Sun™ Storage J4500 Array
Service Manual

Part No.: 820-3160-12
March 2013, Revision A

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Contents

Preface

This document contains information and procedures for maintaining and upgrading the Sun™ Storage J4500 array.

Before You Read This Book

It is important that you review the safety guidelines in the *Sun Storage J4500 Array Safety and Compliance Guide (820-3161).*

Typographic Conventions

Typeface	Meaning	Examples
`AaBbCc123`	The names of commands, files, and directories; on-screen computer output	Edit your `.login` file. Use `ls -a` to list all files. `% You have mail.`
`AaBbCc123`	What you type, when contrasted with on-screen computer output	`%` **`su`** `Password:`
AaBbCc123	Book titles, new words or terms, words to be emphasized. Replace command-line variables with real names or values.	Read Chapter 6 in the *User's Guide*. These are called *class* options. To delete a file, type **`rm`** *filename*.

Note – Characters display differently depending on browser settings. If characters do not display correctly, change the character encoding in your browser to Unicode UTF-8.

Documentation, Support, and Training

The Sun web site provides information about the following additional resources:

- Documentation (http://docs.sun.com/app/docs/prod/j4500.array)
- Support (http://www.sun.com/support)
- Training (http://www.sun.com/training)

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Please include the title and part number of your document with your feedback:

Sun Storage J4500 Array Service Manual, part number 820-3160-12.

Change History

The following describes the change history of this document:

- 820-3160-10, October 2008, initial publication.
- 820-3160-11, June 2009, updated to include support for additional servers, multipathing, and zoning of array storage for multiple hosts using the Sun Common Array Manager.
- 820-3160-12, March 2013, updated to remove restriction on mixing drives from different supported manufacturers.

CHAPTER 1

Introduction to the Sun Storage J4500 Array

This chapter contains an overview of the Sun™ Storage J4500 array disk enclosure, including features and included components.

1.1 Features

The Sun Storage J4500 array is a mid-level, modular, rack-optimized, expansion storage solution in the Sun storage product family. It is designed for deployment into commercial server markets in a slide-mounted, horizontally biased enclosure for rack cabinet installations, primarily in datacenter locations.

TABLE 1-1 summarizes the features of the Sun Storage J4500 array.

TABLE 1-1 Summary of Features

Feature or Component	Description
Hard disks	Up to forty-eight 3.5-inch SATA II drives, of 500 GB, 750 GB or 1 TB capacity each (48 TB total system capacity), 3 Gbit/sec data rates, hot-pluggable.
System Controller	The System Controller contains four LSI™ SAS x36 expanders. These expanders provide a redundant set of independent SAS fabrics (two expanders per fabric), enabling two paths to the J4500 array's 48 drives. Four external mini-SAS x4 (by four) connector ports, each connector contains four PHYs (physical links) enabling eight SAS lanes per fabric to connect to storage. Each x4 connector port links to all 48 disks. The expander firmware is upgradable (see Chapter 3). The System Controller module is hot-pluggable.
RAID options	RAID support is specific to the supported host bus adapter.
Data rates	The SAS interface allows 1.5 and 3 Gbit/sec SAS and SATA with auto-negotiation.
Bandwidth	Up to 48 Gb/sec total bandwidth: 2 (x4-wide) SAS host/uplink ports (24 Gb/sec bandwidth) 2 (x4-wide) SAS expansion port (24 Gb/sec bandwidth)
Protocols	Supports SSP, STP, SMP as defined in the Serial Attached SCSI (SAS) v1.0 and v1.1 specifications.
Management	Enclosure management is provided through SMP and SES-2.
I/O	Four external mini-SAS x4 connector ports (a two-port primary path and a redundant two-port secondary path).
Power	Two 1500 W DC max output power supplies, two bays, 1+1 redundancy (array continues to operate with one power supply), hot-swappable. 110–220 VAC input voltage 47-63 Hz input frequency 1100 W DC max power consumption
Cooling	Five variable-speed fan modules (two per module), hot-swappable. Additionally, each power supply has its own fan. Cooling is front-to-back forced air.
SAS cables	Two mini-SAS x4 SFF-8088 cables are supplied with the array.

1.2 Exterior Features, Controls, and Indicators

This section describes the features, controls and indicators on the front and back panels of the J4500 array.

1.2.1 Front Panel

FIGURE 1-1 shows the front panel. FIGURE 1-2 shows a close up of the front panel controls and indicators. TABLE 1-2 lists and describes the front panel controls and indicators.

FIGURE 1-1 Sun Storage J4500 Array Front Panel

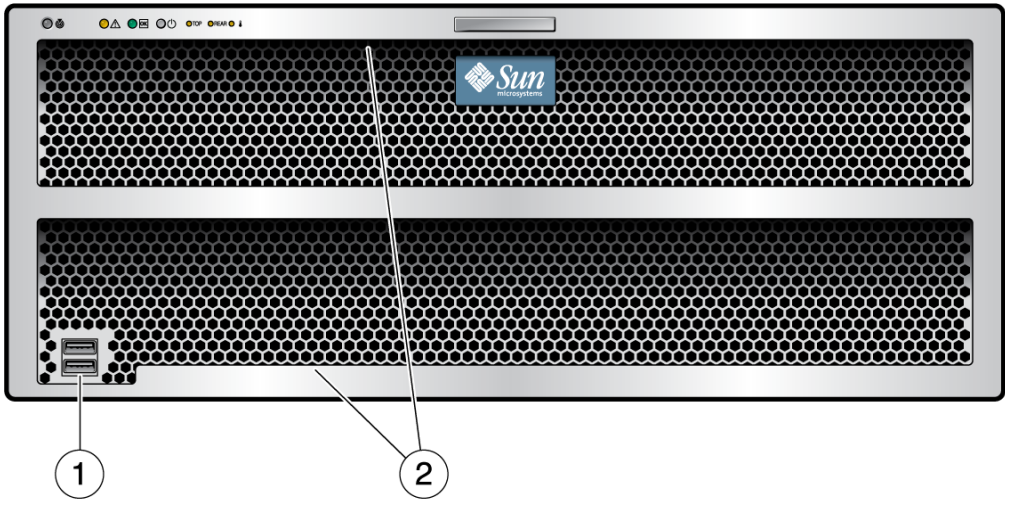


Figure Legend

1	USB ports—Not used
2	Serial numbers on ledge

FIGURE 1-2 Front Panel Controls and Indicators

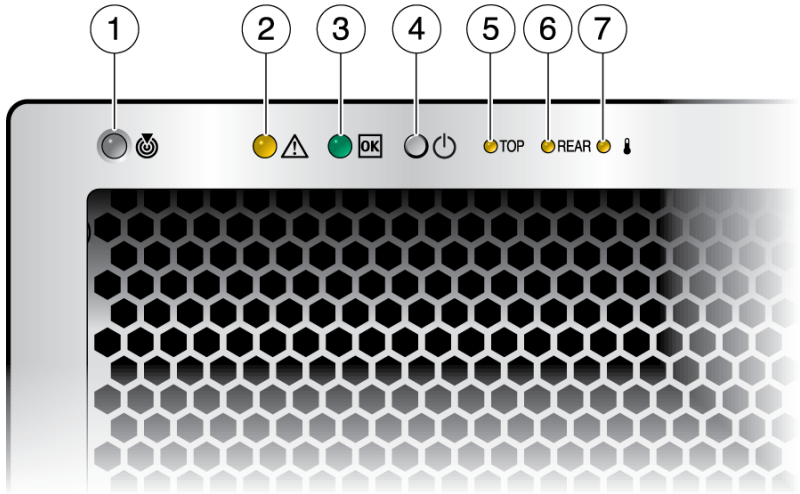


TABLE 1-2 Front Panel Controls and Indicators

#	Name	Description
1	Locate button/LED	Using array management software, operators can turn this LED on remotely to help them to locate the server in a crowded server room. Press to turn off.
2	System fault	On – Service action is required.
3	Power LED	On – Power is on. Blinking – Standby power is on but main power is off. Off – Power is off.
4	System power button	See Section 2.2 "Powering On and Off the Array" on page 2-11 for details.
5	Top fault LED	On – Hard disk or fan fault.
6	Rear fault LED	On – Power supply, or system controller fault (service is required).
7	Over temperature LED	On – The enclosure has exceeded the operating temperature.

1.2.2 Back Panel

FIGURE 1-3 shows the features of the back panel. TABLE 1-3 lists and describes each feature.

FIGURE 1-3 Sun Storage J4500 Array Back Panel

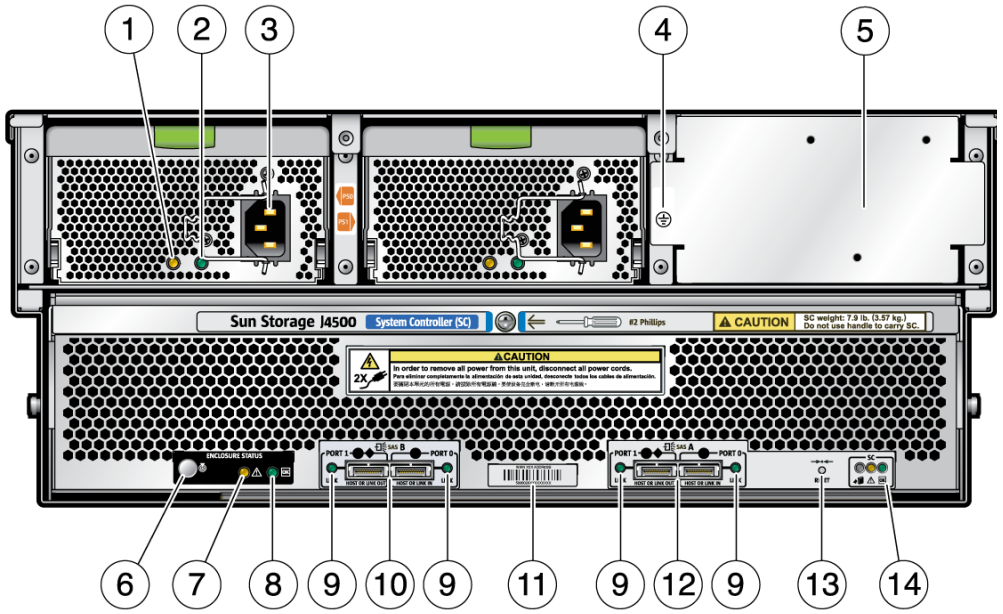


TABLE 1-3 Back Panel Features

#	Name	Description
1	Power supply fault LED (amber)	On – Service action is required.
2	Power supply LED (green)	On – Power is on (AC/DC are OK). Blinking – Standby power is on (AC is OK). Off – Power is off.
3	AC power connector	Each power supply has its own AC connector with a clip to secure its power cable.
4	Chassis ground	Connect grounding straps here.
5	Filler panel	This filler panel seals an access area in the chassis used by service personnel.
6	Locate button/LED (white)	Using array management software, operators can turn this LED on remotely to help them to locate the enclosure in a crowded server room. Press to turn off.
7	System fault LED (amber)	On – Service action is required.
8	System power LED (green)	On – Power is on. Blinking – Standby power is on but main power is off. Off – Power is off.

TABLE 1-3 Back Panel Features *(Continued)*

#	Name	Description
9	SAS link activity LED (green)	Each SAS port has a SAS Link Activity LED: On – 1 to 4 links are ready. Blinking – Read/Write port activity. Off – Link is lost.
10	Two mini-SAS x4 connector ports (SAS B)	Secondary (redundant) SAS ports 0 and 1, each with SAS Link activity LEDs. Port 0 uses subtractive or direct routing and connects to a host or upstream devices; Port 1 is universal, using table and direct routing, and connects to a host or downstream devices.
11	SAS ID (or WWN)	The label placed here lists the unique SAS ID address (also known as World-Wide Name) of the enclosure.
12	Two mini-SAS x4 connector ports (SAS A)	Primary SAS ports 0 and 1, each with SAS Link activity LEDs. Port 0 uses subtractive or direct routing and connects to a host or upstream devices; Port 1 is universal, using table and direct routing, and connects to a host or downstream devices.
13	Enclosure reset button	Resets the enclosure hardware without powering down the enclosure. For more information, see Chapter 4.
14	System controller status LEDs	Blue – Ready to remove (service action allowed) Amber – Fault (Service action required) Green – OK (no action required)

1.2.3 Sun Storage J4500 Array Internal Components

FIGURE 1-4 shows the locations of the J4500 array components, with the covers removed. All power supplies, drives and fans are numbered and labeled.

FIGURE 1-4 Internal Components

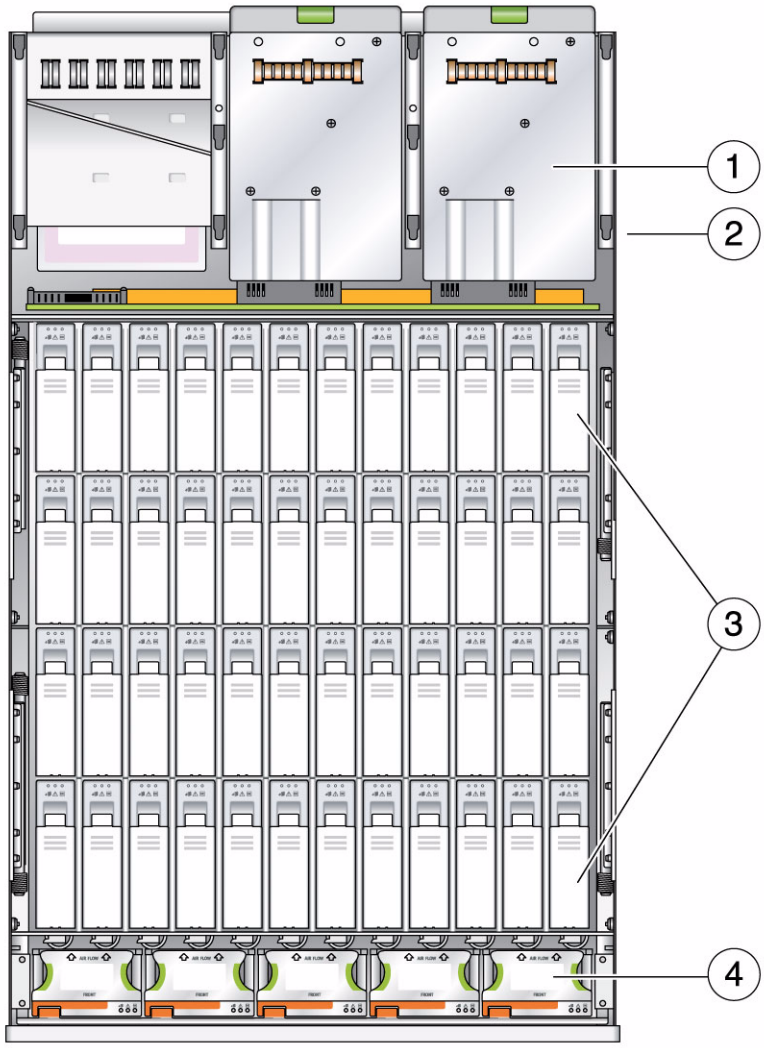


Figure Legend

1	Power supplies (two: PS0 and PS1)
2	System Controller (SC) board (beneath power supplies)
3	Hard Disk Drives (48)
4	Fans (5 trays with two fans each)

1.3 Accessory Kit

The contents of the accessory kit shipped with the J4500 array are listed in TABLE 1-4.

TABLE 1-4 Sun Storage J4500 Array Accessory Kit

Item	Part Number
Sun Storage J4500 Array Accessory Kit (which includes the items listed below)	565-1939
Two 3-meter mini-SAS x4 cables	530-3884
Sun Storage J4500 Array Setup poster	820-3152
Sun Storage J4500 Array Document Set (contains the following documents: *Where to Find Your Sun Storage J4500 Array Documentation*; *Sun Storage J4500 Array Setup*; *Important Safety Information*; *EIP* (*Environmental Information*)	825-7142

CHAPTER 2

Configuring and Powering On the Sun Storage J4500 Array

This chapter contains the following procedures and information:

2.1 Configuration and Cabling

The J4500 array can be connected to a supported HBA (Host Bus Adapter) installed in a server. The rules for connecting J4500 array are described here.

2.1.1 Terms and Definitions

There are several terms used in this document that you will need to become familiar with to better understand J4500 array configuration options.

TABLE 2-1 Sun Storage J4500 Array Configuration Terms and Definitions

Term	Definition
HBA	Host bus adapter (also called an initiator) is disk controlling circuity embedded on a motherboard, or an optional expansion card used to control a set of disks. Some HBAs support hardware RAID (Redundant Array of Independent Disks), which is configured by the HBA software and provides redundancy in the event of a disk failure.
SAS target	A device containing logical units and target ports that receives requests from, and responds to, an initiator. An example of a target device is a hard disk. Other terms used to describe a SAS target are "device" and "end device." In multipath configurations, each hard disk is seen by the HBA as two targets.
SAS fabric	A SAS fabric is conceptually similar to a network segment. A SAS fabric is made up of an initiator, targets, and a set of linked expanders that work like network switches linking end point devices (intitiators and targets) together as a discreet storage system. The J4500 array uses a dual fabric scheme with a primary SAS fabric "A" and a secondary, redundant SAS fabric "B". A fabric can be expanded by daisy-chaining additional J4500 arrays. There are two 4-lane (or x4) connector ports (Port 0 and Port 1) per fabric. Each connector port links to all 48 disks.
Single path configuration	This is a single path connection from a host to a one of the enclosure's SAS fabrics (A or B). No path redundancy is available.
Multipath configuration	This is a dual path connection from a host to both of the array's SAS fabrics (A and B). Provides two paths to the array's disks and uses the redundant SAS fabric capability of the array for failover.
Daisy-chaining (or cascading)	A method for linking several J4500 arrays together to increase the amount of available disks to the host. When cascading multiple arrays using a multipath configuration, Sun recommends cascading the host links in opposite directions from the edge of the SAS fabrics to prevent a single array failure from preventing access to other arrays in the cascade.
Zoning	Zoning is a configuration method that takes the available connected storage and allows each host to have its own storage resources. Zoning is done on a per hard disk level and hard disks owned by one host cannot be accessed by other hosts. Sun Common Array Manager (CAM) version 6.4.1 software is required to perform host initiator-to-disk access configuration (zoning).

2.1.2 Configuration Rules

Before attaching cables to the J4500 array, read through the following configuration rules:

2.1.2.1 General Rules

- The array enclosure drive bays must be fully populated. All 48 SATA hard disk drives must be present and the same size. Do not mix drive capacities in the array enclosure; however you could, for example, have one J4500 populated with 750 GB SATA drives and a daisy-chained J4500 array with 1 TB SATA drives. The J4500 array does not support SAS drives.
- The mini-SAS connector ports are configured as follows: **Port 0** uses subtractive or direct routing (indicated by the circle icon above the connector, see FIGURE 2-1) and connects to upstream devices (either an HBA, or an upstream J4500 array). **Port 1** is universal (indicated by the diamond and circle icons), using table and direct routing, and connects to either an upstream HBA or a downstream J4500 array.
- Use only supported mini-SAS x4 cables (SFF-8088). There are two cables included with the array. Refer to Section 3.1 "Options and Replaceable Components" on page 3-1 for additional cable options. Maximum cable lengths between devices is 6 meters. **Using non-Sun certified cables or longer cables is not supported.**
- Do not cross connect an array enclosure's SAS fabrics. **The SAS A ports of an array enclosure must not be cross connected to its SAS B ports**.

Caution – Cross connecting the SAS fabrics of a J4500 array (connecting its SAS A ports to its SAS B ports) can cause the HBA to be unable to properly identify or access drives in the array which could lead to data loss.

2.1.2.2 Connecting Host Bus Adapters (HBAs)

HBAs can be connected as follows:

- Use only supported HBAs with the array. At initial release, supported HBAs for use with your array product are:
  - Sun StorageTek SAS RAID Eight-Port, External HBA (SG-XPCIESAS-R-EXT-Z, Adaptec™-based RAID controller). **Single path configurations only.**
  - Sun StorageTek PCI Express SAS 8-Channel External HBA (SG-XPCIE8SAS-E-Z, LSI™-based disk controller). **Single or multipath configurations supported.**
  - Sun StorageTek ExpressModule SAS 8-Channel External HBA (SG-PCIE8SAS-EB-Z, LSI-based disk controller). **Single or multipath configurations supported.**

  An updated list of supported HBAs is maintained in the *Sun Storage J4500 Array Product Notes* (820-3162) available on the Sun documentation web site `http://docs.sun.com`.
- A single path configuration consists of a single SAS cable connecting a single HBA to one of the array's SAS fabrics, either A or B.

- A multipath configuration consists of connections to both of the J4500 array's SAS fabrics, A and B, using one or more HBAs in order to create a dual path. More on configuring your array for multipathing can be found in the *Sun Storage J4500 Array System Overview* (820-3163).
- Configuring zoning of the array storage is currently only available using the Sun Common Array Manager (CAM) through an LSI-based HBA connected to the array. For more information on zoning, see the *Sun Storage J4500 Array System Overview* (820-3163).

Note – The J4500 array is not supported in a clustering configuration.

2.1.2.3 Connecting Multiple Sun Storage J4500 Arrays

Sun Storage J4500 arrays can be **daisy-chained**, or **cascaded**, together as follows:

- The maximum number of arrays that can be daisy-chained together is limited by the number of SAS targets (also called "devices" or "end devices") supported by the attached HBA. Check the HBA's documentation to see how many SAS targets are supported. Also see Section 2.1.2.4 "SAS Target Limits" on page 2-4.
- In single path configuration, arrays may be cascaded from **Port 1 (out)** of the upstream array to **Port 0 (in)** of the downstream array. Array cascade port connections must be of compatible types (for example, **no array cascading from Port 1-to-1, Port 0-to-0, or Port 0-to1**).
- In a multipath configuration (creating a dual path by utilizing both SAS fabrics), Sun recommends cascading the host links in opposite directions from the edge of the SAS fabric. For example, the first host connection goes to the top of the SAS A fabric and cascades down, while the second host connection goes to the bottom of the SAS B fabric and cascades up. Array cascade port connections must be of compatible types (for example, **no array cascading from Port 1-to-1 or Port 0-to-0**). For more on configuring for multipathing, see the *Sun Storage J4500 Array System Overview* (820-3163).
- **Do not mix a J4500 array with any other type of JBOD array in a daisy-chain.** Check the *Sun Storage J4500 Array System Overview* (820-3163) for updated configuration information.

2.1.2.4 SAS Target Limits

To ensure a given configuration of J4500 array's does not exceed the HBAs' **target limit**, the following rules apply:

- For single path configurations, each hard disk visible to an HBA consumes one target.

- For multipath configurations, each hard disk visible to an HBA consumes two targets.
- Each expander visible to an HBA consumes three targets. There are two expanders per SAS fabric in the array.
- When zoning is being used on array storage, there must be a host that runs the zoning manager. This host must be able to communicate with all targets in the system. This means that the number of targets seen by the zoning host's HBA(s) must not exceed the target limit for that HBA.
- Refer to your HBA documentation to find out how many targets it can support. Targets might also be called "devices" or "end devices."

2.1.2.5 Configuration with Blade Servers

For Sun Blade Server Modules, the same configuration rules listed above for Sun Storage J4500 arrays apply with the following blade-specific rules:

- An array may be connected to a Sun Blade Server Module in **single path** or **multipath** configuration using a supported SAS PCIe ExpressModule HBA that includes SAS x4-wide connectors. An updated list of supported HBAs are maintained in the *Sun Storage J4500 Array Product Notes* (820-3162) available on the Sun documentation web site.
- The array may not be connected to a SAS NEM in the chassis (a Network Expansion Module that includes external SAS connectors). A server blade may also have its own set of drives and expanders, or be connected to a storage blade and already be using the SAS NEM. This can limit the number of available SAS targets supported by the blade server's internal HBA. Therefore, the J4500 array should only be connected to a supported SAS PCIe ExpressModule HBA that is used exclusively to connect external SAS devices.

2.1.3 Cabling the SAS Connectors

The following figure shows the SAS connector ports for cabling J4500 array to your server's HBA. Before cabling a J4500 array to your server's HBA, refer to the Section 2.1 "Configuration and Cabling" on page 2-1.

FIGURE 2-1 Sun Storage Array Back Panel SAS Ports

Figure Legend

1	SAS B (secondary fabric)
2	SAS A (primary fabric)

The J4500 array has two SAS fabrics: SAS A (primary) and SAS B (secondary). Each connector port on both fabrics connects to all 48 disks. SAS B is a redundant fabric. SAS port descriptions and assignments are shown in FIGURE 2-2.

Examples of supported configurations can be found in Section 2.1.4 "Example Configurations" on page 2-7.

FIGURE 2-2 SAS Ports (Diagram Applies to Both SAS A Ports and SAS B Ports)

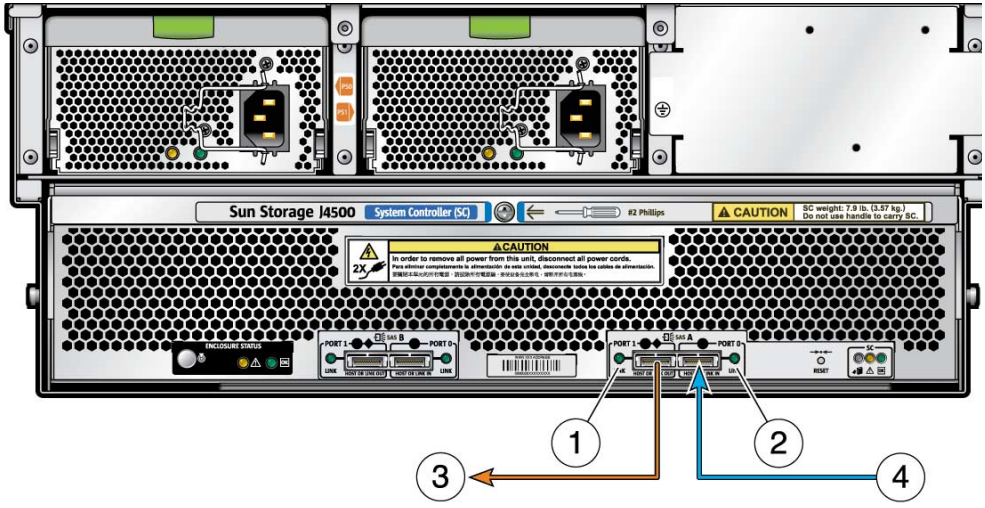


Figure Legend

1	SAS Port 1 (4 PHYs, activity LED, supports direct or table routing)

Figure Legend *(Continued)*

2	SAS Port 0 (4 PHYs, activity LED, supports direct or subtractive routing)
3	Port 1 connects to an HBA, or to a downstream J4500 array
4	Port 0 connects to an HBA, or from an upstream J4500 array

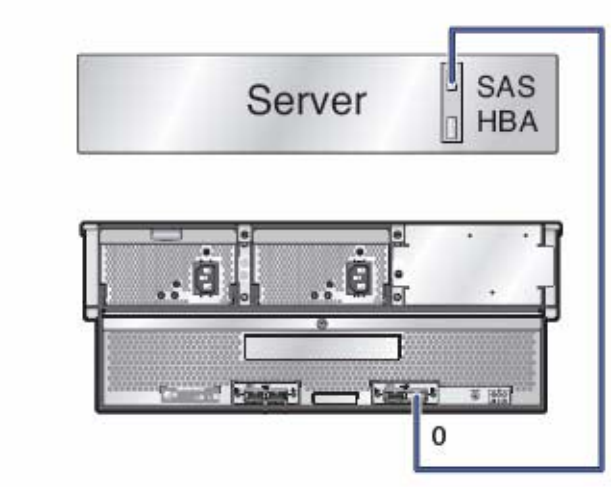
2.1.4 Example Configurations

This section includes examples of supported single path and multipath configurations for your J4500 array.

2.1.4.1 Single Host Direct Connection

FIGURE 2-3 shows a simple host to array connection. In this configuration, the host connection can be to any port, either SAS fabric.

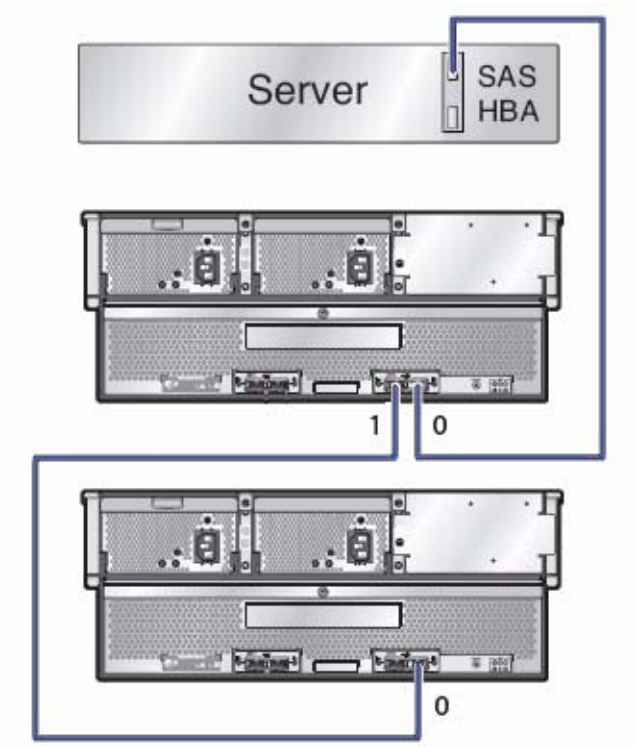
FIGURE 2-3 Single Host to Array Connection



2.1.4.2 Single Host With Cascaded Arrays

FIGURE 2-4 shows a host with two cascaded arrays. In this configuration, the cascaded arrays comsume a total of 108 SAS targets (96 disk targets and 12 expander targets). All of the supported HBAs for the J4500 array can support this number.

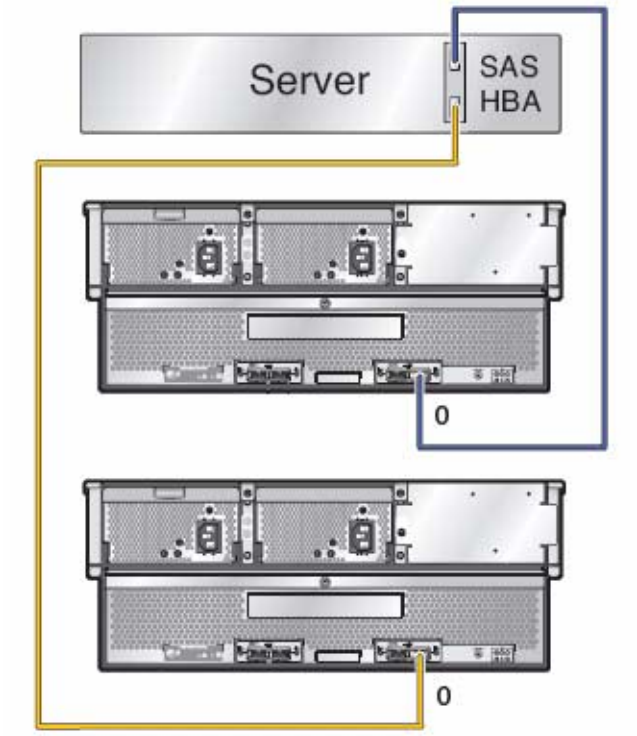
FIGURE 2-4 Host to Cascaded Arrays



2.1.4.3 Single Host Direct Connection to Two Arrays

FIGURE 2-5 shows a host with two cascaded arrays. In this configuration, the two arrays also comsume a total of 108 SAS targets (96 disk targets and 12 expander targets). All of the supported HBAs for the J4500 array can support this number.

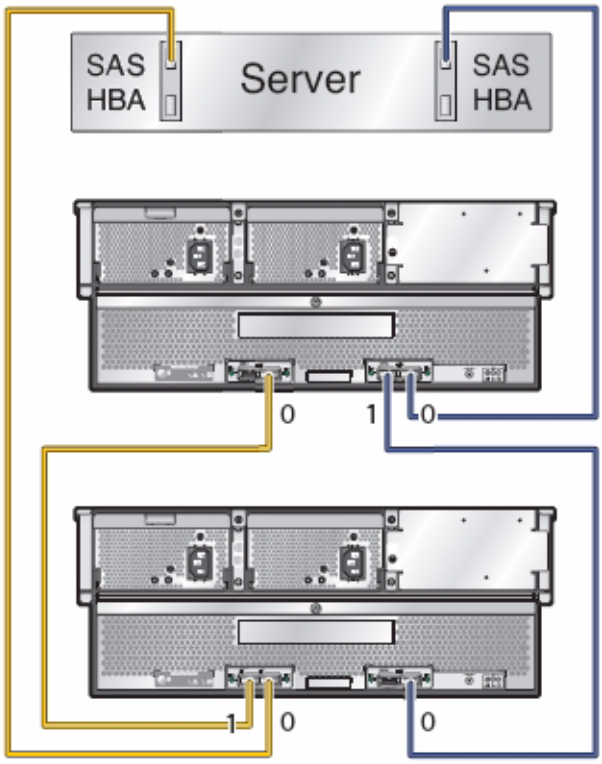
FIGURE 2-5 Host with Two Direct-Connected Arrays



2.1.4.4 Multipath Connection to the Array

FIGURE 2-6 shows an example of multipath cabling using one host, two HBAs and two cascaded arrays. Note that the host links are cascaded in opposite directions from the edge of the SAS fabric so that if one array enclosure fails, there is still host access to the working array enclosure. This configuration supports zoned storage and failover. For more information on configuring multipath, see the *Sun Storage J4500 Array System Overview* (820-3163).

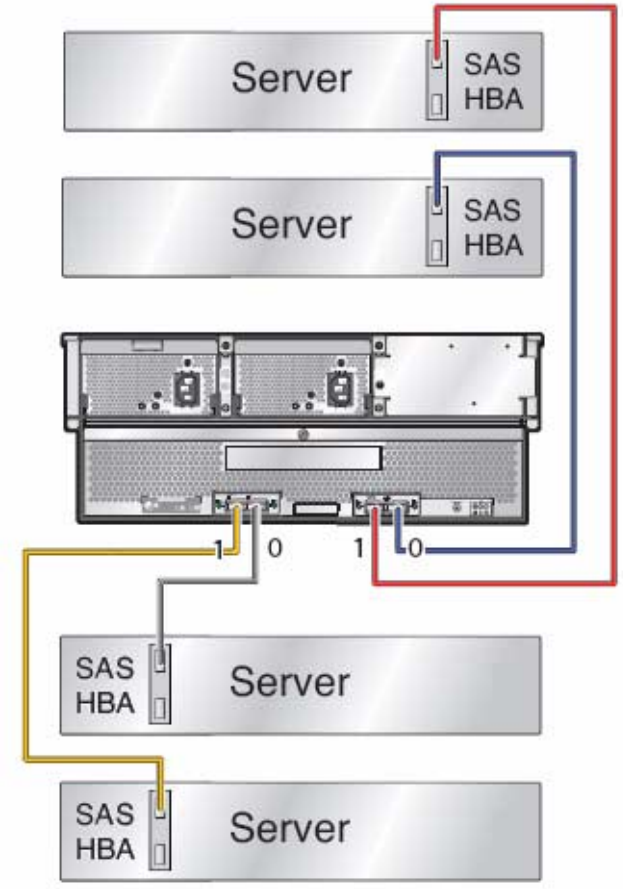
FIGURE 2-6 Host with Multipath-Connected Arrays



2.1.4.5 Multi-host Zoned Connection to the Array

FIGURE 2-7 shows a color-coded example of four hosts connected in single path configuration to an array. In this configuration, the storage in the array has been separated into four zones. Each host (indicated by a separate cable color) can only see the disks in its assigned zone. In this configuration, each of the hosts must have the Sun Common Array Manager (CAM) proxy agent installed and running, or one of the hosts can act as the CAM management host while the others run the proxy agent. The CAM management host is used to configure and manage zones on the array. For more information on configuring zoning, see the *Sun Storage J4500 System Overview* (820-3163).

FIGURE 2-7 Four Hosts Directly Connected to a Zoned Array



2.2 Powering On and Off the Array

The Sun Storage J4500 array has two levels of power: standby power and main power. The initial setup of the array should be done before plugging in AC power. The procedures for powering on to main power mode and going from main power mode to standby power mode are included in this section.

Caution – Do not operate the enclosure without all fans, component heatsinks, air baffles, and covers installed. Severe damage to enclosure components can occur if the enclosure is operated without adequate cooling mechanisms.

▼ To Power On the Array

The proper power-up sequence for a system connected to the Sun Storage J4500 array is to first power on the array, wait one minute, then power on the host server. This wait time allows all 48 array hard disk drives to power up to the point where the server can see them and helps reduce the number of start-up device link messages saved to the server's log file

To apply main power to the array, do the following:

1. **Connect two grounded AC power cords to the two AC power supply connectors at the back of the array enclosure.**
2. **Then connect the other ends of the two AC power cords to grounded AC (110-220 VAC) power outlets.**

   Connecting the AC power cords to the array automatically applies main power to the array. In main power mode, the array Power/OK LED next to the Power button lights and remains lit.

Note – See the service label on the hard disk drive access cover for an explanation of the LEDs on the hard disk drives, fans, power supply, and system controller. Or, refer to Chapter 4.

▼ To Place the Array Into Standby Power Mode

The front panel power button is used to switch the array from main power to standby power (or from standby power back to main power). Standby power mode leaves the power supplies partially on, but powers down the enclosure hard disks, SAS expanders and SAS links.

1. **To switch the array enclosure from main power mode to standby mode, use a stylus to press and hold in the power button on the front panel (see FIGURE 1-2) for 5 or more seconds (during which the locate LED will flash).**

   As the enclosure enters standby power mode, the Power/OK LED on the front and back panel blinks, indicating that standby power mode is working.

2. **Release the power button on the front panel.**

   With AC power connected, the array takes about 10 seconds to go fully into standby power mode.

Caution – To power off the array completely, you must disconnect the AC power cords from the back panel of the array enclosure. It takes a full 20 seconds with the AC power cords unplugged for internal power to be completely drained from the enclosure.

3. **To reapply main power to the array from standby power mode, use a stylus to press and release the recessed Power button on the array front panel. See** FIGURE 1-2**.**

   When main power is applied to the array, the Power/OK LED next to the Power button lights and remains lit.

▼ To Power Off the Array

To power off the array completely, you must disconnect the AC power cords from the power supplies at the back of the array enclosure. The power switch is only used for putting the array into standby power mode, or applying main power from standby power mode. Do the following to power off the array:

- **To completely power off the array, disconnect the two AC power cords from the power supplies at the back of the enclosure.**

  It takes a full 20 seconds with the AC power cords unplugged for the internal power to be completely drained form the enclosure.

2.2.1 AC Power Failure Auto-Recovery

If AC power is temporarily lost to the array, for example if the municipal power grid experiences an outage, the array automatically restarts to main power mode when power is restored. No user intervention is required.

The same behavior occurs if you disconnect the AC power cords from the back of a powered-on array and then reconnect them.

CHAPTER 3

Maintaining the Sun Storage J4500 Array

This chapter describes maintenance procedures for the Sun Storage J4500 array and covers the following topics:

3.1 Options and Replaceable Components

TABLE 3-1 lists the after-factory options and replaceable components for the J4500 array. All parts are customer-replaceable units (CRUs).

Note – The J4500 array is shipped from the factory with drives of the same capacity. Mixing drives of different capacities in the array is unsupported. When ordering a replacement drive, ensure that the disk subcomponent of the CRU conforms to this rule.

Devices described as *hot-pluggable* may be replaced without requiring a reboot of the host computer or the array, however the device being replaced first needs to be shut down or isolated by the operating system to prevent host access during replacement. Devices described as *hot-swappable* may be replaced without any kind of system preparation, reboot or shut down.

Supported components and their part numbers are subject to change over time. For the most up-to-date list of replaceable components, product updates, and downloads, see the following URL:

(http://sunsolve.sun.com/handbook_pub/Systems/)

TABLE 3-1 Sun Storage J4500 Array Replaceable Components

Component	Part Number	CRU or FRU
Power Supply 1500W—Type A205 (two PS per enclosure, hot-swappable)	#300-1787	CRU
500 GB SATA 3.5-inch Hard Disk Drive (hot-pluggable)	#541-3050	CRU
750 GB SATA 3.5-inch Hard Disk Drive (hot-pluggable)	#540-7244	CRU
1 TB SATA 3.5-inch Hard Disk Drive (hot-pluggable)	#540-7507	CRU
Fan Module pair (five Fan Module pairs per enclosure, hot-swappable)	#541-0458	CRU
1 meter mini-SAS x4 cable (SFF-8088)	#530-3882	CRU
2 meter mini-SAS x4 cable (SFF-8088)	#530-3883	CRU
3 meter mini-SAS x4 cable (SFF-8088)	#530-3884	CRU
6 meter mini-SAS x4 cable (SFF-8088)	#530-3887	CRU
System Controller module (hot-pluggable)	#541-2474	CRU
Front Indicator Board (FIB) with ribbon cable	#501-7192	CRU
System Enclosure Super FRU (includes disk backplane and FIB with ribbon cable)	#541-3424	CRU
Power Distribution Board	#501-7104	CRU
X4500-J Rack Slide Rails, stand-alone	#371-3493	CRU

3.2 Tools and Supplies Needed

The J4500 array can be serviced with the following items:

- No. 2 Phillips screwdriver (10-inch recommended length with magnetic tip)
- Antistatic wrist strap

- Stylus or other pointed object (to press the recessed Power button and recessed system controller release button)

The following component replacements require additional tools:

- Replacing the power distribution board requires a No. 1 Phillips screwdriver.
- Replacing the front indicator board requires a No. 1 Phillips screwdriver (magnetic tip recommended).

3.3 Powering Off the Array and Removing It From the Rack

Use the procedures in this section when you are referred to them from the removal and replacement procedures.

▼ To Power Off the Array

Before attempting to work inside the array enclosure, power it down as follows:

1. **Shut down the J4500 array from main power as described in** Chapter 2**.**

Caution – When you use the Power button to enter standby power mode, power is still directed to the power supply fans, indicated when the Power/OK LED is flashing. To completely power off the array enclosure, you must disconnect the AC power cords from the back panel of the array.

2. **Disconnect both power cords from the array's power supplies.**
3. **Disconnect any other cables that must be disconnected in order to remove and replace a specific component.**

   It is a good idea to label your cables as you disconnect them to ensure correct reconnection.

Caution – Before handling components, attach an electrostatic discharge (ESD) wrist strap to a grounding point on the chassis. The system's printed circuit boards and hard disk drives contain components that are extremely sensitive to static electricity.

▼ To Remove the Array Enclosure From the Rack

This procedure assumes you have turned off the system and removed any cables or cords that would restrict the movement of the system.

Caution – To avoid serious personal injury and/or equipment damage while handling or moving this product, always use all four chassis handles to support the product weight. These systems can weigh up to 170 pounds (77 kg) when fully loaded with components. If only three people are available, remove power supplies, hard disks, and system controller to reduce the weight to about 50 pounds before removing the system. Leave the fan trays installed. Attempting this procedure without a mechanical lift or with fewer than four people could result in personal injury or equipment damage.

---

1. **If you do not have a mechanical lift, remove the following components from the rear of the rack to reduce the weight to a safe level for manual lifting:**

   To remove power supplies, see "To Replace a Power Supply" on page 3-26.

   To remove the System Controller, see "To Replace the System Controller Module" on page 3-28.

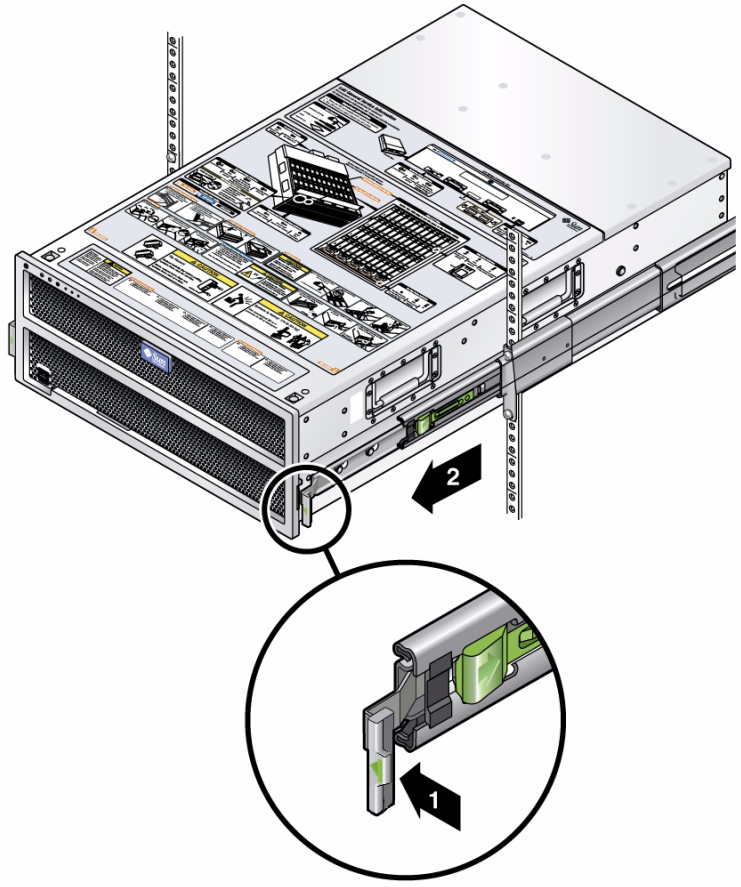
Caution – Once components have been removed, do NOT attempt to lift the chassis at these openings, the sheet metal may deform. Use the lifting handles on the sides of the chassis (see "4" in FIGURE 3-2).

---

2. **From the front of the rack, extend the rack anti-tip bar.**

3. **Slide out the system out to its service position by first releasing the latches on each side of the system, and then sliding it out until it reaches the stops. See the inset with arrows labeled 1 and 2 in FIGURE 3-1).**

FIGURE 3-1 Sliding the Enclosure Out of the Rack



4. **If you need to lighten the enclosure, open the hard disk drive access cover and remove the hard disk drives.**

   See "To Remove the Hard Disk Drive Access Cover" on page 3-9.

Caution – Make sure you label the drives so you can replace them in their original locations. Not doing so may result in data loss.

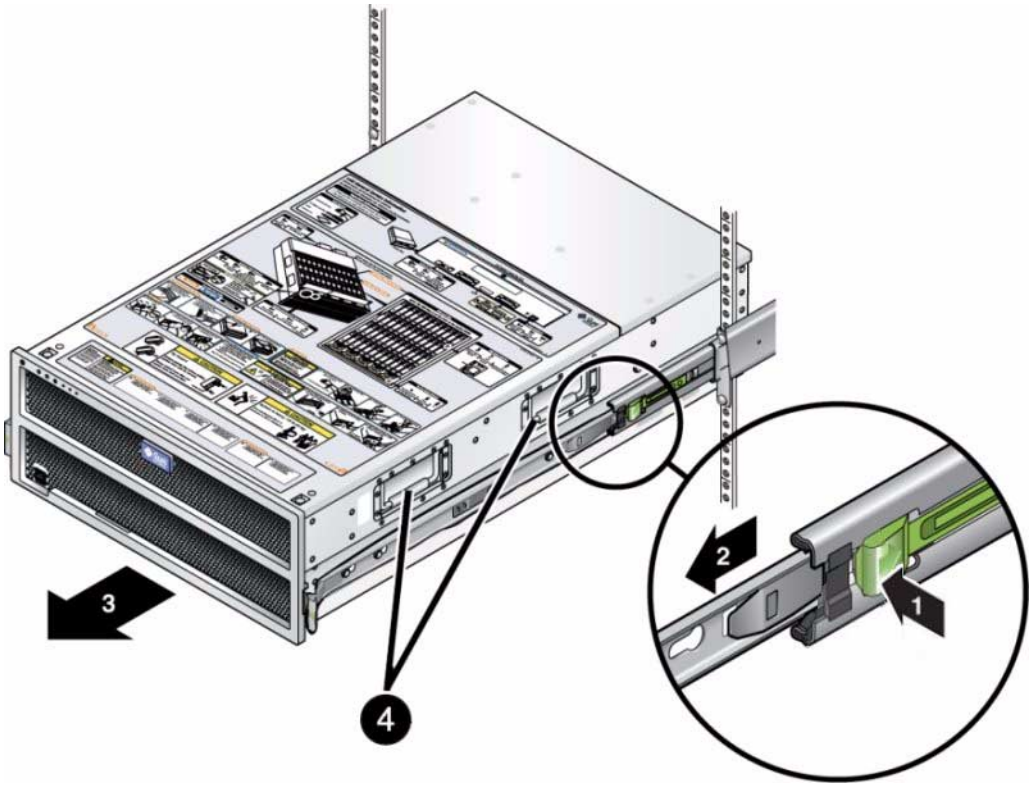
---

5. **To completely remove the system from the rack, do the following:**

   a. **Press the green release lever (with embossed arrow) on each slide rail to disengage the system inner rails from the slide rail assembly (see the inset arrows labeled 1 and 2 in** FIGURE 3-2**.**

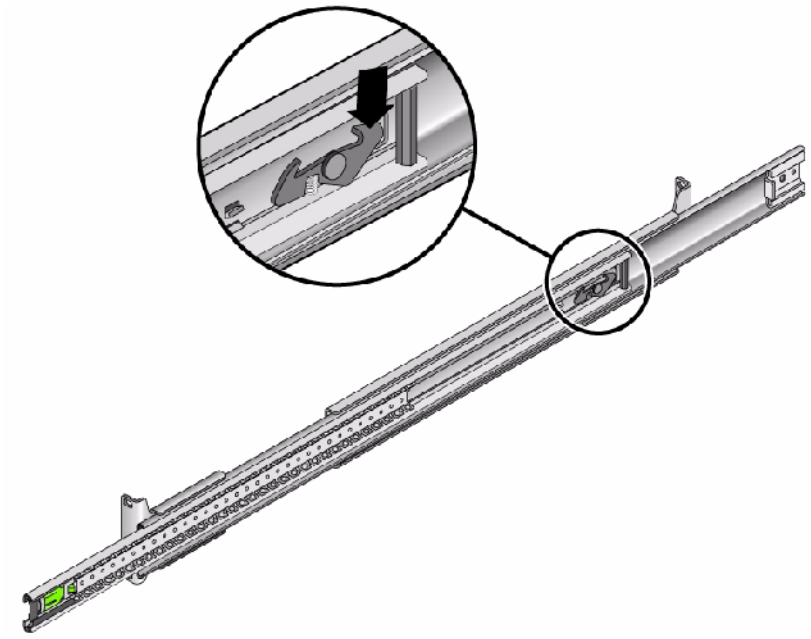
b. Holding the handles located on each side of the system, slide the system completely out of the rack (see label 4 in FIGURE 3-2) and set it down on a clean, stable surface.

FIGURE 3-2 Removing the Enclosure from the Rack



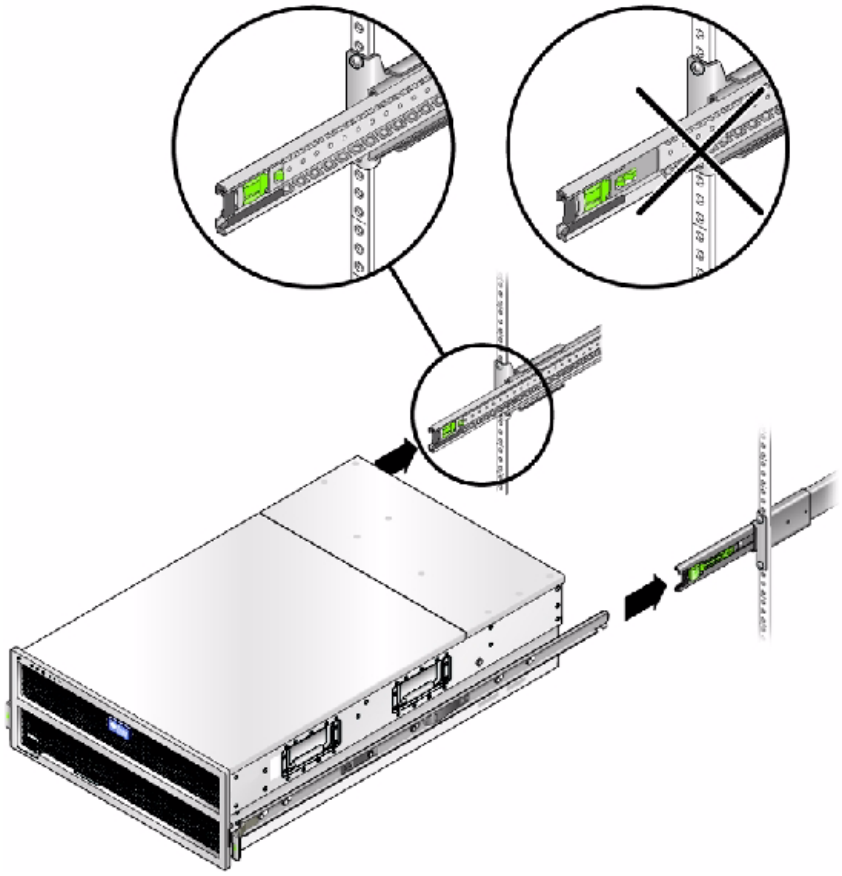
6. To prevent the middle rails from blocking access to the aisle as you service your system out of the rack, release the middle rail locks and then slide the middle rails back inside the outer rails. See FIGURE 3-3.

FIGURE 3-3 Releasing the Middle Rail Lock



Note – When reinstalling the system into the rack, first pull the middle rails back out to their locking position (see FIGURE 3-4) before attempting to reinsert the inner rails on the system into the middle and outer slide rails.

FIGURE 3-4 Correct Setup for Inserting the System Into the Slide Rails



3.4 Removing and Replacing the Hard Disk Drive Access Cover

This section describes how to remove and replace the array enclosure hard disk drive access cover.

▼ To Remove the Hard Disk Drive Access Cover

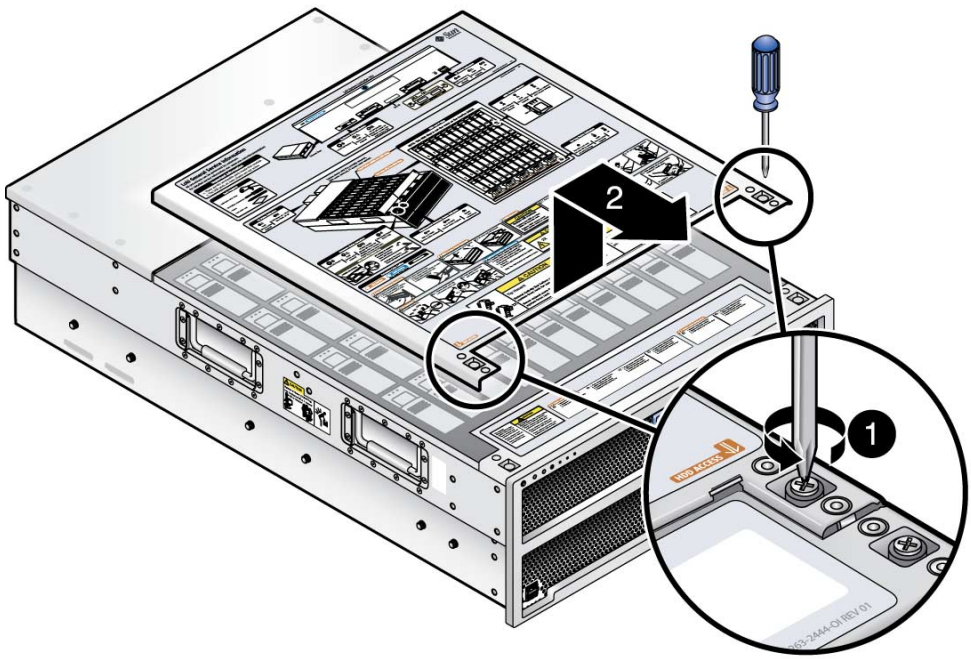
The hard disk drive access cover protects the 48 hard disks in the array enclosure and ensures proper cooling to the drives and the system controller.

Caution – When the array is powered on, the hard disk drive access cover should be in place to ensure proper cooling. Do not remove the cover for more than **60** seconds when the array power is on.

---

1. **Using a No. 2 Phillips screwdriver, loosen the left and right captive screws. See** FIGURE 3-5**.**
2. **Grasp the cover by its edges, lift the front up from the chassis, and pull it forward.**

FIGURE 3-5 Removing the Hard Disk Drive Access Cover



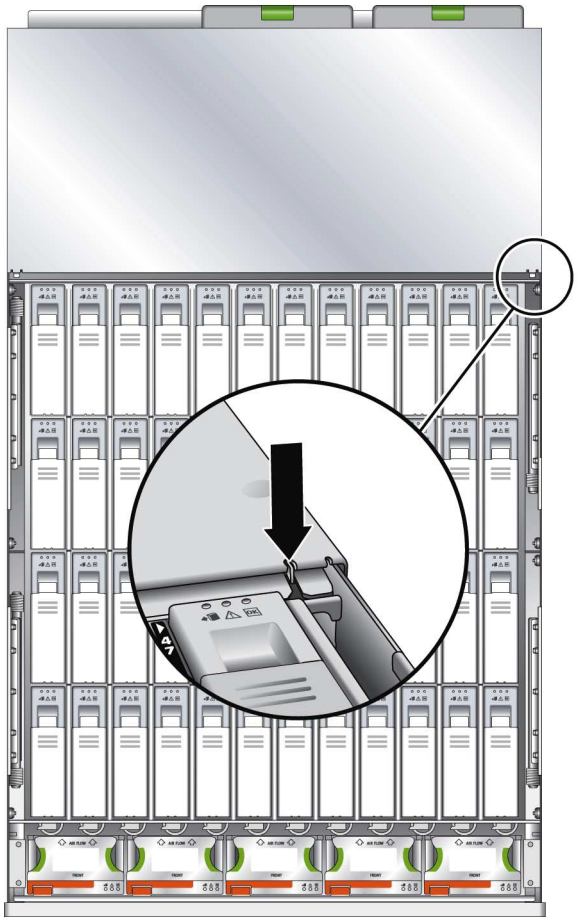
▼ To Replace the Hard Disk Drive Access Cover

Complete the following steps to replace the hard disk drive access cover.

1. **Set the cover on the chassis so that the rear lip of the cover slides under the chassis. Take care not to damage the cover intrusion switch. See** FIGURE 3-6**.**

Caution – Be careful not to damage the hard disk drive access cover intrusion switch when you replace the cover. See FIGURE 3-6.

FIGURE 3-6 Hard Disk Drive Access Cover Intrusion Switch



2. **Lower the cover and push it toward the rear of the enclosure until it fully engages under the chassis. The front retaining screws should align with the holes in the chassis.**

3. **Use a No. 2 Phillips screwdriver to tighten the cover retaining screws until hand-tightened.**

3.5 Internal Component Locations

The locations of the replaceable components in the enclosure are shown in FIGURE 3-7.

FIGURE 3-7 Sun Storage J4500 Array Internal Components

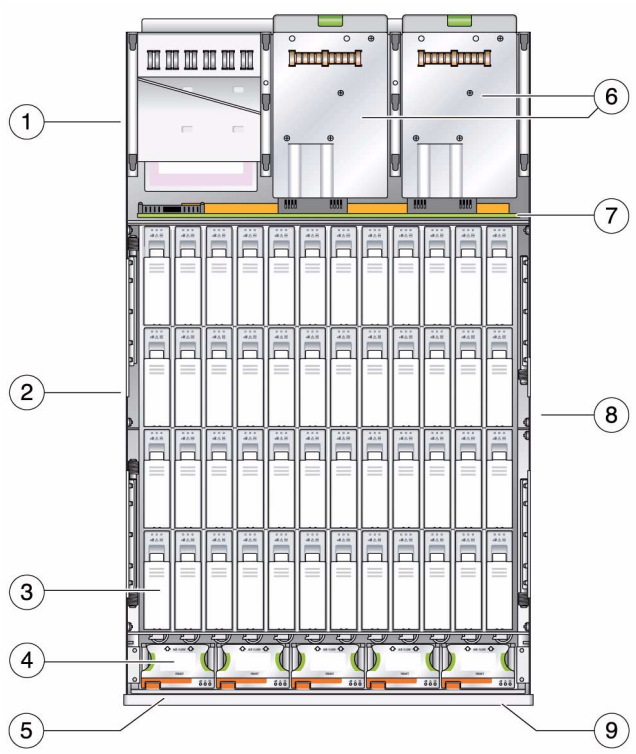


Figure Legend

1	System Controller (under power supplies)
2	ESD ground location
3	Hard disk drives (numbered 0-47)
4	Fan tray modules (numbered 0-4)
5	Front indicator board (behind bezel)
6	Power supplies (2)

Figure Legend *(Continued)*

7	Power Distribution Board (PDB)
8	Hard disk backplane (under chassis plate)
9	Front bezel

3.6 Replacing Components

This section provides procedures replacing enclosure components. All of the components described here are customer-replaceable units (CRUs).

This section describes the following replacement tasks:

Caution – Before handling components, attach an ESD wrist strap to a grounding location on the chassis (see FIGURE 3-7). The enclosure's printed circuit boards and hard disk drives contain components that are extremely sensitive to static electricity.

▼ To Replace a Fan Module

Each fan module (also known as a fan tray) has two fans. The array enclosure has five fan modules (for a total of 10 fans in the enclosure). This component is customer replaceable.

Note – Enclosure cooling might be affected by dust and contaminant build-up. It is recommended that the enclosure be opened and checked approximately every six months or more often in dirty operating environments. Check component heatsinks, fans, and air openings. If necessary, clean the enclosure by brushing or blowing contaminants or carefully vacuuming contaminants from the enclosure.

Caution – The fans are hot-swappable and can be removed and replaced while the array is running. Do not keep the fan tray access cover open for more than **60 seconds** at a time to avoid overheating the array enclosure. Remove and replace only **one fan module at a time**.

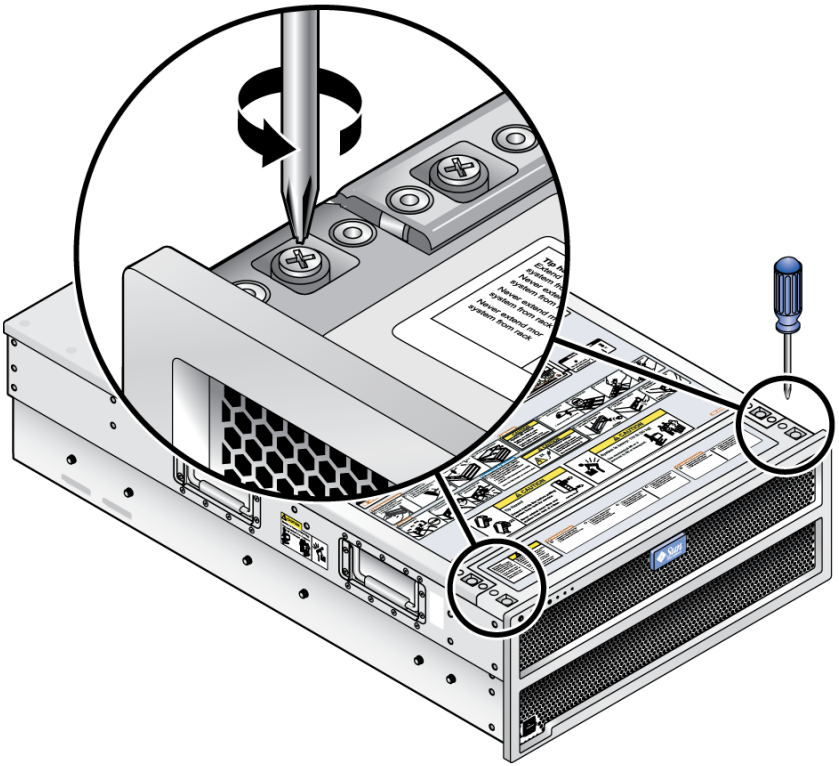
Fans are labeled FT0 (fan tray 0) to FT4 (fan tray 4). See Section 3.5 "Internal Component Locations" on page 3-11.

1. **If the array enclosure is in a rack, slide it far enough out of the rack so that you can access the fan modules.**

2. **From the front of the enclosure, open the fan tray access cover.**

   Using a No. 2 Phillips screwdriver, loosen the two captive screws on the left and right sides. See FIGURE 3-8.

FIGURE 3-8 Removing the Fan Tray Cover



3. **Identify the defective fan module.**

   If the amber (left) LED is on, the fan module is defective and should be replaced.

Note – If both green and amber indicators are on, then one of the two fans in the fan module is still operational. You should replace this fan module last if there is more than one fan module failure.

4. Remove the fan module.

Caution – Be careful to not damage the gaskets when you remove the fan module. Damaging the gaskets can disrupt proper airflow.

Using your thumb and forefinger, grasp the top handle of the fan module and lift the module up and out of the chassis. See FIGURE 3-9.

FIGURE 3-9 Removing a Fan Module

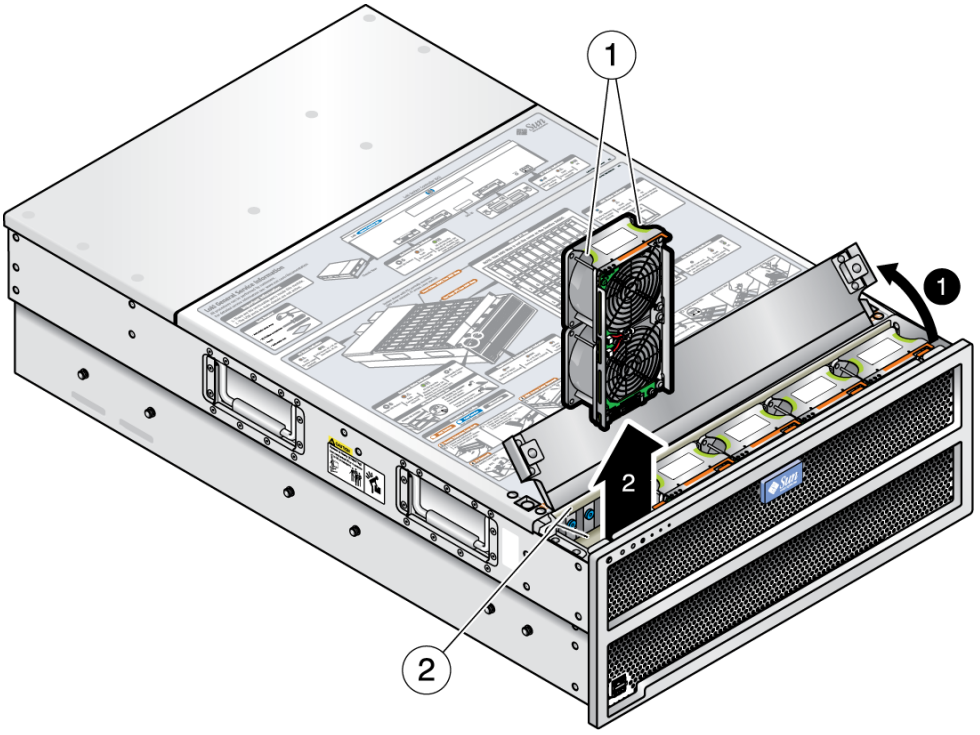


Figure Legend

1	Grab fan tray module by finger handle
2	Be careful not to damage the enclosure fan tray module gaskets

5. Install the new fan module:

a. **Align the new fan module with the bay in the chassis.**

b. **Lower the fan tray into the bay until it comes into contact with the connector on the fan board.**

c. **Push down gently on the fan module until its connector is fully engaged.**

   Once fully engaged, the amber LED on the fan tray may light momentarily.

6. **Close the fan cover and tighten the retaining screws on the left and right sides of the cover.**

▼ To Replace the Front Indicator Board

The front indicator board supports the front panel power button and front panel indicator LEDs. This board also contains the ribbon cable that connects to the hard disk drive backplane. Be sure you have the tools necessary as described in Section 3.2 "Tools and Supplies Needed" on page 3-2.

1. **Power off and unplug the array enclosure as described in Chapter 2.**

Caution – To power off the enclosure **completely**, you must disconnect the AC power cords from the back panel of the array enclosure. It takes a full 20 seconds with the AC power cords unplugged for internal power to be completely drained from the enclosure.

2. **If the array enclosure is in a rack, slide it far enough out of the rack so that you can access the fan modules.**

3. **From the front of the enclosure, open the fan cover.**

   Using a No. 2 Phillips screwdriver, loosen the two captive screws on the left and right sides.

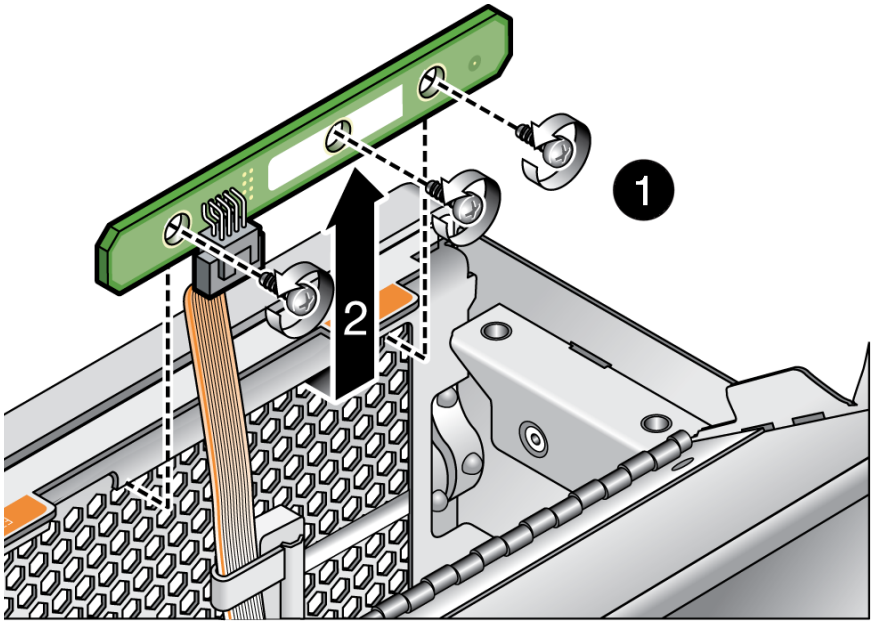
4. **Remove fan tray 0 and fan tray 1.**

5. **Remove the hard disk drive access cover so that the fan cover opens more freely. See** "To Remove the Hard Disk Drive Access Cover" on page 3-9**.**

   Using a No. 2 Phillips screwdriver, loosen the two captive screws on the left and right sides.

6. **Using a No. 1 Phillips screwdriver, remove the three screws (see 1 in** FIGURE 3-10**) securing the front indicator board to the chassis.**

FIGURE 3-10 Removing the Front Indicator Board Screws



7. **Detach the ribbon cable from the front indicator board, see** FIGURE 3-11**.**

   If you suspect that the ribbon cable is bad, remove the old ribbon cable from the hard disk drive backplane and use the new ribbon cable that comes with the new front indicator board. Make sure you route the ribbon cable through the cable securing clips to prevent damage to the cable.

FIGURE 3-11 Detaching the Ribbon Cable from the Hard Disk Backplane

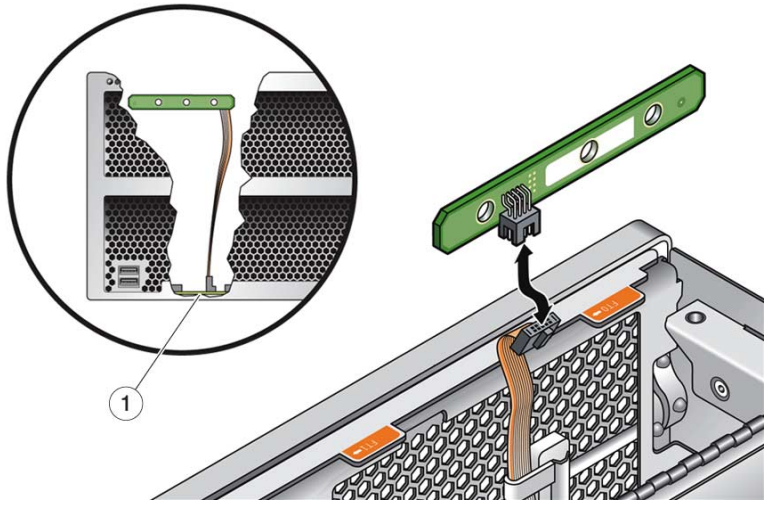


Figure Legend

1	Ribbon cable connection to hard disk backplane

8. **Install the new front indicator board:**

   a. **Align the holes in the indicator board with the three screw holes in the inside-front of the chassis.**

   b. **Using a No. 1 Phillips screwdriver, replace and tighten the two screws that secure the indicator board to the chassis.**

   c. **Connect the ribbon cable to the connector on the hard disk drive backplane and to the connector on the front indicator board.**

9. **Replace fan module 0 and fan module 1.**

10. **Close the fan cover and, using a No. 2 Phillips screwdriver, tighten the two screws on the left and right sides.**

11. **Replace the hard disk drive access cover and, using a No. 2 Phillips screwdriver, tighten the two screws on the left and right sides. See** "To Replace the Hard Disk Drive Access Cover" on page 3-9**.**

▼ To Replace a Hard Disk Drive

This section describes how to remove and replace a hard disk drive. The J4500 array comes fully populated with 48 SATA drives installed. When replacing drives, note the following:

- Replacement drives must be SATA, of the same capacity, and the same manufacturer as the drive being replaced. If is configured for multipathing, only supported drives may be used (for more on drives supported for multipath, see Section 4.4.5.4 "Multipath Problems With Unsupported Drives" on page 4-14).
- Drives are a hot-pluggable CRU and can be replaced by anyone. Hot-pluggable means that the hard drive must be first brought offline by using a management software or operating system command; however, the array does not need to be powered off.
- A single hard disk failure does not cause data loss if the hard disk is part of a RAID 1 (or higher) volume. The hard disk can be hot-plugged (but not hot-swapped). When a new hard disk is inserted, the contents are automatically rebuilt from the rest of the array with no need to reconfigure the RAID parameters. If the bad hard disk was configured as a hot spare, the new hard disk is automatically configured as a new hot spare.
- Do not configure RAID volumes with drives of different capacities. This can cause unexpected operation or other problems. All drives in the array enclosure must be SATA and of the same capacity.
- Each hard disk has a physical drive number, a map of the array hard disks is shown on the service label.
- When using Linux hosts, if you add or remove array disks the host might hang or panic due to known Linux kernel issues. If you encounter this problem, a reboot of the host should resolve it.

Caution – To avoid overheating the array enclosure, do not leave a hard disk drive out for longer than **60** seconds at a time when the array power is on. Remove and replace only one hard disk drive at a time. Replace the hard disk drive access cover as soon as the service tasks are completed.

1. **Remove the hard disk drive access cover as described in** "To Remove the Hard Disk Drive Access Cover" on page 3-9**.**
2. **Identify the defective hard disk by looking at the hard disk LEDs.**

   If the amber (middle) LED is on, the drive is faulty and should be replaced.

3. **A failed drive should have already been taken offline by the system. If you want to remove a drive that has not failed (the amber LED is not lit), use the operating system or array management software to take the hard disk offline before you remove it. Not doing so could cause data loss or unexpected error messages.**

Caution – Taking a disk offline that is part of a non-redundant logical drive causes the entire logical drive to fail and result in data loss.

If you are using an operating system command line, note that disks in the enclosure are typically identified in sequential order. Although the enclosure contains only 48 disks, your operating system may see a list of 51 devices; if this is the case, the first 4 addresses (0-3) represent the enclosure's four SAS expanders, the other 48 addresses (4-51) represent the 48 hard disks.

Once the drive has been taken off line, the blue ready-to-remove LED should turn on. This means the drive is ready to be removed and service action is allowed.

4. **Remove the hard disk.**

Lift the metal latch and remove the hard disk from the drive bay as shown in FIGURE 3-12, or on the service label.

FIGURE 3-12 Removing a Hard Disk Drive

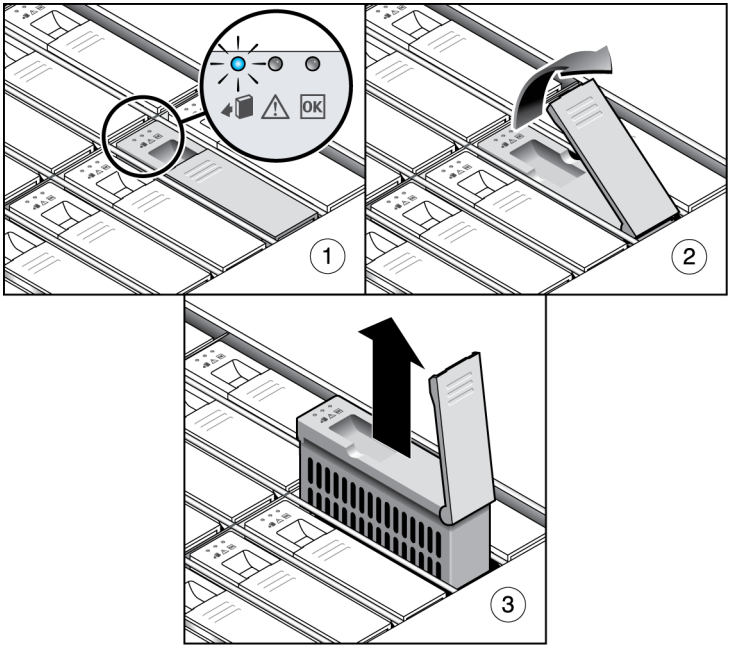


Figure Legend

1	Identify desired hard disk
2	Unlatch hard disk
3	Lift and pull hard disk up and out of bay

5. **Install the new hard disk of the same capacity as the one removed.**

   Push the hard disk into the bay until it stops, and make sure the drive is fully engaged with the connector on the hard disk backplane.

6. **Make sure the metal handle is properly seated.**

7. **Replace the hard disk drive access cover. See** "To Replace the Hard Disk Drive Access Cover" on page 3-9**.**

8. **Configure the new hard disk.**

   Refer to your HBA or operating system documentation for information on adding a new hard disk.

Note – If the hard disk was previously configured as a RAID 1 (or higher) array, an automatic resynchronization is invoked and the contents are automatically rebuilt from the rest of the array with no need to reconfigure the RAID parameters. If the bad hard disk was configured as a spare, the new hard disk is automatically configured as a new spare.

▼ To Replace the Power Distribution Board

This section describes how to remove and replace the power distribution board (PDB), which is also called the power backplane. Be sure you have the tools necessary as described in Section 3.2 "Tools and Supplies Needed" on page 3-2.

1. **Power off the array enclosure as described in** Chapter 2**.**

Caution – To power off the enclosure **completely**, you must disconnect the AC power cords from the back panel of the array enclosure. It takes a full 20 seconds with the AC power cords unplugged for internal power to be completely drained from the enclosure.

2. **Disconnect all cables from the enclosure.**
3. **Remove the system controller as described in** "To Replace the System Controller Module" on page 3-28**.**
4. **Remove all power supplies as described in** "To Replace a Power Supply" on page 3-26**.**
5. **From the back of the enclosure, remove the power supply cover.**

   Using a No. 1 Phillips screwdriver, remove the two screws on the power supply cover. Pull the cover toward you and lift. Some extra effort may be required to disengage the eight mushroom-head pins that secure the power supply cover to the chassis (see FIGURE 3-13).

FIGURE 3-13 Removing the Power Supply Area Cover

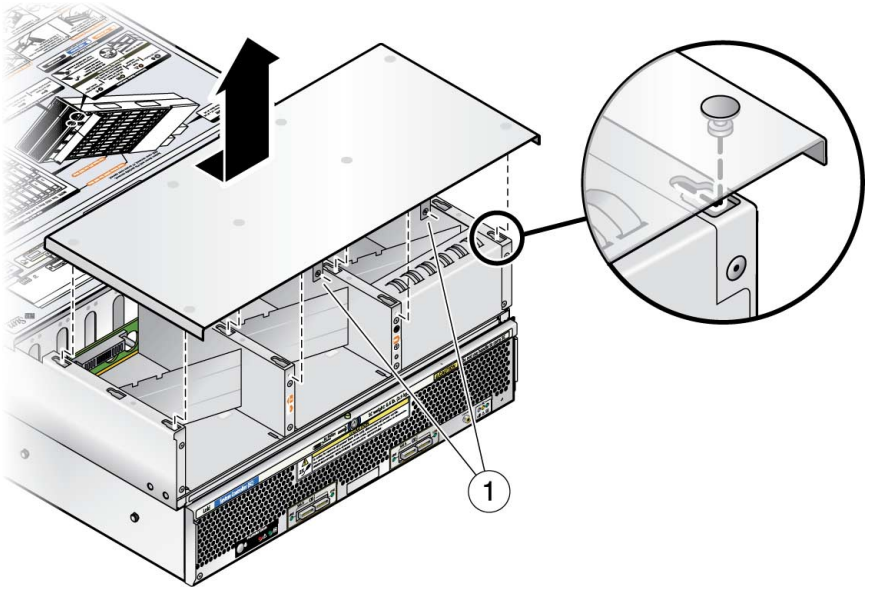


Figure Legend

1	Power supply cover securing screws

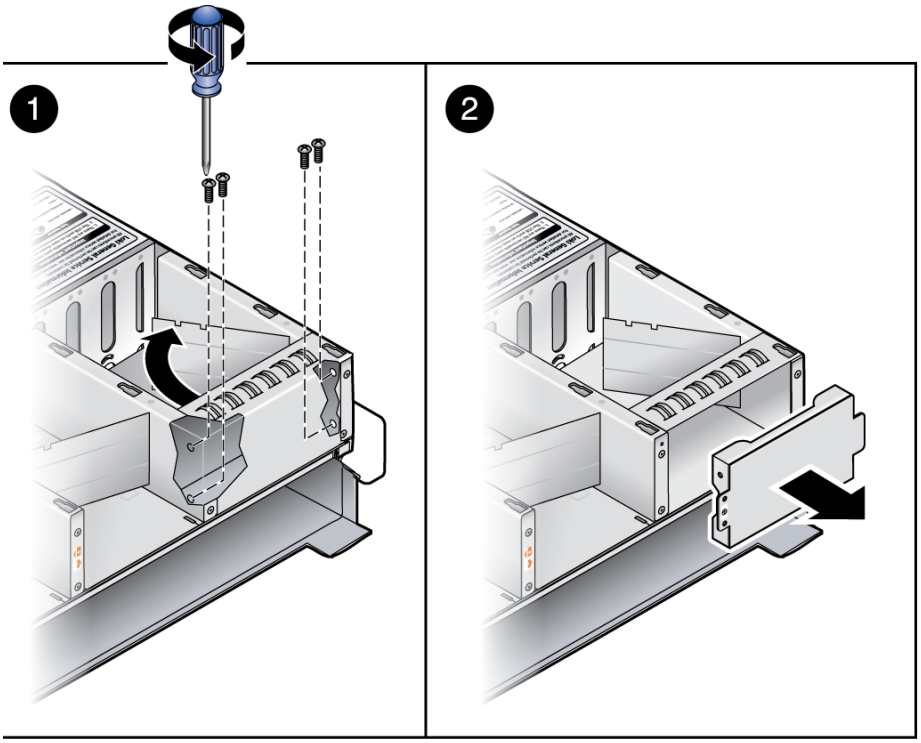
6. Remove the rear chassis filler panel.

You must remove the rear chassis filler panel to get access to one of the screws that attaches the PDB to the chassis.

a. Push back the power supply swing door so you can access the area behind the rear filler panel.

b. Use a No. 2 Phillips screwdriver to remove the four screws that attach the rear chassis filler panel to the bay, as shown in FIGURE 3-14**.**

FIGURE 3-14 Removing the Rear Chassis Filler Panel



7. **Remove the PDB:**

   a. **Remove the hard disk drive access cover as described in** "To Remove the Hard Disk Drive Access Cover" on page 3-9**. By removing the hard disk drive access cover, you will have more room to maneuver.**

   b. **Use a No. 1 Phillips screwdriver to loosen the three captive screws that secure the PDB to the chassis. See** FIGURE 3-15**.**

FIGURE 3-15 Removing the Power Distribution Board

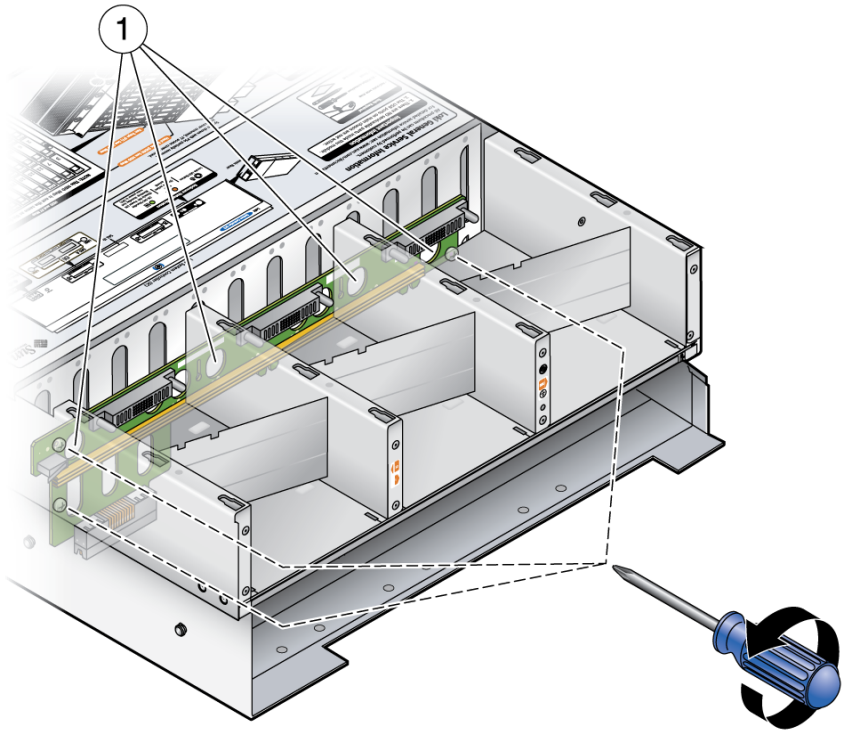
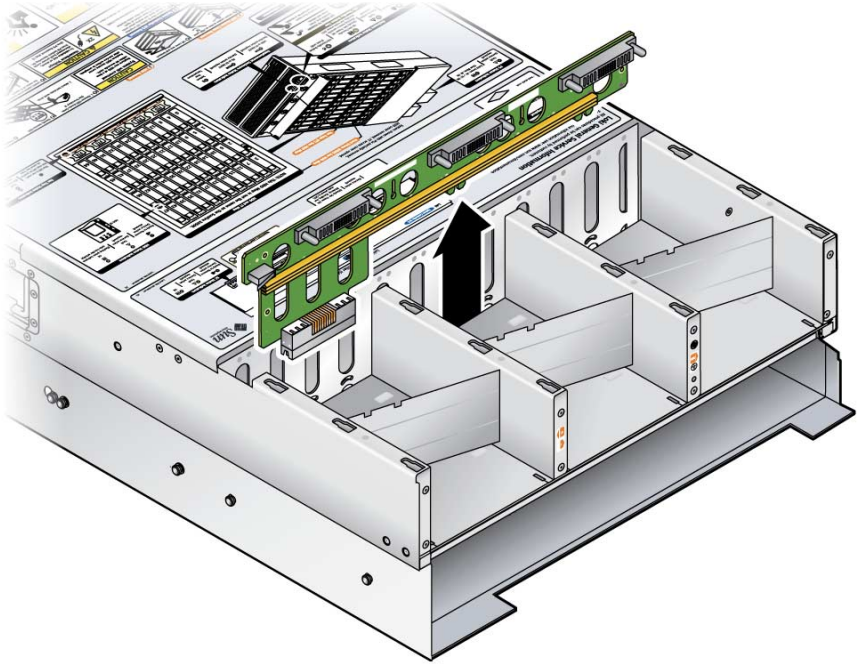


Figure Legend

1	Power Distribution Board (PDB) securing screws

c. Put your fingers in the holes to pull the PDB up and then out of its keyed openings from the chassis standoffs. See FIGURE 3-16**.**

FIGURE 3-16 Pulling Out the Power Distribution Board



8. **Install the new PDB:**

   a. **Align the new PDB so that the chassis standoffs protrude through its keyed openings, and then slide the PDB downward to lock it into place.**

   b. **Push down on the edge of the board.**

   c. **Use a No. 1 Phillips screwdriver to tighten the three captive screws that secure the PDB to the chassis. See** FIGURE 3-15**.**

   d. **Verify that the hard disk drive access cover intrusion switch is functioning correctly and is not bent during installation of the PDB. See** "To Replace the Hard Disk Drive Access Cover" on page 3-9**.**

9. **Replace the rear chassis filler panel.**

10. **Replace the power supply cover.**

    a. **Align the mushroom-head pins with the indentations in the cover. This ensures that the intrusion switch is not blocked. For the locations of the mushroom-head pins, see** FIGURE 3-13**.**

    b. **Push down on the cover and then slide the cover forward into place.**

    c. **Replace and tighten the two screws at the rear of the power supply cover.**

11. **Replace all power supplies:**

    a. **Align the power supply with the empty bay in the chassis.**

    b. **With the power supply handle in the down position, push the power supply into the bay. It will stop about three-quarters of the way in when it meets the connector on the PDB.**

    c. **Next, continue to push in and lift the power supply handle up until the power supply fully engages with the PDB (indicated when the thumb-latch clicks into place). The power supply should be flush against the chassis. See** "To Replace a Power Supply" on page 3-26**.**

12. **Replace the system controller. See** "To Replace the System Controller Module" on page 3-28**.**

13. **Replace the hard disk drive access cover. See** "To Replace the Hard Disk Drive Access Cover" on page 3-9**.**

14. **Reconnect AC power cords to the power supplies. Make sue to use the power cord retaining clips to keep power cords secure.**

▼ To Replace a Power Supply

This section describes how to remove and replace a power supply.

The power supplies are fully redundant from 110 to 220 VAC; if one power supply fails, the other power supply will continue to operate.

Note – This component is a hot-swappable CRU and can be replaced by anyone. Hot-swappable means that you do not need to power off the array during replacement. However, you must unplug the power supply to be replaced or the entire system could shut down during removal.

The physical numbering of the two power supplies in the array enclosure is shown on the service label.

1. **Identify which power supply you will replace. Each power supply has one fault LED that you can view from the rear of the array enclosure. If the LED is amber, the power supply is faulty and should be replaced.**

2. **Disconnect the AC power cord from the power supply that you are replacing.**

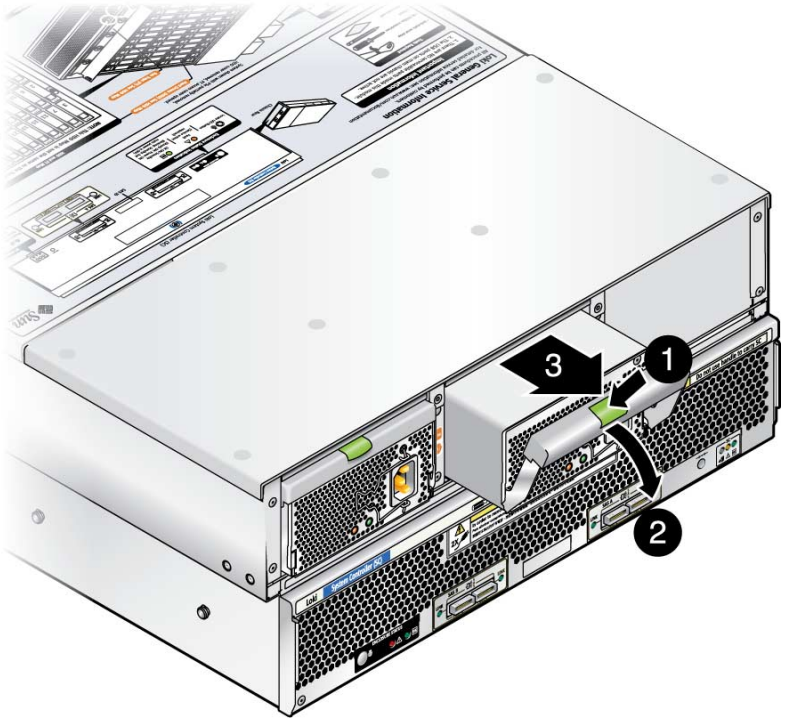
   The power supplies are hot-swappable, so you do not have to shut down the array or disconnect AC power from the other working power supply.

Note – The Service Action Required LEDs on the front panel and back panel blink when a power supply is unplugged. See Section 4.1 "External Status LEDs" on page 4-1 for the LED locations and descriptions.

3. **Remove the power supply.**

   a. **Press down on the thumb latch at the center of the power supply. See** FIGURE 3-17 **or the service label for an illustration.**

FIGURE 3-17 Removing a Power Supply



   b. **While continuing to push on the latch, use the handle to pull the power supply from the chassis with one hand while supporting the power supply weight with the other hand.**

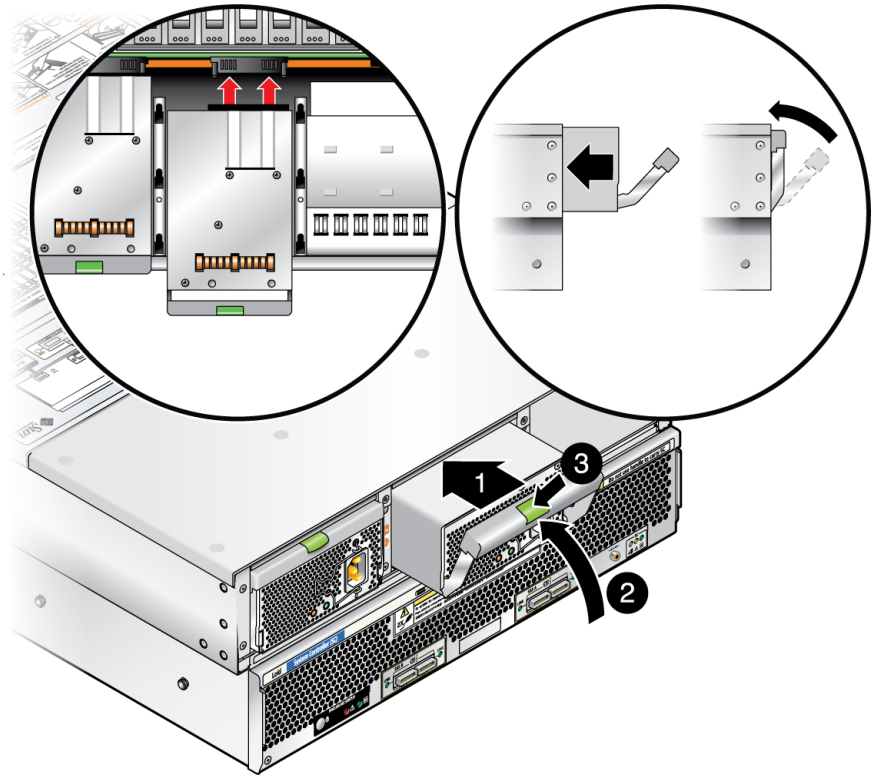
4. **Install the new power supply:**

   a. **Align the power supply with the empty bay in the chassis.**

   b. **With the power supply handle in the down position, push the power supply into the bay. It will stop about three-quarters of the way in when it meets the connector on the power distribution board.**

c. **Next, continue to push in and lift the power supply handle up until the power supply fully engages with the power distribution board (indicated when the thumb-latch clicks into place). The power supply should be flush against the chassis. See** FIGURE 3-18**.**

FIGURE 3-18 Replacing a Power Supply



5. **Connect the AC power cord to the new power supply. Make sure you use the power cord retaining clips to keep the power cord secure.**

▼ To Replace the System Controller Module

The system controller (SC) consists of a sub-enclosure module and board that are removed as a unit from the back of the array enclosure. The system controller board contains the SAS expanders used to access the enclosure's 48 hard disk drives. The module is replaced as a unit—there are no replaceable parts inside.

Note the following before you begin:

- If the array was configured for zoning (array storage divided among multiple initiators), ensure that the zoning configurations created with the Sun Comman Array Manager (version 6.4.1 at a minimum) have been exported to a file. Zoning configurations (including initiator-to-disk access and SAS domain passwords) are saved on the array's SAS expanders in the SC. You will need to import these configurations (per initiator and SAS domain) after you replace the SC. Refer to the chapters on zoning and multipathing in the *Sun Storage J4500 Array System Overview* (820-3163) for proper initiator-to-disk access configuration.
- Be sure that you have first taken the array offline to prevent any host computer processes attempting to accessing it while the system controller is removed.
- Be aware of SATA affiliations. When SATA drives are used, an affiliation (dedication) to the initiator (HBA port) is automatically created. This complies with the SATA protocol and is point-to-point in nature. If multiple initiators are attached to a single SAS fabric (either SAS A or B), the drive-to-initiator affiliation will be arbitrarily chosen which can create potential issues (such as disks or initiators not being seen). Refer to the chapters on zoning and multipathing in the Sun Storage J4500 Array System Overview (820-3163) for proper initiator-to-disk access configuration. Also refer to the *Sun StorageTek Common Array Manager Release Notes* for the version of CAM being used.

Caution – To prevent electrostatic discharge (ESD) damage to the components on the system controller, connect a ground strap between yourself and the chassis ground before proceeding. See FIGURE 3-7.

1. **Disconnect the power cables from the array.**

Caution – Although both power supplies should turn off when you remove the system controller, voltage could be present on the chassis connectors if either power supply did not shut down as expected. Thus, you must disconnect the power cords from the power supplies and wait 20 seconds to avoid any risk from inadvertent contact with those connectors.

2. **Disconnect the SAS cable(s) connected to the system controller (SC) module.**

   You must label where your cables are connected as you disconnect them to ensure correct reconnection to a supported configuration.

3. **Use a Phillips screwdriver to loosen the SC module handle lock screw. See** FIGURE 3-19**.**

4. **Rotate the handle downward and pull the SC module from the chassis with one hand while supporting the system controller weight with the other hand.**

FIGURE 3-19 Removing the SC Module

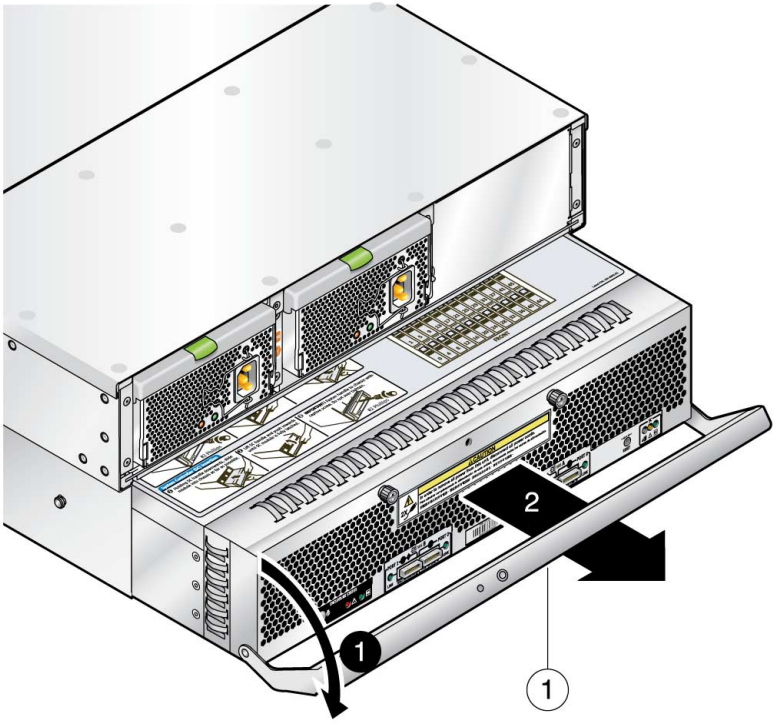


Figure Legend

1	System Controller (SC) handle lock screw location

5. **Slide out the SC module from the chassis.**

   Note that the SC module is connected inside the enclosure to the power distribution board, you may need to exert some pressure to disengage it.

6. **To install the new SC module, first remove the plastic connector covers on the replacement SC module.**

Caution – The module will not plug into the power distribution board with the connector covers on.

7. **Align the SC module with the empty bay in the chassis.**

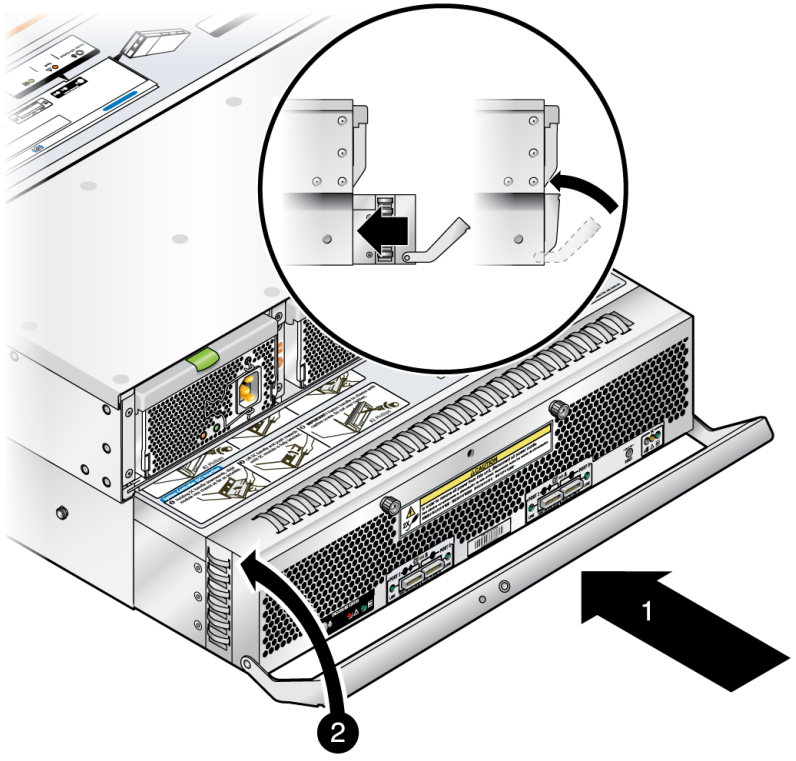
8. **Push the SC module into the bay until it stops (about three-quarters of the way in when it encounters the power distribution board connectors).**

9. **Use your thumbs to apply pressure to the upper right and left corners of the module and firmly push the SC module into place.**

   As the module engages the power distribution board, the module handle will lift into place.

10. **Once the module is fully seated on the power distribution board, finish rotating the SC module handle up and into place (see FIGURE 3-20). Then tighten its securing screw.**

FIGURE 3-20 Replacing the SC Module



11. **Reattach any cables you previously unplugged from the SC module. Ensure that the cables are fully and properly seated.**

12. **Place the plastic connector covers you removed from the new SC module on to the connectors of the defective SC module for return to the factory.**

13. **If the array was configured for zoning or multipathing, you will need to re-establish the appropriate initiator-to-disk access configuration using the Sun Common Array Manager (version 6.4.1 at a minumum).**

    Detailed instructions for configuring zoning and multipathing for the array can be found in the *Sun Storage J4500 Array System Overview* (820-3163) and the *Sun StorageTek Common Array Manager Release Notes* for the version of CAM being used.

▼ To Replace the Array Chassis

This section describes how to replace the array chassis, which includes the chassis, the hard disk drive backplane, and the front indicator board and ribbon cable.

1. **Power off the array enclosure as described in** Chapter 2**.**
2. **Unplug the power cords and SAS cables. Wait 20 seconds for the power supplies to power down.**
3. **Remove the system controller as described in** "To Replace the System Controller Module" on page 3-28**.**
4. **Remove the power supplies as described in** "To Replace a Power Supply" on page 3-26**.**
5. **Remove the fan modules as described in** "To Replace a Fan Module" on page 3-12**.**
6. **Label the hard disks so that you will know which slot to reinstall them in at the end of the procedure.**

Note – When you remove the hard disks from their bays, you must return each hard disk to the equivalent bay in the new chassis. Use an adhesive note or another method to temporarily label the hard disks before you remove them.

---

7. **Remove all hard disks from the drive bays as described in** "To Replace a Hard Disk Drive" on page 3-18**.**
8. **Remove old chassis from the rack as described in** "To Remove the Array Enclosure From the Rack" on page 3-4**.**
9. **Remove the rails attached to the old chassis so that you can put them on the new chassis.**
10. **Install the chassis side rails and slide the new enclosure chassis into the rack. Refer to the** *Sun X4500-J Slide Rail Installation Guide* **(820-1858) on the Sun documentation web site for more information.**

11. **Reinstall all hard disks to the new chassis as described in** "To Replace a Hard Disk Drive" on page 3-18**.**

Note – You must return each hard disk to the bay from which it was removed. If the hard disks were previously configured for RAID (level 1 or higher), an automatic resynchronization should be invoked after the initial power on of the new enclosure to reconfigure the RAID parameters. Any hot spares should also be automatically reconfigured as hot spares.

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12. **Reinstall the power supplies into the new chassis as described in** "To Replace a Power Supply" on page 3-26**.**
13. **Reinstall the fan modules into the new chassis as described in** "To Replace a Fan Module" on page 3-12**.**
14. **Reinstall the SC module into the new chassis as described in** "To Replace the System Controller Module" on page 3-28**.**

3.7 Upgrading Enclosure Firmware

The Storage J4500 array enclosure contains upgradable firmware. You may want to upgrade the enclosure firmware to:

- Install the latest bug fixes and performance enhancements
- Add new features and capabilities as they become available

The Sun Common Array Management (CAM) software provides firmware upgrade capabilities for the J4500 array connected to any supported HBA. For more information on using the CAM software, see the *Sun Storage J4500 Array System Overview* (820-3163).

3.7.1 Ensure Both SAS Fabrics are Upgraded to the Same Firmware Revision Level

The J4500 array contains two SAS fabrics (A and B). Each fabric has its own set of SAS expanders. The firmware upgrade process is only performed on the fabric with the active SAS link to the HBA. When upgrading enclosure firmware, Sun recommends that you upgrade firmware on both SAS fabrics to ensure they are at the same revision level.

This will require you to take the following steps:

1. Using CAM, perform the upgrade on the enclosure's primary SAS fabric.
2. Then, at a convenient time, move the SAS cable to the enclosure's secondary SAS fabric.

   When performing this action, allow time between the removal of the link from the primary fabric and the reconnection to the secondary fabric for your HBA to recover from the lost and then re-established SAS link. Depending on the HBA, this can take up to 2 minutes each time the link state is changed.
3. Using CAM, perform the upgrade on the enclosure's secondary SAS fabric.

CHAPTER 4

Troubleshooting

This chapter contains information about the troubleshooting the Sun Storage J4500 array and includes locations and behaviors of the array enclosure status and fault LEDs. The information is organized to describe external LEDs that can be viewed on the outside of the enclosure, and internal LEDs that can be viewed only with the main cover removed.

The following sections are included:

4.1 External Status LEDs

TABLE 4-1 lists and describes the external LEDs. The front and back panels are shown in FIGURE 4-1.

FIGURE 4-1 Sun Storage J4500 Array Front and Back Panel LEDs

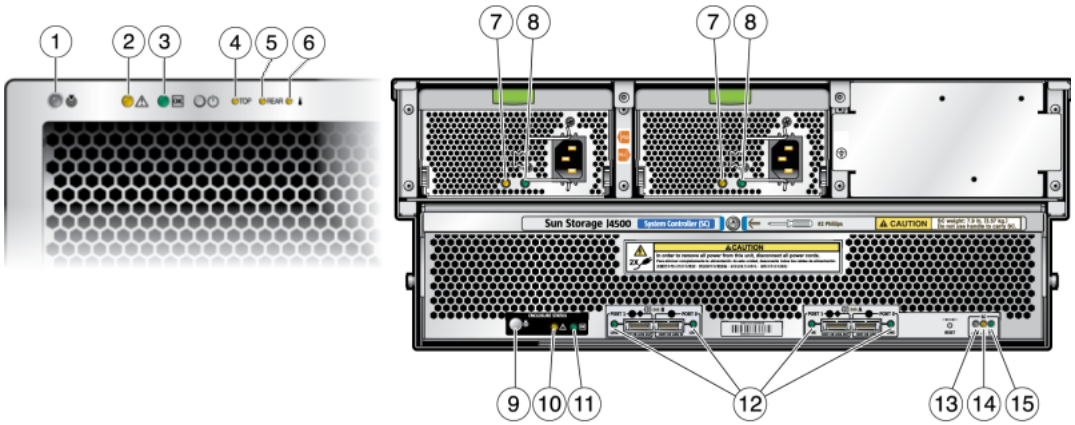

TABLE 4-1 Front and Back Panel LEDs

Figure Callout	Name	Color	Function
1 & 9	Enclosure locate button/LED	White	Operators can turn this LED on remotely to help locate the server in a crowded server room. Press to turn on or off. Pressing the Locate LED/Switch for five seconds turns all indicators on for 15 seconds.
2 & 10	System fault	Amber	Alert/Service action is required.
3 & 11	System power	Green	On – Power is on. Blinking – Standby power is on but main power is off. Off – Power is off.
4	Top fault	Amber	On – Hard disk or fan fault (service is required or should be scheduled).
5	Rear fault	Amber	On – Power supply or system controller fault (service is required).
6	Over temperature	Amber	System over temperature.
7	PS fault	Amber	Service action required.
8	PS OK	Green	On – AC and DC OK. Slow blink – AC OK.
12	SAS link	Green	Each SAS port has a SAS Link Activity LED: On – 1 to 4 links are ready. Blinking – Read/Write port activity. Off – Link is lost.

TABLE 4-1 Front and Back Panel LEDs *(Continued)*

Figure Callout	Name	Color	Function
13	SC ready to remove	Blue	System Controller (SC) service action allowed.
14	SC fault	Amber	Service action required.
15	SC OK	Green	Operational. No action required.

4.2 Internal Disk Drive and Fan LEDs

The array includes internal LEDs on the disk drives and the fan modules.

Note – On fan modules, the green and amber (OK and Fault) LEDs might be on simultaneously. This indicates that one of the fans in the module has failed, the other fan is still operational.

FIGURE 4-2 shows the location of the internal LEDs and a close-up view of the disk drive and fan trays, including the symbols that identify the LEDs. TABLE 4-2 lists the internal LEDs.

FIGURE 4-2 Disk Drive and Fan Tray LEDs (Fans located at the front of the enclosure)

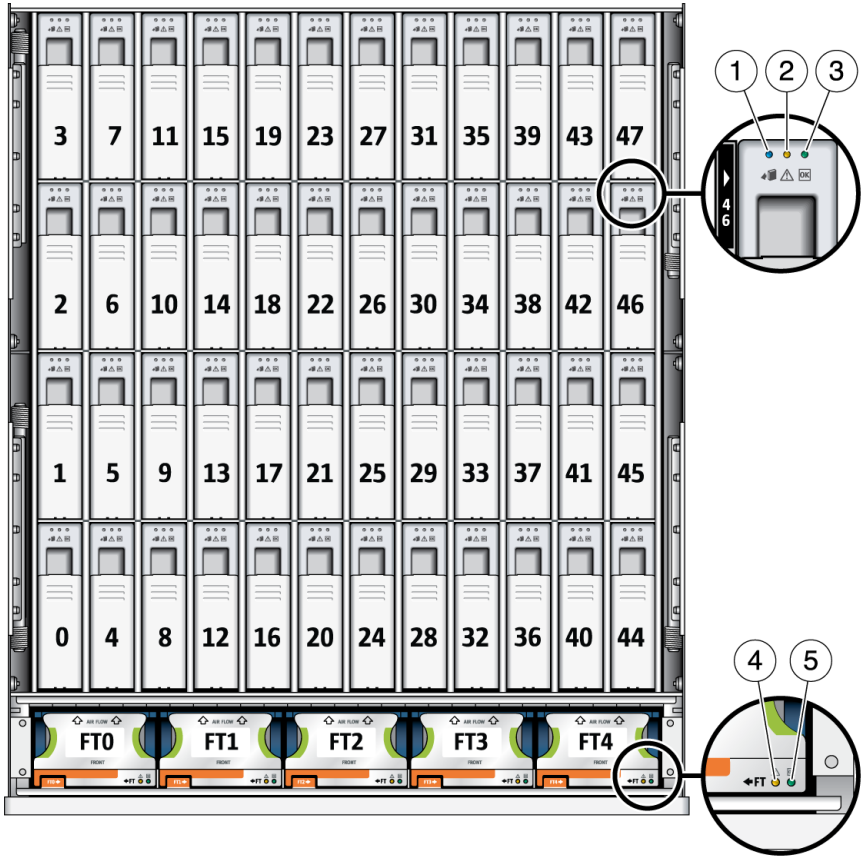

TABLE 4-2 Internal LEDs

Figure Callout	Name	Color	Function
1	Hard disk Ready to Remove	Blue	Service action is allowed.
2	Hard disk Fault	Amber	Service action is required.
3	Hard disk Status	Green	Unit is OK. Blinking = data transfer.
4	Fan Fault	Amber	Fault (Service action required).
5	Fan Status	Green	Unit is OK. (See Note, above).

4.3 Diagnostic and Management Tools

For the most part, you will need to use a combination of HBA and array management tools, log files, and enclosure LEDs to help isolate problems. However, available system level software, such as SunVTS™, may contain additional tools for problem identification/resolution.

4.3.1 SunVTS

SunVTS is the Sun Validation Test Suite, which provides a comprehensive diagnostic tool that tests and validates Sun hardware by verifying the connectivity and functionality of most hardware controllers and devices on Sun platforms. SunVTS software can be tailored with modifiable test instances and processor affinity features.

SunVTS 6.2 or later software might be preinstalled on some Sun servers or included as bootable Diagnostics CD. Booting the system with the CD in the server's internal DVD drive starts SunVTS software. Diagnostic tests run and write output to log files that the service technician can use to isolate problems.

4.3.2 Common Array Manager (CAM)

The Sun StorageTek Common Array Manager (CAM) software includes the Service Advisor application, which provides guided wizards with system feedback for hardware replacement of Customer Replaceable Units (CRUs). In addition, Service Advisor provides troubleshooting procedures for alarms.

Note – All Field Replaceable Units (FRUs) are also CRUs in the J4500 array.

Before you can access Service Advisor procedures, you must have already installed the Common Array Manager software, as described in the *Sun StorageTek Common Array Manager User Guide* for your version of CAM.

Enclosure management (including viewing the event log and upgrading enclosure firmware) and remote command line interface (CLI) functions are performed by the Sun StorageTek Common Array Manager software.

The CRU replacement procedures available through the Sun StorageTek Common Array Manager Service Advisor application include (but are not limited to):

- Disks

- Power Supplies
- Fans
- System Controller
- Chassis

▼ To Access Service Advisor Procedures

To launch Service Advisor and access hardware replacement procedures:

1. **Log on to the Sun Java Web Console on the management software host.**

   For example, `https://management_host_address:6789`

2. **In the Storage section of the Sun Java Web Console page, select Sun StorageTek Common Array Manager.**

   The navigation pane and the Storage System Summary page appear.

3. **Select an array under Storage Systems.**

4. **At the top right of the Storage System Summary page, click the Service Advisor button.**

   The Service Advisor application is displayed in a separate window.

5. **In the left pane, select the type of hardware replacement procedure you want to perform:**
   - CRU/FRU Removal/Replacement Procedures
   - Array Utilities

Note – If you see Service-only procedures listed, these are password protected for access by Sun service personnel only. Contact a Sun service representative for further information and assistance with service only procedures.

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6. **To view a procedure, in the right pane either select it or expand its category, and select the hardware component that corresponds to the procedure.**

▼ To Reserve the Array for Maintenance

Do the following to reserve the array for maintenance. This action will alert other users that a service action is in progress when they login.

1. **From the Service Advisor, click the link to reserve the array for maintenance.**

2. **Enter a description of the service action.**

3. **Select the estimated duration of the service action in hours from the pull-down.**
4. **Select the Reserve button.**
5. **Use the back arrow to return to the procedure.**

▼ To Release the Array After Maintenance

Once the required maintenance has been performed, release the array for normal operation.

- **From Service Advisor, disable the reserve array function by selecting the Release button.**

4.3.2.1 Understanding the CAM Event Log

This section provides a listing of possible J4500 array events, descriptions, and where applicable, Service action recommendations.

Refer to the *Sun StorageTek Common Array Manager User Guide* for your version of CAM for information on viewing system events and configuring automatic notifications.

The severity of an event in CAM is includes one of the following designations:

- Down: Identifies a device or component as not functioning and in need of immediate service.
- Critical: Identifies a device or component in which a significant error condition is detected that requires immediate service.
- Major: Identifies a device or component in which a major error condition is detected and service may be required.
- Minor: Identifies a device or component in which a minor error condition is detected or an event of significance is detected.

Note – When Auto Service Request (ASR) is enabled, it monitors the array system health and performance and automatically notifies the Sun Technical Support Center when critical events occur. Critical alarms generate an Auto Service Request case. The notifications enable SunService to respond faster and more accurately to critical on-site issues.

TABLE 4-3 CAM Events for the Sun Storage J4500 Array

Code	Event Name	Severity	Description
xx.5.13	ValueChangeEvent-.disk	Major/ Critical	The Disk has changed state from OK to something else. Action: A disk may have been removed, or failed. Check the alarm log for additional events.
xx.5.19	ValueChangeEvent-.fan	Major/ Critical	A fan has changed state from OK to something else. Action: Check fan LEDs to locate the fault and replace the faulty fan to ensure nominal system operating temperature.
xx.5.227	ValueChangeEvent-.ps	Major/ Critical	A power supply has changed state from OK to something else. Action: check the event log and chassis fault LEDs to find the trouble. Replace the faulty power supply.
xx.5.586	ValueChangeEvent-.chassis	Major/ Critical	Chassis has had a negative state change. Action: Look for other events that can help identify the problem, check chassis fault LEDs. Replace any failed components.
xx.5.590	ValueChangeEvent-.overTemperatureFailure	Major	The system has detected a critical over-temperature. Action: This event should have shut down the array. Look for other events that can help identify the problem. Check the array's cooling vents and environment. You will need to press the array's power button to re-apply main power to the array, Check chassis fault LEDs and replace any failed components.
xx.5.591	ValueChangeEvent-.overTemperatureWarning	Major	The system has detected a warning temperature. Action: Look for other events that can help identify the problem. Check the array's cooling vents and environment. Check chassis fault LEDs and replace any failed components.
xx.11.21	CommunicationEstablishedEvent.ib	Minor	Indicates that communication has been re-gained to the storage array via the in-band path.
xx.12.21	CommunicationLostEvent.ib	Major/ Critical	Indicates that communication has been lost to the array, and that the last path successfully used was the in-band communication path.
xx.12.31	CommunicationLostEvent.oob	Major/ Critical	Indicates that communication has been lost to the proxy host connected to the storage array.
xx.14.16	DiscoveryEvent	Minor	Indicates that the discovery of an array or proxy host containing one or more arrays has occurred.

TABLE 4-3 CAM Events for the Sun Storage J4500 Array *(Continued)*

Code	Event Name	Severity	Description
xx.41.13	ComponentRemoveEvent.disk	Major/ Critical	A disk has changed state from OK to a removed state. Action: Check the alarm log to determine whether the disk has failed or has been removed for maintenance.
xx.41.19	ComponentRemoveEvent.fan	Minor	A fan has changed state from OK to a removed state. Action: Check the alarm log to determine whether the fan has failed or has been removed for maintenance.
xx.41.227	ComponentRemoveEvent.ps	Minor	A power supply has changed state from OK to a removed state. Action: Check the alarm log to determine whether the power supply has failed or has been removed for maintenance.
xx.75.42	RevisionDeltaEvent.revision	Minor	The firmware revision of the enclosure is not at baseline. Action: upgrade firmware to baseline.

4.4 Troubleshooting Problems with the Array

The following sections describe how to troubleshoot problems you may experience with the J4500 array.

- "Initial Start-up" on page 9
- "Check the Event and Performance Logs" on page 10
- "Using the Array Management Software to Monitor Enclosure Health" on page 11
- "Array Link Problems" on page 11
- "Disk Problems" on page 13
- "Array Environment Problems" on page 15
- "Power Problems" on page 16

4.4.1 Initial Start-up

If you are unable to see the array drives after powering on the array, check the following:

- Ensure all cables are properly connected (power and SAS).

- Be sure you are using SAS cables supported for use with the array. Using longer, or non-certified cables is not supported. For a list of supported cables, see Section 3.1 “Options and Replaceable Components” on page 3-1.
- You should carefully follow the configuration rules listed in Section 2.1 “Configuration and Cabling” on page 2-1. Not following these rules could result in an unsupported configuration.
- Check the array indicator LEDs to make sure all components are operating normally and the link LEDs are green.
- The proper startup sequence for the enclosure is to power-on the enclosure first, wait one minute, then power-up the server.

4.4.2 Check the Event and Performance Logs

The operating system event log is a good first place to start in identifying problems or potential issues with the enclosure or its disks. If you experience disk problems, such as disk errors or invalid read/writes, the system event log can help identify the problem disk.

Note – By default, errors for the enclosure (temperature, voltage, device status), may not be logged in the system event log, but only in the array management software event log. If you want errors to be forwarded to the system event log, refer to the HBA documentation to see if it supports this feature.

You may have problems with the array listed in multiple log files (system and HBA). If this is the case, concentrate on recent errors that best relate to the problem. Try to pinpoint the time when problems began to appear. Search through the log files as soon as possible for when the problems first appeared—log files can quickly fill up with errors and some information may be lost.

4.4.2.1 Identifying Disks in the Array Enclosure

Disks in the array enclosure are typically identified by the operating system in sequential order in a list of 51 devices; the first 4 addresses (0-3) represent the array's four SAS expanders, the other 48 addresses (4-51) represent the 48 hard disks. Drives are mapped in numerical order as shown on the drive map label on the top of the array enclosure. Device names and address information depends on other mass storage devices attached to the server and where the array’s HBA is located in the PCI bus boot order.

4.4.3 Using the Array Management Software to Monitor Enclosure Health

Your J4500 array supports a powerful set of SMP (Serial Management Protocol) and SES-2 (SCSI Enclosure Services) enclosure management features. Some or all of these features are available through supported management software (for example, the Sun Common Array Manager, or the Sun StorageTek RAID Manager software) to provide a system administrator at the array-connected server or network-connected management console the following capabilities:

- Monitor the enclosure status (on/off line status, component health)
- Monitor the enclosure environment (voltage and temperature)
- Remotely identify and locate enclosure components
- Obtain FRU identification and status (expanders, hard disks, fans, power supplies)
- Remove and install FRU components
- Remotely reset the enclosure hardware
- Remotely upgrade the enclosure's firmware (expanders and hard disk—must use CAM)
- View the enclosure event log to aid in troubleshooting

Refer to the *Sun Storage J4500 Array System Overview* (820-3163) for more information on array management software.

4.4.4 Array Link Problems

You may encounter a problem where the server is unable to communicate with the array. Complete the following troubleshooting tasks to reestablish communications with the array.

- Check the SAS link LEDs at the rear of the enclosure (see Section 4.1 "External Status LEDs" on page 4-1) to ensure the ports are properly communicating with the HBA. Each SAS port has a SAS Link Activity LED. The following LED states will be viewable:
  - On – 1 to 4 links are ready.
  - Blink – Read/Write port activity.
  - Off – Link is lost.
- If the link LED is off, check the SAS cables for proper connection. Ensure that the cables are supported for the enclosure (refer to Section 3.1 "Options and Replaceable Components" on page 3-1).

- If you can not reestablish communication with the server, you can try resetting the enclosure hardware. The enclosure hardware may be reset with the power on. See Section 4.5 "Resetting the Enclosure Hardware" on page 4-16. You may also remotely reset the enclosure through the Sun Common Array Manager.
- There may be a problem with SAS fabric you are using. Try using the redundant fabric. If you have daisy chained J4500 arrays, be sure to move all cable connections to the redundant fabric—only one SAS fabric (SAS A or SAS B) may be used per HBA port connection. Cross fabric connections on an array enclosure (SAS A to SAS B) are not supported.
- There may be a problem with the SAS cable. The cable might be damaged and either prevents communication, or it may allow only degraded communication (which can manifest itself in poor array performance). The array comes with two cables, try attaching a new SAS cable.
- Review the Sun and server operating system vendor knowledge base to see if the problem is a known issue with a solution, also see the Sun support site `http://www.sun.com/support`. The J4500 array SAS expanders have firmware that may be upgraded as fixes and new features become available from Sun. For more information on upgrading enclosure firmware, see Section 3.7 "Upgrading Enclosure Firmware" on page 3-33.

4.4.4.1 Switching SAS Cables or Making New Connections

In a single path environment: If your J4500 array is connected to the StorageTek SAS RAID External HBA, and you switch a cable from one port of the HBA to the other port on the HBA, you should wait long enough after the initial cable pull for all the physical hard drives shown in the GUI or through the CLI to be removed from the display. This prevents the problem of the controller attempting to remove drives at the same time it is reading the same drives on another port. If no display is available, you should wait at least 2 minutes between pull and reconnect.

In a multipath environment: Since the J4500 array uses SATA drives, the potential for SATA affiliation conflicts exists. Conflict can occur when more than one initiator tries to access the drive via the same path (for example, two hosts attached to SAS A on a J4500 array), or if you move an established connection from one domain port to another (for example, from port 0 to port 1). Possible symptoms of SATA affiliation conflicts are: operating system hangs, zoning operations take longer than 10 minutes to complete, and/or disk utilities like "format" will not return device lists in a timely fashion. For more about SATA affiliations, see the *Sun Storage J4500 Array System Overview* (820-3163).

4.4.5 Disk Problems

Issues with array disks might be identified by viewing the system event log, being alerted by your array management software, or by viewing the J4500 array's LEDs. In the event of a disk failure, the disk may be replaced with the array online.

▼ To Replace a Disk

If the disk must be replaced, complete the following tasks:

1. **Slide the J4500 array out of the rack far enough to remove the disk top cover panel. See** "To Remove the Hard Disk Drive Access Cover" on page 3-9**.**
2. **To replace a disk, use the operating system, or enclosure management software command to unmount the disk and prepare it for removal. This is required to isolate the disk and stop all read/write activity.**
3. **Identify the physical disk to be removed by looking for the blue ready-to-remove LED, or the amber failed LED, on the disk. Then, remove the disk. For step-by-step procedures for removing disks from the enclosure, see** "To Replace a Hard Disk Drive" on page 3-18**.**
4. **Replace the disk, then use the operating system or enclosure management software commands to remount the disk. If the disk is part of a RAID volume, it will automatically rebuild with the required data after replacement.**

4.4.5.1 Guidelines for Removal and Replacement of RAID Storage

When removing and replacing RAID disks in the J4500 array, use the following guidelines:

- Perform RAID disk removal and replacement procedures with the system powered on. That way, the HBA can update its RAID configuration information.
- When removing and replacing disks, allow enough time between each operation for the HBA to update the RAID configuration information. When hot-plugging non-failed drives for test purposes, you should wait a full minute after removal before reinserting the drive.

4.4.5.2 Persistent Affiliation When Changing HBAs

When connecting your array to an HBA, it is possible that the SAS "affiliation" feature may cause problems if the array was previously connected to another HBA. An affiliation is used by the SAS protocol to prevent multiple SAS initiators (HBAs)

from interfering with each other when communicating with SATA drives. If you encounter such a problem, affiliations may be removed by power cycling the array enclosure prior to connecting it to a different HBA.

4.4.5.3 If You Do Not See All of the 48 Disks

If you see only some of the available disks (for example, if you see only 20 or 28 of the total 48 disks), try the following:

- Look through the vents at the back of the System Controller module to see if the 4 green expander heartbeat LEDs are blinking. If not, try power cycling the array.
- If the problem occurs repeatedly, there might be a problem with the System Controller module. Check in the Sun Common Array Manager (CAM) to see if the array is at firmware baseline, if not, you should upgrade the array firmware.
- If updating the array firmware does not solve the problem, the System Controller module may need to be replaced. For step-by-step procedures for replacing the System Controller module, , refer to "To Replace the System Controller Module" on page 3-28.
- If you have moved SAS cables from one port to another, you may have SATA affiliation conflicts. Conflict can occur when more than one initiator tries to access the drive via the same path (for example, two hosts attached to SAS A on a J4500 array), or if you move an established connection from one domain port to another (for example, from port 0 to port 1). Possible symptoms of SATA affiliation conflicts are: operating system hangs, zoning operations take longer than 10 minutes to complete, and/or disk utilities like "format" will not return device lists in a timely fashion. Refer to the chapters on zoning and multipathing in the Sun Storage J4500 Array System Overview (820-3163) for proper initiator-to-disk access configuration. Also refer to the *Sun StorageTek Common Array Manager Release Notes* for the version of CAM being used.

4.4.5.4 Multipath Problems With Unsupported Drives

Only SATA hard disk drives supported for use with the J4500 array may be used for multipathing. If you install an unsupported drive, you might get the following error in the System Event Log and you will be unable to configure the drive for multipath:

```
Target:2, lun:0 doesn't have a valid GUID, multi pathing for
this drive is not enabled
```

This error means that the drive does not have a SAS WWN (World Wide Name). All drives supported for use with the J4500 array have a unique WWN. The WWN does not change even if the drive firmware is upgraded.

At the release of this document, the following Sun hard disk drives are supported for use in the J4500 array (check the label on the drive to verify it is a supported):

- HUA7250SBSUN500G A90A Hitachi 500 GB SATA 390-0384-02
- HUA7275SASUN750G A90A Hitachi 750 GB SATA 390-0379-02
- HUA7210SASUN1.0T A90A Hitachi 1.0 TB SATA 390-0381-012
- ST35002NSSUN500G SU0B Seagate 500GB SATA 390-0412-02
- ST37502NSSUN750G SU0B Seagate 750GB SATA 390-0413-02
- ST31000NSSUN1.0T SU0B Seagate 1.0 TB SATA 390-0414-02

Note – The J4500 array is shipped from the factory with drives of the same capacity. Mixing drives of different capacities in the array is unsupported. Refer to the *Sun Storage J4500 Array Product Notes* (820-3162) for updated information.

4.4.6 Array Environment Problems

The array enclosure needs to operate within a specific temperature range (below 35 ˚C or 95 ˚F). If the internal temperature is above that, the fans automatically increase in speed when a thermal threshold is reached. This could be a reaction to higher external ambient temperatures in the local environment. If the fan noise level and tone seem high, check to ensure there is no airflow restriction raising the enclosure's internal temperature.

If an excessive temperature threshold is reached that could damage components in the enclosure, the J4500 array Over Temperature LED will light. If this happens do the following:

- Use your array management software to check for a faulty fan. An enclosure fan is a hot-swappable and may be replaced with the power on. The fans include status LEDs to identify a faulty fan. For step-by-step procedures for replacing enclosure fans, refer to "To Replace a Fan Module" on page 3-12.
- Check that there is clear, uninterrupted airflow at the front and rear of the storage system.
- Check for enclosure intake restrictions due to dust buildup and clear them.
- Check for excessive recirculation of heated air from the rear of the array enclosure to the front.
- Reduce the ambient temperature in the room where the array enclosure is racked.

4.4.7 Power Problems

The J4500 array includes redundant, hot-swappable power supplies. If a power supply fails, you may be alerted by the array management software or the enclosure power supply status LEDs (an alert LED will light amber both at the front and rear of the enclosure when service is required). For step-by-step procedures for replacing an array power supply, see "To Replace a Power Supply" on page 3-26.

4.5 Resetting the Enclosure Hardware

In the event the array becomes non-responsive to host commands or you cannot see its disks, you may need to reset the array enclosure hardware. You can reset the array with the power on. The array takes about 1 minute to reset before relinking to the host.

Note – The enclosure may be reset remotely using the Common Array Manager (CAM) software.

▼ To Reset the Enclosure Hardware Using the Reset Button

Resetting the array is done by pressing a recessed button at the rear of the enclosure (see FIGURE 4-3). The array may also be reset remotely using the Sun Common Array Manager.

Note – This procedure should only be performed after you've checked of other problems at the server and have shut down all server processes that are actively accessing the J4500 array.

---

1. **At the back of the J4500 array, locate the enclosure Reset button (see FIGURE 4-3).**
2. **Using a paper clip or stylus, press and release the recessed button on the back panel.**

   The reset process takes about 1 minute. After that, the server should see the array disks.

FIGURE 4-3 Enclosure Reset Button Location

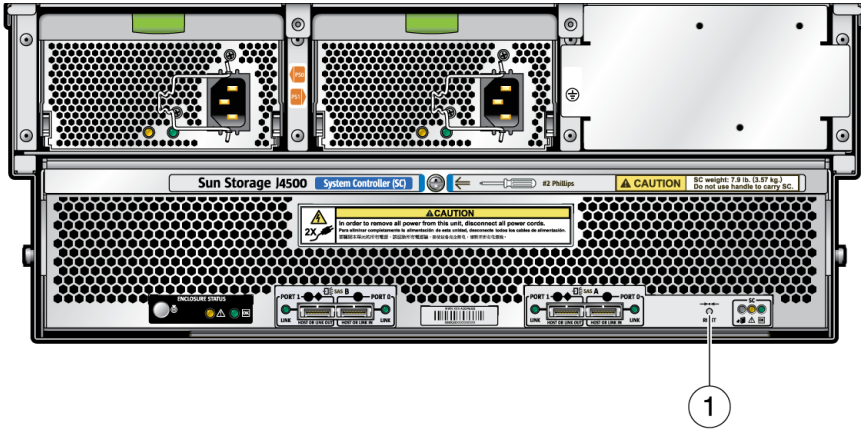

Figure Legend

1	Enclosure Reset button

4.6 Clearing the Enclosure Zoning Password

When creating storage zones on your J4500 array, use the Common Array Manager (CAM). CAM allows you to set a zoning password for each of the array's SAS domains (each domain equates to one of the array's SAS fabrics: A or B). The zoning passwords are stored in the array expanders and in CAM, and are used to prevent unauthorized changes to storage zones. If the array's zoning password is ever forgotten, or becomes corrupt, it can be cleared using the enclosure zoning password clear button on the back of the J4500 array.

Note – Using the enclosure zoning password clear button clears the zoning password for both of the J4500 array's SAS domains. It does not clear zoning configurations.

After clearing the zoning password on the array enclosure, you will also need to clear the zoning password for each of the array's SAS domains stored in CAM. This can be done from the CAM management host. Once the password is cleared in both places, you can use CAM to assign a new password to each of the array's SAS domains.

Note – Clearing the password in both places is important to ensure the passwords stored in the array and in CAM match. Some CAM array maintence operations use the enclosure zone password during execution to ensure the action is authorized.

▼ To Clear the Enclosure Zoning Password

Clearing the enclosure zoning password is done by pressing a recessed button at the rear of the array. This operation may be performed with the enclosure running.

1. **At the back of the J4500 array, locate the Enclosure Zoning Password Clear button (see** FIGURE 4-4**).**

2. **Using a paper clip, press and hold the recessed button on the back panel for five seconds and then release.**

   The enclosure zoning password for both SAS fabrics (A and B) is cleared.

FIGURE 4-4 Enclosure Zoning Password Clear Button

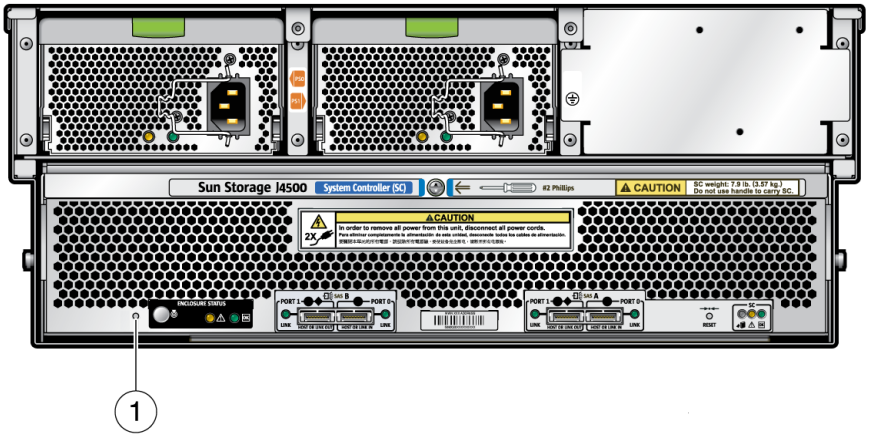

Figure Legend

1	Enclosure Zoning Password Clear button

3. **From the CAM management host, select Clear password from the Administration page and saving the setting for both of the array's SAS domains.**

   Once that is done, you can assign new zoning passwords using CAM.

APPENDIX **A**

System Specifications

This appendix contains physical, power, environmental, acoustic noise emission and disk mapping specifications for the Sun Storage J4500 array.

TABLE A-1 Sun Storage J4500 Array Physical Specifications

Specification	Value
Width	17.28 inches (439 mm)
Height	6.89 inches (175.05 mm)
Depth	• 29.52 inches (749.90 mm) for enclosure • 3 inches (77 mm) for cables
Weight	170 pounds (77 Kg) max

TABLE A-2 Sun Storage J4500 Array Power Specifications

Specification	Value
Universal AC Input	110–220 VAC
Input power (min-max)	90-264 VAC
Input frequency (min-max)	47/63 Hz
Maximum power output per power supply	1500 Watts
Heat output	1020 Watts (3515 BTU/hr = 0.292 tons of air conditioning)

TABLE A-2 Sun Storage J4500 Array Power Specifications *(Continued)*

Specification	Value
Maximum air flow	200 CFM
Maximum power consumption	1100 Watts
Maximum operating current	10 Amps maximum operating @ 110 VAC (100 VAC to 127 VAC range), 47 to 63 Hz 5 Amps maximum operating @ 220 VAC (198 VAC to 264 VAC range), 50 to 60 Hz

TABLE A-3 Sun Storage J4500 Array Environmental Specifications

Specification	Value
Operating temperature	5° to 35° C (41° to 95° F)
Operating humidity	10% to 90% relative humidity, 27º C max. wet bulb (noncondensing)
Operating altitude	Up to 3000 meters (9843 feet), maximum ambient temperature is derated by 1 º C per 500 meters above 500 meters
Storage temperature	-40° to 65° C (-40° to 149° F)
Storage humidity	Up to 93% relative humidity, 38 ºC max. wet bulb (noncondensing)
Nonoperating altitude	Up to 4000 meters (13,123 feet)
Operating shock	3 G, 11 msec, half-sine
Operating vibration	Swept sine, vertical (Z) axis: 0.15G, 0-peak, 5 Hz to 500 Hz; swept sine, horizontal (X,Y) axes: 0.10G, 0-peak, 5 Hz to 500 Hz

TABLE A-4 contains the declared noise emissions in accordance with ISO 9296, A-weighted, operating, and idling.

TABLE A-4 Sun Storage J4500 Array Acoustic Noise Emission Specifications

Specification	28C and below	Above 28C
Acoustic noise	Less than 83 dB sound power in ambient temperature of up to 24º C	
LwAd operating and idle	8.0 B	8.5 B
LpAm	70 dB	75 dB

FIGURE A-1 shows the hard disk numbering scheme. The hardware SATA port number is composite of two numbers, x/y, x is the expander's number (0-3), y is the expander's phy port number (0- 47). For example, 0/4 means expander 0/phy 4, each hard disk connected to two SATA phy ports through an active-active mux.

FIGURE A-1 Hard Disk Drive Phy Map

SAS Expander 0 or 2 Control 20 hard disks					SAS Expander 1 or 3 Control 28 hard disks						
phy #0/3 phy #2/3 Disk #3	phy #0/7 phy #2/7 Disk #7	phy #0/11 phy #2/11 Disk #11	phy #0/15 phy #2/15 Disk #15	phy #0/19 phy #2/19 Disk #19	phy #1/3 phy #3/3 Disk #23	phy #1/7 phy #3/7 Disk #27	phy #1/11 phy #3/11 Disk #31	phy #1/15 phy #3/15 Disk #35	phy #1/19 phy #3/19 Disk #39	phy #1/23 phy #3/23 Disk #43	phy #1/27 phy #3/27 Disk #47
phy #0/2 phy #2/2 Disk #2	phy #0/6 phy #2/6 Disk #6	phy #0/10 phy #2/10 Disk #10	phy #0/14 phy #2/14 Disk #14	phy #0/18 phy #2/18 Disk #18	phy #1/2 phy #3/2 Disk #22	phy #1/6 phy #3/6 Disk #26	phy #1/10 phy #3/10 Disk #30	phy #1/14 phy #3/14 Disk #34	phy #1/18 phy #3/18 Disk #38	phy #1/22 phy #3/22 Disk #42	phy #1/26 phy #3/26 Disk #46
phy #0/1 phy #2/1 Disk #1	phy #0/5 phy #2/5 Disk #5	phy #0/9 phy #2/9 Disk #9	phy #0/13 phy #2/13 Disk #13	phy #0/17 phy #2/17 Disk #17	phy #1/1 phy #3/1 Disk #21	phy #1/5 phy #3/5 Disk #25	phy #1/9 phy #3/9 Disk #29	phy #1/13 phy #3/13 Disk #33	phy #1/17 phy #3/17 Disk #37	phy #1/21 phy #3/21 Disk #41	phy #1/25 phy #3/25 Disk #45
phy #0/0 phy #2/0 Disk #0	phy #0/4 phy #2/4 Disk #4	phy #0/8 phy #2/8 Disk #8	phy #0/12 phy #2/12 Disk #12	phy #0/16 phy #2/16 Disk #16	phy #1/0 phy #3/0 Disk #20	phy #1/4 phy #3/4 Disk #24	phy #1/8 phy #3/8 Disk #28	phy #1/12 phy #3/12 Disk #32	phy #1/16 phy #3/16 Disk #36	phy #1/20 phy #3/20 Disk #40	phy #1/24 phy #3/24 Disk #44
Fan Tray #0		Fan Tray #1			Fan Tray #2		Fan Tray #3			Fan Tray #4	

APPENDIX **B**

Connector Pinouts

This appendix contains information about the Sun Storage J4500 array's connector pinouts for the following connectors:

B.1 Mini-SAS Connectors

The table below defines the pin assignments for mini-SAS x4 receptacle connectors for applications using up to four of the physical links. Be sure you use supported mini-SAS x4 (SFF-8088) cables with these connectors (see Section 3.1 "Options and Replaceable Components" on page 3-1).

FIGURE B-1 Mini-SAS x4 Connectors

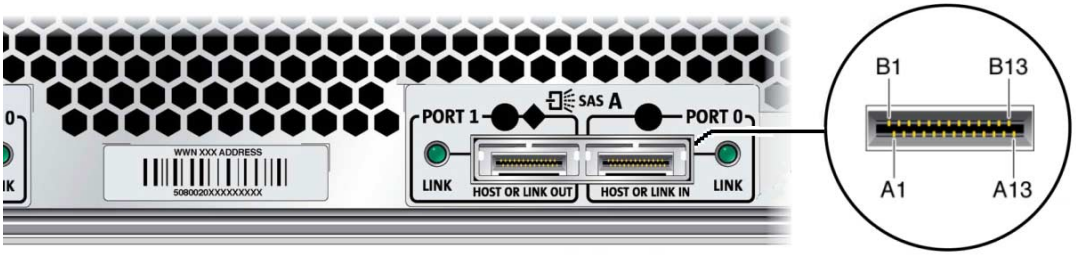

TABLE B-1 Mini-SAS x4 External Connector Pinout

	Pin Signals Based on Physical Links Supported by the Cable			
Signal	**One**	**Two**	**Three**	**Four**
RX0+	A2	A2	A2	A2
RX0-	A3	A3	A3	A3
RX1+	not connected	A5	A5	A5
RX1-	not connected	A6	A6	A6
RX2+	not connected	not connected	A8	A8
RX2-	not connected	not connected	A9	A9
RX3+	not connected	not connected	not connected	A11
RX3-	not connected	not connected	not connected	A12
TX0+	B2	B2	B2	B2
TX0-	B3	B3	B3	B3
TX1+	not connected	B5	B5	B5
TX1-	not connected	B6	B6	B6
TX2+	not connected	not connected	B8	B8
TX2-	not connected	not connected	B9	B9
TX3+	not connected	not connected	not connected	B11
TX3-	not connected	not connected	not connected	B12
GND	A1, A4, A7, A10, A13, B1, B4, B7, B10, B13			

B.2 I/O-to-Disk Backplane Connectors

There are three connectors between the I/O and disk backplane:

- Power Blade Connector, J23 to J50. See TABLE B-2
- Two High-Speed Dock Connectors, J24 to J49, and J25 to J51. See FIGURE B-2, TABLE B-3 and TABLE B-4.

B.2.1 Power Blade Connector

This connector has ten blades and 20 signal pins, with a 30A limit per blade.

TABLE B-2 Power Blade Connector

Pin	Pin Name	Pin	Pin Name	Pin	Pin Name	Pin	Pin Name
A1	FAN4_CTL0	B1	FAN4_CTL0	C1	FAN4_CTL1	D1	FAN4_CTL1
A2	FAN3_CTL0	B2	FAN3_CTL0	C2	FAN3_CTL1	D2	FAN3_CTL1
A3	FAN2_CTL0	B3	FAN2_CTL0	C3	FAN2_CTL1	D3	FAN2_CTL1
A4	FAN1_CTL0	B4	FAN1_CTL0	C4	FAN1_CTL1	D4	FAN1_CTL1
A5	FAN0_CTL0	B5	FAN0_CTL0	C5	FAN0_CTL1	D5	FAN0_CTL1
			Blade 1				5V_DISK
			Blade 2				5V_DISK
			Blade 3				GND
			Blade 4				GND
			Blade 5				GND
			Blade 6				+12V
			Blade 7				GND
			Blade 8				+12V
			Blade 9				GND
			Blade 10				+12V

B.2.2 High-Speed Dock Connectors

Each disk drive uses two 111-circuit Hi-Speed Dock connectors. See in FIGURE B-2.

FIGURE B-2 High-Speed Dock Connectors

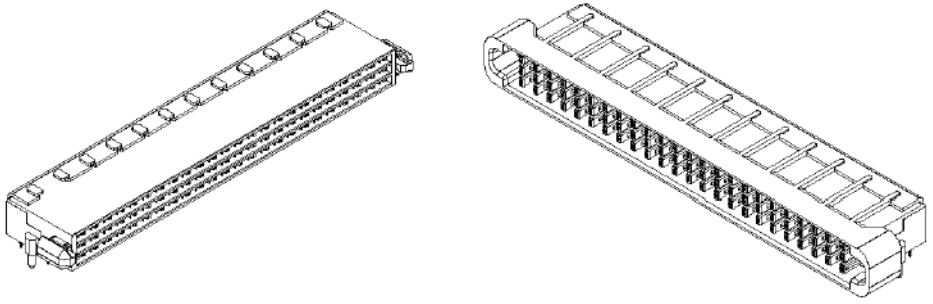

TABLE B-3 I/O-to-Disk Backplane (J24 to J49) Connector Pinouts

Pin	Pin Name	Pin	Pin Name	Pin	Pin Name
A1	FRONT_USB_P	B1	SHORT_PIN1	C1	POWER_BUTTON_L
A2	FRONT_USB_N	B2	P3_3V	C2	LOCATE_BUTTON_L
A3	5V_AUX	B3	5V_AUX	C3	P5V
A4	PS2_BATT_L	B4	GND	C4	GND
A5	DISK36_TX_P	B5	DISK36_RX_N	C5	DISK24_TX_P
A6	DISK36_TX_N	B6	DISK36_RX_P	C6	DISK24_TX_N
A7	DISK24_RX_N	B7	DISK12_TX_P	C7	DISK12_RX_N
A8	DISK24_RX_P	B8	DISK12_TX_N	C8	DISK12_RX_P
A9	DISK36_ACT_LED_L	B9	DISK24_ACT_LED_L	C9	DISK12_ACT_LED_L
A10	DISK13_ACT_LED_L	B10	DISK1_ACT_LED_L	C10	DISK0_ACT_LED_L
A11	DISK0_TX_P	B11	DISK0_RX_N	C11	DISK1_RX_P
A12	DISK0_TX_N	B12	DISK0_RX_P	C12	DISK1_RX_N
A13	DISK1_TX_N	B13	DISK13_RX_P	C13	DISK13_TX_N
A14	DISK1_TX_P	B14	DISK13_RX_N	C14	DISK13_TX_P
A15	DISK25_RX_P	B15	DISK25_TX_N	C15	DISK37_RX_P
A16	DISK25_RX_N	B16	DISK25_TX_P	C16	DISK37_RX_N
A17	DISK37_TX_N	B17	DISK2_RX_P	C17	DISK2_TX_N
A18	DISK37_TX_P	B18	DISK2_RX_N	C18	DISK2_TX_P
A19	DISK25_ACT_LED_L	B19	DISK37_ACT_LED_L	C19	DISK2_ACT_LED_L
A20	DISK38_ACT_LED_L	B20	DISK26_ACT_LED_L	C20	DISK14_ACT_LED_L
A21	DISK14_RX_P	B21	DISK14_TX_N	C21	DISK26_RX_P

TABLE B-3 I/O-to-Disk Backplane (J24 to J49) Connector Pinouts *(Continued)*

Pin	Pin Name	Pin	Pin Name	Pin	Pin Name
A22	DISK14_RX_N	B22	DISK14_TX_P	C22	DISK26_RX_N
A23	DISK26_TX_N	B23	DISK38_RX_P	C23	DISK38_TX_N
A24	DISK26_TX_P	B24	DISK38_RX_N	C24	DISK38_TX_P
A25	DISK3_RX_P	B25	DISK3_TX_N	C25	DISK15_RX_P
A26	DISK3_RX_N	B26	DISK3_TX_P	C26	DISK15_RX_N
A27	DISK15_TX_N	B27	DISK27_RX_P	C27	DISK27_TX_N
A28	DISK15_TX_P	B28	DISK27_RX_N	C28	DISK27_TX_P
A29	DISK3_ACT_LED_L	B29	DISK15_ACT_LED_L	C29	DISK27_ACT_LED_L
A30	DISK16_ACT_LED_L	B30	DISK4_ACT_LED_L	C30	DISK39_ACT_LED_L
A31	DISK39_RX_P	B31	DISK39_TX_N	C31	DISK4_RX_P
A32	DISK39_RX_N	B32	DISK39_TX_P	C32	DISK4_RX_N
A33	DISK4_TX_N	B33	DISK16_RX_P	C33	DISK16_TX_N
A34	DISK4_TX_P	B34	DISK16_RX_N	C34	DISK16_TX_P
A35	DISK28_RX_P	B35	DISK28_TX_N	C35	DISK40_RX_P
A36	DISK28_RX_N	B36	DISK28_TX_P	C36	DISK40_RX_N
A37	DISK40_TX_N	B37	DISK5_RX_P	C37	DISK5_TX_N
A38	DISK40_TX_P	B38	DISK5_RX_N	C38	DISK5_TX_P
A39	DISK28_ACT_LED_L	B39	DISK40_ACT_LED_L	C39	DISK5_ACT_LED_L
A40	DISK41_ACT_LED_L	B40	DISK29_ACT_LED_L	C40	DISK17_ACT_LED_L
A41	DISK17_RX_P	B41	DISK17_TX_N	C41	DISK29_RX_P
A42	DISK17_RX_N	B42	DISK17_TX_P	C42	DISK29_RX_N
A43	DISK29_TX_N	B43	DISK41_RX_P	C43	DISK41_TX_N
A44	DISK29_TX_P	B44	DISK41_RX_N	C44	DISK41_TX_P
A45	3_3AUX_IN	B45	3_3AUX_IN	C45	3_3AUX_IN
A46	GND	B46	5V_DISK_SENSE_N	C46	GND
A47	3_3_AUX_SENSE_P	B47	5V_DISK_SENSE_P	C47	SP_I2C_CLK
A48	3_3_AUX_SENSE_N	B48	MAMMOTH_INT_L	C48	SP_I2C_DAT

TABLE B-4 I/O-to-Backplane (J25 to J51) Connector Pinouts

Pin	Pin Name	Pin	Pin Name	Pin	Pin Name
A1	12V_SENSE_P	B1	3_3AUX_POWERGOOD	C1	VDD_RTC
A2	12V_SENSE_N	B2	PS1_ENABLE_L	C2	PS0_ENABLE_L
A3	DISK6_RX_P	B3	DISK6_TX_N	C3	DISK18_RX_P
A4	DISK6_RX_N	B4	DISK6_TX_P	C4	DISK18_RX_N
A5	DISK18_TX_N	B5	DISK30_RX_P	C5	DISK30_TX_N
A6	DISK18_TX_P	B6	DISK30_RX_N	C6	DISK30_TX_P
A7	DISK6_ACT_LED_L	B7	DISK18_ACT_LED_L	C7	DISK30_ACT_LED_L
A8	DISK19_ACT_LED_L	B8	DISK7_ACT_LED_L	C8	DISK42_ACT_LED_L
A9	DISK42_RX_P	B9	DISK42_TX_N	C9	DISK7_RX_P
A10	DISK42_RX_N	B10	DISK42_TX_P	C10	DISK7_RX_N
A11	DISK7_TX_N	B11	DISK19_RX_P	C11	DISK19_TX_N
A12	DISK7_TX_P	B12	DISK19_RX_N	C12	DISK19_TX_P
A13	DISK31_RX_P	B13	DISK31_TX_N	C13	DISK43_RX_P
A14	DISK31_RX_N	B14	DISK31_TX_P	C14	DISK43_RX_N
A15	DISK43_TX_N	B15	DISK8_RX_P	C15	DISK8_TX_N
A16	DISK43_TX_P	B16	DISK8_RX_N	C16	DISK8_TX_P
A17	DISK31_ACT_LED_L	B17	DISK43_ACT_LED_L	C17	DISK8_ACT_LED_L
A18	DISK44_ACT_LED_L	B18	DISK32_ACT_LED_L	C18	DISK20_ACT_LED_L
A19	DISK20_RX_P	B19	DISK20_TX_N	C19	DISK32_RX_P
A20	DISK20_RX_N	B20	DISK20_TX_P	C20	DISK32_RX_N
A21	DISK32_TX_N	B21	DISK44_RX_P	C21	DISK44_TX_N
A22	DISK32_TX_P	B22	DISK44_RX_N	C22	DISK44_TX_P
A23	DISK9_RX_P	B23	DISK9_TX_N	C23	DISK21_RX_P
A24	DISK9_RX_N	B24	DISK9_TX_P	C24	DISK21_RX_N
A25	DISK21_TX_N	B25	DISK33_RX_P	C25	DISK33_TX_N
A26	DISK21_TX_P	B26	DISK33_RX_N	C26	DISK33_TX_P
A27	DISK9_ACT_LED_L	B27	DISK21_ACT_LED_L	C27	DISK33_ACT_LED_L
A28	DISK22_ACT_LED_L	B28	DISK10_ACT_LED_L	C28	DISK45_ACT_LED_L
A29	DISK45_RX_P	B29	DISK45_TX_N	C29	DISK10_RX_P

TABLE B-4 I/O-to-Backplane (J25 to J51) Connector Pinouts *(Continued)*

Pin	Pin Name	Pin	Pin Name	Pin	Pin Name
A30	DISK45_RX_N	B30	DISK45_TX_P	C30	DISK10_RX_N
A31	DISK10_TX_N	B31	DISK22_RX_P	C31	DISK22_TX_N
A32	DISK10_TX_P	B32	DISK22_RX_N	C32	DISK22_TX_P
A33	DISK34_RX_P	B33	DISK34_TX_N	C33	DISK46_RX_P
A34	DISK34_RX_N	B34	DISK34_TX_P	C34	DISK46_RX_N
A35	DISK46_TX_N	B35	DISK11_RX_P	C35	DISK11_TX_N
A36	DISK46_TX_P	B36	DISK11_RX_N	C36	DISK11_TX_P
A37	DISK34_ACT_LED_L	B37	DISK46_ACT_LED_L	C37	DISK11_ACT_LED_L
A38	DISK47_ACT_LED_L	B38	DISK35_ACT_LED_L	C38	DISK23_ACT_LED_L
A39	DISK23_RX_P	B39	DISK23_TX_N	C39	DISK35_RX_P
A40	DISK23_RX_N	B40	DISK23_TX_P	C40	DISK35_RX_N
A41	DISK35_TX_N	B41	DISK47_RX_P	C41	DISK47_TX_N
A42	DISK35_TX_P	B42	DISK47_RX_N	C42	DISK47_TX_P
A43	PS0_FAN_FAIL_L	B43	PS0_POWEROK	C43	PS1_POWEROK
A44	PS1_FAN_FAIL_L	B44	PS0_PRESENT_L	C44	PS2_POWEROK
A45	PS2_FAN_FAIL_L	B45	PS1_PRESENT_L	C45	PS0_FAIL
A46	PS0_VIN_GOOD_L	B46	PS2_PRESENT_L	C46	PS1_FAIL
A47	PS1_VIN_GOOD_L	B47	PS2_VIN_GOOD_L	C47	PS2_FAIL
A48	PS2_ENABLE_L	B48	SHORT_PIN4	C48	INTRUSION_SW

B.3 Power Supply Connector

The power supply connector has signal pins and power blades. See TABLE B-5 for signal pins and TABLE B-6 for power blades.

TABLE B-5 Power Supply Signal Connectors

X,Y	1	2	3	4	5	6	7
D	3.3AUX	GND	12LS	Spare	SCL	A0	3.3 Vsb RS+
C	3.3AUX	GND	AC OK	+12V RS+	+12V RS-	A1	3.3 Vsb RS-
B	3.3AUX	GND	PSON	PSKILL	SDA	A2	Fan fail
A	3.3AUX	GND	PRESENT	PWOK	FAIL	ACL	Reserved

TABLE B-6 Power Supply Connector Power Blades

Pin	Function
P1	12VDC
P2	12VDC Return
P3	12VDC
P4	12VDC Return
P5	12VDC
P6	12VDC Return
P7	12VDC
P8	12VDC Return

B.4 Disk Backplane-to-Front Indicator Connector

A 10-wire flex cable connects the disk backplane to the indicator board. TABLE B-7 lists the pins:

TABLE B-7 Disk Backplane to Front Indicator Board Pins

Disk Backplane Pin	Pin Name	Front Indicator Board Pin
1	LOCATE_LED	10
2	LOCATE_BUTTON_L	9
3	ALERT_LED	8

TABLE B-7 Disk Backplane to Front Indicator Board Pins

Disk Backplane Pin	Pin Name	Front Indicator Board Pin
4	POWER_LED	7
5	POWER_BUTTON_L	6
6	FAN_FAIL_LED	5
7	PS_FAIL_LED	4
8	OVERTEMP_LED	3
9	PRESENT_L (GND on front indicator board	2
10	GND	1

B.5 Backplane-to-Disk-Backplane Connector

The backplane to disk backplane connector has eight blades that support 30 amps each. It also has 30 signal pins. See TABLE B-8 for the blades and TABLE B-9 for the signal pins.

TABLE B-8 Backplane-to-Disk-Backplane Connector Power Blades

Pin	Function
Blade 1	+12V
Blade 2	GND
Blade 3	+12V
Blade 4	GND
Blade 5	+12V
Blade 6	GND
Blade 7	GND
Blade 8	GND

TABLE B-9 Backplane-to-Disk-Backplane Connector Signal Pins

Pin	Pin Name	Pin	Pin Name
A1	3.3V AUX	C1	.3V AUX
A2	GND	C2	GND
A3	VDD_RTC	C3	SP_I2C_CLK
A4	INTRUSION_SW	C4	SP_I2C_DAT
A5	PS2_ENABLE_L	C5	PS2_BATT_L
A6	PS2_VIN_GOOD_L	C6	PS0_POWEROK
A7	PS2_POWEROK	C7	PS1_FAN_FAIL_L
A8	PS2_FAIL	C8	PS1_POWEROK
A9	PS2_FAN_FAIL_L	C9	PS1_PRESENT_L
B1	3.3V AUX	D1	3.3V AUX
B2	GND	D2	GND
B3	PS0_FAN_FAIL_L	D3	3_3_AUX_SENSE_P
B4	NC	D4	3_3_AUX_SENSE_N
B5	PS2_PRESENT_L	D5	PS0_FAIL
B6	PS0_PRESENT_L	D6	PS0_VIN_GOOD_L
B7	PS1_FAIL	D7	PS0_ENABLE_L
B8	PS1_VIN_GOOD_L	D8	12V_SENSE_P
B9	PS1_ENABLE_L	D9	12V_SENSE_N

B.6 Fan Tray Connectors

The fan tray uses the SATA hard drive connector for the interface to the disk backplane. The pins have been designed so that no damage occurs if a fan tray is accidentally inserted into a hard drive slot or vice versa. TABLE B-10 lists the pins.

TABLE B-10 Fan Tray Connectors

Pin	Name
S1	GND
S2	REMOVE_LED_L
S3	FAIL_LED_L
S4	PRESENT_L
S5	FAN_TACH0
S6	FAN_TACH1
S7	GND
P1	FAN_CTL0
P2	FAN_CTL0
P3	No Connect
P4	GND
P5	GND
P6	GND
P7	3.3AUX
P8	5VAUX
P9	No Connect
P10	GND
P11	OK_LED_L
P12	GND
P13	No Connect
P14	FAN_CTL1
P15	FAN_CTL1

B.7 Fan Connectors

The fans have three-pin connectors, listed in TABLE B-11.

TABLE B-11 Fan Connectors

Pin	Name	Color
1	Ground	Black
2	Power	Red
3	Tach	Blue

FIGURE B-3 shows the connectors.

FIGURE B-3 Fan Connectors

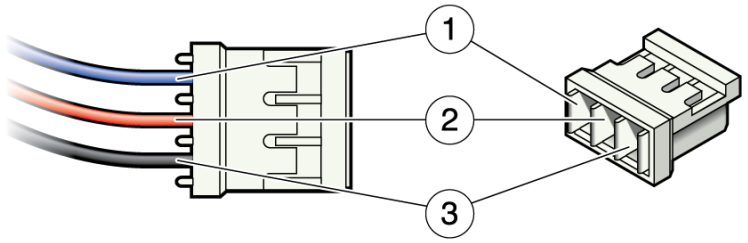

Figure Legend

1	Fan tach (blue)
2	Fan power (red)
3	Fan ground (black)

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