 40-GB, 8-mm internal tape drive

Service and Support

The SunSpectrum℠ program is an innovative and flexible service offering that allows customers to choose the level of service best suited to their needs, ranging from mission-critical support for maximum solution availability to backup assistance for self-support customers. The SunSpectrum program provides a simple pricing structure in which a single fee covers support for an entire system, including related hardware and peripherals, the Solaris™ Operating Environment software, and telephone support for Sun™ software packages. The majority of Sun's customers today take advantage of the SunSpectrum program, underscoring the value that it represents. Customers should check with their local Sun Enterprise Services representatives for program and feature availability in their areas.

FEATURE	SUNSPECTRUM PLATINUM℠ Mission-critical Support	SUNSPECTRUM GOLD℠ Business-critical Support	SUNSPECTRUM SILVER℠ Systems Support	SUNSPECTRUM BRONZE℠ Self Support
Systems Features				
Systems approach coverage	Yes	Yes	Yes	Yes
System availability guarantee	Customized	No	No	No
Account Support Features				
Service account management team	Yes	No	No	No
Local customer support management	No	Yes	No	No
Personal technical account support	Yes	Yes	Option	No
SunStart℠ installation service	Yes	No	No	No
Account support plan	Yes	Yes	No	No
Software release planning	Yes	No	No	No
On-site account reviews	Monthly	Semiannual	No	No
Skills assessment	Yes	No	No	No
Site activity log	Yes	Yes	No	No
Coverage / Response Time				
Standard telephone coverage hours	7 day/24 hour	7 day/24 hour	8 a.m.–8 p.m., Monday–Friday	8 a.m.–5 p.m., Monday–Friday
Standard on-site coverage hours	7 day/24 hour	8 a.m.–8 p.m., Monday–Friday	8 a.m.–5 p.m., Monday–Friday	N/A
7-day/24-hour telephone coverage	Yes	Yes	Option	Option
7-day/24-hour on-site coverage	Yes	Option	Option	N/A
7-day/12-hour on-site coverage	No	Option	No	No
5-day/24-hour on-site coverage	No	Option	No	No

FEATURE	SUNSPECTRUM PLATINUM℠ Mission-critical Support	SUNSPECTRUM GOLD℠ Business-critical Support	SUNSPECTRUM SILVER℠ Systems Support	SUNSPECTRUM BRONZE℠ Self Support
Coverage / Response Time (cont.)				
Customer-defined priority setting	Yes	Yes	Yes	Option
• Urgent (phone/on-site)	Live transfer/ 2 hour	Live transfer/ 4 hour	Live transfer/ 4 hour	4 hour / N/A
• Serious (phone/on-site)	Live transfer/ 4 hour	2 hour/next day	2 hour/next day	4 hour / N/A
• Not critical (phone/on-site)	Live transfer/ customer convenience	4 hour/ customer convenience	4 hour/ customer convenience	4 hour / N/A
2-hour on-site response	Yes	Option	Option	N/A
Additional contacts	Option	Option	Option	Option
Premier Support Features				
Mission-critical support team	Yes	For urgent problems	No	No
Sun Vendor Integration Program (SunVIP℠)	Yes	Yes	No	No
Software patch management assistance	Yes	No	No	No
Field change order (FCO) management assistance	Yes	No	No	No
Hardware Support Delivery				
Replacement hardware parts	On-site technician	On-site technician	On-site technician	Courier
Two day parts delivery	N/A	N/A	N/A	Yes
Overnight parts delivery	N/A	N/A	N/A	Option
Same-day parts delivery	Yes	Yes	Yes	Option
Remote Systems Diagnostics				
Remote dial-in analysis	Yes	Yes	Yes	Yes
Remote systems monitoring	Yes	Yes	No	No
Remote predictive failure reporting	Yes	Yes	No	No
Software Enhancements and Maintenance Releases				
Solaris enhancement releases	Yes	Yes	Yes	Yes
Patches and maintenance releases	Yes	Yes	Yes	Yes
Sun unbundled software enhancements	Option	Option	Option	Option
Internet and CD-ROM Support Tools				
SunSolve℠ license	Yes	Yes	Yes	Yes
SunSolve EarlyNotifier℠ Service	Yes	Yes	Yes	Yes

Glossary

Active termination, regulated	Terminates the SCSI bus with a series of resistors tied to +5 volts. The terminator is labeled *Regulated* but is often referred to as *Active Terminator.*
Bandwidth	A measure of the capacity of a communication channel, usually specified in MB/second.
DSBE/S	SBus fast differential SCSI-2/buffered Ethernet card.
DWIS/S	SBus differential fast/wide intelligent SCSI-2 host adapter.
Fast SCSI	Data transfer rate of 10 MB/second.
Fast/wide SCSI	Data transfer rate of 20 MB/second wide devices can be connected to a narrow SCSI interface, but the extra data lines need to be terminated.
FSBE/S	Fast SCSI Buffered Ethernet.
GB	Gigabyte. A gigabyte is 1,073,741,824 (2^{30}) bytes.
GUI	Graphical user interface. The VERITAS Volume Manager software provides a powerful, easy-to-use GUI.
Host adapter	A device that connects a peripheral device I/O protocol and medium to the computer system's I/O bus.
Hot plug	The ability to remove, replace or add a device while current I/O processes continue on the bus.
Hot spare	A drive in an array that is held in reserve to replace any other drive that fails.
Hot swap	The specific case of hot-plugging which involves replacing a device with another of the same size, type, and layout.
IOPS	Input/output operations per second. A measure of I/O performance, IOPS is usually used to quote random I/O performance. See Throughput.
MTBF	Mean time between failures. A measure of reliability, this is the average expected time between failures of equipment, usually measured in operating hours.
RAID	Redundant array of independent disks. A set of disk drives that appears to be a single logical disk drive to an application such as a database or file system. Different RAID levels provide different capacity, performance, availability, and cost characteristics.
Release	A SCSI command to release a previously granted reservation. See Reserve.

Reserve	A SCSI command issued by a host system to reserve access to a controller or disk drive. Once a reservation is granted to a system, commands to the controller or disk drive by any other system are rejected. This is a valuable safety feature in dual-hosted Sun StorEdge Array configurations.
SBE/S	SCSI controller 5 MB/second transfer rate.
SCSI address	The octal representation of the unique address (0–7) assigned to a narrow device; or the hex representation of the unique address (0–15) assigned to a wide SCSI device.
Single connector	A SCSI disk connector technology co-invented by Sun Microsystems. The single connector attachment (SCA) provides all SCSI, power, and control signals in a single connector, and enables easy servicing and highly reliable, pluggable disk drives.
SSHA	SBus SCSI host adapter.
SunSwift™	Single-ended fast/wide SCSI-2 10/100 Mbps Ethernet SBUS host adapter.
SunSwift PCI	Single-ended UltraSCSI 10/100 Mbps Ethernet PCI host adapter.
SWIS/S	Single-ended wide intelligent SCSI.
Throughput	A measure of sequential I/O performance, measured in MB/second. See IOPS.
UltraSCSI	Data transfer rate of 40 MB/second. Wide devices can be connected to a narrow SCSI interface, but the extra data lines need to be terminated.
US2S	PCI UltraSCSI dual channel host adapter.
Volume	In the VERITAS Volume Manager software, a volume is a virtual disk partition into which a file system, DBMS, or other application can place data. A volume can physically be a single disk partition or multiple disk partitions on one or more physical disk drives. Applications that use volumes do not need to be aware of their underlying physical structure. The Volume Manager handles mapping of virtual partition addresses to physical addresses.
Warm plug	The ability to remove, replace or add a device while power is still applied, but only while all I/O processes are suspended.

Materials Abstract

All materials will be available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Powerpack				
– *Sun StorEdge™ MultiPack, FlexiPack, and UniPack Systems, Just the Facts*	Just The Facts	Training Sales Tool	SunWIN, Reseller Web	50843
References				
– *Sun StorEdge MultiPack Desktop Storage Product Brief*	Product Brief	Sales Tool	SunWIN, Reseller Web, E-mail	50845
Product Literature				
– *Literature - StorEdge MultiPack Data Sheet*	Data Sheet on Sun StorEdge MultiPack	Sales Tool	SunWIN, Reseller Web, E-mail	66769
– *Sun Intro - New Sun StorEdge UniPack, FlexiPack, and MultiPack Enhancements*	Sun Product Intro on Sun StorEdge Product Enhancements	Sales Tool	SunWIN, Reseller Web	80969
– *Sun Product Intro - Introduction and Transition of Sun StorEdge Products and MultiPack Configurations*	Sun Product Intro on Product Transitions	Sales Tool	SunWIN, Reseller Web	95833
– *Literature - StorEdge UniPack Datasheet*	Data Sheet on Sun StorEdge UniPack	Sales Tool	SunWIN, Reseller Web	66767
– *Sun StorEdge UniPack Desktop Storage Product Brief*	Product Brief on Sun StorEdge UniPack	Sales Tool	SunWIN, Reseller Web	46703
External Web Sites				
– *Sun Home Page*	`http://www.sun.com`			
– *Site for Information on Sun StorEdge MultiPack*	`http://www.sun.com/storage/multipack/`			
– *Site for Information on Sun StorEdge UniPack*	`http://www.sun.com/storage/unipack/`			