

# **Sun StorEdge™ 3320 SCSI Array**

## **Just the Facts**

### **Sun Internal/Partner Version**

### **Revision December 07, 2005**



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# Positioning



**Figure 1.** The Sun StorEdge™ 3320 SCSI array

## Introduction

Sun is proud to announce the new Sun StorEdge™ 3320 SCSI array. Targeted primarily at Sun's Volume Server Products, this robust Ultra320 SCSI LVD 2U-high array is a worthy successor to the well-established Sun StorEdge A1000/D1000 series arrays and Ultra160 3310 array.

Sun has condensed high performance, high availability, and simple manageability into a flexible, versatile, reliable, rugged, cost-effective, super-scaling, high-density package. Each Sun StorEdge 3320 SCSI array holds twelve 1-inch high disks and is available with a single RAID controller, with dual redundant RAID controllers, or as a JBOD/expansion unit. The Sun StorEdge 3320 SCSI array can easily fulfill a wide variety of network computing storage requirements.

Customers of Sun's Volume Server products should find the Sun StorEdge 3320 SCSI array an excellent storage complement to complete their IT infrastructure. For example, a combination of a Sun Fire™ 480R server and a Sun StorEdge 3320 SCSI array can be a very capable application system serving a large number of nodes currently; or, for Tier One applications such as static web caching, the Sun StorEdge 3320 SCSI array can be mated to a cost-effective Sun Fire™ V20z class server. Environments requiring higher levels of storage capacity such as database applications can obtain up to 10.8TB of raw capacity by daisy-chaining up to three Sun StorEdge 3320 SCSI arrays together.

Highly scalable and highly condensed, the 2U-high/12-drive Sun StorEdge 3320 SCSI array holds one or two RAID controllers and supports up to two 2U-high/12-drive expansion arrays, for a total of up to 36 disks. As a key component in a storage network, this system connects to host servers via industry-standard PCI SCSI host bus-adapters, and to local/remote management consoles via standard SCSI, serial, and Ethernet connections.

This compact, ultra-dense, super-rugged disk array is designed to meet the wide range of Sun's Volume Server platform requirements by providing Sun storage customers with midrange/enterprise-class performance/availability features, management functionality, and configuration flexibility at volume (entry) level price points who require:

- **Affordability:** Midrange and enterprise features and functionality at entry-level price points; pay-as-you-grow expansion; high spindle density per rack unit.
- **Super condensed:** Extremely space-efficient, high-density, 12-drive 2U controller arrays support hundreds of gigabytes of storage, one or two controllers, 128 LUNs, and multiple host connections.



- **Intuitive, simple setup and management:** Single management GUI provides intuitive RAID and LUN configuration for every Sun StorEdge 3320 array in the environment; in band or out of band management; remote manageability.
- **Functionality:** Multi-LUN support with non-disruptive dynamic LUN expansion.
- **Flexibility:** Low-cost SCSI; choice of controller (JBOD, single, or dual) and midplane configurations (single or dual split bus for single or dual hot-swap redundant RAID controller configurations); choice of RAID levels to match the cost of storage to the value of the data; full configuration and support for major operating systems; backward compatible to U160.
- **Scalability:** Cost-effectively grow from five drives to hundreds – from 365GB to many TBs in single-drive increments; grow to 96 drives in one Sun StorEdge rack (8 arrays x 12 drives); to thousands of LUNs in a single rack.
- **Expandability:** Adding more capacity, performance, or availability is simple and thrifty. Grow capacity and I/O performance in single-drive increments or with low-cost expansion units. Grow throughput performance (bandwidth) one controller at a time. Increase availability with hot-swap redundant FRUs, RAID with global hot-sparing, and dual redundant controllers.
- **Reliability:** Full Telcordia NEBS level 3 certification and a sub-set of MIL-STD-810F air, land and sea specification compliant packaging can survive harsh environments and provide flexibility in installation location; E-mail alert notification of potential problems before they occur.
- **Configurability:** Virtually unlimited combinations of controllers, drives, RAID levels, RAID types (that is, hardware- or software-based), LUNs, and redundancy to match to virtually any application workload and critical data need.

## Key Features

The initial release of the Sun StorEdge 3320 SCSI array includes the following features.

| Feature  | Specifications   |
|--|--|
| Interface  | Ultra320 SCSI LVD  |
| Hard Disk Drives   | At GA: 1-inch high low profile Ultra320 LVD drives in the following capacities and speeds: 73GB 10Krpm, 73GB 15Krpm, 146GB 10Krpm, 146GB 15Krpm, 300GB 10Krpm.   |
| Number of Drives   | Per Controller array: 12 hot-swappable<br>Per Expansion array: 12 hot-swappable<br>Per 72-inch Sun StorEdge cabinet: 96 hot-swappable (12 drives x 8 arrays)   |
| Rack Height of array                                       | 2U (approx. 3.5 inches high)   |
| Sun Server Platform Support, Solaris Operating Environment | At GA: Ultra 60, 80 Workstations, Sun Blade 100/150, 1000, 1500, 2000, 2500, Netra 20, 120, 100/150, 210, 240, 440, 1280, Netra t 1120, 1125, 1400, 1405, Enterprise 220R, 250, 420R, 450, 3500, 4500, 5500, 6500, 10000, Sun Fire 280R, V120, V210, V240, V250, V440, V480, V490, V880, V890, V1280, E2900, 4800, 4810, E4900, 6800, E6900, 12000, 15000, E2000, E25000, V60x/V65x, V20z/V40z, X4100/X4200, T2000 |
| Supported HBAs   | SG-XPCI2SCSI-LM320 Ultra320, SG-XPCI1SCSI-LM320, X6758A, X2222A, X9265A (LSI22320-R)   |
| Supported Solaris™ Operating Environment                   | Solaris 8, 9, 10, 10 X86   |



| Feature                                     | Specifications   |
|---|--|
| Supported Non-Solaris Operating Environment | Red Hat Linux AS 3.0, Microsoft Windows NT 2000/2003, IBM AIX 5.1L, HP-UX 11i, Novell Netware 5.1 and 6.5, SUSE Linux SLES 9   |
| Midplane Options                            | Concatenated bus (single) or split bus (dual), field-configurable  |
| RAID/Bus Options                            | Single controller/single bus, single controller/dual bus, dual controller/dual bus, dual controller/single bus   |
| RAID Level Support                          | RAID 0, 1, 1+0, 3, 5, 3+0, and 5+0, with global hot spare (where applicable)   |
| Power Supply Options                        | 100 to 240VAC or -48V or -60VDC dual hot-swap/redundant  |
| Cooling                                     | Hot-swap/redundant fans (integrated into PS units)   |
| RAID Controller                             | 512-MB cache per controller; independent battery-backed cache per controller; 3 SCSI I/O ports per array; hot-swap redundant dual controller configurations; independent XOR engine; 128 LUNs per controller/controller pair; 256 command tag queues (CTQs) per controller/controller pair |
| Sun Cluster Software Support                | Version 3.0, Release 3.0 and greater   |
| Daisy Chain Support                         | Yes, expansion units off of RAID controller equipped arrays  |
| NEBS Compliance                             | Level 3 compliant, certified by Telcordia  |

Additional features of the Sun StorEdge 3320 SCSI array include the following:

- Density of 10.8-TB raw capacity in 2U format (with 300GB drives)
- Redundant hot-swappable (FRUs)
  - Active/active RAID controller configuration
  - Event monitoring units (EMUs)
  - Two power supplies, each with power inlet
  - Two cooling fans integrated into each power supply FRU
- Hot-serviceable I/O and auto-termination boards (Power on but no I/O activity)
- In-band and out-of-band host-based terminal, GUI
- Non-disruptive firmware upgrades (requires dual controller configuration and Sun StorEdge Configuration Service software)
- Dynamic storage capacity expansion (DSCE) and dynamic LUN expansion (DLE)
- Event monitoring and reporting; component health monitoring: disk, power, thermal, fans; SAF-TE and SMART compliant
- Software support includes Sun Logical Volume Manager, Sun Cluster 3.0, VERITAS Cluster 3.2 and 3.5, MS Cluster Windows 2000 and 2003 Server, Solstice Backup 6.1 and greater, Veritas NetBackup, StorADE 2.3, Diagnostic software, Sun StorEdge Performance Suite 4.0, Utilization suite 4.0, Veritas File System (VxFS) 3.2, Sun StorEdge Availability Suite 3.1, Solstice DiskSuite 4.2.1 and VERITAS Volume Manager (VxVM) software.

## Product Availability

The Sun StorEdge 3320 SCSI array schedule is as follows:



- Revenue Release (RR) 11/23/05
- PRESTO Announce October 11, 2005
- General Availability (GA) November 21, 2005
- WEBDESK Orderability October 11, 2005
- General Availability - DC Arrays November 21, 2005

## Product Family Placement

The Sun StorEdge 3320 SCSI array is the third release in the existing SE3xxx SCSI product storage family. This product family consists of a variety of models, each with different technical specifications, yet all sharing a common management facade, RAID architecture, and firmware functionality.

*Note: The End of Life of the Sun StorEdge 3310 has been announced with a Last Order Date of 1/13/06. The Sun StorEdge 3120 array will continue to be offered along with the Sun StorEdge 3320 SCSI array.*

The following table below is a feature comparison of Sun's current storage array product line.

| Sun StorEdge 3320 SCSI Array  | Sun StorEdge A1000 and D1000 Arrays  | Sun StorEdge A5X00 Array  | Sun StorEdge T3 Array for the Workgroup   |
|---|--|---|---|
| Workgroup   | Workgroup  | Workgroup   | Workgroup   |
| <ul style="list-style-type: none"> <li>Controller-based RAID</li> <li>JBOD</li> <li>Software-based RAID</li> </ul>  | <ul style="list-style-type: none"> <li>Controller-based RAID (A1000)</li> <li>JBOD/SW-based RAID (D1000)</li> </ul>  | <ul style="list-style-type: none"> <li>JBOD</li> <li>Software-based RAID</li> </ul>   | <ul style="list-style-type: none"> <li>Controller-based RAID (single controller)</li> </ul>   |
| <ul style="list-style-type: none"> <li>Solaris Operating Environment 8, 9, 10</li> <li>Microsoft Windows NT 4.0 and Windows 2000</li> <li>Sun Linux 5.0 ( LX50 platform)</li> <li>Red Hat Linux v 7.3</li> </ul>  | <ul style="list-style-type: none"> <li>Solaris Operating Environment</li> </ul>  | <ul style="list-style-type: none"> <li>Solaris Operating Environment</li> <li>Microsoft Windows NT</li> </ul>   | <ul style="list-style-type: none"> <li>Solaris Operating Environment</li> <li>Microsoft Windows NT</li> <li>HP-UX</li> <li>Linux</li> <li>IBM AIX</li> </ul>  |
| When to sell <ul style="list-style-type: none"> <li>Price/performance</li> <li>Ultra320SCSI</li> <li>High Availability including dual controllers and redundant components</li> <li>NEBS Level 3 compliance</li> <li>MIL-STD-810F subset compliance</li> <li>When maximum storage density is desired or required (small footprint = 2U, 12 drives)</li> <li>RAS +</li> <li>High performance</li> <li>Flexibility of configurations</li> </ul> | When to sell <ul style="list-style-type: none"> <li>Installed base customers</li> <li>For small-capacity applications</li> </ul>   | When to sell <ul style="list-style-type: none"> <li>Installed base customers</li> <li>Price</li> <li>Fibre Channel storage networking</li> <li>Replaces SPARCstorage™ Array</li> <li>High sequential performance (data warehousing)</li> <li>Campus-area remote mirroring (up to 500m)</li> </ul> | When to sell <ul style="list-style-type: none"> <li>One-array configurations</li> <li>RAS +</li> <li>Remote mirroring to 10 kilometers (using FC switches)</li> <li>Mission-critical availability features</li> <li>High-performance scalable data storage</li> </ul> |
| When NOT to sell <ul style="list-style-type: none"> <li>Customer requires Fibre Channel</li> <li>Customer requires SAN implementation</li> </ul>  | When NOT to sell <ul style="list-style-type: none"> <li>High performance situations</li> <li>High density situations</li> <li>Customer requires Fibre Channel today</li> </ul> | When NOT to sell <ul style="list-style-type: none"> <li>Hardware RAID 5 required</li> </ul>   | When NOT to sell <ul style="list-style-type: none"> <li>High density situations</li> <li>Data centers</li> <li>2-Gb FC required</li> </ul>  |



## Storage Feature Comparison

The table below provides a feature comparison for Sun's storage product line.

- Yes = Feature supported
- No = Feature not supported
- N/A = Not applicable for the specified array

| Functionality/Attribute                                     | Sun StorEdge 3320 SCSI Array | Sun StorEdge A1000 Array | Sun StorEdge D1000 Array | Sun StorEdge D2 Array |
|---|------------------------------|--------------------------|--------------------------|-----------------------|
| Form Factor (Rack/Disk Density)                             | 2U                           | 4U                       | 4U                       | 4U                    |
| Array-Based Hardware RAID x 2 Controllers                   | Yes                          | No                       | No                       | No                    |
| NEBS Level 3 Compliance                                     | Yes                          | No                       | No                       | No                    |
| MIL-STD-810F Subset Compliance                              | Yes                          | No                       | No                       | No                    |
| Ultra320 SCSI LVD   | Yes                          | No                       | No                       | Yes                   |
| 128 LUNs (Total)  | Yes                          | No                       | N/A                      | N/A                   |
| Two Host SCSI Ports   | Yes                          | No                       | No                       | Yes                   |
| Lights Out Manageability                                    | Yes                          | No                       | No                       | No                    |
| Online Dynamic Reconfiguration (LUN/Capacity)               | Yes                          | No                       | No                       | No                    |
| Expansion Drive Array(s)                                    | Yes                          | No                       | N/A                      | N/A                   |
| Split Bus or Single Bus Configurable                        | Yes                          | No                       | No                       | No                    |
| In-Band or Out-of-Band Management                           | Yes                          | No                       | No                       | No                    |
| Standard Cache Size   | 512 MB                       | 24 MB                    | N/A                      | N/A                   |
| 19-inch Depth for Telco Cabinets                            | Yes                          | Yes                      | Yes                      | Yes                   |
| AC/DC Power Supplies  | Yes                          | Yes                      | Yes                      | No                    |
| Solaris Operating Environment Compatible Based RAID Manager | Yes                          | Yes                      | N/A                      | N/A                   |
| GUI/Terminal/Web-Based Manageability                        | Yes                          | Yes                      | N/A                      | N/A                   |
| Online Controller Firmware Upgrade                          | Yes                          | No                       | No                       | No                    |
| Component Health Monitoring                                 | Yes                          | Yes                      | Yes                      | Yes                   |
| Sun Cluster 3.0 Software Support                            | Yes                          | Yes                      | Yes                      | Yes                   |
| Mirrored/Redundant Cache                                    | Yes                          | No                       | N/A                      | N/A                   |



## Key Messages

- High-density 2U rack unit with high-performance/high-availability/high-reliability/high-functionality SCSI RAID storage at entry-level pricing
- Low-cost JBOD or high-availability configuration options
- Expansion arrays supported; up to 36 disks per RAID array
- NEBS Level 3 compliant
- MIL-STD-810F subset compliant
- RoHS Compliant using the Lead (Pb) in solder exemption

## Target Markets

The Sun StorEdge 3320 SCSI array is ideal for any environment where space is at a premium. Customers should appreciate this array's unsurpassed versatility which combines enterprise-class high availability features, high-speed performance, cost-effective configurability, easy-to-use common management interface, remote control functionality, and a highly ruggedized package.

The Sun StorEdge 3320 SCSI array is ideal for IT managers, system administrators, and IT technicians especially in telecommunications or government markets. From an application solution, the Sun StorEdge 3320 SCSI array provides an extremely dense, low-cost, high data availability external disk array storage solution for server users that are supporting different operating environments. The key industries benefiting from the StorEdge 3320 are:

- Business & Professional Services
- Education/Research
- Financial Services
- Government
- Media/Entertainment/Publishing
- Telecommunications
- Network Equipment Providers

The key applications for a Sun StorEdge 3320 SCSI array include, but are not limited to the following:

- ISV Solutions
- Grid Computing
- Customer Management Solutions
- Decision Support/Data Warehousing
- E-commerce
- Enterprise Resource Planning
- Software Development
- Technical Applications





# Selling Highlights

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## Market Value Proposition

The Sun StorEdge™ 3320 SCSI array is a compact, ultra-dense, super-rugged disk array designed to meet the wide range of Sun™ Volume Server platform requirements by providing Sun storage customers with midrange/enterprise-class performance/availability features, management functionality, and configuration flexibility at volume level (entry) pricing.

Sun has condensed high performance, high availability, and simple manageability into a flexible, versatile, reliable, rugged cost-effective super-scaling high-density package.

This array allows simplified storage planning by providing a highly open; flexible; and configurable architecture featuring a common scalable foundation for building today's and tomorrow's storage solutions, which decreases acquisition, deployment, and management costs.

## Key Features, Technical Functions, and Benefits

| Feature  | Technical Function   | Benefit   |
|--|--|---|
| <ul style="list-style-type: none"><li>• Ultra320 SCSI LVD architecture</li></ul>                                     | <ul style="list-style-type: none"><li>• Up to 320 MB/sec. raw bandwidth per channel</li></ul>  | <ul style="list-style-type: none"><li>• Very fast access and transfer of information</li></ul>  |
| <ul style="list-style-type: none"><li>• Dual hot-swappable event monitoring module</li></ul>                         | <ul style="list-style-type: none"><li>• Monitors and reports disk drive, power supply, and fan failure</li></ul>   | <ul style="list-style-type: none"><li>• High availability - No single point of failure</li></ul>  |
| <ul style="list-style-type: none"><li>• Dual hot-swap/redundant power supplies and fans</li></ul>                    | <ul style="list-style-type: none"><li>• If one fails, the other keeps the array running smoothly; dynamic replacement of failed unit does not disrupt production I/O</li></ul>         | <ul style="list-style-type: none"><li>• Easy serviceability and enhanced system availability</li></ul>  |
| <ul style="list-style-type: none"><li>• LVD SCSI signal</li></ul>  | <ul style="list-style-type: none"><li>• Up to 12-meter cable length</li></ul>  | <ul style="list-style-type: none"><li>• Separate server to array enclosure for ease of physical systems management</li></ul>  |
| <ul style="list-style-type: none"><li>• RAID support with hot-swap/redundant drives and global hot sparing</li></ul> | <ul style="list-style-type: none"><li>• Quick, easy, dynamic failed drive replacement</li></ul>  | <ul style="list-style-type: none"><li>• Easy serviceability; continuous operation</li></ul>   |
| <ul style="list-style-type: none"><li>• One- or two-bus options</li></ul>  | <ul style="list-style-type: none"><li>• Effectively provides two separate and distinct SCSI buses, each supporting 6 drives</li></ul>  | <ul style="list-style-type: none"><li>• Easy field configuration for varied computing environments</li></ul>  |
| <ul style="list-style-type: none"><li>• Single or dual RAID controller configurations</li></ul>                      | <ul style="list-style-type: none"><li>• One 2U array can be configured for standard RAID, or for high-availability RAID (hot-swap/redundant controllers with mirrored cache)</li></ul> | <ul style="list-style-type: none"><li>• Very flexible and highly versatile array has many uses and is easily and quickly adaptable to changing data storage needs</li></ul> |



| Feature  | Technical Function   | Benefit  |
|--|--|--|
| <ul style="list-style-type: none"> <li>• Expansion arrays</li> </ul>                               | <ul style="list-style-type: none"> <li>• Daisy-chain to a RAID controller array</li> </ul> | <ul style="list-style-type: none"> <li>• Saves money; provides a cost-effective transaction-intensive configuration</li> </ul> |
| <ul style="list-style-type: none"> <li>• Industry-standard rack/system cabinet mounting</li> </ul> | <ul style="list-style-type: none"> <li>• Center post or four post compatibility</li> </ul> | <ul style="list-style-type: none"> <li>• Provides easy installation</li> </ul>   |

## Field-Replaceable Units (FRUs)

All of the Sun StorEdge 3320 SCSI array's major components are field-replaceable units (FRUs) and are easily accessible from the front or rear of the unit. Each FRU has a set of LEDs which indicate health and status of the array. Hot-swappable FRUs are quickly and easily replaced while the system remains up and running.

The Sun StorEdge 3320 SCSI array's FRUs include the following:

- **Hot-swappable**
  - RAID controllers
  - Two event monitor units (EMUs)
  - Two power supplies, AC or DC with integrated fan module (PSU)
  - Up to 12 Ultra320 SCSI LVD disk drives (hot-swappable)



# System Architecture

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The Sun StorEdge™ 3320 SCSI array enclosures are rackmountable, NEBS Level 3-compliant, mass storage subsystems. The 2U-high Sun StorEdge 3320 SCSI array utilizes the Ultra320 LVD SCSI interface both internally to the drives and externally to the host ports.

Configuration management and enclosure event reporting are enabled through an in-band SCSI or out-of-band 10/100 BASE-T Ethernet port and a DB9 serial port. Host-based software packages, such as Sun StorEdge Configuration Service software, are available to interface for in-band management and event reporting. Sun StorEdge Configuration Service software can also be launched in a web browser.

Each Sun StorEdge 3320 SCSI array RAID controller/drive array holds up to twelve 1-inch high (low profile) Ultra320 LVD SCSI disk drives and can support up to two expansion drive arrays. The Sun StorEdge 3320 SCSI array supports single or dual redundant SCSI-SCSI disk array controllers. Each Ultra320 SCSI LVD RAID controller has 512 MB of battery-backed data cache with intelligent caching algorithms and supports RAID levels 0, 1, 1+0, 3, 5, 3+0, and 5+0; up to 128 LUNs; and 256 command tag queues (CTQs).

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**Note:** In BOTH single and dual controller configurations the maximum number of addressable LUNs is 128.

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Each 2U-high drive array can contain one or two identical 512-MB caching RAID controllers. When two paired RAID controllers are installed, they are configured for hot-swap redundancy and mirrored data cache so if either controller fails or is removed, the remaining controller takes over the workload (failover), allowing for fail-safe, continuous, online protection.

The midplane for one (single concatenated) or two (dual split) SCSI buses is quickly and easily configured via a short external patch cable (the cable is included with the array). Attaching the cable to create a single-bus configuration sets certain disk slots with unique SCSI target IDs on that bus. The label on the front of the chassis identifies the target IDs.

Each RAID controller can support up to two independent LVD host I/O ports.

Maximum number of host ports:

3X320MB SCSI host ports (without expansion trays)

2X320MB SCSI host ports (with 1 expansion tray)

1X320MB SCSI host ports (with 2 expansion trays)

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**Note:** In dual controller configurations, the maximum number of host I/O ports is still two.

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Both the 2U-high RAID controller and expansion drive arrays support up to 12 1-inch high (low-profile) Ultra320 LVD SCSI disk drives. A maximum configuration supports up to 36 disk drives (one RAID drive array plus two expansion drive arrays). Each drive array is connected to each other via an optional external SCSI cable. See the Ordering Information section of this document for all applicable cables and part numbers.

Dual hot-swap/redundant load-sharing/load-balancing 100 to 240VAC or -48 or -60VDC power supply units each have separate power inputs and contain two high-velocity (52 CFM) fans with detection circuitry to monitor degraded performance provides superior temperature control.

The enclosure reporting monitor (EMU) maintains the enclosure environmental control and status. The EMU monitors all internal +12 and +5 voltages per power supply. Seven temperature sensor locations



and fan speeds from each are monitored by the EMU. The EMU controls front and rear panel display LEDs and buzzer alarm. The drive array supports dual failover EMU modules for fully redundant event monitoring safety. The Sun StorEdge 3320 SCSI arrays support SAF-TE protocol (SCSI Accessed Fault-Tolerant Enclosures) for reporting the environmental information from the EMUs onto the in-band SCSI bus.

## Key Architectural Features

- High-performance embedded RAID controller with intelligent caching algorithms and four Ultra320 SCSI LVD external host/drive ports supports up to 128 LUNs and 256 command tag queues (CTQs)
- Independent battery-back module for each controller, capable of supporting 512-MB cache for ~72 hours
- Four controller configuration options: Single controller/single concatenated midplane, single controller/split midplane, dual controller/dual split midplane, or dual controller/single concatenated midplane
- Configuration management and enclosure event reporting enabled through in-band SCSI or out-of-band 10/100BASE-T Ethernet port and DB9 serial port
- RAID controllers (in dual controller configuration), disk drives, event monitor units (EMUs), and power supply/fan assemblies are all hot-swap/redundant, field-replaceable units (FRUs)
- All FRUs are easily accessible from the front or rear of the array
- Each array supports up to twelve hot-plug, 1-inch high (low-profile) Ultra320 SCSI LVD disk drives
- Each RAID array supports up to two expansion drive arrays, for up to 36 disks total
- Colored LED indicators provide FRU status as well as enclosure environmental and hardware status
- Transmissions up to 12 meters utilizing Ultra320 SCSI LVD cables
- Auto SCSI termination technology supported on external drive SCSI ports
- Single-bus or dual-bus configurations by simple external jumper cable connection
- Intelligent event monitor unit (EMU) monitors enclosure environmental information such as sensing various temperature sensors and obtaining voltage output status from each power supply – each EMU can enable the buzzer alarm for audible alerts
- Dual enclosure reporting monitors with failover control provides redundancy event monitoring security
- Auto detection of major components installed such as disk drives, fan/power supplies units, and RAID controllers are monitored by the EMU
- Embedded SAF-TE protocol interface for in-band enclosure (array) reporting capability
- Compact, low-profile VHDCI connectors on the host and drive I/O port modules for high density cable capability
- Dual redundant power supply/fan assemblies provide high availability (for example, can take inputs from separate power grids)
- AC power supplies feature load-sharing balancing and auto-ranging AC voltage input capability
- Four 52 CFM axial fans provide high availability redundancy and excellent cooling (two fans in each power supply FRU)
- Dynamic disk drive storage expansion within and across arrays
- Multi-host support, (up to two SCSI buses for host channels)
- Optional DC (-48/-60V) version for mobile and Telco installations
- NEBS Level 3; GR-63-CORE, GR-1089-CORE compliant



- Subset of MIL-STD-810F compliant
- Web browser launching of Sun StorEdge Configuration Service
- Serial port out-of-band management and monitoring

## Firmware Features

- Support for global spare disk drives, with applicable RAID level
- Simultaneous support of RAID levels 0, 1, 1+0, 3, 5, 3+0, and 5+0
- Support for non-disruptive dynamic firmware upgrades of the RAID controller (with redundant RAID controllers)
- RAID controller supports up to 128 SCSI LUNs
- RAID controller supports up to 256 command tag queues (CTQs)
- Random/sequential optimization for all logical drives (LDs)
- Write-back and write-through cache control
- In-band and out-of-band SAF-TE support for RAID controller drive arrays
- In-band SAF-TE support for expansion drive arrays
- Built-in SNMP traps and MIB support
- Built-in email generation for event reporting via Diagnostic Reporter
- Built-in terminal window line oriented menu

## Host Interface

The host interface of the Sun StorEdge 3320 SCSI array is Ultra320 SCSI LVD, and can support a maximum of three direct attached hosts (without expansion trays).

## Input Power Options

- Dual-input load-sharing/load-balancing 100 to 240VAC universal input, load sharing
- Dual-input load-sharing/load-balancing -48VDC (-36VDC to .72VDC) or -60VDC input capabilities available

## Power Supplies/Fans

The Sun StorEdge 3320 SCSI array has two fully redundant 420-Watt power supplies with load-sharing and load-balancing capabilities. Each AC power supply has auto-ranging capability from 90VAC to 264VAC and 47 to 63 Hz. With these redundant power supplies, one maintains electrical power to the system if the other fails.

A single power supply can spin up, maintain, and sustain power for a fully loaded Sun StorEdge 3320 SCSI array unit. Each power supply has an automatic thermal shutdown to prevent power supply damage from extreme heat environments.

DC output voltages have over-voltage protection, over current, and short circuit protection. Output current capacity is shown in the table below.



| DC Output | Minimum Load | Maximum Load |
|-----------|--------------|--------------|
| +5 V      | 0 A          | 35 A         |
| +12 V     | 250 mA       | 25 A         |

Both power supply units (PSUs) are removable canisters that slide into one of two slots in the back of the system. Each PSU canister has a locking handle, power status LED, AC power cord connector, and power switch.

Each power supply housing also contains two radial 52 CFM fan assemblies. Each fan is electrically isolated and powered by +12-volt common rail. This allows the fans to continue to run from the redundant power supply even though its power supply unit is turned off. Both 80mm axial fans are connected together in series to allow blade synchronization upon power on.

Power supplies can be replaced while the Sun StorEdge 3320 SCSI array controller and expansion arrays are in operation (hot-swappable).

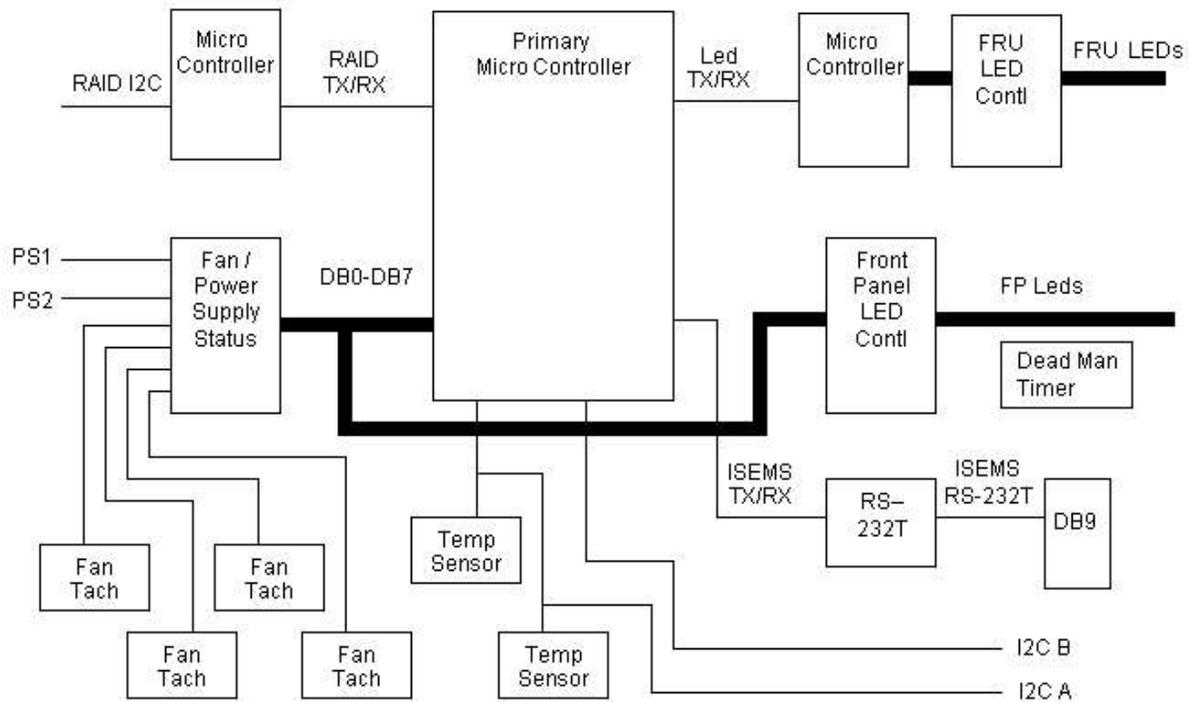
## Event Monitor Unit (EMU)

The event monitor unit (EMU) card monitors environmental information such temperature sensors, power supply status, and fan speed. The EMU has three microcontrollers to assist in managing and monitoring tasks:

- One microcontroller is dedicated for the ISEMS I2C protocol between the RAID controllers and the EMU board.
- Another microcontroller is dedicated to the control of the various LEDs.
- The primary microcontroller (Atmel 8515) communicates to both of the other microcontrollers (Atmel 2313). The 8515 microcontroller also monitors the fan speed status lines and the I2C interface from power supply / fan units. It also monitors the temperature sensors and communicates to the serial EEPROM on the drive mid-plane via I2C. The 8515 microcontroller handles the front panel LED and alarm switch control lines.

Additional features of the EMU include:

- Controls front and rear panel display LEDs and the buzzer (audible) alarm.
- Enclosures support dual fail-over EMU modules for fully redundant event monitoring safety.
- Monitors environmental conditions, including temperature, power supply status, and fan speeds.
- Monitors all internal +12v and +5v voltages for each power supply.



**Figure 2.** Event monitor unit (EMU) block diagram

## Midplanes

### Drive Midplane

The drive midplane is the main interconnect between the SCSI disk drives, RAID controller/midplane, and upper I/O board. The drive midplane has two separate SCSI buses. The internal buses can be independently configured as two 6-drive port channels or dependently configured as a single 12-drive channel by use of external rear panel jumper cables. There are no active components on the drive midplane.

### RAID Midplane

The RAID midplane is the main interconnection between the RAID controllers, terminator board, EMU boards, and the two SCSI buses from the drive midplane. The RAID midplane also connects to the upper and lower I/O boards. There are no active components on the RAID midplane.

### Connection Midplane

The connection midplane is the main interconnection between the upper I/O, lower I/O, and the two SCSI buses from the drive midplane. There are no active components on the connection midplane.

## Upper and Lower I/O Boards (Single Module/FRU) (RAID)

The upper I/O has two independent output ports with auto termination for each SCSI bus. The lower I/O has two independent input ports for each SCSI bus. The two boards are contained in a single, hot-serviceable module.

The upper I/O card has three SCSI port connections (Ch 0, Ch 3, and single bus). Auto SCSI termination is available on Ch 0 and single bus connector ports.

The lower I/O card has three SCSI port connections (Ch 1, Ch 2, and dual bus).

The two boards are contained in a single module.

## Terminator Board

The terminator board is a hot-serviceable, field-replaceable unit which supplies SCSI auto-termination for each of the four internal RAID channels.

## RAID Controllers

Each 2U-high Sun StorEdge 3320 SCSI array can contain one or two Ultra320 SCSI LVD RAID controllers. Each RAID controller has four SCSI channels, two of which can be used as host channels, and 512MB of battery-backed cache.

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*Note: Each RAID array can support a maximum of two host channels.*

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An ASIC controller chip handles the interconnection between the CPU bus, DRAM memory, and PCI internal buses. It also handles the interface between the on-board flash, nvram, DB9 port chip, and 10/100 BASE-T Ethernet chip.

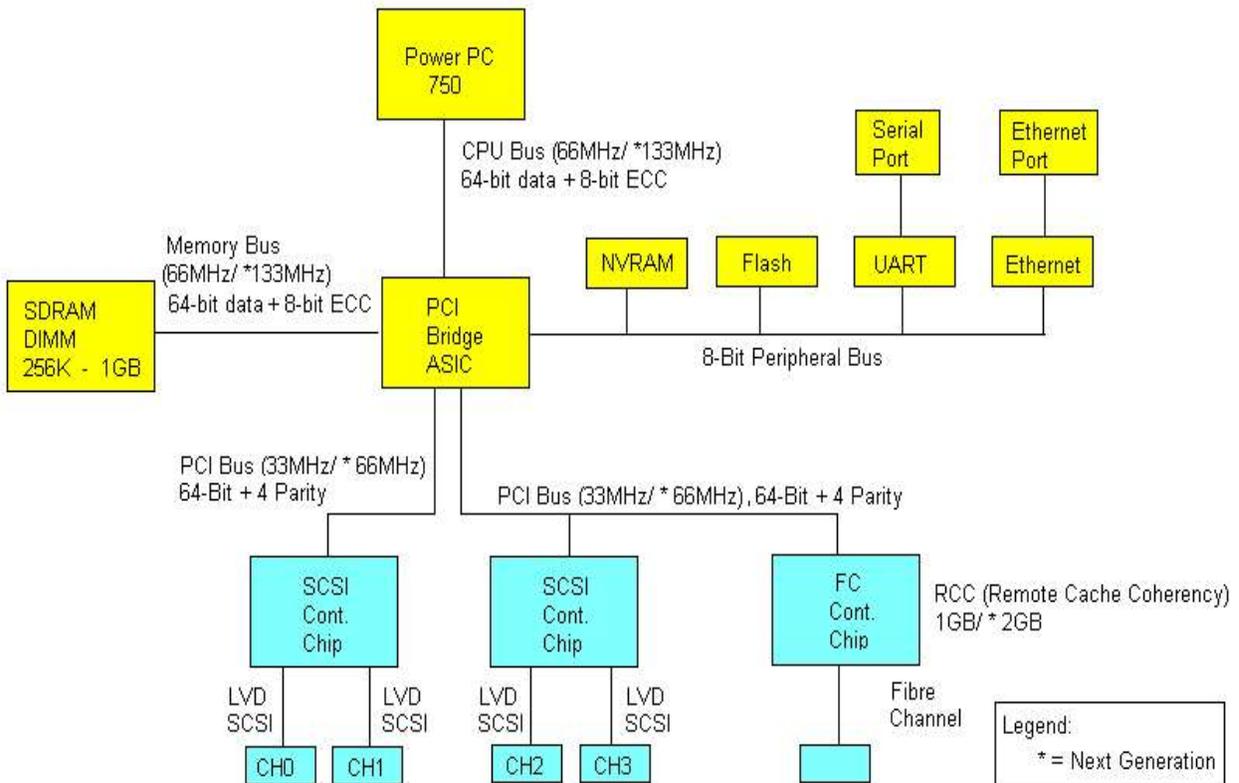
The RAID controllers can be configured as dual redundant active-to-active failover mode wherein they are hot-swap/redundant with mirrored synchronized-write cache. They can also be configured for dual-redundant active-passive mode.

Each RAID controller or RAID controller pair supports RAID 0, 1, 1+0, 3, 5, 3+0, and 5+0. Multiple RAID levels can be simultaneously supported.

Each RAID controller or RAID controller pair supports up to 128 LUNs and up to 256 command tag queues (CTQs).

Each RAID controller has one 10/100 BASE-T Ethernet port for remote configuration, management, and monitoring and one DB9 serial port for local configuration, management, and monitoring.





**Figure 3.** Sun StorEdge 3320 SCSI array RAID controller diagram

## Front Panel Indicators

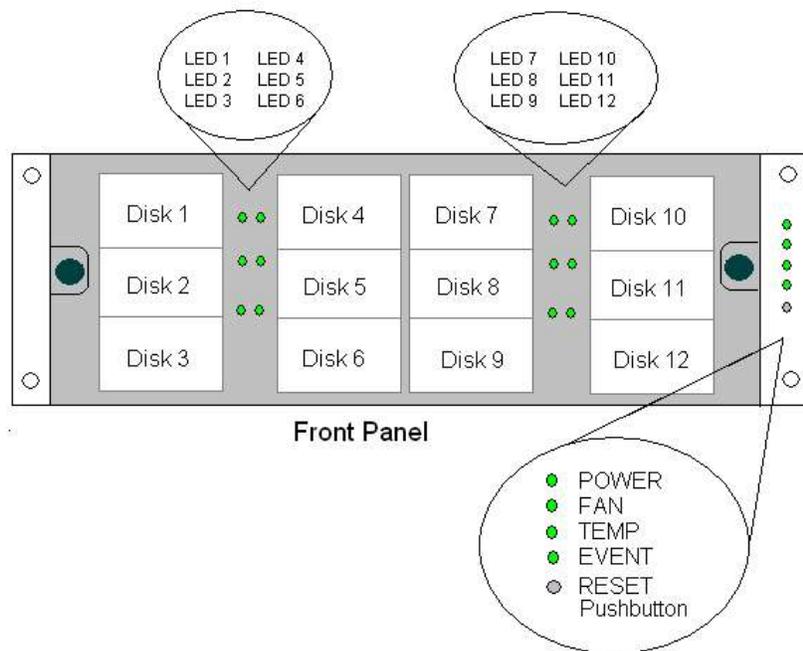
This section describes the components accessed at the front of the Sun StorEdge 3320 SCSI array.

- Light indicators at the far right hand side of panel indicating (from top to bottom):
  - Power
  - Fan
  - Temperature
  - Event

Immediately below the Event LED is an audible-alert RESET pushbutton.

Behind the lockable front door are:

- Drive bays containing plug-in disk drives (drive sleds).
- Light indicators (LEDs) indicating drive status adjacent to each drive bay.



**Figure 4.** Front panel of the Sun StorEdge 3320 SCSI array

## Rear Panel Indicators and Switches

These components are located on the back of the Sun StorEdge 3320 SCSI array:

- Four SCSI I/O connectors for connection to host or expansion array and two SCSI bus configuration connectors for selecting single-bus or split-bus configurations.
- One or two EMUs (labeled Event Monitor). If only one EMU is used, the EMU is in position 1, and a filler panel is inserted on the right (in position 2).
- One or two plug-in RAID controller modules which include one LAN and one serial RS-232 serial connections on each module.
- Two plug-in power supply canisters with integrated fan canisters.

With the exception of the drive sled connectors inside the Sun StorEdge chassis, the following connectors are located on the modules of the rear panel of the unit.

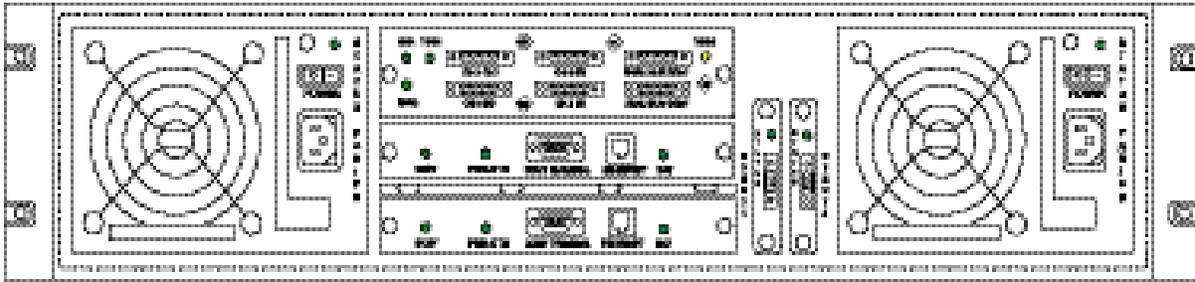
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*Note: Sun StorEdge 3320 SCSI array can support EITHER AC or DC power options.*

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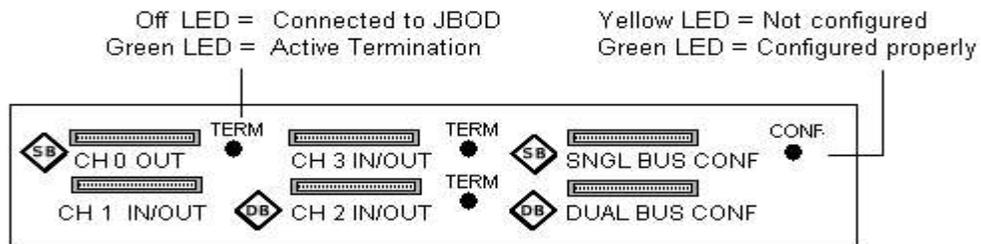
| Connector Type                    | Location                            |
|-----------------------------------|-------------------------------------|
| Ethernet RJ-45 10BASE-T connector | RAID controller module              |
| DB9 serial connector              | RAID controller module              |
| 68-pin VHDCI connector            | I/O module                          |
| AC power outlet, 420W             | Power and fan module                |
| DC power outlet                   | Power and fan module                |
| 80-pin SCA connector              | Midplane, connecting to drive sleds |

The figures below display the port connections and LEDs for the rear panel components. SB or DB icons indicate where cables connect for single or dual bus.



**Figure 5.** Rear panel, Sun StorEdge 3320 SCSI array (Dual RAID controller version)

**LEDs for SCSI Ports**



**Figure 6.** LEDs for SCSI ports

# Support and Configuration (What Works with What)

## Detailed Information on Qualified Operating Systems Environments, HBA's, Servers, Cabling and Expansion Cabinet/Mounting Support

Please refer to the Sun StorEdge 3320 SCSI – What Works With What matrix for detailed information on the latest Operating Systems, HBA and drivers (Solaris and non-Solaris), peripherals, cables, expansion cabinet/racks and mounting option support. The 3320 WWWWW can be found by selecting the Sun StorEdge 3320 SCSI Array matrix link at <http://webhome.ebay/networkstorage/sales/matrix.html>

### Peripherals and Software Support Matrix

The following products are supported on the Sun StorEdge 3320 SCSI array at general availability. Additional hardware and software products are scheduled for support in subsequent releases.

| Category                  | Description  |
|---------------------------|--|
| SCSI Disk Drive           | 73-GB 10000 RPM, Ultra 320 LVD SCSI: (X)TA-SC1NC-73G10K, TB-SC1NC-73G10K<br>73-GB 15000 RPM, Ultra 320 LVD SCSI: (X)TA-SC1NC-73G15K, TB-SC1NC-73G15K<br>146-GB 10000 RPM, Ultra 320 LVD SCSI: (X)TA-SC1NC-146G10K, TB-SC1NC-146G10K<br>146-GB 15000 RPM, Ultra 320 LVD SCSI: (X)TA-SC1NC-146G15K, TB-SC1NC-146G15K<br>300-GB 10000 RPM, Ultra 320 LVD SCSI: (X)TA-SC1NC-300G10K, TB-SC1NC-300G10K  |
| Secondary RAID Controller | Ultra320 SCSI Hardware RAID Controller, 512 MB, and battery backup unit<br>Part number: XTA-3320-CTRL-512M   |
| SCSI HBA                  | <ol style="list-style-type: none"> <li>1) Dual-channel Ultra320 PCI – Part number: (X)6758A</li> <li>2) Dual-channel Ultra 2 SCSI and dual Gigabit Ethernet PCI adapter – (X)4422A</li> <li>3) Dual Channel Ultra320 PCI-X adapter – SG-XPCI2SCSI-LM320</li> <li>4) Single Channel Ultra320 PCI-X adapter – SG-XCI1SCSI-LM320</li> <li>5) Dual Channel Ultra320 PCI-X adapter – X9265A LSI2230-R<sup>3</sup></li> <li>6) Adaptec Dual Ultra320 SCSI PCI host adapter – Adaptec 39320A-R<sup>4</sup></li> <li>7) HP Ultra 160 SCSI Adapter for SCSI<sup>1</sup> – A6829A</li> <li>8) IBM Dual Channel PCI Ultra3 SCSI Adapter<sup>2</sup> - SYM53C1010</li> </ol> <p>8) Applicable embedded SCSI controllers off of supported Solaris Operating Environment servers</p> <p>Note:<br/>           1 This HP HBA is officially tested and supported. Equivalent HP HBAs are also supported.<br/>           2 This IBM AIX HBA is officially tested and supported. Equivalent AIX HBAs are also supported.<br/>           3 The LSI22320-R HBA is not available from Sun.<br/>           4 The Adaptec HBA is not available from Sun.</p> |
| Optional Power Supply     | DC power supply (hot-swap)<br>Part number: XTA-3000-2UDC-KIT   |
| Back-up Software          | Solstice Backup 6.1 and greater software<br>VERITAS NetBackup 4.5 and greater software   |
| File System Software      | Sun StorEdge Performance Suite 4.0 software (Sun StorEdge QFS software)<br>Sun StorEdge Utilization Suite 4.0 software (Sun StorEdge SAM-FS software)<br>VERITAS File System (VxFS) 3.2 and greater  |



| Category  | Description   |
|---|---|
| Volume Manager Software                             | Solstice DiskSuite 4.2.1<br>VERITAS Volume Manager (VxVM including DMP) 3.2   |
| Clustering Software                                 | Sun™ Cluster 3.0 and greater software<br>Veritas Cluster (VCS) 3.2, 3.5<br>MS Cluster Service (MSCS) Windows 2000 Server, Windows 2003 Server |
| Diagnostic Software                                 | Sun Storage Automated Diagnostic Environment (StorADE) 2.3 software and 2.4<br>Sun StorEdge Diagnostic Expert 1.2                             |
| Point-in-Time Copying and Remote Mirroring Software | Sun StorEdge Availability 3.1 software  |

**Note 1:** *The Sun StorEdge 3320 SCSI RAID arrays do not come with any SCSI cables (for host/expansion units). Customers can order these according to their cabling needs. Only the JBOD/Expansion unit comes with one external SCSI cable.*

**Note 2:** *The secondary RAID controller option is only supported on arrays that have a primary RAID controller installed. JBOD/Expansion Sun StorEdge 3320 SCSI arrays CANNOT be converted into RAID arrays.*

## Mounting Options

The Sun StorEdge 3320 SCSI array is available in rack ready configuration for Sun racks, including the Sun StorEdge expansion rack and the Sun Fire rack. Rack mount rail kits are available for additional rack configurations. Tabletop Conversion Kits for conversion from rack ready to tabletop configurations are also available.

**Note:** *Rack-ready configurations of the Sun StorEdge 3320 SCSI array do NOT come with any rack mount rail kits. Customers need to order one of the following, depending on their needs:*

| StorEdge 3320 Rack Mount Rail Kit Options   |                                 |
|---|---------------------------------|
| Description   | Order Number                    |
| Sun StorEdge(TM) 3000 2U universal rack, sliding rail kit. For Sun Racks and industry standard 19" RETMA racks. (Common part for SE3310, SE3320, SE3510 and SE3511) | XTA-3000-2URK-19U               |
| Rack Kit, 2U, 19" Telco Center Mount rail kit (Common part for SE3310, SE3320, SE3510 and SE3511)   | XTA-3000-2URK-19C               |
| Rack Kit, 2U, 19" Telco Front Mount rail kit (Common part for SE3310, SE3320, SE3510 and SE3511)  | XTA-3000-2URK-19F               |
| Sun StorEdge(TM) 3000 2U universal rack, sliding rail kit. Factory configured. (Common part for SE3310, SE3320, SE3510 and SE3511)                                  | TA-3000-2URK-19U <sup>(1)</sup> |

### Footnotes:



1. The Sun StorEdge 3000 family is available through the Sun[SM] Customer Ready Systems (CRS) program. The Sun CRS program delivers Sun factory-integrated solutions with custom options and services. For more information regarding Sun CRS, please reference Sun Product Intro Q4FY2002-9I.

| <b>StorEdge 3320 Tabletop Conversion Kit Options</b>   |                     |
|--|---------------------|
| <b>Description</b>   | <b>Order Number</b> |
| Sun StorEdge(TM) 3000 2U Rack Ready to Tabletop conversion kit. Includes outer skin with feet, screws, instructions. (Common part for SE3310, SE3320, SE3510 and SE3511) | XTA-3000-2U-R2T     |
| Sun StorEdge(TM) 3000 2U Tabletop conversion kit. Includes outer skin with feet, screws. (Common part for SE3310, SE3320 and SE3510)                                     | XTA-3310-DESK-KIT   |

## Expandability

The Sun StorEdge 3320 SCSI array can be expanded up to 36 drives (two expansion drive arrays and one RAID array array). All models support 12 disk drives per array.

## Supported Configurations

Single or split-bus (dual-bus) configurations for Sun StorEdge 3320 SCSI arrays are field configurable through the use of rear panel jumper cable. In split-bus configurations, the drive midplane control signals are partitioned into two separate groups of six drives each. Separate SCSI control channels control each group within a drive array. A Sun StorEdge 3320 SCSI array drive array is available with zero, one, or two hardware RAID controllers. These configurations are discussed in more detail below.

| <b>Number of RAID Controllers</b> | <b>Maximum Host (servers) Supported from RAID Array</b> | <b>Single or Dual Bus Midplane (on RAID Array)</b> | <b>Maximum JBOD/Expansion Arrays Supported from RAID Array</b> | <b>Total Number of Drives Supported from RAID Array</b> |
|-----------------------------------|---|--|--|---|
| One or Two                        | One   | Dual   | Two  | 36  |
| One or Two                        | One   | Single   | Two  | 36  |
| One or Two                        | Two   | Dual   | One  | 24  |
| One or Two                        | Two   | Single   | One  | 24  |
| One or Two                        | Three   | Single   | Zero   | 12  |
| One or Two                        | Three   | Dual   | Zero   | 12  |

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**Note:** JBOD arrays (arrays without RAID controllers) CANNOT be daisy-chained together.

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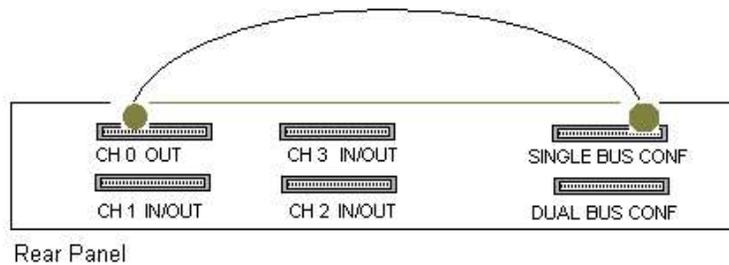
## Connecting Cables for a Single Bus Configuration

A single bus configuration assigns all disk drive IDs in a drive array to one channel. This configuration is convenient administratively so the user can assign all RAID controller drive array drive IDs to Channel 0, and assigns all expansion array drive IDs to Channel 2.



- **To configure a RAID controller drive array** as a single bus configuration, connect the SCSI jumper cable between the SCSI ports labeled "CH 0 OUT" and "SINGLE BUS CONF" as shown in the figure below.

**Single Bus Connection:** All 12 drives are assigned to a single channel (CH 0).



**Figure 7.** Single-bus cabling on a RAID controller drive array

- **To configure an expansion drive array** as a single bus configuration, connect the SCSI jumper cable between SCSI ports labeled between "SCSI A OUT" and "SCSI B IN."

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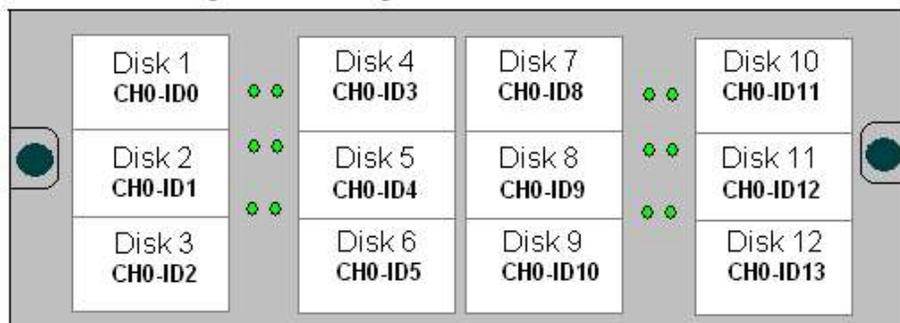
**Caution:** There is a limitation of 14 drive IDs per channel. Therefore, do NOT connect a dual bus Channel 0 or Channel 2 (6 IDs) to a single bus expansion drive array (12 IDs).

---

- (Optional) Use a SCSI cable to connect a RAID controller drive array (Channel 2 port) to an expansion drive array (SCSI IN port). An example configuration would include a RAID controller drive array with all its drive IDs assigned to Channel 0, and an expansion drive array with all its drive IDs assigned to Channel 2.
- The default drive IDs for a single-bus configuration are shown in the figure below. ID6 and ID7 are reserved for controller communication and not used for drive IDs.

The IDs are also displayed on the bottom inside edge of the chassis. These IDs are automatically assigned and appear in RAID controller status tables.

**RAID Unit - Single Bus Configuration - Default IDs**



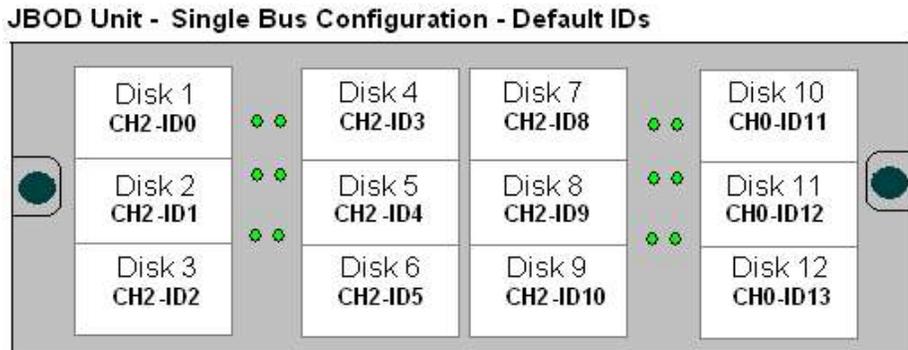
**Figure 8.** Default ID assignments, single bus RAID controller drive array

- Connect the RAID controller drive array (SCSI Channel 1 and 3 ports) to two host servers with HBA adapter cables. SCSI ports for Channels 1 and 3 are assigned as host channels by default.

---

*Note: Users can also reconfigure Channel 1 or Channel 3 to a drive channel status.*

---



**Figure 9.** Default ID assignments, single-bus expansion drive array

## Connecting Cables for a Dual Bus Configuration

A dual bus configuration assigns half of the disk drives and their IDs to one channel, and the other half of the disk drives and IDs to the second channel. This configuration is popular if the customer wants to use one set of drives to mirror the second set of drives with drives configured as RAID 1 drives.

**JBOD Dual Bus Connection:** No jumper cable is required.



Rear Panel

**Figure 10.** Expansion drive array dual-bus connection

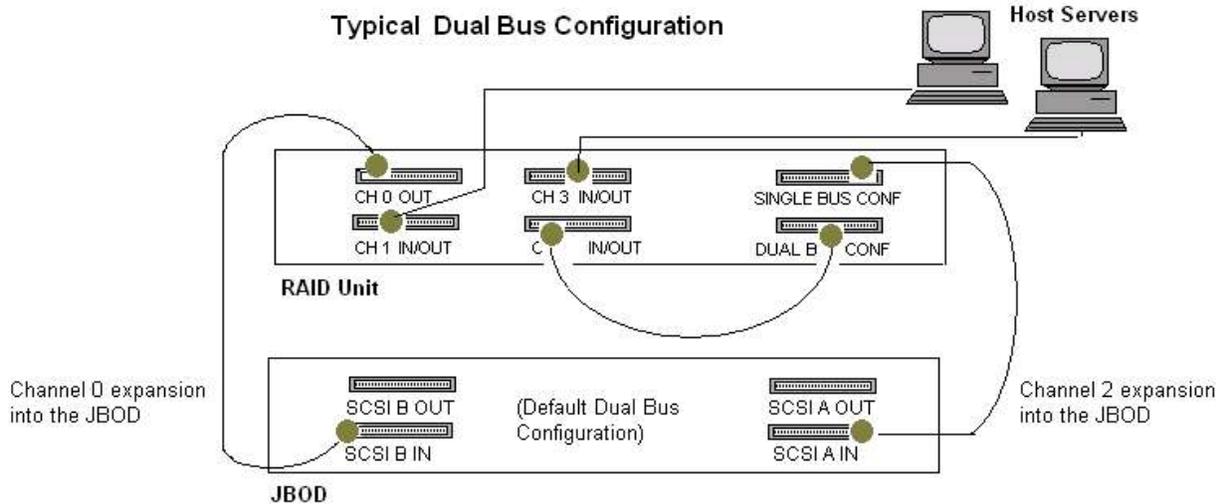
- (Optional) Use a SCSI cable to connect a RAID controller drive array (Channel 2 port) to an expansion drive array (SCSI IN port).

---

**Caution:** There is a limitation of 14 drive IDs per channel. Therefore, do NOT connect a dual bus Channel 0 or Channel 2 (6 IDs) to a single bus expansion drive array (12 IDs).

---

The dual bus configuration below assigns half the IDs from the RAID controller and expansion drive arrays to Channel 0, and the other half of all the IDs to Channel 2. **The "SINGLE BUS CONF" port is a Channel 2 expansion port** in a dual bus configuration.



**Figure 11.** Dual-bus configuration

- Based on the configuration shown above, the default drive IDs for a dual bus configuration are shown in the figure below. ID6 and ID7 are reserved for controller communication and not used for drive IDs.
- The IDs are also displayed on the bottom inside edge of the chassis. These IDs are automatically assigned and appear in RAID controller status tables.
- Connect the RAID controller drive array (SCSI Channel 1 and 3 ports) to two host servers with HBA adapter cables. SCSI ports for Channels 1 and 3 are assigned as host channels by default.

---

**Note:** To use Channel 1 or Channel 3 as a drive channel (which the user can connect to another expansion drive array), reconfigure the channel to a drive channel status.

---

## Alternative Configurations with Two Expansion Drive arrays

Designed for a redundant configuration, a standard RAID controller drive array has Channels 0 and 2 assigned as drive channels, and Channels 1 and 3 assigned as host channels.

Users can attach two expansion drive arrays to a RAID controller drive array if they change the host channel mode of Channel 1 or Channel 3 to a drive channel mode.

---

**Caution:** There is a limitation of 14 drive IDs per channel. Therefore, do NOT connect a dual bus Channel 0 or Channel 2 (6 IDs) to a single bus expansion drive array (12 IDs).

---

## Connecting COM Port to a VT100 Terminal or Workstation

For a first-time configuration, users must assign an IP address to the chassis via the COM port of either controller module. Users can configure the RAID controller drive array via the COM port, or via the Ethernet port after they set up the IP address.

When users configure the RAID controller drive array for the first time, it automatically configures the primary controller and transfers the same configuration to the secondary controller.

## Connecting Ethernet Port to LAN/WAN

To connect a RAID controller drive array to an Ethernet port, users must first assign an IP address to the RAID controller drive array via the Sun 2U COM port and a VT100 terminal or workstation.

Connect the Ethernet port of one of the controllers to the LAN connection. This connection enables configuration and monitoring of RAID controller and expansion drive arrays remotely.

---

*Note: In a dual controller configuration, the Ethernet ports on both controllers must be connected in order to fully manage the array when one controller fails.*

---

## Connecting Event Monitor Unit (EMU) to an Expansion Drive Array

The EMU modules report fan, temperature, and voltage conditions to the controller which reports the events in the event log, in status windows and via alarms.

# Reliability, Availability, and Serviceability (RAS)

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The Sun StorEdge™ 3320 SCSI array includes the reliability, availability, and serviceability features listed below.

## Reliability

The Mean Time Between System Outage (MTBS) of the Sun StorEdge 3320 SCSI array is specified to be greater than 330,000 hours. MTBF was calculated according to Telcordia SR-332 Issue 1, May 2001. Ambient temperature for the MTBF was calculated at 25 degrees C.

- The MTBF of a single controller/single-bus/12-drive Sun StorEdge 3320 SCSI array configuration is specified to be greater than 36,000 hours.
- The MTBF of a single controller/single-bus/9-drive Sun StorEdge 3320 SCSI array configuration is specified to be to be greater than 37,000 hours.
- The MTBF of a paired controller/single-bus Sun StorEdge 3320 SCSI array is specified to be greater than 34,000 hours.

The reliability features of the Sun StorEdge 3320 SCSI array include:

- NEBS Level 3 compliant
- MIL-STD-810F subset compliant
- Load-sharing/load-balancing extends power supply life

## Availability

The availability features of the Sun StorEdge 3320 SCSI array include:

- Dual hot-swap/redundant load-sharing/load-balancing power supplies with separate inputs
- Hot-swap/redundant high-velocity (52 CFM) electrically isolated cooling fans are powered by a +12-volt common rail and contain detection circuitry to monitor degraded performance provide superior temperature control. Fans continue to run from the redundant power supply even though their power supply unit is turned off. The twin 80-mm axial fans in each PSU are connected together in series to allow blade synchronization upon power up.
- Hot-swap redundant event monitoring units
- Hot-swap redundant RAID controllers with mirrored synchronized-write cache (optional configuration)

# Serviceability

## Failover

The Sun StorEdge 3320 SCSI array supports both hard- and soft-failover capabilities.

- **Hard failover**

The Sun StorEdge 3320 SCSI array automatically switches from the failed component to the redundant component.

- **Soft failover**

The Sun StorEdge 3320 SCSI array provides the ability to manually failover a component for hardware upgrades, and so on.

## Hot-Serviceability and Hot-Swappable FRUs

All hot-swap components can be replaced while the subsystem is on line and are automatically recognized by the subsystem. Additionally, the hot serviceable I/O card and terminator modules can be replaced while the system is powered on but off line.

Any single hot-swap field-replaceable unit (FRU) can be removed from the subsystem while running applications. All FRUs are easily accessible from the front or rear of the subsystem. Redundant hot-swappable or hot-serviceable FRUs include:

- RAID controllers/cache (when in paired mode)
- Disk drives (when part of a supported RAID configuration is selected)
- Event monitoring units (EMU)
- Power supply/cooling unit (PSU)
- I/O and SCSI termination modules (hot serviceable)
- Cache battery (hot serviceable)

# System Configuration and Management

## Configuration and Management Software

There are three ways to configure and manage a Sun StorEdge™ 3320 SCSI array:

1. **Terminal menu interface** – This method allows the MOST control over the Sun StorEdge 3320 SCSI, since it "taps" directly into the array's RAID controller firmware.

Examples of the terminal menu interface are shown below.

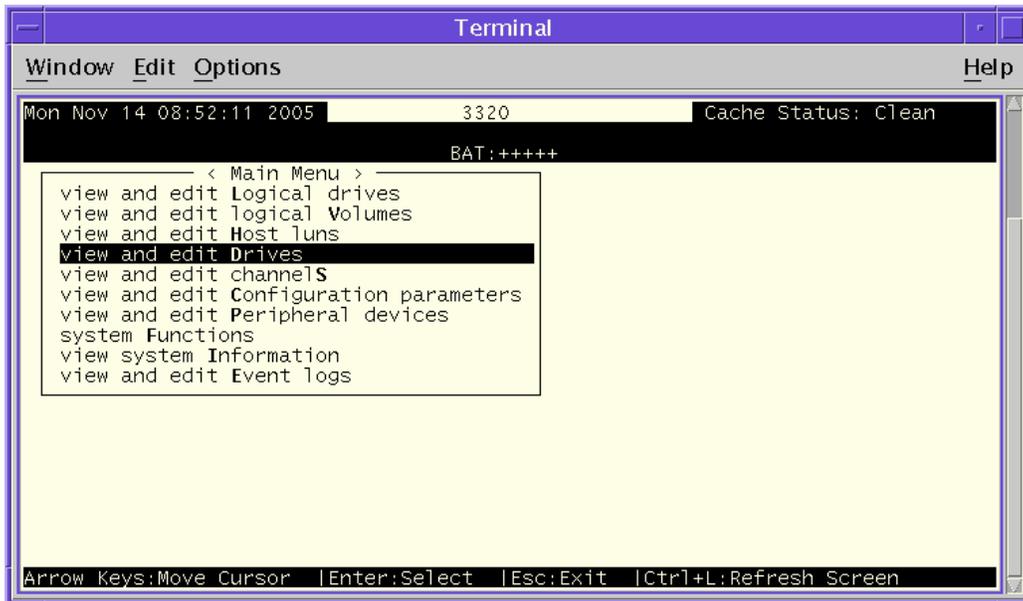


Figure 12. Terminal menu interface, main menu

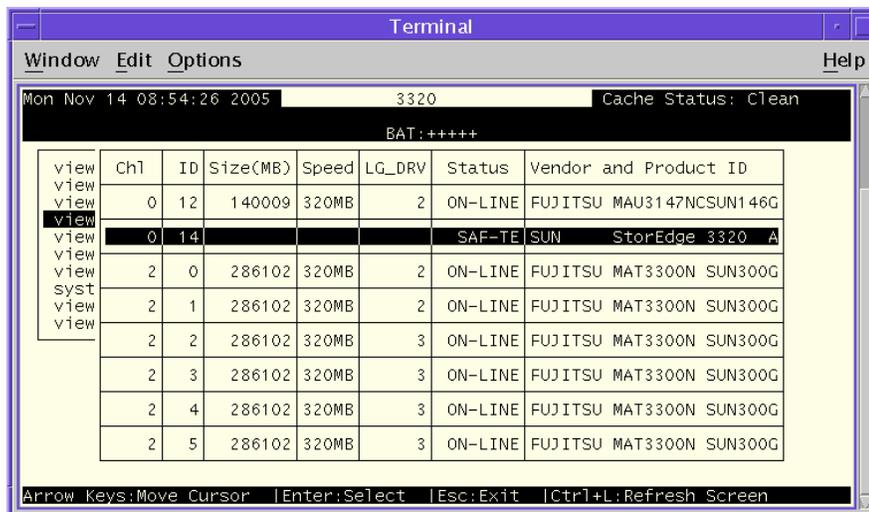


Figure 13. Terminal menu interface, cache status

## 2. Sun StorEdge Configuration Service (SSCS) Graphical User Interface

- A. This requires that an SSCS agent utility be loaded onto a Solaris™ Operating Environment server that is connected to a Sun StorEdge 3320 SCSI array that is to be managed/monitored.
- B. An SSCS console utility also needs to be loaded onto a Solaris Operating Environment workstation.
- C. From an SSCS console, the user can manage an X number of SSCS agents/Sun StorEdge 3320 SCSI arrays.
- D. SSCS can also be used to dynamically change RAID controller firmware (when there are dual redundant controllers installed).
- E. SSCS agent/console utilities for the Solaris Operating Environment are included in the Sun StorEdge 3320 SCSI software CD shipping package.
- F. More details about SSCS are found in the sections below.

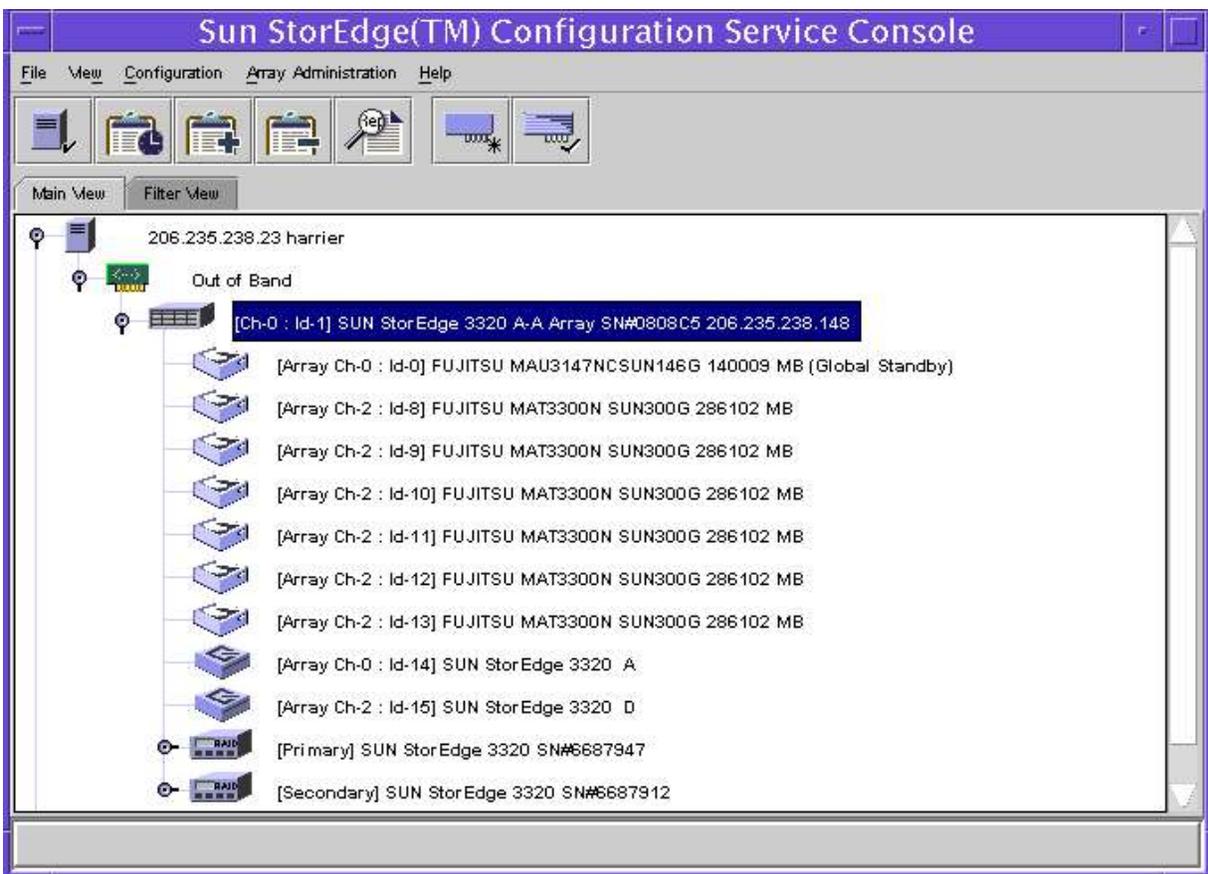


Figure 14. Sun StorEdge Configuration Service GUI

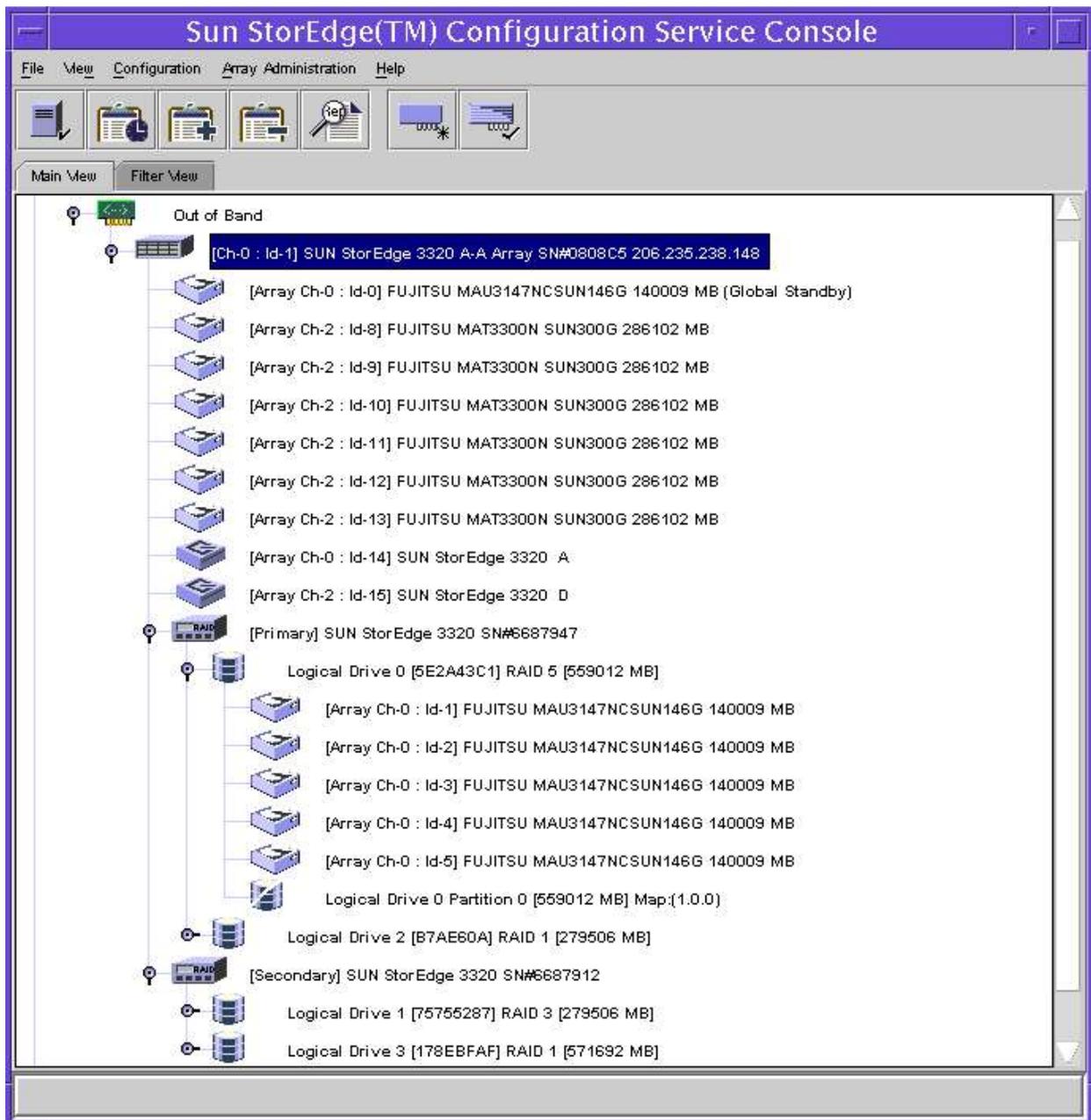


Figure 15. Sun StorEdge Configuration Service GUI

## Sun StorEdge Configuration Service Software

Sun StorEdge Configuration Service software is a Java™ technology-based software program that combines storage configuration, maintenance, and monitoring tools into a single, easy-to-use application. Sun StorEdge Configuration Service software provides centralized administration of Sun StorEdge 3320 SCSI storage systems across existing local and wide area networks. It greatly simplifies storage management and reduces its administration costs.

The Sun StorEdge Configuration Service software graphical interface uses intuitive controls and graphics to present configuration options, maintenance features, and status information for storage systems and servers. A color-coded design provides feedback and clear status information for each component. Critical conditions that require immediate attention are always easily identified and simple to locate. Configuration features and controls are well marked and operate smoothly. Sun StorEdge Configuration Service software is also very easy to learn through its use of familiar interface elements.

Sun StorEdge Configuration Service software provides complete monitoring of Sun StorEdge 3320 specific RAID controllers, disk drives, etc. From a single Sun StorEdge Configuration Service console located anywhere on a network, system administrators can view entire Sun StorEdge 3320 storage systems, change storage configurations, and monitor storage status. In the event of a status change, Sun's Diagnostic Reporter software sends real-time, proactive alerts to the system administrator via its console display, e-mail, or through an alphanumeric pager, allowing users to monitor the storage system remotely.

Storage setup and management is easy with Sun StorEdge Configuration Service software. Custom configuration options allow network administrators to configure storage volumes, RAID levels, cache modes, stripe sizes, and other storage parameters to meet particular server and application requirements.

Sun StorEdge Configuration Service also allows dynamic array firmware upgrades when there are dual redundant controllers configured. With Sun StorEdge Configuration Service's unsurpassed ease of use and attention to detail, even the most ambitious storage installations are simple to manage.

Configuration services features include the following:

- GUI based management and monitoring
- Phone home alert support (email alerts)
  - Defines the types of message traps sent, the timing of messages sent, forward encrypted messages, and receive messages on the Diagnostic Reporter which functions as an email viewing program.
  - Operates in background mode continuously on the computer where it is installed and also has a controlling Sun StorEdge Configuration Service Agent (a controlling agent is the only agent which talks to a specific array).

## RAID System Storage Resource Management Features

- Web-based 10/100 BASE-T Ethernet support
- Serial port out-of-band support
- RAID levels 0, 1, 1+0, 3, 5, 3+0, and 5+0
- Dynamic firmware upgrades (with redundant RAID controllers)
- Up to 128 LUNs and 256 CTQs per RAID controller



- 512-MB battery-backed ECC cache option per controller

## Event Notification

- Dual hot-swap event monitoring units
- Notification of temperature, fan, and power supply status
- Each FRU has a status LED
  - Provides easy identification of FRU status
  - Automatic awareness of FRU installation
- Audible alarm

## CLI Functionality

The command line interface (CLI) provides limited commands over the Sun StorEdge 3320 array. These commands are discussed in this section. The two most important functions of the CLI are: 1) the ability to download controller firmware (when the array is in dual controller mode); and 2) to download disk firmware.

## Supported Command Modes

The CLI supports single command mode and prompting mode as shown in the following examples.

Type the entire command on the command line:

```
# sccli /dev/rdisk/clt0d0s2 show events
```

Or specify the device on the command line:

```
# sccli /dev/rdisk/clt0d0s2
sccli> show events
      :
sccli> quit
```

Or specify nothing on the command line:

```
# sccli
Available devices:
    1. /dev/rdisk/clt0d0s2 [SUN StorEdge 3320 00028E]
    2. /dev/rdisk/clt1d0s2 [SUN StorEdge 3320 00028F]
Enter selection: 1
sccli> show events
      :
sccli> quit
```

## Accessing SCCLI Man Pages

To access the Man page for `sccli` without specifying environment variables, type

```
# man -M /opt/SUNWsscs/man sccli
```

To be able to type `man sccli` without specifying the man page directory each time, add the directory `/opt/SUNWsscs/man` to the colon-separated list of directories in the `$MANPATH` environment variable.

## SCCLI Options and Subcommands

This section explains the device name, lists the options, and provides the available `sccli` subcommands along with sample code.

---

*Note: To prevent unauthorized access, the `sccli` requires super user or system administrator privileges.*

---

## Specifying the Device Name

Except for the `help` command, all `sccli` subcommands require the specification of a device filename, typically specified as:

```
/dev/rdisk/cXtYdZs2
```

where

*X* = controller number

*Y* = scsi target number

*Z* = logical unit number

*s2* = slice 2 of the (logical) disk. Usually, slice 2 is specified when identifying a disk for administrative purposes, but any slice number between 0 and 7 (if the slice exists) works.

---

*Note: If no device is specified on the command line, and more than one Sun StorEdge 3320 array is connected to the host, a menu of devices is presented with one device filename for each array. If there is only one StorEdge 3320 device connected to the host, that device is selected automatically.*

---

## Options

```
-y, --yes
```

Assume a yes response to any yes/no prompts. This is used to allow particularly dangerous commands to be run from a script without prompting the user.

```
-n, --no
```

Assume a no response to any yes/no prompts.



```
-v, --version
```

Displays the version number of the sccli utility and exits without processing any subcommands.

```
-h, --help, --usage
```

Displays a usage message.

## Options Usage

```
# sccli option device subcommand
```

## Subcommands

---

*Note: If no subcommand is entered on the command line, sccli enters an interactive mode, prompting the user to enter subcommands until the quit command is entered. All subcommands operate on the currently-selected device.*

---

### about

Displays version and copyright information.

```
# sccli device about
```

```
# sccli /dev/rdisk/c0t5d0s2 about
sccli version 1.0.2
Sun StorEdge 3000 Series command line interface
Copyright 2002 Dot Hill Systems Corporation
All rights reserved. Use is subject to license terms.
```

### clear events

Clears the array's internal event log.

```
# sccli device clear events
```

```
# sccli /dev/rdisk/c0t5d0s2 clear events
```

*Caution: All download commands are potentially dangerous and should be used only as instructed.*

---

*Note: All download commands take the controller offline; therefore, after running a download command, the select command must be run to reselect the device.*

---

## download controller-firmware

Downloads firmware into the controller. In a dual-controller configuration, the failover capability of the redundant controller pair is used to activate the new firmware without requiring the array to be shut down.

If boot-record is specified, it names an additional file that is downloaded at the same time.

```
# sccli device download controller-firmware filename [boot-record]
```

```
# sccli /dev/rdisk/c0t5d0s2 download controller-firmware SUN 325k-3320.bin
b32a131e
Start to download Boot record... Done
Start to download controller firmware...Flashing and
Programming...
Done
Resetting Controller...Done
```

## download disk-firmware

Downloads disk driver firmware into disk drives connected to the Sun StorEdge array. If a disk-model string is specified, it is matched against SCSI INQUIRY data to determine which drives should be programmed.

---

*Note: To download firmware to expansion unit disk drives, they must be attached to the Sun StorEdge array. That is, the sccli utility does not download firmware to JBODs directly.*

---

When using this command:

- All daemons that access the RAID controller must be stopped.
- I/O is interrupted.
- The controller is reset after disks are flashed.

---

*Note: The option disk-model must be 16 characters. If it is less than 16 characters, a space must be inserted for each missing character up to 16 in between the quote marks. See the following code for an example.*

---

```
# sccli device download disk-firmware filename disk-model
```

```
# sccli /dev/rdisk/c0t5d0s2 download disk-firmware st3366051.0538.fw
"ST336605LSUNS6G "
Controller is shutdown and entered into download mode
Start to send Disk Firmware data
Flashing firmware data, please wait...
Disk Firmware Download on Channel 0 Id 0 Completed
Disk Firmware Download on Channel 0 Id 1 Completed
Disk Firmware Download on Channel 0 Id 2 Completed
Disk Firmware Download on Channel 0 Id 3 Completed
Disk Firmware Download on Channel 0 Id 4 Completed
Disk Firmware Download on Channel 0 Id 5 Completed
Disk Firmware Download on Channel 0 Id 8 Completed
Disk Firmware Download on Channel 0 Id 9 Completed
Disk Firmware Download on Channel 0 Id 10 Completed
Disk Firmware Download on Channel 0 Id 11 Completed
Disk Firmware Download on Channel 0 Id 12 Completed
Disk Firmware Download on Channel 0 Id 13 Completed
Resetting controller...Done
```

## download safte-firmware

Downloads firmware into the SAF-TE microprocessor in an LVD SCSI array enclosure controller.

When using this command:

- All daemons that access the RAID controller must be stopped.
- I/O is interrupted.
- The controller is reset after disks are flashed.

```
# sccli device download safte-firmware filename
```

```
# sccli /dev/rdisk/c0t5d0s2 download safte-firmware saftew.fw
Controller is shut down and entered into download mode
Start to download firmware of SAFTE device modules
SAFTE Module EMU ENVIRONMENTAL Download on Channel 0 Id 14 OK!
SAFTE Module EMU ISEMS Download on Channel 0 Id 14 OK!
SAFTE Module EMU LED CONTROLLER Download on Channel 0 Id 14 OK!
SAFTE Module POWER SUPPLY CTRL Download on Channel 0 Id 14 OK!
SAFTE Module SAFTE HC11 Download on Channel 0 Id 14 OK!
Writing Safte FW Package 0.93 to target Channel 0 Id 14 OK!
Download SAFTE Firmware OK!
Safte Module Firmware Download on Channel 0 Id Completed
Resetting Controller...Done
```

## help

Displays a short synopsis of available commands.

```
# sccli help
```



## inquiry

Displays SCSI INQUIRY data returned by the array controller. (Shortcut for show inquiry-data).

```
# sccli device inquiry
```

```
# sccli /dev/rdisk/c0t5d0s2 inquiry
Vendor: SUN
Product: StorEdge 3320
Revision: 0325
Vendor-specific S/N: 5E034B32-00
Peripheral Device Type: 0
Removable Media: no
Page 80 Serial Number: 00028E5E034B3200
Page 83 Logical Unit Device ID: 600C0FF000000000000028E5E034B3200
```

---

**Caution:** All reset commands are potentially dangerous and should be used only as instructed.

---

## reset controller

Resets the controller. This temporarily causes the array to go offline, which in turn may affect applications running on any hosts connected to the array. Also see shutdown controller.

```
# sccli device reset controller
```

```
# sccli /dev/rdisk/c0t5d0s2 reset controller
WARNING: This is a potentially dangerous operation. The controller
will go offline for several minutes. Data loss may occur if the
controller is currently in use.
Are you sure? no
```

## reset nvram

Clears the NVRAM configuration memory and restores factory defaults. After issuing this command, a reset controller operation should be done, and the controller must be reconfigured to restore any non-default configuration options.

---

**Caution:** Logical devices are not deleted, but it is possible for them to become inaccessible after this command is run. This may result in data loss.

---

```
# sccli device reset nvram
```

## select

Select a new device to which subsequent commands are issued. If no device is specified, and more than one choice exists, a menu of choices is displayed.

```
sccli> select device
```

```
sccli> select /dev/rdisk/c0t5d0s2  
sccli: selecting /dev/rdisk/c0t5d0s2 [SUN StorEdge 3320 00028E]
```

## show events

Displays the contents of the array's event log.

```
# sccli device show events
```

```
# sccli /dev/rdisk/c0t5d0s2 show events  
Tue Jul 30 16:04:45 2002  
[0181] Event Index 1 : "StorEdge Unit (SN 3150177) Controller  
NOTICE: Controller Initialization Completed"  
Tue Jul 30 16:04:24 2002  
[0181] Event Index 2 : "StorEdge Unit (SN 3150177) Controller  
NOTICE: Controller Initialization Completed"
```

## show inquiry-data

Displays the SCSI INQUIRY data returned by the array controller.

```
# sccli device show inquiry-data
```

```
# sccli /dev/rdisk/c0t5d0s2 show inquiry-data  
Vendor: SUN  
Product: StorEdge 3320  
Revision: 0325  
Vendor-specific S/N: 5E034B32-00  
Peripheral Device Type: 0  
Removable Media: no  
Page 80 Serial Number: 00028E5E034B3200  
Page 83 Logical Unit Device ID: 600C0FF000000000000028E5E034B3200
```

## shutdown controller

Shuts down the RAID controller and stops I/O processing. This temporarily causes the array to go offline, which in turn may affect applications running on any hosts connected to the array. Data in the controller cache is flashed to logical drives. After issuing this command, the user usually issues the reset controller command.

```
# sccli device shutdown controller
```



```
# sccli /dev/rdisk/c0t5d0s2 shutdown controller  
WARNING: This is a potentially dangerous operation. The controller  
will go offline for several minutes. Data loss may occur if the  
controller is currently in use.  
Are you sure? no
```

## **quit**

Exits the interactive mode.

```
sccli> quit
```

# Ordering Information

---

## Ordering Notes

---

- Note 1:** *Sun StorEdge™ 3320 SCSI array configurations do NOT ship with a documentation and software CD. There is NO hard copy documentation, with the exception of release notes. The single CD containing Sun StorEdge Configuration Service Management and Diagnostic Reporter Software, installation and configuration documents, and Sun StorEdge 3000 Family documentation is NOT automatically included with the Sun StorEdge 3320 SCSI Array configurations. The contents of this CD are available via the Sun Download Center located at the following URL: <http://www.sun.com/software/download/>. The CD is available by ordering the following no charge X-option part number: NCSS9-200-W9NR (Sun StorEdge 3000 Family software and documentation 2.0 and 2.1).*
- Note 2:** *All Sun StorEdge 3320 SCSI array configurations ship with dual redundant power supplies standard with both "fixed" standalone X-option system combinations and customized factory configured "assemble to order" (XATO) combinations. Customers can order either AC or DC equipped versions of the array.*
- Note 3:** *All Sun StorEdge 3320 SCSI array configurations ship with the nameplate "Sun StorEdge 3300" affixed on the front bezel.*
- Note 4:** *For all "fixed" X-option system and XATO drive configurations of the Sun StorEdge 3320 SCSI array under the maximum number of 12 drives, that same number of corresponding drive carriers are included installed with the drives in the array. The remaining empty drive bays do NOT come with empty drive carriers. After initial system configuration, customers can purchase additional Sun StorEdge 3320 SCSI array specific X-option drives, which do come with drive carriers.*
- Note 5:** *The Sun StorEdge 3320 SCSI array drive carriers are UNIQUE – Sun StorEdge T3, A/D1000, D2, etc. drive carriers CANNOT be used in the Sun StorEdge 3320 SCSI array.*
- Note 6:** *All drive bays MUST be populated with either 1) a drive; or 2) an air management sled. This is critical to maintain proper air flow and cooling in the system.*
- Note 7:** *All Sun StorEdge 3320 SCSI array configurations ship with a cable that allows the array to be configured for single or dual SCSI bus operation.*
- Note 8:** *All StorEdge 3320 SCSI array configurations (RAID controller equipped) ship pre-configured with RAID level zero, and a global standby hot spare drive.*
- 



---

**Note 9:** *Rack-ready configurations of the Sun StorEdge 3320 SCSI array do NOT come with any rack mount rail kits. Customers need to order one of the following, depending on their needs:*

- *XTA-3000-2URK-19U – Universal Rail Kit for Sun Racks and industry standard 19” RETMA racks*
  - *XTA-3300-2URK-19C – 19” TELCO rack, center mount rail kit*
  - *XTA-3300-2URK-19F – 19” TELCO rack, front mount rail kit*
-

## Part Number Format Description

The basic system configuration can be determined from the components of each part number. Here is an example part number, with each component explained. The more comprehensive part number scheme details for the SE300 Family is also included below.

### Example part number = XTA3320R01A0T876

**X** = X-option

**T** = Sun StorEdge product designator

**A** = Revision level

**3320** = Model number

**R** = Physical configuration: T = tabletop, R = rack ready (X-Option "PTO" or ATO)

**01** = RAID controller support: 00= JBOD Only (No controller upgrade supported, 01=Supports addition of RAID controller

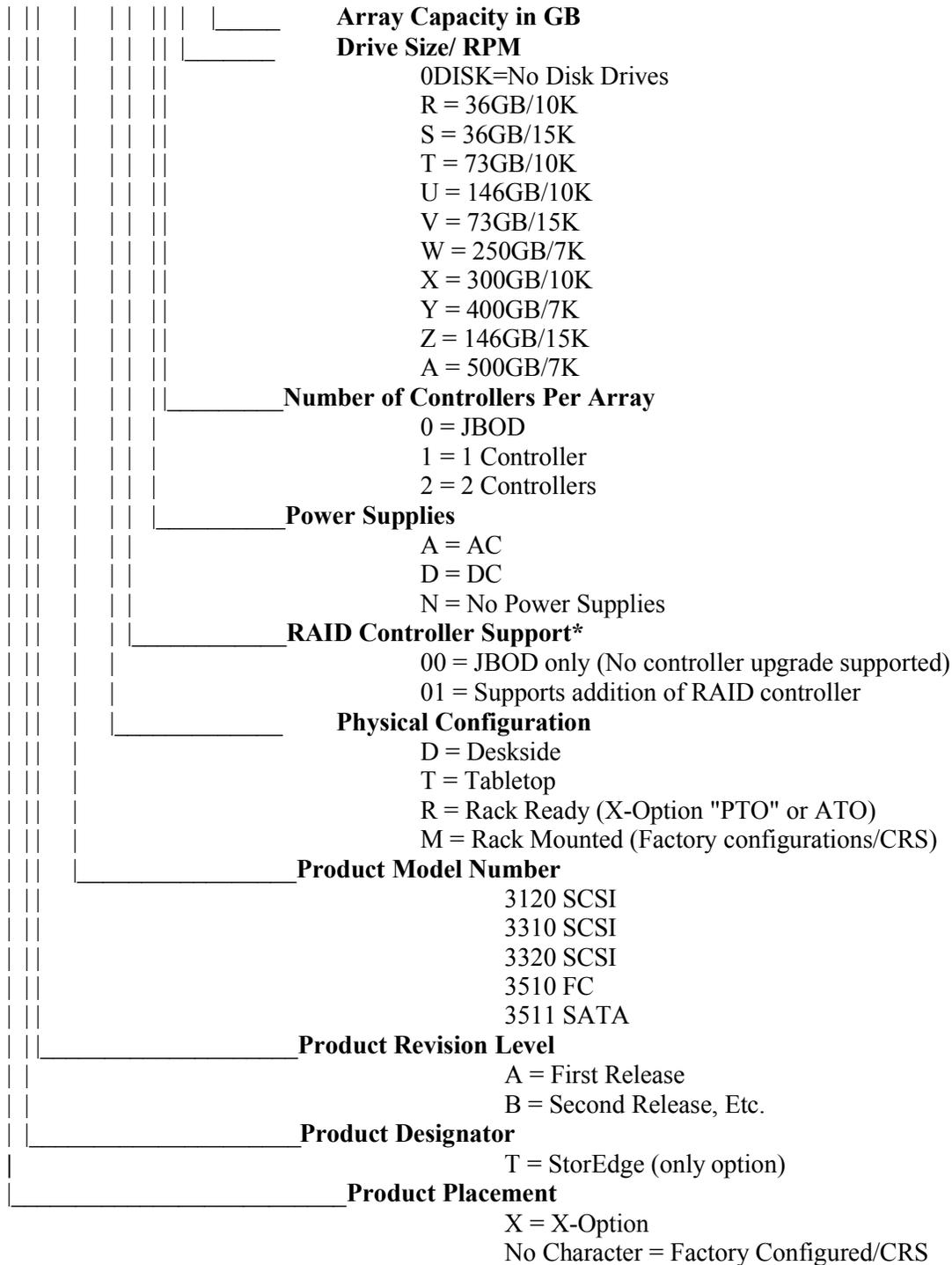
**A** = Power supply: A = AC, D = DC

**0** = Number of controllers per array: 0 = JBOD/Expansion, 1 = 1 RAID controller, 2 = 2 RAID controllers

**T** = Drive size and rpm (T=73GB/10Krpm)

**876** = Capacity: 876 = 12 x 73GB drives, 365 = 5 x 73GB drives

**Part Number Scheme for the StorEdge 3000 Family products:  
XTA3320R01A0T876**



\*Note: The StorEdge 3310 Does not follow this scheme.

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## Sun StorEdge 3320 SCSI Array Part Numbers and Webdesk Ordering Flow

The SE3320 SCSI Array is available in two forms:

a) Multiple "fixed" standalone X-option system combinations represented by single pre-defined product codes for 5 or 12 disk drive configurations per 2U tray.

OR

b) Customized factory configured "assemble to order" (XATO) combinations, which are formed by an aggregation of product codes. With this ordering model JBOD arrays can be configured with 1 to 12 disk drives per 2U tray and the RAID arrays can be configured with 2 to 12 disk drives per 2U tray.

For a detailed listing of the SE3320 X-option and XATO product codes, technical configuration requirements and Webdesk order flow information, please refer to the Worldwide Configuration Guide at <http://mysales.central/public/configGuide/>

Once inside the Configuration Guide:

- 1) Select "Workgroup Storage"
- 2) Select one of the following associated links
  - Sun StorEdge 3320 Fixed Configuration Ordering Flow Chart
  - Sun StorEdge 3320 SCSI Array XATO Ordering Flow Chart using "SE3320 FAMILY" XATO Model
  - Sun StorEdge 3320 Components
  - Sun StorEdge 3320 Options

Note: Please visit **Webdesk** directly for the most current ordering flow structure.

There are three URLs, depending on the geography

- AMER = <http://webdesk.central>
- APAC = <http://webdesk.singapore>
- EMEA = <http://webdesk.holland>

### Configuration Guide - may look to delete this for info is already on the Guide

This section provides a summary of the configurations available for the Sun StorEdge 3320 SCSI array.

| Feature             | Sun StorEdge 3320 SCSI Array Specifications |
|---------------------|---|
| Product Description | One Ultra320 SCSI External Storage array    |



| Feature                                       | Sun StorEdge 3320 SCSI Array Specifications  |
|---|--|
| Operating System Support                      | Solaris 8, 9, 10, 10 X86<br>Red Hat Linux AS 3.0<br>Microsoft Windows NT 2000/2003<br>IBM AIX 5.1L<br>HP-UX 11i<br>Novell Netware 5.1 and 6.5<br>SUSE Linux SLES 9   |
| Disk Capacity/Types                           | 320MB SCSI LVD 3.5 in., 1-inch high low profile disk drives in the following capacities and speeds: 73GB 10Krpm, 73GB 15Krpm, 146GB 10Krpm, 146GB 15Krpm, and 300GB 10Krpm.  |
| Number of Disks                               | <ul style="list-style-type: none"> <li>• 12 maximum disks drives per 2U tray</li> <li>• "Fixed" standalone X-option system combinations represented by single pre-defined product codes for 5 or 12 disk drive configurations per 2U tray</li> <li>• With the XATO ordering model JBOD arrays can be configured with 1 to 12 disk drives per 2U tray and the RAID arrays can be configured with 2 to 12 disk drives per 2U tray.</li> <li>• 96 per 72-inch Sun StorEdge cabinet ( 8 arrays)</li> </ul> |
| Max. Raw Capacity                             | 10.8TB per RAID array (12x300GB)   |
| Host Interface                                | 320MB SCSI LVD   |
| Hardware-based RAID Controller Support        | <ul style="list-style-type: none"> <li>• One RAID controller per drive array</li> <li>• Two RAID controllers per drive array</li> </ul>  |
| Software-based RAID Support                   | <ul style="list-style-type: none"> <li>• Solstice DiskSuite™ 6.1 or greater</li> <li>• VERITAS Volume Manager 4.5 or greater</li> </ul>  |
| Cluster Support                               | Sun Cluster 3.0 software<br>Veritas Cluster 3.2, 3.5<br>MS Cluster Service Windows 2000 Server, 2003 Server  |
| Max. Number of Interfaces per RAID Controller | Four Ultra320 SCSI LVD ports   |
| Dimension                                     | <ul style="list-style-type: none"> <li>• Rack ready = H 3.5" x W 17.6" x D 18" (main chassis)</li> </ul>   |
| Footprint                                     | 2U high  |
| Power Supplies                                | Two hot-swap/redundant , AC or DC option   |
| Warranty                                      | 2-year:<br>First year – Second business day on-site<br>Second year – 15-day parts exchange   |
| Host Bus Adapter Options                      | SG-XPCI2SCSI-LM320 Ultra320, SG-XPCI1SCSI-LM320, X6758A, X2222A, X9265A (LSI22320-R)   |



| Feature       | Sun StorEdge 3320 SCSI Array Specifications   |
|---------------|---|
| Cable Options | <p>Ultra320 SCSI LVD cables, VHDCI/VHDCI</p> <ul style="list-style-type: none"> <li>• X3831B = 10-meter cable</li> <li>• X3830B = 4-meter cable</li> <li>• X1138A = 2-meter cable</li> <li>• X1137A = 1.2-meter cable</li> <li>• X1136A = 0.8-meter cable</li> </ul> <p>Ultra320 SCSI LVD cables, HD-68/VHDCI</p> <ul style="list-style-type: none"> <li>• X3831A = 10-meter cable</li> <li>• X3830A = 4-meter cable</li> <li>• X3832A = 2-meter cable</li> <li>• X1135A = 1.2-meter cable</li> <li>• X1132A = 0.8-meter cable</li> </ul> |

# Frequently Asked Questions

---

This section summarizes some of the most frequently asked questions for the Sun StorEdge™ 3320 array. Additional details can be found throughout this JTF document.

## ***Question 1. How is the StorEdge 3320 SCSI Array offered?***

A. The Sun StorEdge 3320 SCSI Arrays are available in two forms:

a) multiple "fixed" standalone X-option system combinations represented by single pre-defined product codes OR b) customized factory configured "assemble to order" (ATO) combinations, which are formed by an aggregation of product codes. All "fixed" and ATO 3320 configurations are based on the following features:

- RAID Controllers: 0, 1, or 2 controllers per array
- Rack Ready and rack mountable configurations
- AC or DC Power Options (DC via custom "assemble to order" model only)
- Disks: 73GB 10Krpm and 15Krpm drives, 146GB 10Krpm and 15Krpm drives, and 300GB 10Krpm drives
- Ship Kits for associated custom ATO configurations ("non-selectable" system determined components)

When the Sun or Sun Partner technical sales representative is customizing factory configured ATO selectable options/features, the Sun Microsystems configuration tool, WebDesk/Partner WebDesk Configurator, will enforce the following technical requirements:

3320 JBOD/EU Units must consist of a minimum of the following combination of components:

- Qty 1 JBOD Base Chassis (P/N: TA3320R00N00DISK)
- Qty 1 AC or DC Power Kit (P/Ns: TA-3000-2UAC-KIT or TA-3000-2UDC-KIT)
- Qty 1 Disk Drive (P/Ns: TB-SC1NC-xxxxxx)
- Qty 1 Ship Kit for DC or AC configurations (P/Ns TA-3320-JBOD-xxSK)

3320 RAID Units must consist of a minimum of the following combination of components:

- Qty 1 RAID Base Chassis (P/N: TA3320R01N00DISK)
- Qty 1 Controller (P/N: TA-3320-CTRL-512M)
- Qty 1 AC or DC Power Kit (P/Ns: TA-3000-2UAC-KIT or TA-3000-2UDC-KIT)
- Qty 2 Disk Drives (P/Ns: TB-SC1NC-xxxxxx)
- Qty 1 Ship Kit for RAID, AC power, w/1 Controller or RAID, DC power, w/1 Controller configurations (P/Ns TA-3320-xRAID-xxSK)

Configuration Notes: 1) Ship kits are "non-selectable" zero dollar components the WebDesk/Partner WebDesk configuration tool will systematically determine, based on previously selected options/features, and add to the ATO configuration output. 2) Optional X-option HDDs can be purchased separately and field installed in the "fixed" standalone X-option system configurations.



Raw Capacity Notes for Available 3320 SCSI Drives:

\*73GB 10Krpm and 15Krpm HDDs 876GB per 2U tray; expandable to 2.6TB per RAID array

\*146GB 10K rpm and 15Krpm HDDs 1.72TB per 2U tray; expandable to 5.2TB per RAID array

\*300GB 10K rpm HDDs 3.60TB per 2U tray; expandable to 10.8TB per RAID array

***Question 2. What accessories does the Sun StorEdge 3320 SCSI array ship with?***

A.

SE3320 JBOD Expansion Unit Base Configuration

The StorEdge 3320 SCSI array JBOD expansion unit base configuration ships with the following accessories:

One SCSI Bus Jumper Cable, Ultra 3, VHD-VHD, 1-foot length

One RAID to JBOD Storage Expansion Cable, Ultra 3, VHD-VHD, 1.5 foot length

Two power cord lock kits

Two Keys for bezel lock

SE3320 Single and Dual RAID Controller Base Configuration

The StorEdge 3320 SCSI array single and dual RAID controllers base configuration ships with the following accessories:

One SCSI Bus Jumper Cable, Ultra 3, VHD-VHD, 1 foot length

One 25-foot CAT 5 cable (for out-of-band management)

One 25-foot serial null modem cable (for out-of-band management)

One DB9 to DB25 adapter

Two power cord lock kits

Two Keys for bezel lock

Aside from the associated configuration specific components, (# of HDDs, # of controllers, etc.) see the section above entitled "Ordering Notes" (pages 44-45 of this document) for some important notes regarding the Sun StorEdge 3320 SCSI array.

***Question 3. Do the rack ready StorEdge 3320 configurations come with rack mount rail kits?***

A. Rack ready configurations of the Sun StorEdge 3320 SCSI array do NOT come with any rack mount rail kits. Customers need to order one of the following, depending on their needs:

- XTA-3000-2URK-19U – Universal Rail Kit for Sun Racks and industry standard 19” RETMA racks
- XTA-3300-2URK-19C – 19” TELCO rack, center mount rail kit
- XTA-3300-2URK-19F – 19” TELCO rack, front mount rail kit



***Question 4. How many host or JBOD connections are supported for a single or split bus configuration?***

A. Four configurations are supported in either single or split bus configurations. All configurations support one or two RAID controllers.

1. Split Bus - 2 JBOD - 1 Host - 36 drives total
2. Single Bus - 2 JBOD - 1 Host - 36 drives total
3. Split Bus - 1 JBOD - 2 Hosts - 24 drives total
4. Single Bus - 1 JBOD - 2 Hosts - 24 drives total
5. Split Bus - 0 JBOD - 3 Hosts - 12 drives total
6. Single Bus - 0 JBOD - 3 Hosts - 12 drives total

***Question 5. When do I need an external SCSI terminator (P/N: XTA-3320-SC-TERM)?***

A. An external SCSI termination is only needed in the JBOD/dual-host/split SCSI bus configuration. All other configurations do not need external SCSI termination.

***Question 6. How many external JBOD subsystems can the Sun StorEdge 3320 SCSI array support?***

A. The Sun StorEdge 3320 SCSI array supports up to two expansion (JBOD) subsystems. The maximum configuration supports 36 drives (12 drives/system) in one RAID chassis and two expansion chassis.

***Question 7. What are the hot-swappable components contained in the Sun StorEdge 3320 SCSI array?***

A. The RAID controllers, disk drive sled assemblies, event monitor units(EMU), and power supply/fan assemblies are all hot-swappable, field-replaceable units (FRUs). All FRUs are accessible from the front or rear of the array.

***Question 8. What does the event monitor unit (EMU) do?***

A. The event monitor unit monitors enclosure environmental information such as sensing various temperature sensors, obtaining voltage output status from each power supply. Auto detection of major components installed such as disk drives, fan/power supplies, and RAID controllers are also monitored by the EMU.

***Question 9. Can the Sun StorEdge 3320 JBOD/Expansion units be upgraded to single or dual controllers?***

A. No, the Sun StorEdge 3320 JBOD/expansion units uses a different midplane design than the RAID controller equipped array.

***Question 10. How much memory does each RAID controller support? Is the memory upgradeable?***

A. Each RAID controller supports 512-MB memory and this amount is fixed.



***Question 11. How many external JBOD subsystems can the StorEdge 3320 SCSI array support?***

A. The StorEdge 3320 SCSI array supports up to two expansion (JBOD) subsystems. The maximum configuration supports 36 drives (12 drives/system) in one RAID chassis and two expansion chassis.

***Question 12. What operating environments, HBAs, FC cables, switches, hosts and software does the StorEdge 3320 SCSI array support?***

A. For the most current and comprehensive support information, refer to the Sun StorEdge 3320 SCSI Array What Works With What compatibility matrix posted on SunWIN; token # 452528 and the Sun StorEdge 3320 SCSI Array Release Notes posted at <http://docs.sun.com/app/docs/prod/storedge#hic>

***Question 13. Can JBOD/expansion units be daisy-chained off each other?***

A. No, expansion units can only be daisy-chained off RAID controller equipped arrays.

***Question 14. Can StorEdge 3320 rack ready configurations be converted into desktop configurations?***

A. Yes, customers can purchase the SE3000 2U Tabletop conversion kit to convert their StorEdge 3320 rack ready configuration; P/Ns: XTA-3000-2U-R2T or XTA-3310-DESK-KIT. The kit includes outer skin with feet, screws and instructions.

***Question 15. How can I purchase extra AC power supplies?***

A. Extra AC power supplies can be purchased through Sun Services.

***Question 16. What is the maximum point-to-point cable length for the Sun StorEdge 3320 on any one bus?***

A. 12 meters point-to-point.

***Question 17. Between the terminal, GUI, and web interfaces, which interface provides the most control functionality?***

A. The terminal interface "taps" directly into the RAID controller firmware, thus this interface gives users the most functionality control.

***Question 18. Can a single power supply power up and support a fully populated array?***

A. Yes, it can. However, there is a risk of significant downtime if that single power supply fails.

***Question 19. Are the fan modules a different FRU (Field replaceable unit)?***

A. No, the fan modules are incorporated into the power supply FRUs.

***Question 20. Are there SCSI I/O connections on the RAID FRU?***

A. No, the SCSI I/O connections are on a separate I/O FRU.



***Question 21. What is the cache policy of the RAID controllers?***

A. For better performance, the default setting is write back, However, the user can toggle back and forth between write through and write back cache policies.

***Question 22. Can the terminal interface be accessed point to point (from a PC to the array)?***

A. Yes, users can directly connect to a Sun StorEdge 3320 array and access the terminal interface through a serial cable.

***Question 23. Is array co-existence supported (for example, a Sun StorEdge A1000 and 3320 array in the same server)?***

A. Yes, it is supported.

***Question 24. How many agents (servers attached to Sun StorEdge 3320 array) can a single Sun StorEdge Configuration Server Console manage?***

A. There is no limit to the number of servers it can manage.

***Question 25. How many power supply inputs are there for each power supply module?***

A. Each power supply module has one power supply input.

***Question 26. What type of communications connections are on each RAID controller FRU?***

A. There is a 9-pin serial port as well as a 10/100 Ethernet port for manageability.

***Question 27. How many LUNs can a controller/controller pair support?***

A. The total number of LUNs is 128, for either a single or dual controller.

***Question 28. Can a RAID controller span LUNs across an expansion unit?***

A. Yes it can.

***Question 29. What's the factory default setting for dual controllers?***

A. The default configuration is active-active controllers.

***Question 30. Can dual controllers be configured in an active-passive mode?***

A. Yes.

***Question 31. In the event of a power failure, how many hours can the battery backup module last to support the 512-MB cache?***

A. The battery backup module can support a 512-MB cache for approximately 72 hours.

***Question 32. Can the battery backup module be upgraded to support longer hours?***

A. No, the duration of the battery module support is fixed at approximately 72 hours.

***Question 33. Do any cables ship with the 3320 arrays?***

A. 1. Both RAID and JBOD/expansion units come equipped with one external jumper cable that enables field configuration of single or split SCSI bus.



2. The JBOD/expansion units ship with one 1.5 ft SCSI cable for connectivity to the RAID array.
3. The RAID unit ships with a 9-pin serial cable as well as an Ethernet cable for manageability.

***Question 34. How many hosts can an SE3320 support simultaneously?***

A. The SE3320 supports:

- up to 3x320MB SCSI host ports regardless of the number of controllers with 0 expansion trays  
host ports: 1, 2 and 3
  
- up to 2x320MB SCSI host ports with 1 expansion tray  
host ports: 1 and 3  
drive ports: 0 and 2
  
- up to 1x320MB SCSI host port with 2 expansion trays  
host ports: 3  
drive ports: 0, 1 and 2

***Question 34. Can AC-powered versions of the Sun StorEdge 3320 be converted to DC-powered?***

A. Yes, customers can reconfigure their existing AC-powered StorEdge 3320 SCSI arrays to DC power by using the DC power supply X-option conversion kit; P/N: XTA-3000-2UDC-KIT.

***Question 35. Is there a price premium for customers wanting to purchase customized factory configured "assemble to order" (XATO) configurations?***

A. No. The StorEdge 3320 array provides a pricing model in which the XATO and standalone "fixed" system combinations are priced equally for like configurations. Customers are not penalized for opting to purchase custom configurations.

***Question 36. What are the SCSI disk drive X-options available for the StorEdge 3320 Array?***

A. The following SCSI disk drive x-options are compatible with the 3320 Array:

- 73GB/10Krpm: Part No. XTA-SC1NC-73G10K
- 73GB/15Krpm: Part No. XTA-SC1NC-73G15K
- 146GB/10Krpm: Part No. XTA-SC1NC-146G10K
- 146GB/15Krpm: Part No. XTA-SC1NC-146G15K
- 300GB/10Krpm: Part No. XTA-SC1NC-300G10K

***Question 37. Are upgrades from a StorEdge 3310 to a StorEdge 3320 supported?***

A. NO.



***Question 38. Can the StorEdge 3320 be configured with DC power?***

A. Yes, customers can create a custom configuration with DC power using the 3320 array's factory configurable "assemble to order" (XATO) offering.

***Question 39. What is the difference between a rack ready and a rack mounted part number (prefixes "XTA" and "TA" respectively)?***

A. A rack ready part number is ready to be assembled in a rack or cabinet. Proper rail kits are required and must be ordered separately. A rack mounted part number means that the array comes assembled inside a rack or cabinet from Sun factories or Sun CRS factories.

***Question 40. What is the the Sun[SM] Customer Ready Systems (CRS) program?***

A. The Sun CRS program delivers Sun factory-integrated solutions with custom options and services. For more information regarding Sun CRS, please reference Sun Product Intro# Q4FY2002-9I.

***Question 41. Can the StorEdge 3310 JBOD/expansion unit be attached to the StorEdge 3320 RAID Array?***

A. Yes. The 3310 JBOD uses the U320 compatible hard disk drives. By attaching the 3310 JBOD to the 3320 RAID Array, the required bus link is achieved. However, early released U320 compatible hard disk drives did not always sustain U320 speed, so performance could be throttled to U160 on some of those drives.

***Question 40. Is the CD containing the Sun StorEdge 3000 Family Configuration Service Management and Diagnostic Reporter Software, installation and configuration documents, and SE3000 Family Documentation automatically included with the Sun StorEdge 3320 SCSI Array configurations?***

A. No. The single CD containing Sun StorEdge Configuration Service Management and Diagnostic Reporter Software, installation and configuration documents, and SE3000 Family Documentation is NOT automatically included with the Sun StorEdge 3320 SCSI Array configurations. The contents of this CD are available via the Sun Download Center located at the following URL: <http://www.sun.com/software/download/>. The CD is also available by ordering the following no charge part number: NCSS9-200-W9NR (Sun StorEdge 3000 Family Software and Documentation 2.0 and 2.1).

***Question 41. What exactly does RoHS compliant mean?***

A. Compliant with the "restriction of hazardous substances" directives.



***Question 42. What substances are included in the RoHS directive?***

A. The RoHS directive bans the sale of certain electronic equipment containing the following materials: Lead, Mercury, Hexavalent Chromium, Cadmium, PBB and PBDE brominated flame retardants

***Question 43. Is the StorEdge 3320 SCSI Array and all X-option and ATO part numbers supported by the SE3320 compliant with the European Union (EU)parliament "Removal of Hazardous Substances" (RoHS) directive?***

A. Yes. Please note, the SE3320 will be taking the Lead in solder exemption to the RoHS directive.

Notes:

The RoHS compliant Sun StorEdge 3320 SCSI Array meets requirements for reduction of five regulated substances to the appropriate maximum concentration values. The term "RoHS-5" present in the current SE3320 SCSI Array product descriptions identifies RoHS compliance is achieved, but utilizes the exemption that allows lead to be used in solder materials for certain products.

The rack mount rail kit and tabletop conversion kit options in the "Mounting Options" section above (pages 24/25 of this document) will be available shipping as RoHS compliant products by February 28, 2006.

***Question 44. Why did the SE3320 take the Lead in solder exemption?***

A. The only alternative to Lead in solder right now is to use Tin. Currently the use of Tin in solder causes growth of "whiskers" that can be detrimental to the electronics.

***Question 45. What is the implementation date for being RoHS compliant?***

A. The implementation date per the EU directive is July 1, 2006.

***Question 46. What languages does the StorEdge 3320 SCSI Array software and documentation support?***

A. English, French, Japanese, Korean, Simplified Chinese, and Traditional Chinese are the languages currently supported. Strategy for further localization is reviewed on a periodic basis.

***Question 47. Can the StorEdge 3320 JBOD/expansion unit be attached to the StorEdge 3310 RAID Array?***



A. Yes. 3320 expansion units behind a 3310 RAID array is supported. Note: It is important everyone understands it will only support U160 speed.

# Specifications

## Physical Specifications

| Description                            | Desktop     | Rackmount           |
|--|-------------|---------------------|
| Height                                 | 3.64 inches | 3.45 inches         |
| Width                                  | 19 inches   | 17.56 inches (body) |
| Depth                                  |             |                     |
| • Main chassis                         | 18.0 inches |                     |
| • Chassis with fan modules             | 20.0 inches |                     |
| • Chassis with fan modules and handles | 21.0 inches |                     |
| Weight (without drives)                | 31.85 lb.   |                     |
| Weight (fully loaded with 12 drives)   | 53.25 lb.   |                     |

## Heat and Air Flow

- Air flow for the Sun StorEdge™ 3320 array is from front to rear.
- A fully populated array dissipates a maximum of 785 BTU per hour.

## Power Input/Output

Numbers shown for the Sun StorEdge 3320 SCSI array are for a single power supply mode of operation, and these numbers are double in a dual redundant power supply mode.

## AC Primary Input Voltage/Frequency Range

- Input selection is automatic, and the power supply operates continuously over the required input range.
- The power supply is capable of supplying full rated output power in the input voltage range of 100VAC to 240VAC from a single phase source.
- Input current meets the limits shown in the following table:

| Input Voltage | Maximum Input Current | Maximum Inrush Current |
|---------------|-----------------------|------------------------|
| 100VAC        | 10A                   | 50A peak               |
| 240VAC        | 5A                    | 100A peak              |

Inrush current shall be less than 100A peak for 2 msec. and 30A peak for 50 msec., at peak nominal line from a cold start. Inrush current shall be measured after the power supply has idled for a minimum of ten minutes at an ambient temperature of 25°C, with the input voltage source removed.



## DC Output Voltages/Currents/Power

- The power supply provides two DC output voltages, +5VDC and +12VDC.
- The voltage outputs are capable of supplying the output current shown in the following table, subject to a combined maximum output power of 420 Watts.

| Output | Nominal Output (VDC) | Minimum | Maximum | Units | Conditions       |
|--------|----------------------|---------|---------|-------|------------------|
| 1      | 5 V                  | 0.0     | 35      | A     |                  |
| 2      | 12 V                 | 0.25    | 25      | A     | Peak 35A/15 sec. |

- Capacitive loads: The power supply can to power up and operate normally with the following capacitances simultaneously present on the DC outputs.

| Output               | +12VDC | +5VDC |
|----------------------|--------|-------|
| Capacitive load (uF) | 6,000  | 10000 |

- DC input voltages/currents/power: Optional -48VDC (-36VDC to .72VDC) or -60 input capabilities available.

## AC and DC Input Power Version

- **AC input power version (both power supplies operating)**
  - Nominal input voltage: 100VAC to 240VAC
  - Input voltage range: 90VAC to 264VAC
  - Input frequency range: 47 Hz to 63 Hz
- **DC input power version (both power supplies operating)**
  - Nominal input voltage: -48 or -60VDC
  - Input voltage range: -36VDC to 75VDC
- **Power supply output voltages**
  - +5VDC
  - +12VDC

## Environmental Specifications

| Feature            | Specifications  |
|--------------------|---|
| <b>Temperature</b> |   |
| Operating          | -5°C to 50°C (short term, 96 hours)<br><b>Standalone</b> = 5°C to 40°C (continuous)<br><b>Rack</b> = 5°C to 35°C (continuous)<br>MIL-STD-810F <ul style="list-style-type: none"> <li>• High Temperature, Method 501.4 (+49°C, 16 Hr dwell)</li> <li>• Low Temperature, Method 502.4 (-10°C, 16 Hr dwell)</li> </ul> |



| <b>Feature</b>  | <b>Specifications</b>  |
|-----------------|--|
| Nonoperating    | -40°C to 65°C<br>MIL-STD-810F <ul style="list-style-type: none"> <li>• High Temperature, Method 501.4 (+71°C, 16 Hr dwell)</li> <li>• Low Temperature, Method 502.4 (-40°C, 16 Hr dwell)</li> </ul>  |
| Stock           | 55°C, 80% RH @ 5 hours<br>-10°C @ 10 hours<br>20°C, 10% RH @ 5 hours   |
| Cold Starts     | 5 times powered on at 2°C<br>MIL-STD-810F<br>Low Temperature, Method 502.4 (Exploratory, with 2 Hr dwell at each level and the start-up at: 5°C, 0°C, -5°C, -10°C)   |
| <b>Humidity</b> |  |
| Operating       | 10 to 90% RH, 38°C max. (noncondensing)<br>MIL-STD-810F, using Method 507.4, 5 cycles total<br>Cycle description <ul style="list-style-type: none"> <li>• 95% RH @ 60°C, 16Hr, nonoperating</li> <li>• 95% RH @ 30°C, 22 Hr</li> <li>• 4 Hr Op</li> <li>• 95% RH @ 20°C, 6 Hr, nonoperating</li> <li>• 95% RH @ 30°C, 5 Hr</li> <li>• 4 Hr Op</li> </ul> |
| Nonoperating    | 0% to 93% RH, 27°C max. (non-condensing)<br>MIL-STD-810F, using Method 507.4, 5 cycles total<br>Cycle description <ul style="list-style-type: none"> <li>• 95% RH @ 60C, 16Hr, nonoperating</li> <li>• 95% RH @ 30°C, 22 Hr</li> <li>• 4Hr Op</li> <li>• 95% RH @ 20°C, 6 Hr nonoperating</li> <li>• 95% RH @ 30°C, 5 Hr</li> <li>• 4 Hr Op</li> </ul>   |
| <b>Altitude</b> |  |
| Operating       | 70 kPa (approx. 3,000 meters) @ 40°C, standalone<br>70 kPa (approx. 3,000 meters) @ 35°C, rack<br>MIL-STD-810F, using Method 500.4<br>15,000 ft @ 40°C   |
| Nonoperating    | 19.3 kPa (approx. 12,000 meters) 0°C<br>MIL-STD-810F, using Method 500.4<br>40,000 ft @ ambient temperature  |
| <b>Shock</b>    |  |
| Operating       | 5.0 g's, 11ms, half-sine (x, y, and z axis)<br>MIL-STD-810F, Method 516.5, Procedure I, Figure 516.5-10<br>3 Pulses at 5 g's<br>3 pulses at 14 g's<br>3 pulses at 20 g's (positive Saw Tooth)<br>3 pulses at 20 g's (negative Saw Tooth)   |
| Nonoperating    | 15 g's, 11ms, half sine (x, y, and z axis)<br>MIL-STD-810F, Method 516.5, Procedure I, Figure 516.5-10<br>3 Pulses at 5 g's<br>3 pulses at 14 g's<br>3 pulses at 20 g's (positive Saw Tooth)<br>3 pulses at 20 g's (negative Saw Tooth)<br>MIL-STD-810F, Bench Handling, Method 516.5, Procedure VI  |



| Feature          | Specifications   |
|------------------|--|
| <b>Vibration</b> |  |
| Operating        | <b>Standalone</b> = 0.20 g's, 5 Hz to 500 Hz to 5 Hz, swept-sine (5 sweeps in x, y, and z axis)<br><b>Rack</b> = 0.15 g's vertical and 0.1 g's horizontal, 5 Hz to 500 Hz, swept-sine<br>MIL-STD-810F, Method 514.5, Category 21 (Watercraft – marine vehicles)<br>2 Hr random from 1 Hz to 100 Hz, with up to 0.0010g <sup>2</sup>  |
| Nonoperating     | <b>Standalone</b> = 1.0 g's, 5 Hz to 500 Hz to 5 Hz, swept-sine (5 sweeps in x, y, and z axis)<br><b>Rack</b> = 0.5 g's vertical and 0.25 g's horizontal, 1.0 Octaves per minute, 5 Hz to 500 Hz, swept-sine<br>MIL-STD-810F, Method 514.5, Category 4 (Truck/trailer/tracked – restrained cargo)<br>Vertical Axis: 1.04 g-rms<br>Transverse Axis: 0.204 g-rms<br>Longitudinal Axis: 0.704 g-rms |
| Inclination      | 15 degrees, 4 tests off the XY-plane   |

## Compliance

| Standard  | Specifications  |
|---|---|
| <b>Safety</b>   |   |
| IEC 60950 (C22.2-60950) (EN60950) (UL60950)                 | CUL Notice of Authorization   |
| EMC and Safety  | Telcordia GR-1089-CORE test report  |
| <b>Emissions and Immunities</b>                             |   |
| RF Radiated Emissions                                       | CISPR22 (EN55022), Class B – European Union<br>FCC Part 15, Class B – USA, Industry of Canada |
| Conducted Emissions   | CISPR22 (EN55022), Class B – European Union<br>FCC Part 15, Class B – USA, Industry of Canada |
| Harmonic Emissions  | IEC 61000-3-2:2000 (No Limits) – European Union   |
| Voltage Flicker   | IEC 61000-3-3:1995/A1:2001 (No Limits)  |
| ESD Immunity  | CISPR 24 (EN55024; 8kV Contact, 15kV Air) IEC 61000-4-2                                       |
| RF Field Immunity   | CISPR 24 (EN55024, 10V/m) IEC 61000-4-3   |
| Electrical Fast Transient/Burst Immunity                    | CISPR 24 (EN55024; 1kV I/O, 2kV Power) IEC 61000-4-5  |
| Surge Immunity  | CISPR 24 (EN55024; 1kV I/O, 1kV Power L-L, 2kV Power L-G) IEC 61000-4-5                       |
| RF Conducted Immunity                                       | CISPR 24 (EN55024; 3V I/O and Power) IEC 61000-4-6  |
| Power Frequency Magnetic Field Immunity                     | CISPR 24 (EN55024) IEC 61000-4-8  |
| Voltage Dip and Interruption                                | CISPR 24 (EN55024; 0v/0.5cycle, 70%V/0.5sec, 0V/5sec)   |
| Voltage Dips/Short Interruptions/Voltage Variation Immunity | IEC 61000-4-11  |
| NEBS Compliance (Environmental and Physical)                | Telcordia GR-63-CORE, Level 3 (No margin requirement) (Telco, -48VDC Only)<br>GR-1089-CORE    |
| ETSI (Environmental and Emissions)                          | EN 300 386  |



| Standard       | Specifications  |
|----------------|---|
| MIL-STD-810F   | Method 500.4 Altitude<br>Method 501.4.High Temperature<br>Method 502.4.Low Temperature<br>Method 507.4.Humidity<br>Method 509.4.Salt Fog<br>Method 514.5.Category 4 Transportation Vibration<br>Method 514.5.Category 21 Watercraft Vehicle<br>Method 516.5.Functional Shock (15G.s operational)<br>Method 516.5.Bench Handling |
| Acoustic Noise | ISO 7779:1988   |

## Product Safety by Country

| Country        | Standard  |
|----------------|---|
| U.S.           | UL Listed to UL60950:2000, 3rd Edition              |
| Canada         | CSA Standard CAN/CSA-C22.2 No. 60950-00 3rd Edition |
| Germany        | TUV   |
| European Union | EN60950:2000  |
| Japan          | Part of World-wide CB Scheme                        |
| Australia      | Part of World-wide CB Scheme                        |
| Argentina      | Resolution 92-98 (S-Mark)                           |
| Germany        | GS mark (ergonomics)(Rheinland)                     |

## Electromagnetic Compatibility/Interference by Country

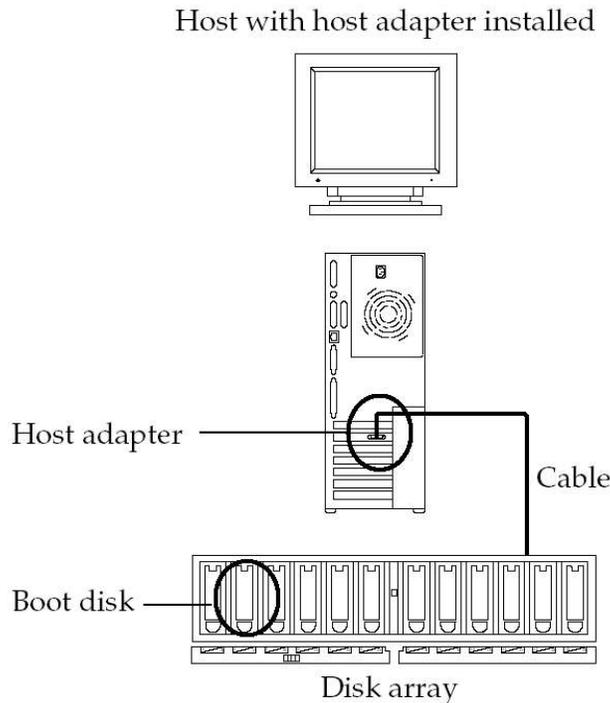
| Country               | Standard  |
|-----------------------|---|
| U.S.                  | FCC #47, Part 15, Subpart B, Class A (standalone minimum) |
| Canada                | ICES-003  |
| Japan                 | VCCI Class A  |
| European Union        | EN 55022:1998 Class A (standalone minimum)                |
| Australia/New Zealand | AS/NZS 3548:1996  |
| Taiwan                | BSMI CNS 13438 Class A (Standalone minimum)               |
| Germany               | Same as European Union                                    |
| Argentina             | S mark  |

# Bootability Details

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## Enabling the Host to Boot Through the Host Adapter

This section provides procedures for enabling bootability. Bootability in this document means the ability of a host to boot from a disk, when the boot disk resides in a disk array that is connected to the host through the Sun StorEdge™ PCI Dual Ultra3 SCSI host adapter.



**Figure 18.** Host with boot disk on an array connected through the host adapter

The procedures in this section can be followed to install the driver and any patches needed for the Sun StorEdge PCI Dual Ultra3 SCSI host adapter into the Solaris™ Operating Environment on the boot disk. The driver is not available in the current version of the Solaris Operating Environment. Therefore, the host adapter cannot be recognized by the disk's operating system unless the user enables bootability as described in this section.

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***Note:** Refer to the Solaris Operating Environment Release Notes for the required driver/patch combinations.*

---

## Enabling Bootability (Options)

The table below lists the bootability procedures and identifies which procedure to use based on each site's configuration. Contact Sun support for help with other options that might be available if neither of the procedures in the table apply.

| Condition  | Where to Go   | Notes  |
|--|---|--|
| A host must be available on the subnet to be used as a net install or boot server.   | "Enabling Bootability Using a Boot/Install Server"<br>OR "To Enable Bootability Using a Boot/Install Server," below | This method is easier and poses a smaller risk of data loss than the following method. |
| No host is available to use as a boot/install server, but it is possible to connect a boot disk directly to the host (at least for the duration of the procedure). | "To Partition the New Boot Disk the Same as the Temporary Boot Disk," below   |  |

## Enabling Bootability Using a Boot/Install Server

This option installs the Solaris Operating Environment from a boot/install server onto the host with the host adapter. Any other host on the same subnet can be set up as a boot/install server.

---

***Note:** The procedure is identical for using a boot server or an install server. Therefore, the convention used in this section is to refer to either type of server as the "boot/install server." For the distinction between these two types of server, see the Solaris Operating Environment system administration documentation.*

---

Installing a client from a boot/install server uses two images of the Solaris Operating Environment:

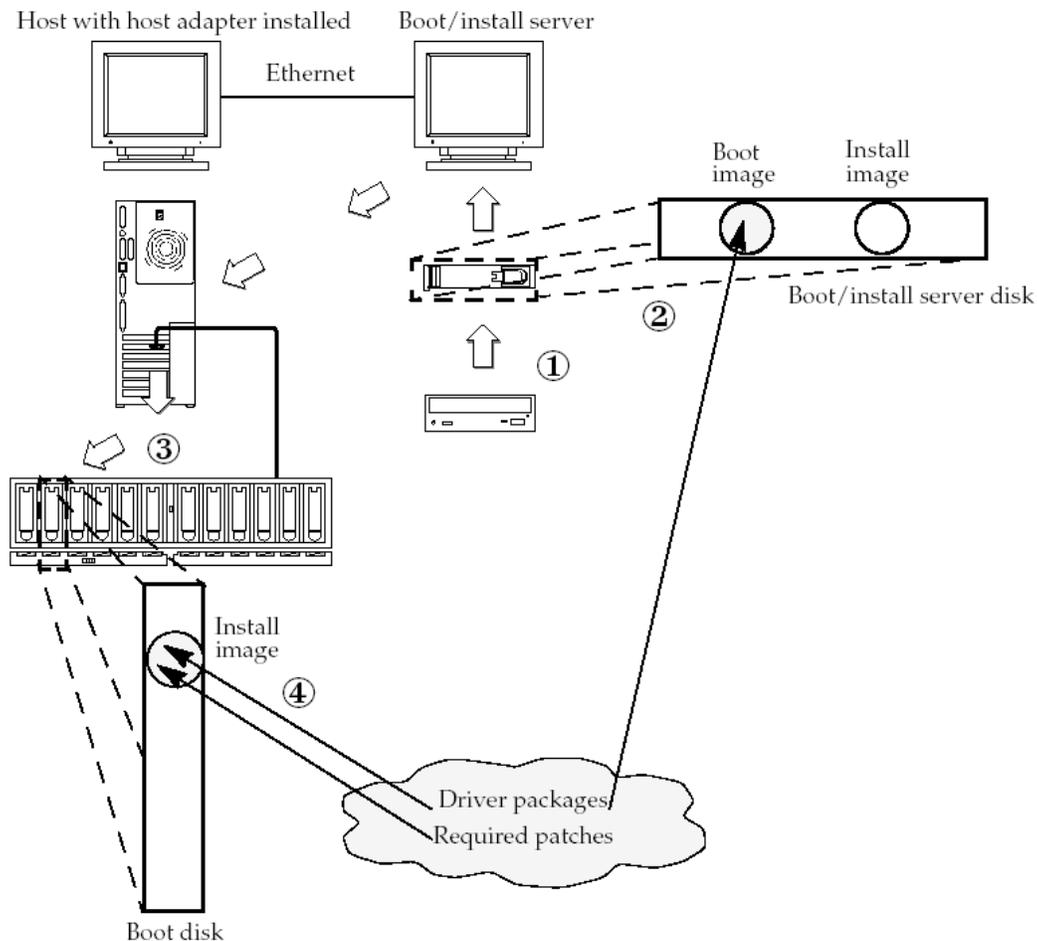
- A boot mini-root (which is referred to from here on as the boot image)
- A separate *install image* that gets copied onto the boot disk

---

***Note:** While setting up the boot/install server, the user must either have the contents of the Solaris Operating Environment installation CD-ROM copied to a disk that is directly connected to the boot/install server or have the CD inserted and mounted from an attached CD-ROM device.*

---

The procedure "To Enable Bootability Using a Boot/Install Server," below, is needed to make both images aware of the host adapter. At the start of the procedure, the system administrator downloads the driver and all required patches to a shared directory on the boot/install server. The rest of the sequence followed in the procedure is illustrated in the figure below.



**Figure 19.** Installing packages and patches into the boot and install images

1. The *boot image* is copied from a Solaris Operating Environment CD-ROM or from another location onto a disk that is attached to a boot/install server. (1)
2. The driver packages are added to the boot image. (2)
 

Add the driver packages to the boot image so that the boot/install server can then send and receive data through the host adapter on the boot client.
3. The client boots from the boot/install server, the interactive `suninstall(1M)` application starts, and the system administrator provides configuration information requested at the prompts.
4. After the system administrator provides all configuration information requested by the installation program, the installation of the Solaris Operating Environment begins.
5. The install image is copied to the client. (3)
6. Before a reboot, while the client is still booted from the boot image mini-root, the driver packages and all required patches are copied from the boot/install server and then installed in the *install image*. (4)
 

Install the driver packages and patches into the install image so that the host can see the host adapter after a reboot.
7. The host boots from the boot disk through the host adapter.

## To Enable Bootability Using a Boot/Install Server

This procedure assumes an understanding of how to install Solaris Operating Environment software over the network as described in the Solaris Operating Environment installation manuals. For more information, see the `man(1)` pages for the commands that are used in this procedure.

### To Set Up the Boot/Install Server

1. Switch users to root on the host to be used as the boot/install server.

```
% su
Password:
#
```

2. Use the `setup_install_server(1M)` command from the Tools directory in the location where the Solaris Operating Environment software resides.

As shown in the following screen example, the `setup_install_server` command copies the boot image to a directory on the boot/install server. (The boot directory is named `/boot_dir` in the example.) The example shows the command being run from the Tools subdirectory on a mounted Solaris 8 Operating Environment installation CD-ROM.

```
# cd /cdrom/cdrom0/s0/Solaris_8/Tools
# ./setup_install_server -b /boot_dir
```

3. Download the driver packages and the accompanying `README` file from Sun's download center into a public shared directory in the boot image.

This example uses the `/public` directory. Whatever directory used must be shared. This example uses the `share(1M)` command with the name of the `/public` directory on the command line. See the Solaris Operating Environment system administration documentation and the `share(1M)` and `dfstab(4)` man pages, if needed, for other options on how to share a directory.

- a. Make sure that the public directory where the package is to be placed is shared.

This example shows using the `share` command to share the `/public` file system, and the output of the `share` command showing that the `/public` directory was successfully shared.

```
# share /public
# share
-          /spare   rw   "D2 dir"
-          /public  rw   "" /public
```

- b. Refer to the instructions on how to download the Sun StorEdge PCI Dual Ultra3 SCSI QUS driver in the release notes, and go to the download center at the location specified.
- c. Download the `README` file.
- d. Remove any previously-installed packages for this host adapter as instructed in the `README`.
- e. Download the packages into the public shared directory. In this example, the packages would be installed into `/public`.



- f. Use the `uncompress(1M)` and `tar(1M)` commands to uncompress and expand the packages from the `tar` file, as instructed in the `README`.

**Caution:** Do not use the version of the `pkgadd(1M)` command line that is given in the `README` to install the packages. After Step 4, install relocatable versions of the packages using the command line given in Step 5.

- g. Go to Step 4.

**4. Download the required patch(es) and the accompanying `README` file(s) from <http://sunsolve.sun.com> into a public directory on the boot/install server.**

- a. See the release notes for a list of required patches.
- b. Make sure that the public directory where the patches will be put is shared.

This example shows using the `share` command to share the `/public` file system, and the output of the `share` command showing that the `/public` directory was successfully shared.

```
# share /public
# share
-          /spare   rw   "D2 dir"
-          /public  rw   "" /public
```

- c. Refer to the the instructions on how to download the Sun StorEdge PCI Dual Ultra3 SCSI QUS required patch(es) in the release notes, and go to the download center at the location specified.
- d. Download the `README` file.
- e. Remove any previously installed related patches that may be specified in the `README`.
- f. Download the patch(es) into the public directory following the instructions in the release notes.

In this example, the patch(es) would be installed into `/public`.

- g. Use the `uncompress(1M)` and `tar(1M)` commands to uncompress and expand the patch (es) from the `tar` file, as instructed in the `README`.

**Caution:** Do not use the `patchadd(1M)` command line that is given in the `README` to install the patch (es). After Step 5, install relocatable versions of the patch(es) using the command line given in Step 6.

- h. Go to Step 5.

**5. Install the driver packages into the boot image.**

The following example installs all packages previously downloaded into the public (`/public`) directory.

```
# cd /public
# pkgadd -R /boot_dir/Solaris_8/Tools/Boot -d .
```

**6. Install all required patches into the boot image.**

The following example installs all patches that were previously downloaded into the public (`/public`) directory.



```
# cd /public
# patchadd -R /boot_dir/Solaris_8/Tools/Boot -d .
```

7. **Make sure the host name, its IP address, and its Ethernet address have been added to the name service (/etc files, NIS, or NIS+).**
8. **Run the `add_install_client(1M)` command to add the host with the host adapter as a boot/install client.**

The example shows the `add_install_client` command followed by the name of the host `sunny` followed by its platform name, `sun4u`. (`sunny` is the client with the host adapter installed.)

```
# add_install_client sunny sun4u
```

---

*Note:* To find the platform name, run the `uname` command with the `-m` option on the host that has the host adapter.

---

9. **Log out of the boot/install server.**

## To Set Up the Client

1. **Bring the client host (with the host adapter) down to the `ok` prompt at run level 0.**

See the Solaris Operating Environment system administration documentation for the commands that can be used with different configurations. The following example uses the `shutdown(1M)` command.

```
# shutdown
...
ok
```

**Caution:** Do not reboot the boot/install server.

2. **Boot the host from the net.**

```
ok boot net
```

The Solaris Operating Environment interactive installation program runs from the boot/install server.

3. **Respond to the prompts according to the system's configuration, as instructed in the Solaris Operating Environment installation guide.**

Make sure to specify the new boot disk as the destination for the operating environment installation.

4. **When prompted to choose between automatic reboot or manual reboot, click the Manual Reboot button, complete the remaining question, and start the installation.**

This question offering a choice between automatic and manual reboot is the last question before the installation starts.



**5. Mount the public directory which contains the driver packages and any needed patches onto the /mnt directory mount point.**

Enter the mount command followed by the hostname of the boot/install server, followed by a colon (:), followed by the name of the public directory followed by /mnt. The following example uses `boot_install_server` as the name of the boot/install server and `/public` as the name of the public directory.

```
# mount boot_install_server:/public /mnt
```

**6. Install the driver packages into the install image.**

The following example installs all packages previously downloaded into the `/public` directory.

```
# cd /mnt
# pkgadd -R /a -d .
```

**7. Install all required patches into the boot image.**

The following example installs all patch(es) that were previously downloaded into the `/public` directory.

```
# cd /mnt
# patchadd -R /a -d .
```

**8. Bring the system down to the ok prompt at run level 0.**

**9. Reboot the host from the newly installed operating environment.**

```
ok boot -r
```

## Enabling Bootability Using a Directly Connected Temporary Boot Disk

For this procedure to work, a boot disk must be directly connected (at least temporarily) to the host. The boot disk must have the following installed:

- The Solaris Operating Environment
- The driver packages and all required patches

See the release notes for how to download and install the driver packages and all required patches.

---

*Note: The initial boot disk can be removed if it is not needed after the boot disk is enabled.*

---

## To Enable Bootability Using a Directly Connected Boot Disk

To enable bootability using a directly-connected boot disk, perform the procedures described in the table below.

| Task  | Procedure   |
|---|---|
| Partition the new boot disk the same as the temporary boot disk.  | "To Partition the New Boot Disk the Same as the Temporary Boot Disk"          |
| Create a file system on each new partition.   | "To Create File Systems on the New Boot Disk"                                 |
| Install the boot block and copy the root file system on the new disk.   | "To Copy the Boot Block and Root File System Contents onto the New Boot Disk" |
| Copy the install image from system disk to the new boot disk.   | "To Copy the Contents of Non-root File Systems onto the New Boot Disk"        |
| Replace the name of the temporary boot disk with the name of the new boot disk in the <code>vfstab</code> (4) file. | "To Update the <code>vfstab</code> File"                                      |
| Redefine the boot disk and reboot.  | "To Specify the New Boot Disk as the Boot Device"                             |

---

*Note: The examples show disk 0 as the directly-connected boot disk, and disk 1 as the designated new boot disk that is connected through the host adapter.*

---

## To Partition the New Boot Disk the Same as the Temporary Boot Disk

1. Switch users to root on the host with the host adapter.

```
% su
Password:
#
```

2. If the driver and any needed patches are not already installed, download the driver package from Sun's download center and install it on the host, following the instructions in the README file that comes with the driver.

To download the driver, follow the instructions in the release notes.

3. Reboot using the `reboot(1M)` command with the `-r` option.

```
# reboot -- -r
```

4. Log into the host as root.
5. Record the layout of the partitions (slices) on the system boot disk.
  - a. Enter the `format(1M)` command.

If needed, refer to the `format` man page and the instructions on adding a disk and using the `format` command in the Solaris Operating Environment administration documentation.

---

*Note: These examples use disk 0 as the temporary disk (c0t0d0) and disk 1 (c3t8d0) as the new boot disk.*

---

```
# format
Searching for disks...done

AVAILABLE DISK SELECTIONS:
  0. c0t0d0 <SUN4.2G cyl 3880 alt 2 hd 16 sec 135>
    /pci@1f,4000/scsi@3/sd@0,0
  1. c3t8d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /pci@1f,4000/pci@4/scsi@4/sd@8,0
  2. c3t9d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /pci@1f,4000/pci@4/scsi@4/sd@9,0
  3. c3t10d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /pci@1f,4000/pci@4/scsi@4/sd@a,0
  4. c3t11d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /pci@1f,4000/pci@4/scsi@4/sd@b,0
  5. c3t12d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /pci@1f,4000/pci@4/scsi@4/sd@c,0
  6. c3t13d0 <SUN36G cyl 24620 alt 2 hd 27 sec 107>
    /pci@1f,4000/pci@4/scsi@4/sd@d,0

Specify disk (enter its number):
```

**b. Make a note of the device pathname of the new boot disk.**

For example, for disk 1, the new boot disk in this example, the device pathname shown is: /pci@1f,4000/pci@4/scsi@4/sd@8,0. This information can be used later in Step 4 in "To Specify the New Boot Disk as the Boot Device."

**c. Specify the disk where the operating system is installed on the temporary boot disk.**

The following screen example specifies disk 0.

```
Specify disk (enter its number): 0
```

**d. Enter the partition command to bring up the PARTITION MENU.**

```
format> partition
PARTITION MENU:
  0      - change '0' partition
  1      - change '1' partition
  2      - change '2' partition
  3      - change '3' partition
  4      - change '4' partition
  5      - change '5' partition
  6      - change '6' partition
  7      - change '7' partition
select  - select a predefined table
modify  - modify a predefined partition table
name    - name the current table
print   - display the current table
label   - write partition map and label to the disk
!<cmd> - execute <cmd>, then return
quit

partition>
```

**e. Enter the `print` command to display the partition table for the specified disk.**

```
partition> print
Current partition table (original):
Total disk cylinders available: 3880 + 2 (reserved cylinders)

Part      Tag      Flag      Cylinders      Size      Blocks
 0      root      wm       0 - 1937      2.00GB (1938/0/0) 4186080
 1      swap      wu       1938 - 2908   1.00GB (971/0/0) 2097360
 2      backup     wm       0 - 3879      4.00GB (3880/0/0) 8380800
 3 unassigned  wm        0              0 (0/0/0)      0
 4 unassigned  wm        0              0 (0/0/0)      0
 5 unassigned  wm        0              0 (0/0/0)      0
 6 unassigned  wm        0              0 (0/0/0)      0
 7      home      wm       2909 - 3879   1.00GB (971/0/0) 2097360
```

In the example, the temporary boot disk has three slices defined: 0 (root), 1 (swap), and 7 (home) with sizes, 2.00GB, 1.00GB, and 1.00GB.

**f. Record the layout (sizes and numbers) assigned to the slices on the temporary boot disk, and enter `quit` when done.**

```
partition> quit
FORMAT MENU:
    disk          - select a disk
    type          - select (define) a disk type
    partition     - select (define) a partition table
    current       - describe the current disk
    format        - format and analyze the disk
    repair        - repair a defective sector
    label         - write label to the disk
    analyze       - surface analysis
    defect        - defect list management
    backup        - search for backup labels
    verify        - read and display labels
    save          - save new disk/partition definitions
    inquiry       - show vendor, product and revision
    volname       - set 8-character volume name
    !<cmd>        - execute <cmd>, then return
    quit
format>
```

As shown in the previous example, the quit command returns to the `FORMAT MENU`.

**6. Specify one slice on the new boot disk for every slice on the temporary boot disk.**

The following examples specify the root slice 0 on the new boot disk to match slice 0 on the temporary boot disk.

**a. At the `format>` prompt, use the `disk` command to start laying out the new boot disk.**

Enter the `disk` command followed by the number of the disk to be formatted. The following screen example uses disk 1.

```
format> disk 1
selecting c3t8d0
[disk formatted]

FORMAT MENU:
    disk           - select a disk
    type           - select (define) a disk type
    partition      - select (define) a partition table
    current        - describe the current disk
    format         - format and analyze the disk
    repair         - repair a defective sector
    label          - write label to the disk
    analyze        - surface analysis
    defect         - defect list management
    backup         - search for backup labels
    verify         - read and display labels
    save           - save new disk/partition definitions
    inquiry        - show vendor, product and revision
    volname        - set 8-character volume name
    !<cmd>         - execute <cmd>, then return
    quit

format>
```

As shown in the previous example, the `FORMAT MENU` displays.

**b. Make a note of the device name of the disk.**

The disk's device name in the previous screen example is `c3t8d0`.

**c. Enter the `partition` command to bring up the `PARTITION MENU`.**

```
format> p
PARTITION MENU:
    0              - change '0' partition
    1              - change '1' partition
    2              - change '2' partition
    3              - change '3' partition
    4              - change '4' partition
    5              - change '5' partition
    6              - change '6' partition
    7              - change '7' partition
    select         - select a predefined table
    modify         - modify a predefined partition table
    name           - name the current table
    print          - display the current table
    label          - write partition map and label to the disk
    !<cmd>         - execute <cmd>, then return
    quit

partition>
```

**d. Enter the number of the slice to be defined.**

Slice 0 is specified in the following example. As shown, the partition table for the new boot disk displays.

```
partition> 0
Current partition table (original):
Total disk cylinders available: 24620 + 2 (reserved cylinders)
Part      Tag      Flag      Cylinders      Size      Blocks
  0      root      wm        0 - 90      128.37MB  (91/0/0)    262899
  1      swap      wu        91 - 181    128.37MB  (91/0/0)    262899
  2      backup    wu        0 - 24619   33.92GB   (24620/0/0) 71127180
  3 unassigned  wm         0           0          (0/0/0)      0
  4 unassigned  wm         0           0          (0/0/0)      0
  5 unassigned  wm         0           0          (0/0/0)      0
  6      usr      wm       182 - 24619  33.67GB   (24438/0/0) 70601382
  7 unassigned  wm         0           0          (0/0/0)      0
Enter partition id tag[root]:
```

**e. Enter the partition ID tag.**

The following example shows a question mark (?) entered after the prompt. The list of accepted partition id tags displays. The example then shows the default partition id tag of root accepted by pressing the Return key.

```
Enter partition id tag[root]: ?
Expecting one of the following: (abbreviations ok):
      unassigned      boot      root      swap
      usr             backup    stand     var
Enter partition id tag[root]:
Enter partition permission flags[wm]:
```

**f. Enter the partition permission flags.**

The following example shows the default permission flags wm accepted by pressing the Return key.

```
Enter partition permission flags[wm]:
Enter new starting cyl[0]:
```

**g. Enter the new starting cylinder.**

The following example shows the default new starting cylinder of 0 accepted by pressing the Return key.

```
Enter new starting cyl[0]:
Enter partition size[262899b, 91c, 128.37mb, 0.13gb]:
```

**h. Enter the partition size.**

The following example shows the partition size of 2.00gb entered.

```
Enter partition size[262899b, 91c, 128.37mb, 0.13gb]: 2.00gb
partition>
```

**i. Enter the print command to display the updated partition table.**

The following example shows that the root tag, the wm permissions flag, and the partition size of 2.00GB are assigned to slice 0.

```
partition> print
Current partition table (unnamed):
Total disk cylinders available: 24620 + 2 (reserved cylinders)

Part      Tag      Flag    Cylinders      Size              Blocks
  0       root     wm       0 - 1451      2.00GB (1452/0/0)  4194828
  1       swap     wu       91 - 181     128.37MB (91/0/0)   262899
  2    backup     wu       0 - 24619    33.92GB (24620/0/0) 71127180
  3 unassigned     wm                0                0 (0/0/0)         0
  4 unassigned     wm                0                0 (0/0/0)         0
```

**j. Repeat Step d through Step i as needed until all slices are defined as they are in the temporary boot disk.**

**k. Enter the quit command to return to the FORMAT MENU.**

```
partition> quit

FORMAT MENU:
  disk          - select a disk
  type          - select (define) a disk type
  partition     - select (define) a partition table
  current       - describe the current disk
  format        - format and analyze the disk
  repair        - repair a defective sector
  label         - write label to the disk
  analyze       - surface analysis
  defect        - defect list management
  backup        - search for backup labels
  verify        - read and display labels
  save          - save new disk/partition definitions
  inquiry       - show vendor, product and revision
  volname       - set 8-character volume name
  !<cmd>       - execute <cmd>, then return
  quit

format>
```

**7. Label the new boot disk with the new partition table.**

**a. Enter the label command.**

```
format> label
```



**b. Enter y[es] to continue.**

```
Ready to label disk, continue? y
```

**c. When the labeling is complete, enter q[uit] to quit the `format` program.**

```
format> q
#
```

## To Create File Systems on the New Boot Disk

- Create a file system on each slice on the disk using the `newfs(1M)` command.

Enter the `newfs` command followed by the device name of the slice. In this example, the device name for slice 0 of disk `c3t8d0` is `/dev/rdisk/c3t8d0s0`.

```
# newfs /dev/rdisk/c3t8d0s0
newfs: construct a new file system /dev/rdisk/c3t8d0s0: (y/n)? y
/dev/rdisk/c3t8d0s0: 4194828 sectors in 1452 cylinders of 27 tracks, 107
sectors
      2048.3MB in 46 cyl groups (32 c/g, 45.14MB/g, 7488 i/g)
super-block backups (for fsck -F ufs -o b=#) at:
32, 92592, 185152, 277712, 370272, 462832, 555392, 647952, 740512, 833072,
925632, 1018192, 1110752, 1203312, 1295872, 1388432, 1480992, 1573552,
1666112, 1758672, 1851232, 1943792, 2036352, 2128912, 2221472, 2314032,
2406592, 2499152, 2591712, 2684272, 2776832, 2869392, 2958368, 3050928,
3143488, 3236048, 3328608, 3421168, 3513728, 3606288, 3698848, 3791408,
3883968, 3976528, 4069088, 4161648,
```

For more information, see the section on how to create file systems in the Solaris Operating Environment system administration documentation.

Do this step to create a file system on the new boot disk for every slice on the temporary boot disk. When finished, refer to the section "To Copy the Contents of Nonroot File Systems onto the New Boot Disk," below.

## To Copy the Boot Block and Root File System Contents onto the New Boot Disk

1. Install the boot block on the root (`/`) file system of the new disk.

The following example uses the `installboot(1M)` command to install the boot block. The boot block resides in the `/usr/platform/platform_name/lib/fs/ufs/bootblk` directory. The example shows invoking the `uname` command with the `-i` option between left single quotes on the command line to specify the platform name.

```
# /usr/sbin/installboot /usr/platform/`uname -i`/lib/fs/ufs/bootblk \
/dev/rdisk/c3t8d0s0
```

For more information, see the instructions on how to install a boot block in the Solaris Operating Environment system administration documentation.



2. **Mount the root file system from slice 0 of the new boot disk onto the `/mnt` mount point.**

```
# mount /dev/dsk/c3t8d0s0 /mnt
```

3. **Use the `ufsdump(1M)` and `ufsrestore(1M)` commands to copy the contents of the root file system from the temporary boot disk to the root slice of the new boot disk (on the `/mnt` mount point).**

```
# ufsdump 0f - /dev/rdisk/c0t0d0s0 | ( cd /mnt; ufsrestore rf -)
DUMP: Writing 32 Kilobyte records
DUMP: Date of this level 0 dump: Tue 19 Feb 2002 02:44:35 PM PST
DUMP: Date of last level 0 dump: the epoch
DUMP: Dumping /dev/rdisk/c3t8d0s0 (hba2-81://) to standard output.
DUMP: Mapping (Pass I) [regular files]
DUMP: Mapping (Pass II) [directories]
DUMP: Estimated 1818082 blocks (887.74MB).
DUMP: Dumping (Pass III) [directories]
DUMP: Dumping (Pass IV) [regular files]
Warning: ./lost+found: File exists
DUMP: 88.77% done, finished in 0:01
DUMP: 1818046 blocks (887.72MB) on 1 volume at 1363 KB/sec
DUMP: DUMP IS DONE
#
```

4. **Unmount the root file system on slice 0 from the `/mnt` mount point.**

```
# umount /mnt
```

## To Copy the Contents of Non-root File Systems onto the New Boot Disk

1. **Mount the file system onto the `/mnt` mount point.**

This example shows the copying of the `/home` file system from slice 7 to the new boot disk.

```
# mount /dev/dsk/c3t8d0s7 /mnt
```

2. **Use the `ufsdump(1M)` and `ufsrestore(1M)` commands to copy the contents of the file system from the temporary boot disk to the new boot disk.**



```
# ufsdump 0f - /dev/rdisk/c0t0d0s0 | ( cd /mnt; ufsrestore rf -)
DUMP: Writing 32 Kilobyte records
DUMP: Date of this level 0 dump: Tue 19 Feb 2002 02:44:35 PM PST
DUMP: Date of last level 0 dump: the epoch
DUMP: Dumping /dev/rdisk/c3t8d0s0 (hba2-81:/) to standard output.
DUMP: Mapping (Pass I) [regular files]
DUMP: Mapping (Pass II) [directories]
DUMP: Estimated 1818082 blocks (887.74MB).
DUMP: Dumping (Pass III) [directories]
DUMP: Dumping (Pass IV) [regular files]
Warning: ./lost+found: File exists
DUMP: 88.77% done, finished in 0:01
DUMP: 1818046 blocks (887.72MB) on 1 volume at 1363 KB/sec
DUMP: DUMP IS DONE
#
```

**3. Unmount the file system from the /mnt mount point.**

```
# umount /mnt
```

**4. Repeat Step 1 through Step 3 as needed until all the file systems' contents are copied to the new boot disk. When finished, go to "To Update the vfstab File," below.**

## To Update the vfstab File

**1. Mount the root file system from slice 0 of the new boot disk onto the /mnt mount point.**

```
# mount /dev/dsk/c3t8d0s0 /mnt
```

**2. Change directories to /mnt/etc and open the vfstab(4) file for editing.**

The following example shows the file systems defined.

```
# cd /mnt/etc
# vi vfstab
...
/dev/dsk/c0t0d0s1      -      -      swap      -      no      -
/dev/dsk/c0t0d0s0      /dev/rdisk/c0t0d0s0      /      ufs      1      no -
/dev/dsk/c0t0d0s7      /dev/rdisk/c0t0d0s7      /home     ufs      2      yes -
```

**3. Replace the name of the temporary boot disk with the name of the new boot disk, and then save and quit the file.**

The following example shows the disk name c0t0 changed to c3t8 in the mount table entries for slices 0, 1, and 7.

```
/dev/dsk/c3t8d0s1      -      -      swap      -      no      -
/dev/dsk/c3t8d0s0      /dev/rdisk/c3t8d0s0      /      ufs      1      no -
/dev/dsk/c3t8d0s7      /dev/rdisk/c3t8d0s7      /home     ufs      2      yes -
:wq
#
```



**4. Unmount the file system from the /mnt mount point.**

```
# umount /mnt
```

**To Specify the New Boot Disk as the Boot Device.**

**1. Bring the host with the host adapter down to the ok prompt at run level 0.**

See the Solaris Operating Environment system administration documentation on shutting down a host for the commands that can be used with different configurations. The following screen example uses the `shutdown(1M)` command.

```
# shutdown
...
ok
```

**2. Use the `nvalias` command to alias the device name of the disk to a short name for the disk.**

The following example uses `/pci@1f,4000/pci@4/scsi@4/sd@8,0`, which was noted as the device path name for disk 1 in Step 5.

```
ok nvalias disk1 /pci@1f,4000/pci@4/scsi@4/sd@8,0
```

**3. Use the `nvstore` command to store the new alias followed by the `reset all` command.**

```
ok nvstore
ok reset-all
```

**4. Define the new boot disk as the default `boot-device`.**

**a. Enter the `setenv` command followed by the `boot-device` parameter followed by the name of the new disk.**

```
ok setenv boot-device disk1
```

**b. Enter the `reset` command.**

```
ok reset
```

**5. Enter the `boot` command with the `-r` option so that the host adapter can be recognized located by the Solaris Operating Environment.**

```
ok boot -r
```

# Warranty, Service, and Support

## Warranty

The Sun StorEdge™ 3320 SCSI array comes with a 2-year warranty: 1st year, second business day, on-site. 2nd year, 15-day parts exchange.

## Support Contracts

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.

SunSpectrum program support contracts are available both during and after the warranty program. Customers may choose to uplift the service and support agreement to meet their business needs by purchasing a SunSpectrum contract. For more information on the SunSpectrum program offerings refer to the following URL:

[http://service.central/TS/ESP/SunSpectrum/Feature\\_Matrix/index.html](http://service.central/TS/ESP/SunSpectrum/Feature_Matrix/index.html).

The four levels of SunSpectrum support contracts are outlined below.

## SunSpectrum Program Support

| Program   | Description  |
|---|--|
| <b>Mission-Critical<br/>SunSpectrum Platinum™ Support</b> | Designed to support client-server, mission critical solutions by focusing on failure prevention, rapid recovery and year round technical services planning. Support is provided 24 x 7.  |
| <b>Business-Critical<br/>SunSpectrum Gold™ Support</b>    | Includes a complete package of proactive and responsive services for customers who require maximum uptime for their strategic business-critical systems. Support is provided 24 x 7.   |
| <b>System Coverage<br/>SunSpectrum Silver™ Support</b>    | Combines the service expertise, responsive on-site support and technical support by telephone and SunSolve™ CD/on-line services. Support is provided 8 a.m. to 8 p.m. Mon. through Fri.  |
| <b>Self-Directed<br/>SunSpectrum Bronze™ Support</b>      | Provided for customers who rely primarily upon their own in-house service capabilities. Enables customers to deliver high quality service by giving them access to UNIX® expertise, Sun certified replacement parts, software releases and technical tools. Support is provided 8 a.m. to 5 p.m. Mon. through Fri. |



## Professional Services

### Sun StorEdge Array Installation Service

This service includes site preparation review, installation planning, installation, configuration verification, and system turnover for one Sun StorEdge SE3320 array product. The specific tasks and deliverables included in this service are:

- Site preparation review including environmental states.
- On-site installation planning including schedule and resources.
- Development of System Installation Specification including RAID characteristics and recommendations.
- Verify supported configuration and customer sign-off to start installation.
- Installation of array hardware and cabling.
- Installation of array software and patches.
- Configuration and customization of the array including RAID levels and logical volumes.
- Verification of installation and array functionality.
- System turnover.

# 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 an Active Terminator.   |
| Bandwidth                     | A measure of the capacity of a communication channel, usually specified in MB/second.  |
| Cache                         | Memory on the RAID controller card which permits intermediate storage of read and write data without physically reading/writing from/to the disk, which can increase overall performance under certain conditions.                                   |
| CLI                           | Command line interface.  |
| Concatenated Channel          | Inside the same drive array enclosure, a single contiguous drive channel supporting 12 drives concurrently   |
| Device Name                   | Software device address that identifies the controller/LUN, such as cXtYdZs0, where X is the host bus adapter, Y is the controller, and Z is the LUN. s0 slice number is used by the system, not by RAID Manager.                                    |
| Disk Array                    | Two or more drives configured as a Drive Group (see next).   |
| Drive Group                   | A physical set of drives configured as an array. Drive groups are defined during configuration.  |
| Expansion Drive Array         | An enclosure containing a group of drives, power supplies, cooling fans, I/O cards, and midplanes (no RAID controller/controllers); generally, an external drive array that is used to daisy-chain to an existing hardware-based RAID configuration. |
| Fast Write                    | Allows disk write commands to be safely acknowledged to the host before the data is actually written to the disk media. This can be enabled/disabled through the storage management software.  |
| Fast/wide SCSI                | Data transfer rate of 20 MB/sec. Wide devices can be connected to a standard SCSI interface but the extra data lines need to be terminated.  |
| Full-Duplex                   | Data transmission in both directions at the same time. See also Half-duplex and Simplex.   |
| Half-Duplex                   | Refers to an interface, such as SCSI, that can transmit data in only one direction at a time. See also Full-duplex and Simplex.  |
| Host Bus Adapter              | A card that connects a peripheral device 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.  |
| Hot-serviceable               | The ability to remove, replace or add a device while power is still applied but all I/O processes are suspended.   |
| Hot Spare or Hot Sparing      | A drive in an array that is held in reserve to replace any other drive that fails. After a reconstruction, the hot-spare drive is returned to the standby status.  |

|                             |  |
|-----------------------------|--|
| Hot-swap or Hot-swappable   | A specific case of hot-plug which involves replacing a device with another of the same size, type, and layout, without any notification to the operating environment.  |
| IOPS                        | Input/output operations per second. A measure of I/O performance, this is usually used to quote random I/O performance. See throughput.  |
| JBOD                        | Just a Bunch Of Disks. JBOD refers to a group of drives without an embedded RAID controller; generally, such a group is used without RAID formatting, with a host-based hardware RAID controller, or with RAID formatting from host software (with no hardware-base RAID controller) |
| LUN                         | Logical unit number. A LUN is a set of physical drives in a RAID configuration which are seen by the operating system as one virtual drive.  |
| MTBF                        | Mean time between failures. A measure of reliability, this is the average expected time between failures of equipment, usually measured in operating hours.  |
| MTBDL                       | Mean time between data loss. In a RAID system, this is the average expected time between two rapid disk failures that would cause irreparable data loss.   |
| MTTR                        | Mean time to repair. A measure of availability, this is the average time the system is out of commission to complete a repair process.   |
| Parity                      | Additional information stored along with the data that allows the controller to reconstruct lost data on RAID 3 or 5 LUNs if a single drive fails.   |
| Reconstruction              | Process used to restore a degraded RAID 1, 3, or 5 LUN to its original state after replacing a single failed drive.  |
| RDAC                        | Redundant disk array controller. The RDAC driver is included in the RAID Manager software, and manages the rerouting of active I/O operations when a controller fails.   |
| RAID                        | Redundant Array of Independent Disks. A RAID is a set of disk drives appearing as a single logical disk drive to a system host. Different RAID levels provide different capacity, performance, availability, and cost characteristics.   |
| RAID Controller Drive Array | An enclosure containing one or two RAID controllers, a group of drives, power supplies, cooling fans, I/O cards, and midplanes.  |
| RAS                         | Reliability, availability, and serviceability. Features that enhance these attributes, including hot-pluggable capability and redundancy, are important for keeping mission-critical applications and data on-line.  |
| SAF-TE                      | SCSI Accessed Fault-Tolerant Enclosures.   |
| SCA                         | Single connector attachment. A SCSI disk connector technology co-invented by Sun Microsystems. The SCA provides all SCSI, power, and control signals in a single connector, and enables easy servicing and highly reliable, pluggable disk drives.                                   |
| SCSI Address                | The octal representation of the unique address (0–7) assigned to a narrow device; or hex representation of the unique address (0–15) assigned to a wide SCSI device.   |



|                   |   |
|-------------------|---|
| Simplex           | Transmission in one preassigned direction only. See also Full-duplex and Half-duplex.   |
| SNMP              | Simple network management protocol. SNMP enables RAID events to be remotely monitored by designated network management stations.  |
| Split Channel     | Inside the same drive array enclosure, when the drive channel is evenly divided into two separate channels; for example, when a 12-drive channel is cleaved into two independent channels   |
| Striping          | Spreading, or interleaving, logically contiguous blocks of data across multiple independent disk spindles. The amount of data written on each disk before moving to the next drive is the stripe width.   |
| Throughput        | A measure of sequential I/O performance, quoted in MB/sec. See IOPS.  |
| Volume            | In 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 VERITAS Volume Manager software 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 all I/O processes are suspended.  |
| Ultra320 SCSI LVD | Ultra 3 SCSI command set plus a raw data rate of 320 MB/sec. plus the ability to connect up to a distance of 12m (Low Voltage Differential)   |
| XOR               | eXclusive OR. A binary mathematical operation performed on data to produce parity information. In RAID levels 3 and 5, parity is generated from the user data, stored, and used to regenerate lost data if a drive failure occurs.  |

# Materials Abstract

All materials are available on SunWIN, except where noted otherwise.

| Collateral   | Description   | Purpose    | Distribution         | Token # or COMAC Order # |
|--|---|------------|----------------------|--------------------------|
| <b>Product Literature</b>  |   |            |                      |                          |
| – <i>Sun StorEdge™ 3320 SCSI Arrays, Just the Facts</i>  | Reference Guide (this document)   | Sales Tool | SunWIN, Reseller Web | 452529                   |
| – <i>Sun StorEdge 3320 Array Telecommunications Companies and NEPs Datasheet</i>   | Two-page Color Data Sheet   | Sales Tool | SunWIN, Reseller Web | 452526                   |
| – <i>Sun StorEdge 3320 Array Data Sheet</i>  | Two-page Color Data Sheet   | Sales Tool | SunWIN, Reseller Web | 452525                   |
| – <i>Sun StorEdge 3320 Array Highlights</i>  | Quick Reference Card  | Sales Tool | SunWIN, Reseller Web | 452527                   |
| – <i>Sun StorEdge Product Introduction-Announcing the 3320 SCSI Array and Transitioning the Sun StorEdge 3310 SCSI Array</i> | Product Announcement  | Sales Tool | SunWIN, Reseller Web | 454863                   |
| – <i>Sun StorEdge 3320 SCSI Array What Works With What</i>   | Reference Guide   | Sales Tool | SunWIN, Reseller Web | 452528                   |
| – <i>Sun Product Intro – Promotion: Sun StorEdge 3320 for Education</i>  | Promotion   | Sales Tool | SunWIN, Reseller Web | 457238                   |
| – <i>Sun Product Intro – Repricing Sun StorEdge 3320 SCSI Array</i>  | Pricing Information   | Sales Tool | SunWIN, Reseller Web | 459894                   |
| <b>External Web Sites</b>  |   |            |                      |                          |
| – <i>Sun StorEdge Array Information Site</i>   | <a href="http://www.sun.com/storage/">http://www.sun.com/storage/</a>   |            |                      |                          |
| – <i>Additional Information</i>  | <a href="http://www.sun.com/products_n_solutions/hardware/docs">http://www.sun.com/products_n_solutions/hardware/docs</a>                   |            |                      |                          |
| – <i>Upgrades Information</i>  | <a href="http://www.sun.com/ibb">http://www.sun.com/ibb</a>   |            |                      |                          |
| <b>Internal Web Sites</b>  |   |            |                      |                          |
| – <i>Storage Products Business Unit Web Site</i>   | <a href="http://webhome.ebay/networkstorage/products/">http://webhome.ebay/networkstorage/products/</a>                                     |            |                      |                          |
| – <i>Specifications Sheet</i>  | <a href="http://webhome.east/workgroupserverstorage/Carmel_ESM_Spec.pdf">http://webhome.east/workgroupserverstorage/Carmel_ESM_Spec.pdf</a> |            |                      |                          |
| – <i>Upgrades Information</i>  | <a href="http://ibb.eng/upgrades">http://ibb.eng/upgrades</a>   |            |                      |                          |

