Hardware Installation Guide for Sun™ Storage 6580 and 6780 Arrays

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Contents

Preface

The *Hardware Installation Guide for Sun Storage 6580 and 6780 Arrays* introduces the array and provides information on installing the array and associated hardware components, and powering on an array.

Accessing Sun Documentation

You can obtain additional Sun documentation related to this product at:

http://docs.sun.com/app/docs/prod/6780.array#hic

Related Documentation

Application	Title	Part Number
Site planning information	*Site Preparation Guide for Sun Storage 6580 and 6780 Arrays*	820-5775
Regulatory and safety information	*Sun Storage Array Regulatory and Safety Compliance Manual*	*820-5506*
Late-breaking information not included in the information set	*Release Notes for Sun Storage 6580 and 6780 Arrays*	820-7490
Installation overview for rack-mounted arrays	*Getting Started Guide for Sun Storage 6580 and 6780 Rack Mounted Arrays*	820-5772
Installation overview for rack-ready arrays	*Getting Started Guide for Sun Storage 6580 and 6780 Rack-Ready Arrays*	820-6875
Rack installation instructions	*Sun Rack II User's Guide*	820-4759
Rail kit installation instructions	*Sun Storage Modular Rail Kit Installation Guide*	820-5774
PDU installation	*Power Distribution Unit Installation Guide for Sun Storage 6580 and 6780 Arrays and Sun StorageTek™ 2500 and 6000 Array Series*	820-6200
Software installation instructions	*Sun StorageTek Common Array Manager Software Installation Guide*	820-5747
Command line management interface	*Sun StorageTek Common Array Manager CLI Guide*	820-6662
Release-specific information for the Sun StorageTek Common Array Manager	*Sun StorageTek Common Array Manager Release Notes, v6.4*	*820-7589*
Multipathing failover driver installation and configuration	*Sun StorageTek MPIO Device Specific Module for 6000 and 2500 Series Arrays Microsoft Windows OS Platforms*	820-4737
	Sun StorageTek RDAC Failover Driver for Linux OS	820-4738

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Hardware Installation Guide for Sun Storage 6580 and 6780 Arrays, part number 820-5773-11.

Product Overview

This chapter provides an overview of the hardware and management software for the Sun Storage 6580 and 6780 Arrays. It contains the following sections:

- "About the Sun Storage 6580 and 6780 Arrays" on page 1
- "Hardware Overview" on page 5
- "About the Management Software" on page 16

About the Sun Storage 6580 and 6780 Arrays

The Sun Storage 6580 and 6780 Arrays provide a high-performance, enterprise-class, 4- and 8-Gigabit per second (Gb/s) Fibre Channel (FC) solution that combines outstanding performance with the highest reliability, availability, flexibility, and manageability.

The Sun Storage 6580 or 6780 Array can be shipped in a fully-assembled and cabled rack or as independent components. If you have purchased independent components, see "Installing and Cabling Rack-Ready Trays" on page 65 for information about assembling your array.

The fully-assembled Sun Storage 6580 and 6780 Arrays are mounted in a Sun Rack II, which can accommodate up to 12 expansion trays. The array is scalable from a base configuration of one dual RAID controller tray and one expansion tray to a maximum configuration of one dual RAID controller tray and 12 expansion trays in one cabinet (FIGURE 1-2), up to 24 expansion trays across two cabinets (FIGURE 1-3), to a maximum of 28 expansion trays mounted in three cabinets.

FIGURE 1-1   Sun Storage 6580 and 6780 Arrays Product Overview
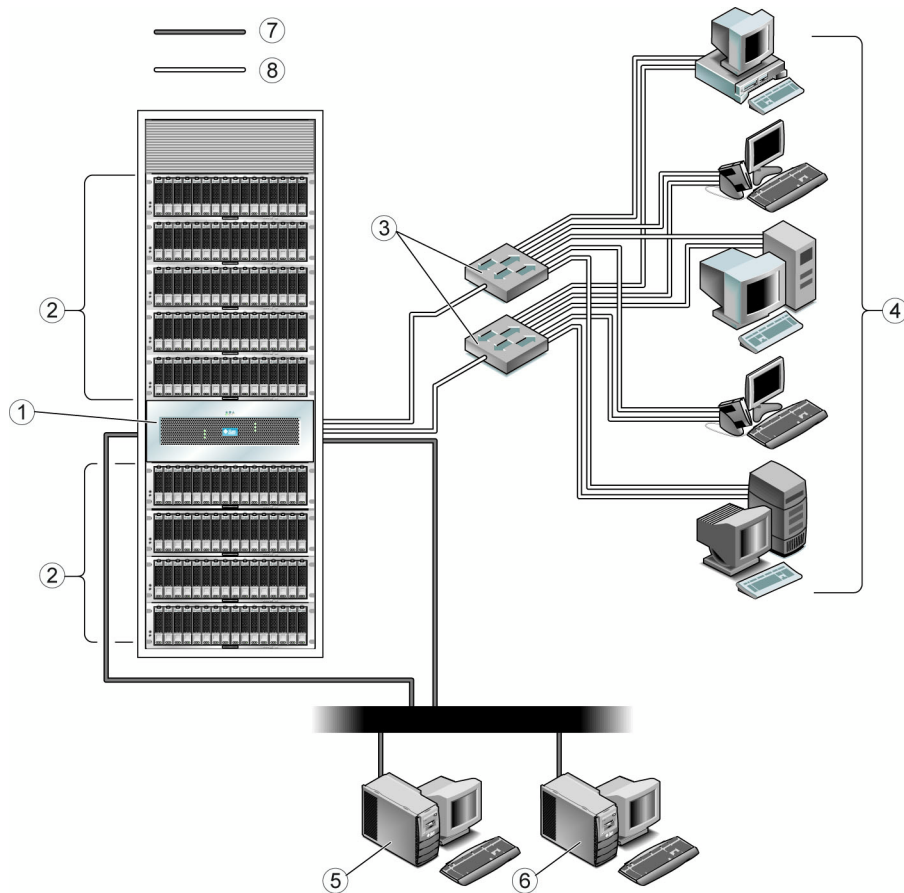
Figure Legend

1	Controller tray	**5**	Local management host
2	Expansion trays	**6**	Remote management host
3	Fibre Channel switches	**7**	Ethernet out-of-band connection
4	Data hosts	**8**	Fibre Channel connection

FIGURE 1-2 shows three sample configurations:

- One controller tray and four expansion trays (1x5)
- One controller tray and eight expansion trays (1x9)
- One controller tray and twelve expansion trays (1x13)

FIGURE 1-2   Sun Storage 6580 and 6780 Array Sample Configurations
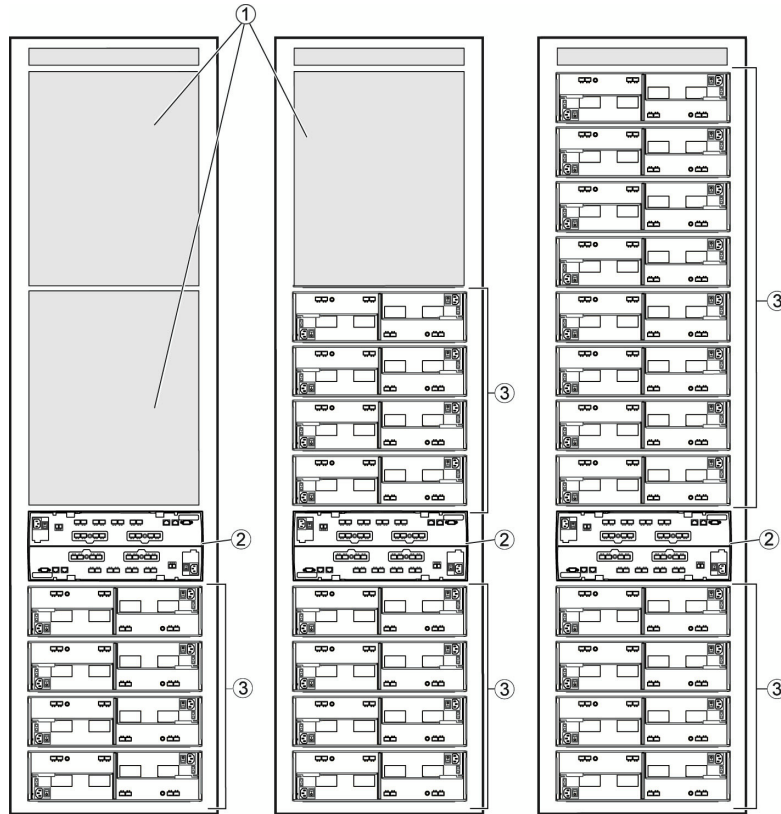
Figure Legend

1	Filler panels	**3**	Expansion trays
2	Controller tray		

For controller and expansion tray cabling details, see "Intertray Cabling" on page 75.

Array Configuration Naming Convention

The configuration naming convention is the *number of controller trays* x the *number of disk expansion trays* where the first number is the controller tray and the second is the total number of trays. For example, 1x5 is one controller tray and four expansion trays, and 1x17 is one controller tray and 16 expansion trays.

FIGURE 1-3 shows one controller tray and sixteen expansion trays (1 x 17 configuration). The main cabinet arrays 1 through 12 are located in the same cabinet as the controller tray, and arrays 13 through 16 are located in an expansion cabinet.

FIGURE 1-3 Sun Storage 6780 Array 1x17 Configuration with Expansion Rack
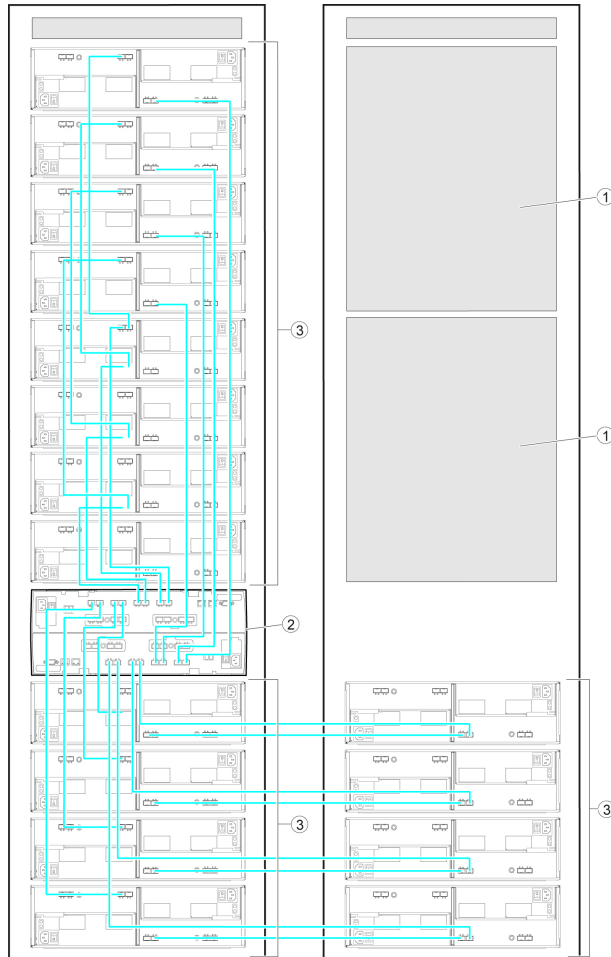
Figure Legend

1	Filler panels	**3**	Expansion trays
2	Controller tray		

Sun Storage 6580 and 6780 Array Features

The Sun Storage 6580 and 6780 Arrays share the same controller and expansion tray hardware. TABLE 1-1 provides a comparision of the model features.

TABLE 1-1   Comparison of Sun Storage 6580 and 6780 Arrays

	Sun Storage 6580 Array	Sun Storage 6780 Array
Total cache size	8 Gbytes	16 Gbytes or 32 Gbytes
Number of host ports	8 4-Gbit/second	8 or 16 4-Gbit/second or 8-Gbit/second
Maximum number of drives	256	448
Disk reads	IOPS* 115K Throughput 3000 MB/seccond	IOPS 175K Throughput 6400 MB/seccond
Maximum array configuration	1x13	1x28

* Input/output operations per second

Hardware Overview

The Sun Storage 6580 and 6780 arrays consists of one controller tray and disk expansion trays.

Controller Tray

The controller tray contains two redundant array of independent disks (RAID) controllers, which operate independently and provide failover capability for the data and management paths. The controller tray is configured for FC connections to expansion trays that hold disk drives, and provides RAID functionality and caching. The controller tray supports Common Storage Module 200 (also known as CSM2) expansion trays and legacy Sun StorageTek 6140 Array expansion trays.

The controller tray has two power supply-fan assemblies, and a battery backup compartment in which batteries are housed to retain cache memory in the event of a power failure. The backup batteries are accessed from a removable panel in the interconnection module.

FIGURE 1-4   Sun Storage 6580 and 6780 Array Controller Tray (Front View)
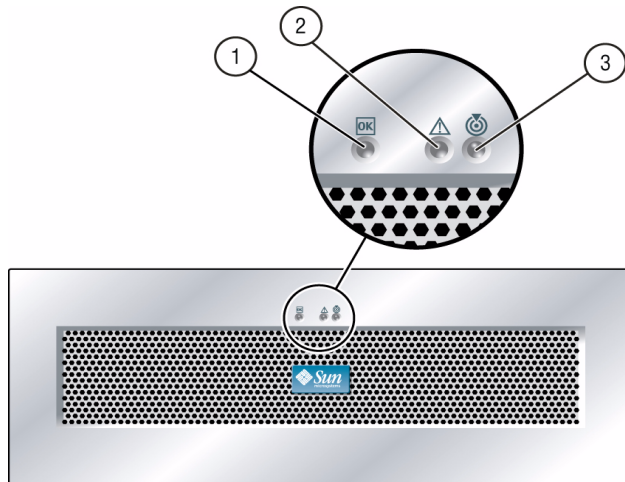
Figure Legend

1	Power-on LED	**3**	Locate Indicator LED
2	Service Action Required LED		

Controller Tray Ports and Switches

FIGURE 1-5   Controller Tray Ports (Back View)
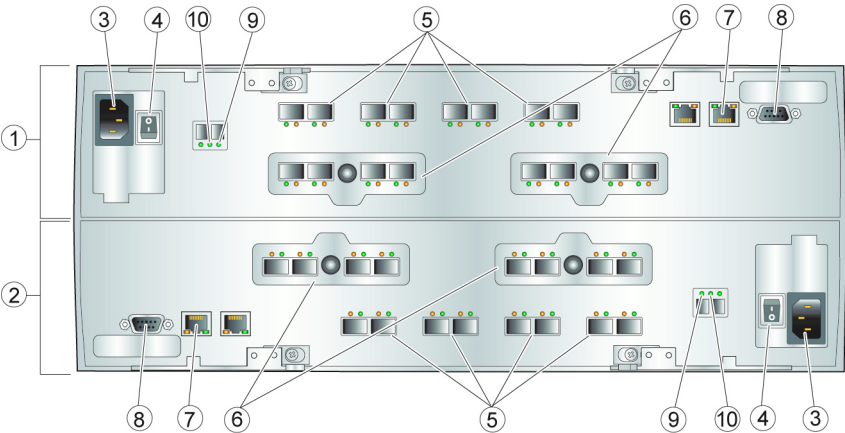
Figure Legend

1	Controller A (top, inverted)	**6**	Host ports
2	Controller B (bottom)	**7**	Ethernet port 1 (for out-of-band array management) [*]
3	AC input	**8**	Serial ports
4	AC power switch	**9**	Service Action Allowed LED (Blue)
5	Drive ports (connects to disk expansion trays)	**10**	Service Action Required LED (Amber)

[*] Ethernet port 2 is reserved for service access.

Controller Tray LEDs

TABLE 1-2 shows the LEDs and indicators located at the back of the controller tray.

TABLE 1-2 Controller Tray Back LED Descriptions

LED	Symbol	Function
Service Action Allowed		On: You can remove the canister safely. See "Service Action Allowed LED" on page 101.
Service Action Required (Fault)		On: A problem exists with the canister.
Host Port Speed		The speed of the host channel is indicated: • Left LED on—1 Gb/s • Right LED on—2 Gb/s • Left LED and right LED on—4 Gb/s **Note -** LEDs above the port pertain to that port.
Drive Port Bypass		On: A bypassed port is indicated.
Drive Port Speed		The speed of the drive channel is indicated: • Right LED on—2 Gb/s • Left LED and right LED on—4 Gb/s **Note -** Drive channel LEDs are paired. The two inner LEDs indicate the channel speed. The two outer LEDs indicate the channel is bypassed.
Cache Active		The activity of the cache is indicated. • Blinking—Data is in cache • Off—No data is in cache
Tray ID Numeric Display and Diagnostic Display		The tray ID or a diagnostic code is indicated. See "Controller Tray Diagnostic Codes" on page 102. For example, if some of the cache memory dual in-line memory modules (DIMMs) are missing in a controller, error code L8 appears in the diagnostic display.
Ethernet Speed and Ethernet Activity		The speed of the Ethernet ports and whether a link has been established are indicated. • Left LED on—1000BASE-T speed • Left LED off—100BASE-T or 10BASE-T speed • Right LED on—A link is established • Right LED off —No link exists • Right LED blinking —Activity is occurring

CSM2 Expansion Tray

The Common Storage Module 200 (also known as CSM2) expansion tray is directly attached by a FC loop to the controller tray and cannot operate independently. The expansion trays are connected to the RAID controllers in the controller tray using the drive port connections.

FIGURE 1-6   Expansion Tray
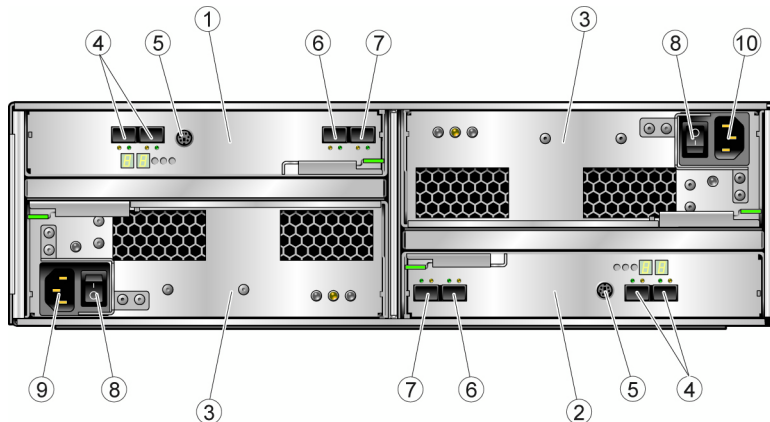
Figure Legend

1	Input/output module A	**6**	Expansion ports 1B (Out)
2	Input/output module B	**7**	Expansion ports 1A (In)
3	Power supply A (top) Power supply B (bottom)	**8**	Power switch
4	Reserved expansion ports	**9**	Power connector A
5	Serial port	**10**	Power connector B

Multiple expansion trays are connected using FC cables. Expansion trays are built from a 3 RU chassis and include the same controllers, power systems, and disk drives. Each expansion tray has two Fibre Channel Arbitrated Loop (FCAL) switch cards, one for each back-end loop.

In addition, each expansion tray is connected to the tray above and the tray below it by two FC cables. The FCAL switch performs trunking operations, which increases performance by opening multiple threads through the switch at one time.

Refer to "Installing and Cabling Rack-Ready Trays" on page 65 for details on expansion tray cabling.

TABLE 1-3 describes the expansion tray disk configuration.

TABLE 1-3   Expansion Tray Configuration for Sun Storage 6580 and 6780 Arrays

Description		Quantity
FC or SATA II disk drives	FC hard disk drives: 73G10K, 73G15K, 146G10K, 146G15K, 300G10K	5-16 4-Gbit/second or 2-Gbit/second drives.
	SATA II hard disk drives: 500G7.2K	5-16 3-Gbit/second drives with circuitry to support operation in either a 4-, 2-, or 1-Gbit/second environment.
Drive expansion ports		One pair per controller. Ports 2A and 2B are disabled, reserved for future use.
Power supply/fan assemblies		2

CSM2 Expansion Tray LEDs and Indicators

FIGURE 1-7 shows the location of the LEDs at the back of the expansion tray.

FIGURE 1-7   Expansion Tray LEDs and Indicators
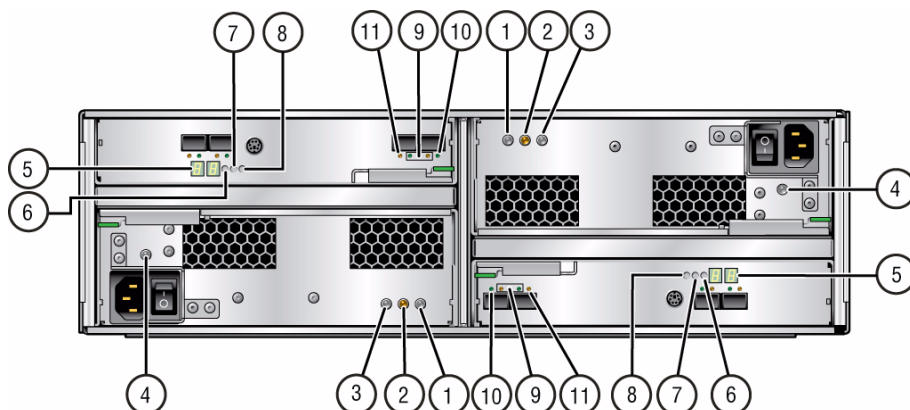
TABLE 1-4 describes the LEDs and indicators at the back of the expansion tray.

TABLE 1-4   Expansion Tray LEDs and Indicators (Back)

Legend	LED/Indicator		Description
	Power Supply LEDs		
	DC	DC	On indicates that the correct DC power is being supplied from the controller power supply.
	Service Action Required	⚠	Steady amber indicates that the power supply requires service. Off indicates that the power supply does not require service.
3	Service Action Allowed		Steady blue indicates that service action can be taken on the power supply without adverse consequences. Off indicates that the power supply is engaged and service action should not be implemented.
4	AC	AC	On indicates that AC power is being supplied to the controller power supply.
	Expansion Tray LEDs		
5	ID/Diag display		Seven-segment readouts indicate the ID of the tray. Also provides diagnostic information, such as the number 85, which indicates all is well. Contact Sun Customer Service for additional information.
6	Power LED		Steady green indicates power is connected to the tray.
7	Service Action Required	⚠	Steady amber indicates that the controller requires service. Off indicates that the controller does not require service.
8	Service Action Allowed		Steady blue indicates that service action can be taken on the controller without adverse consequences. Off indicates that the controller is engaged and service action should not be implemented.

TABLE 1-4 Expansion Tray LEDs and Indicators (Back) *(Continued)*

Legend	LED/Indicator	Description
	Expansion Tray Indicators	
9	Expansion Port Rate **4** ←→ **2**	The combined display indicates the expansion port link rate for the tray: • LED 4 On, LED 2 Off – 4 Gbits/second • LED 4 Off, LED 2 On – 2 Gbits/second The LEDs display as follows: W X Y Z For each pair of drive ports (ports 1 and 2 are one pair, and ports 3 and 4 are the other pair) W and Z LEDs indicate whether or not the port is by-passed (amber); the X and Y LEDs indicate the speed of this pair of drive ports. If the Y LED is the only one lit, it represents 2Gb/sec. If both X and Y are lit, it represents 4Gb/sec.
10 11	Expansion Port Bypass1A In Expansion Port Bypass 1B Out	Steady amber indicates that no valid device is detected and that the drive port is bypassed. Off indicates that there is no SFP installed or that the port is enabled.

6140 Expansion Tray

The Sun StorageTek 6140 expansion tray provides from 5 to 16 additional FC or Serial Advanced Technology Attachment (SATA) II drives. An expansion tray is cabled directly to a controller tray and cannot operate independently.

FIGURE 1-8   Expansion Tray Ports and Components (Back)
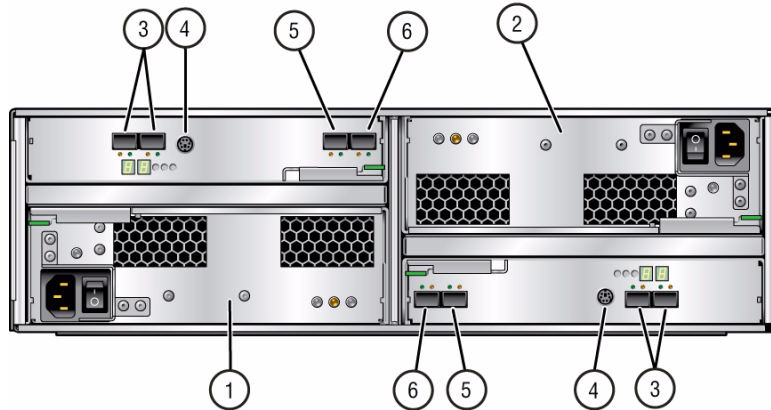
Figure Legend

1	Power supply A	**4**	Serial port
2	Power supply B	**5**	Expansion ports 1B (Out)
3	Reserved expansion ports 2A and 2B	**6**	Expansion ports 1A (In)

TABLE 1-5 describes the ports and components at the back of the expansion tray.

TABLE 1-5   6140 Expansion Tray Ports and Components (Back)

Ports/Switches/LEDs	Description
Expansion ports 1A (In), 1B (Out)	Two 4- or 2-Gbit FC ports used to connect to an array controller and/or additional expansion trays.
Serial port	Not used in the expansion trays.
Power supplies	For each expansion tray, two power supplies that provide redundant power to the tray. If one power supply fails, the tray is powered by the remaining power supply.
Reserved expansion ports 2A and 2B	Reserved for future use.

FIGURE 1-9 shows the LEDs at the back of the expansion tray.

FIGURE 1-9   6140 Expansion Tray LEDs and Indicators (Back)
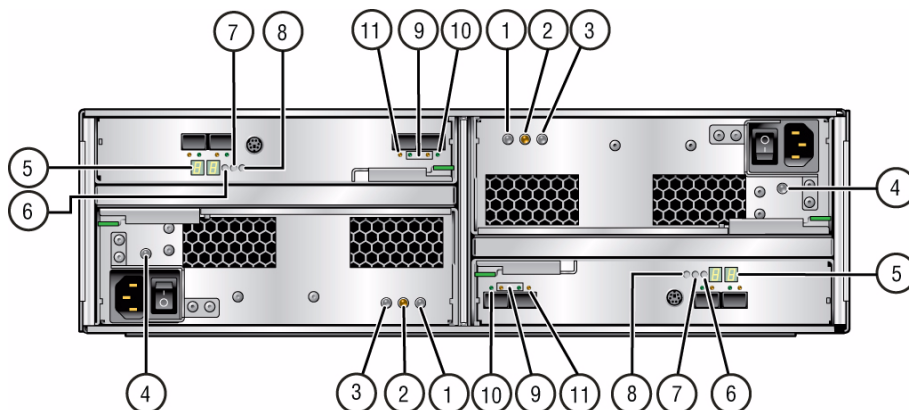
For a description of numerical LED status codes, see "Expansion Tray LED Status Codes" on page 108.

TABLE 1-4 describes the LEDs and indicators at the back of the expansion tray.

TABLE 1-6   6140 Expansion Tray LEDs and Indicators (Back)

Legend	LED/Indicator	Description
	Power Supply LEDs	
1	DC	On indicates that the correct DC power is being output from the controller power supply.
2	Service Action Required	Steady amber indicates that the power supply requires service. Off indicates that the power supply does not require service.
3	Service Action Allowed	Steady blue indicates that service action can be taken on the power supply without adverse consequences. Off indicates that the power supply is engaged and service action should not be implemented.
4	AC	On indicates that AC power is being supplied to the controller power supply.

TABLE 1-6   6140 Expansion Tray LEDs and Indicators (Back) *(Continued)*

Legend	LED/Indicator	Description
	Expansion Tray LEDs	
5	ID/Diag display	Seven-segment readouts indicate the ID of the tray and fault diagnostic status codes. See "Expansion Tray LED Status Codes" on page 108 for definitions of the codes.
6	Power LED	Steady green indicates power is supplied to the tray.
7	Service Action Required	Steady amber indicates that the controller requires service. Off indicates that the controller does not require service.
8	Service Action Allowed	Steady blue indicates that service action can be taken on the controller without adverse consequences. Off indicates that the controller is engaged and service action should not be implemented.
	Expansion Tray Indicators	
9	Expansion Port Rate	The combined display indicates the expansion port link rate for the tray: • LED 4 On, LED 2 Off – 4 Gbits/second • LED 4 Off, LED 2 On – 2 Gbits/second
10 11	Expansion Port Bypass1A In Expansion Port Bypass 1B Out	Steady amber indicates that no valid device is detected and that the drive port is bypassed. Off indicates that there is no SFP installed or that the port is enabled.

About the Management Software

The Sun Storage 6580 and 6780 Arrays are managed by the Sun StorageTek Common Array Manager (CAM) software. CAM consists of a software suite that provides management, monitoring, and servicing capabilities. The software is delivered on CD and is available from the Sun Download Center (SDLC).

The Sun StorageTek Common Array Manager software is a web-based management software that provides both a browser interface and a command-line interface (CLI) for configuring and managing arrays on an external management host. The management software supports the Solaris 8, Solaris 9, or Solaris 10 Operating System (OS), Redhat Linux, SuSE Linux, Windows XP Pro, Windows Server 2003, and Windows Server 2008. (See the release notes for supported host operating system details.)

Management Software Options

In addition to the full management software, you can install a compact, CLI-only version of the software. The features of the two versions compare as follows.

Full Management Software

This install option creates a management station that contains the full set of CAM services, including:

- Array management, monitoring, and service capabilities
- Web browser interface
- Local and Remote CLIs
- Array firmware
- Multiple array management

CLI-only Management Software

This install option creates a compact, standalone installation which can be as little as 25MB in size. This light-weight management solution is installed on a data host attached to the array. It is installed using the CLI-only installation option and provides the following services:

- Array management and monitoring capabilities
- Local CLI
- Single array management
- Optional array firmware

For more information about the management software and installation instructions, see the *Sun StorageTek Common Array Manager Installation Guide*.

Data Host Software

Data host software controls the data path between the data host and the array.

Note – Some management hosts can also be used as data hosts.

The data host software contains tools that manage the data path I/O connections between the data host and the array. This includes drivers and utilities that enable hosts to connect to, monitor, and transfer data in a storage area network (SAN).

The type of data host software you need depends on your operating system. You must obtain the data host software from the Sun Download Center or other source. See "About Data Host Software" on page 37 and the *Sun StorageTek Common Array Manager Software Release Note*s for more information.

Installing a Rack-Mounted Array System

This chapter describes power-on procedures for a fully-assembled and cabled array system.

If you purchased independent array components, go to "Installing and Cabling Rack-Ready Trays" on page 65 for installation instructions.

This chapter includes the following sections:

- "Installation Checklist" on page 20
- "Before Powering On the Array" on page 20
- "Connecting the Power Cables" on page 21
- "Powering On the Array" on page 24
- "Next Steps" on page 25

Installation Checklist

The following checklist (TABLE 2-1) outlines all of the tasks required for installing a fully-racked array. To ensure a successful installation, perform the tasks in the order in which they are presented.

TABLE 2-1 Sun Storage 6580 and 6780 Arrays Installation Checklist

Step	Task	Where to Find Procedure
1.	Prepare the site.	*Sun Storage Regulatory and Safety Compliance Manual*
		Site Preparation Guide for Sun Storage 6580 and 6780 Arrays
2.	Check for late-breaking information related to the installation of the array.	*Release Notes for Sun Storage 6580 and 6780 Arrays*
3.	Unpack the array and move it into position.	Unpacking guide attached to the outside of the shipping carton
4.	Attach the power cables to the power source.	"Connecting the Power Cables" on page 21
5.	Attach the host interface cables.	"Connecting Data Hosts" on page 31
6.	Connect the management host.	"Connecting the Management Host" on page 27
7.	Turn on the power.	"Powering On the Array" on page 24
8.	Configure IP addresses for the array controllers.	"Configuring the IP Address of the Array Controllers" on page 46
9.	Install CAM management software on data hosts	*Sun StorageTek Common Array Manager Software Installation Guide*

Before Powering On the Array

You can set up a Dynamic Host Configuration Protocol (DHCP) server to issue the IP address for each controller. If a DHCP server is not available, the controller tray defaults to internal static IP addresses. See "Configuring the IP Address of the Array Controllers" on page 46 for details.

For instructions on how to set up the DHCP server, see "Configuring a DHCP Server" on page 55.

Connecting the Power Cables

1. **Verify that both power switches are off for each tray in the rack.**

2. **Connect each power supply in the tray to a different power source in the rack.**

3. **Connect the power cables from the rack to the external power source.**

FIGURE 2-1 Connecting the Power Cables to the Controller Tray
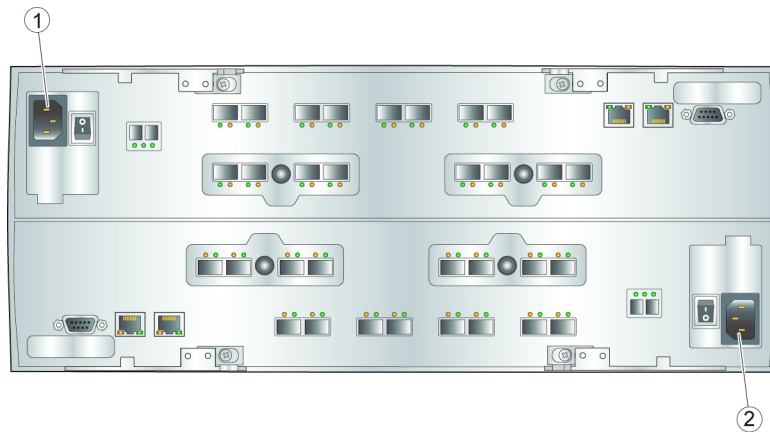
Figure Legend

1	Power connector for Controller A
2	Power connector for Controller B

FIGURE 2-2 Power Connections for 1x13 Array Configuration
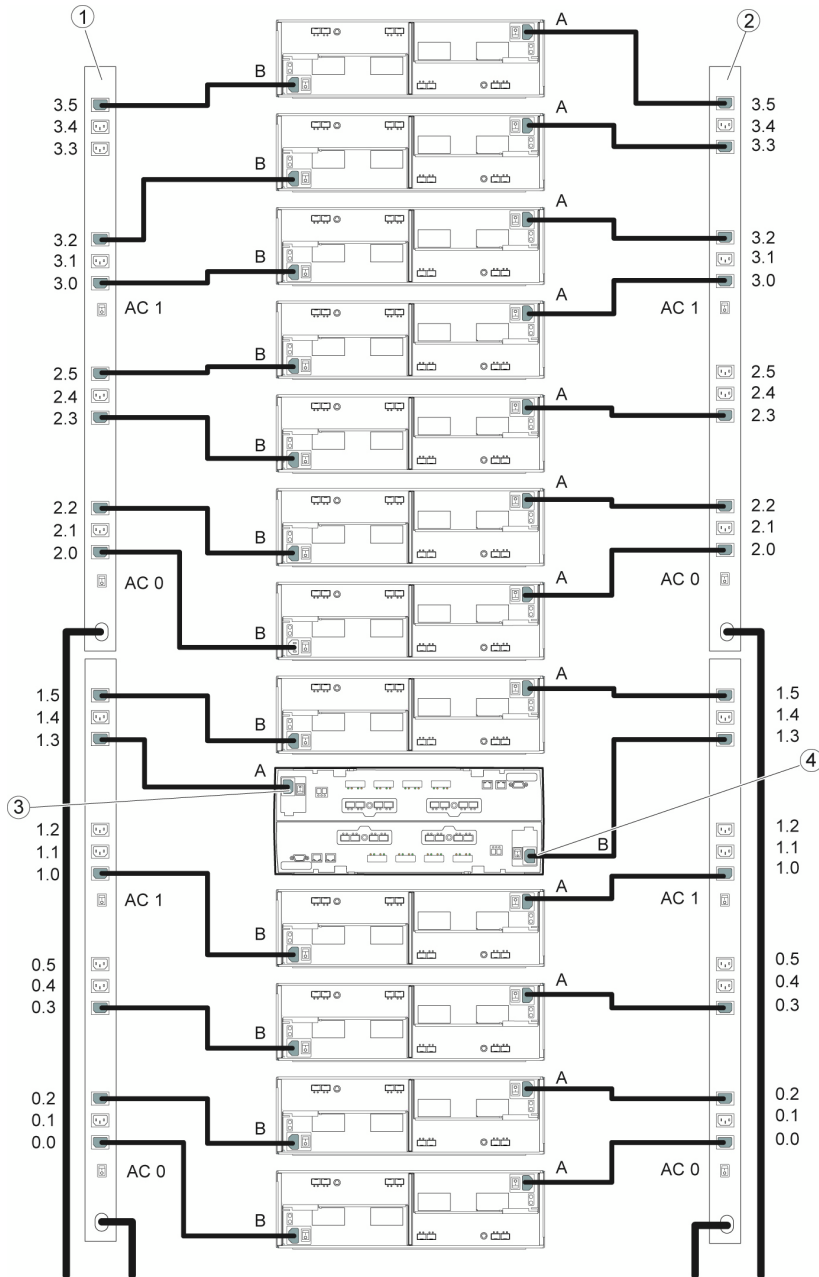
1	Power distribution Unit (PDU) B	**3**	Controller tray power connector A
2	PDU A	**4**	Controller tray power connector B

Verifying the Link Rate for Each Tray

The Tray Link Rate switch (FIGURE 2-3) on each expansion tray is preset to operate at 2 Gbits/second or 4 Gbits/second.

If you added an expansion tray to a factory-assembled array, set the tray link rate as described in "Setting the Tray Link Rate" on page 97.

FIGURE 2-3 Expansion Tray Link Rate Switch
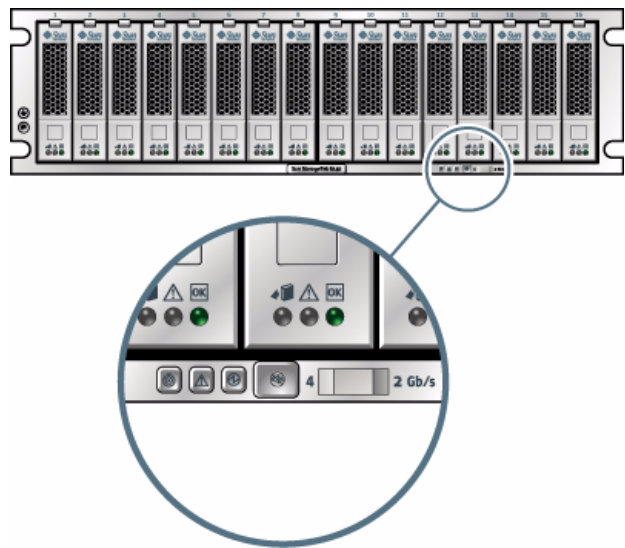
Figure Legend

1	Tray Link Rate switch, Left = 4 Gbits/second, Right = 2 Gbits/second

- If the drive speed of the drives in an expansion tray are all 4 Gbits/second drives, the Tray Link Rate switch is set to the left position (4 Gb/s).
- If the drive speed of the drives in an expansion tray are all 2 Gbits/second, the Tray Link Rate switch is set to the right position.

- If an expansion tray drive has mixed drive speeds, the expansion tray setting is set at the lowest drive speed rate.

Note – The Tray Link Rate switch does not affect the data rate of host ports.

Powering On the Array

Use this procedure to turn power on for all trays installed in the rack.

Note – The order in which you power on the trays is important. Be sure to power on the controller tray last in order to ensure that the disks in the expansion trays have enough time to spin completely before being scanned by the redundant array of independent disks (RAID) controllers in the controller tray.

1. **Turn on the rack circuit breakers, if applicable.**

2. **Turn on the two power switches at the back of each expansion tray (see** "Expansion Tray" on page 10**).**

   Wait until the tray ID/Diag display on the back indicates the number of the tray ID to be sure that the tray has powered up fully before proceeding to the next step.

3. **Turn on the two power switches at the back of the controller tray (see** "Expansion Tray" on page 10**).**

   While the tray powers on, the green and amber LEDs at the front and back of the controller tray turn on and off intermittently. Depending on your configuration, it can take several minutes for the tray to power on. Wait at least two minutes until all of the drives are spinning completely before moving to step 4. When the power-on sequence is complete, the controller tray ID indicates 99.

4. **Check the status of each tray.**

   After the power-on sequence is complete, confirm that the green OK/Power LEDs are steady green, both on the tray and on each drive in the tray.

   If all tray and drive OK/Power LEDs are steady green and the amber Service Required LEDs are off, the power-on sequence is complete and no faults have been detected.

Note – The array rarely needs to be powered off. For power-off instructions, see "Powering Off the Array" on page 109.

Next Steps

Now you are ready to connect the management host and data hosts, as described in Chapter 3.

Connecting the Management Host and Data Hosts

This chapter describes Sun Storage 6580 and 6780 Arrays cable connections for the management host and data hosts. It contains the following sections:

Note – You need to know the storage management method that you plan to use before you install the software, connect the cables, and use the storage management software.

Note – If you use the out-of-band management method but do not have a DHCP server, you must manually configure your controllers.

Connecting the Management Host

There are two types of management paths:

- Out-of-band uses a management path such as Ethernet that is separate from the data path (the default).
- In-band communicates the management and control commands on the same path as the data being processed.

Setting Up Out-of-Band Array Management

By default, the management host communicates with the array out-of-band over Ethernet. An out-of-band management method sends commands to the storage array through the Ethernet connections on the controller.

To set up an out-of band connection:

1. **Connect the Ethernet cables between Ethernet port 1 on Controller A and Controller B and the management host (see** Connection Options Between the Array and Management Host**).**

Note – You can only use Ethernet port 1 to connect to a management host. Ethernet port 2 is reserved for service use.

FIGURE 3-1 Ethernet Ports
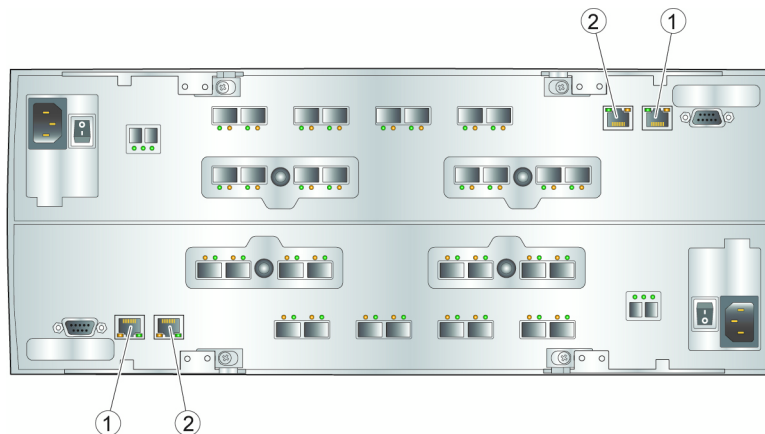
Figure Legend

1	Controller A Ethernet port 1
2	Controller B Ethernet port 2 (Reserved for service access)

2. **Assign a static IP address or dynamic IP address to each controller.**

   a. **If you have a DHCP server, see** "Configuring a DHCP Server" on page 55 **for instructions.**

   b. **If you do not have a DHCP server, you will manually configure the controllers as described in** "Configuring IP Addressing" on page 45**.**

Connection Options Between the Array and Management Host

You can establish a connection between the management host and Ethernet port 1 of an array controller in one of three ways:

- "Attaching the Ethernet Ports to the LAN of the Management Host" on page 29
- "Attaching the Ethernet Ports to the LAN Using an Ethernet Hub" on page 29
- "Attaching the Ethernet Ports Directly to the Management Host With a Cross-Over Cable" on page 30

Attaching the Ethernet Ports to the LAN of the Management Host

To attach the Ethernet ports to the local area network (LAN) of the management host:

1. **Locate the Ethernet port 1 for Controller A and Controller B at the back of the controller tray (**FIGURE 3-1**).**

2. **Connect an Ethernet cable to Ethernet port 1 of each controller.**

3. **Connect the other end of each Ethernet cable to the LAN on which your management host resides (preferably on the same subnet).**

Attaching the Ethernet Ports to the LAN Using an Ethernet Hub

To attach the Ethernet ports and the management port Ethernet interface to an Ethernet hub on a private subnet:

1. **Locate Ethernet port 1 on Controller A and Controller B at the back of the controller tray (**FIGURE 3-1**).**

2. **Connect an Ethernet cable to Ethernet port 1 of each controller.**

3. **Connect the other end of each Ethernet cable to an Ethernet hub.**

4. **Connect an Ethernet port on the management host to the Ethernet hub.**

Attaching the Ethernet Ports Directly to the Management Host With a Cross-Over Cable

Use this method to establish temporary IP connectivity between the management host and the controller's Ethernet ports.

To attach the Ethernet ports directly to the management host using a cross-over cable, follow these steps for each controller, as necessary:

1. **Locate Ethernet port 1 on either Controller A or Controller B at the back of the controller tray (**FIGURE 3-1**).**

2. **Obtain and connect an Ethernet cross-over cable to Ethernet port 1 of the controller.**

3. **Connect the other end of the Ethernet cross-over cable to the LAN on which your management host resides.**

Setting Up In-Band Array Management

You can configure in-band management using a Fibre Channel (FC) connection between a data host and the array. An in-band connection uses the data path between the array and host for management traffic.

To set up in-band management:

1. **Install CAM software on at least one of the network-attached hosts. See the** *Sun StorageTek Common Array Manager Installation Guide* **for installation instructions.**

2. **Connect two in-band FC cables between HBAs on the data host and the array (one cable to each controller). You can connect the data host HBAs directly to the array or through FC switches.**

Note – CAM 6.2 supports Solaris Sparc and x86, Windows, and Linux platforms for in-band management. For Red Hat Enterprise Linux OS, Release 5.1 or higher is required. Check the *Sun StorageTek Common Array Manager Release Notes*, v.6.2 for the latest list of packages to install from the CD.

Connecting Data Hosts

You can connect data hosts to access the Sun Storage 6580 or 6780 array through Fibre Channel (FC) switches to the array or directly to the array.

The Sun Storage 6580 and 6780 arrays have eight data host pair connections per controller. To maintain redundancy, connect two data paths from each host, one to each controller.

Note – A host interface card (HIC) must be connected to a host bus adapter (HBA) that uses the same data rate. If not, the data transfer rate will be the lower speed. For instance, if you are using a 4-Gb/s HIC with an 8-Gb/s HBA, the data transfer rate is 4 Gb/s.

Connecting Data Hosts Through External Fibre Channel Switches

Prerequisites

- Install and configure the FC switches as described in the vendor's installation documentation. (See the *Sun Storage 6580 and 6780 Arrays Release Notes* for a list of supported switches.)
- Connect and route the interface cables between the data host's host bus adapters (HBAs), switches, and installation site.
- Obtain fiber-optic cables (2 meters or longer) to connect the array to the FC switches.

1. Locate the data host ports (Small Form-factor Pluggable [SFP] transceivers) at the back of the controller tray.

FIGURE 3-2 Controller Tray Data Host Ports
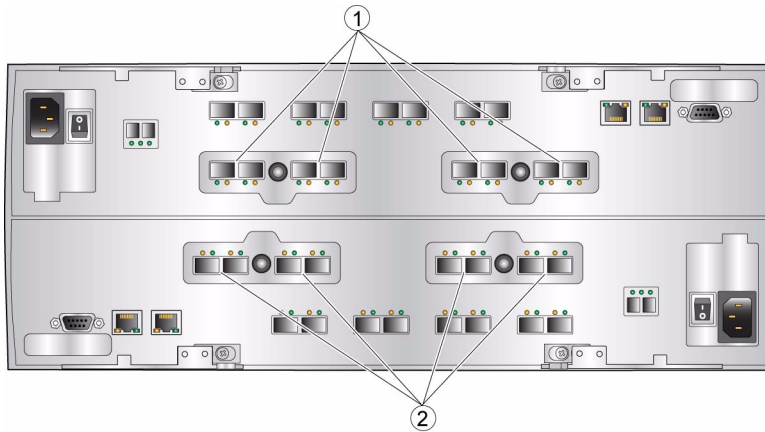
Figure Legend

1	Controller A data host ports
2	Controller B data host ports

2. Connect each fiber-optic cable to the data host ports of Controller A and Controller B.

Caution – Fiber-optic cables are fragile. Do not bend, twist, fold, pinch, or step on the fiber-optic cables. Doing so can degrade performance or cause data loss.

3. Connect the other end of each cable to the external switch as shown in the graphics that follow.

4. Connect the cables from the switch to the HBAs for each data host.

5. Affix a label to each end of the cable to identify the connection. Include the following information on the label:

- Switch name and the port
- Controller ID (A or B)
- Data host port number

FIGURE 3-3 Data Host Through FC Switch Connections
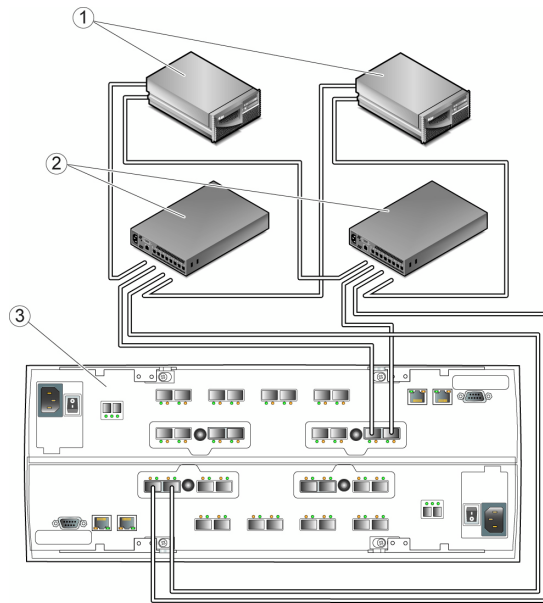
Figure Legend

1	Data hosts	**3**	Redundant connections to Controller A (top)
2	Switches		and Controller B (bottom)

Connecting Data Hosts Directly

A direct point-to-point connection is a physical connection in which the data host HBAs are cabled directly to the array's host ports.

Prerequisites

- Interface cables are connected and routed between the data host's HBAs and the installation site.
- Fiber-optic cables (2 meters or longer) are available to connect the array host ports to the data host HBAs.

1. **Locate the data host ports at the back of the controller tray.**

2. **Connect a fiber-optic cable to each data host port on Controller A and Controller B that you intend to use.**

Caution – Fiber-optic cables are fragile. Do not bend, twist, fold, pinch, or step on the fiber-optic cables. Doing so can degrade performance or cause data loss.

3. Connect the other end of each fiber-optic cable to a data host HBA.

FIGURE 3-4 Data Host Direct Connections
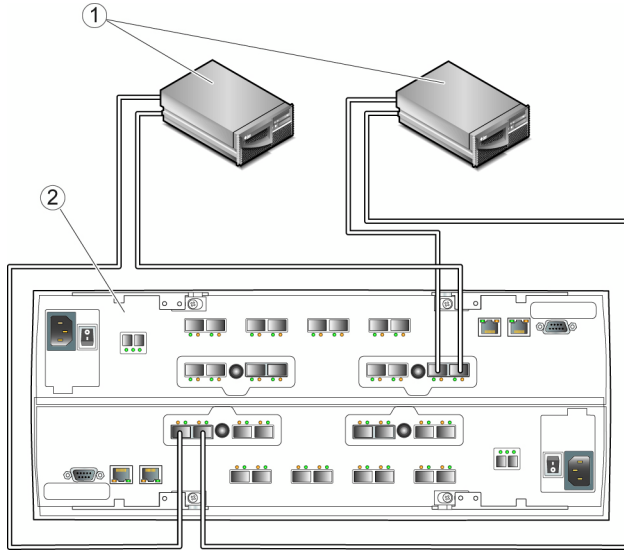
Figure Legend

1	Data hosts each with redundant HBAs	**2**	Redundant connections to Controller A (top) and Controller B (bottom)

4. Affix a label to each end of the cable to identify the connection. Include the following information on the label:

- Host name and HBA port number
- Controller ID (A or B)
- Data host port number

5. Check the status of each connection. If you see a fault, use CAM to diagnose and correct the problem.

Completing the Hardware Installation

When you finish connecting all cables, close the front and back cabinet doors.

Caution – The front and back doors of system cabinets must be closed for reduced EMI emissions and proper cooling. Do not block or cover the openings of the system cabinet. Cabinet airflow is from front to back. Allow at least 30 inches (76.2 cm) in front of the cabinet, and at least 24 (60.96 cm) inches behind the cabinet, for service clearance, proper ventilation, and heat dissipation.

Next Steps

After you have connected the management host and data hosts, you are ready to configure IP addressing, if necessary, as described in Chapter 5.

Data Hosts, HBAs, and Other Software

This chapter describes how to install data host software, HBAs, and other software on different host platforms. It contains the following sections:

About Data Host Software

The data host software contains tools that manage the data path I/O connections between the data host and the array. This includes drivers and utilities that enable array management hosts to connect to, monitor, and transfer data in a storage area network (SAN).

Note – Some management hosts can also be used as data hosts.

About HBAs and Drivers

Host Bus Adapters (HBAs) are storage adapters that manage all data I/O on your data host. The specific HBAs you need depend on the data host server platform, operating system, and data transfer rates used in your storage area network. HBAs must be ordered separately, from Sun or their respective manufacturers. Sun HBAs can be ordered from:

`www.sun.com/storagetek/storage_networking/hba/`

The required versions of HBA drivers must be installed on the data host before you can set up a data host. The *Release Notes for Sun Storage 6580 and 6780 Arrays* lists the data host requirements for HBAs and drivers. Refer to the specific vendor HBA documentation for instructions on installing HBA drivers.

About Multipathing Software

Data host software controls the data path between the data host and the array. Since there can be more than one path between the host and the array for redundancy, this function is called multipathing.

You must install data host software (including multipathing) on each data host that communicates with the Sun Storage 6580 and 6780 Arrays. For Solaris OS 8 and 9 data hosts, the multipathing software is part of the Sun StorEdge SAN 4.4 software. Multipathing is included in Solaris OS 10.

For multipathing support on data host platforms running non-Solaris operating systems such as Windows, Linux, Novell Netware, IBM AIX, or others, you can use the Sun StorageTek RDAC Driver software or other multipathing software as listed in the *Sun Storage 6580 and 6780 Arrays Release Notes*.

Setting Up a Data Host On a Solaris System

The Sun Storage 6580 and 6780 Arrays provide data path support for data hosts running Solaris, Windows Server 2003, Red Hat Linux, HP-UX, NetWare, and IBM AIX operating systems. This section applies to hosts running Solaris OS 8, 9, and 10.

See the *Release Notes for Sun Storage 6580 and 6780 Arrays* for the latest supported operating system versions.

Note – To install data host software on systems that are not running the Solaris OS, see "Installing Data Host Software for Operating Systems Other Than Solaris" on page 40.

You must install data host software (including multipathing) on each data host that communicates with the Sun Storage 6580 and 6780 Arrays. Multipathing is included in the Solaris OS 10. For Solaris OS 8 and 9 data hosts, you need the Sun StorEdge SAN Foundation Kit software (which includes the multipathing software).

To install data host software on Solaris OSs, see the following sections:

- "Obtaining Sun Solaris 8 and 9 Data Host Software" on page 39
- "Installing the SAN_4.4 Data Host Software" on page 40

Obtaining Sun Solaris 8 and 9 Data Host Software

Obtain Sun Solaris OS 8 and 9 data host software as follows:

1. **Go to the Sun Microsystems web page (sun.com).**

   The Sun home page is displayed.

2. **Select Downloads from the home page navigation bar.**

   The Sun Downloads page is displayed.

3. **On the View by Category tab, select System Administration > Storage Management.**

   The Storage Management page is displayed, showing a list of downloadable storage-related products.

4. **Select the StorageTek SAN 4.4 product.**

   The login page is displayed.

5. **Login using your Sun account ID.**

   The SAN 4.4.x Download page is displayed.

6. **Accept the License Agreement and select the SAN 4.4 version required for your operating system.**

   The data host software version you need depends on your operating system. See the *Sun Storage 6580 and 6780 Arrays Release Notes* for the current data host software requirements. Download the SAN 4.4.x Base Kit (if you do not already have it installed), and the latest patch version as recommended in the release notes.

   There is a README file available on the SAN 4.4.x Download page with instructions for unpacking and installing the download file on your data host computer.

Installing the SAN_4.4 Data Host Software

To launch the host software installer:

1. **Log in to the host as** `root`.

2. **Change to the** `SAN_4.4.xx_install_it` **directory in which the compressed installation file was unpacked:**

   `cd` *<user-specified location>*`/SAN_4.4..xx_install_it`

   where *xx* is the software version number of the installed files.

3. **Start the host software installer by typing the following command:**

   `./install_it`

   When the installation is complete, the root prompt returns.

4. **Enable the Sun multipathing software (see** "Enabling Multipathing Software" on page 42**).**

Installing Data Host Software for Operating Systems Other Than Solaris

To install data host software for operating systems other than Solaris, see the following sections:

■ "About Data Host Software For Non-Solaris Platforms" on page 41

■ "Downloading and Installing Sun RDAC Software" on page 41

■ "Downloading the AIX Array Support Library (ASL) Package" on page 42

About Data Host Software For Non-Solaris Platforms

The following data host software is available for operating systems other than the Solaris OS:

- Multipath I/O (MPIO) Device Specific Module (DSM) for Windows OS platforms, available from the Sun Download Center (SDLC).

- Sun Redundant Dual Array Controller (RDAC) for Red Hat Linux OS platforms, from the Sun Download Center (SDLC).

- Veritas Dynamic MultiProcessing (DMP) for HP-UX and AIX platforms, which is part of the Veritas Volume Manager. Download the AIX ASL from http://support.veritas.com. The AIX ASL is available only from Veritas. Contact Veritas for HP-UX DMP.

- Netware Multiprocessing Executive (MPE) for Novell Netware OS, available only from Novell.

See the *Release Notes for Sun Storage 6580 and 6780 Arrays* for a list of supported operating systems, patches, and HBAs.

Downloading and Installing Sun RDAC Software

1. **To download the latest Sun version of RDAC software (support for Windows and Linux multipathing), go to:**

   http://www.sun.com/download/index.jsp

2. **On the View by Category tab, select Hardware Drivers > Storage.**

3. **Select the StorageTek RDAC Driver link for the Windows or Linux.**

   An RDAC Driver download page is displayed.

4. **Select the data host platform that you want to install.**

5. **Read the software license agreement, click the checkbox, and click Continue.**

6. **Follow the download information and files instructions to select and download the appropriate files.**

7. **To install the software, refer to the platform-specific guide:**

- *Sun StorageTek MPIO Device Specific Module for 6000 and 2500 Series Arrays Microsoft Windows OS Platforms* (820-4737)

- *Sun StorageTek RDAC Failover Driver for Linux OS* (820-4738)

Downloading the AIX Array Support Library (ASL) Package

1. Go to the Veritas AIX ASL page:

http://support.veritas.com/docs/279730

A page displays with the ASL installation instructions.

2. Read the instructions and click Download Now.

3. Follow the instructions to uncompress and install the ASL.

Enabling Multipathing Software

Sun StorageTek SAN Foundation software includes the Sun StorEdge Traffic Manager multipathing software.

The procedure you use to enable multipathing software depends on the version of Solaris OS running on the host:

- "Enabling Multipathing Software for Solaris 8 or 9 OS" on page 42
- "Enabling Multipathing Software for Solaris 10 OS" on page 43

Enabling Multipathing Software for Solaris 8 or 9 OS

To enable the multipathing software on hosts running Solaris OS 8 or 9:

1. Open the `/kernel/drv/scsi_vhci.conf` **file with a text editor.**

2. Set `mpxio-disabling";` **in the file.**

3. Set `load-balance="round-robin";` **in the file.**

4. Set `auto-failback="enable";` **in the file.**

5. Save the updated file.

6. Reboot the host.

7. **Use the** `cfgadm` **command to configure HBA paths.**

   How you configure paths depends on how you are using your arrays in a SAN or direct attach environment. See the *Sun StorageTek SAN Foundation Software 4.4 Configuration Guide* for information about configuring paths.

Enabling Multipathing Software for Solaris 10 OS

To enable multipathing software for all Fibre Channel (FC) ports on hosts running Solaris OS 10:

1. **Type the following command:**

   # stmsboot -e

Note – See the `stmsboot`(1M) manpage for complete details.

   You are prompted to confirm the command:

   WARNING: This operation will require a reboot.

   Do you want to continue ? [y/n] (default: y)

2. **Press the Return key to reboot the host.**

Downloading the Veritas Volume Manager ASL

Veritas Volume Manager provides support for the Sun Storage 6580 and 6780 Arrays in the form of the Array Support Library (ASL). If you are using the Veritas Volume Manager on your array (recommended), you will need the ASL. There are ASL software packages for the Solaris 8, 9, and 10 OSs, and for the IBM AIX 5.1 and 5.2 OSs. The ASL must be installed on the same host system as the Volume Manager software to enable it to recognize the Sun Storage 6580 and 6780 Arrays trays.

Downloading the Solaris ASL Package

1. **Log in as superuser on the Sun server to be connected to the array.**

2. **Go to the Sun Downloads page:**

http://www.sun.com/download

3. **On the Downloads A-Z tab, select V, and then VERITAS Volume Manager Array Support Libraries (ASLs).**

VERITAS Volume Manager ASL page is displayed.

4. **Select the data host platform that you want to install.**

5. **Read the software license agreement, and click the checkbox.**

6. **Log in (if you are already registered) or click Register Now.**

7. **Follow the download information and files instructions to select and download the appropriate files for your array.**

8. **Refer to the README file for instructions on installing the Veritas Volume Manager ASL.**

Next Steps

After you have installed and enabled multipathing on the data hosts, configure IP addressing on the array controllers as described in Chapter 5.

Configuring IP Addressing

In order for there to be an out-of-band Ethernet connection between the local management host and the array controllers, the management host and the array controllers must have valid IP addresses.

This chapter describes how to configure IP addressing on the local management host and the array controllers. It contains the following sections:

- "About IP Addressing" on page 45
- "Configuring the IP Address of the Array Controllers" on page 46
- "Configuring the IP Address of the Management Host" on page 51
- "Creating and Deleting a Temporary Virtual Subnet on a Management Host" on page 53
- "Next Steps" on page 54

About IP Addressing

The Sun Storage 6580 and 6780 Arrays are managed out-of-band using a standard Ethernet connection between the redundant array of independent disk (RAID) controllers and your management host.

Use the procedures in the following sections to ensure that the local management host and the array controllers have valid IP addresses:

- "Configuring the IP Address of the Array Controllers" on page 46
- "Configuring the IP Address of the Management Host" on page 51

Configuring the IP Address of the Array Controllers

You can configure two types of IP addressing for Ethernet port 1 of each array controller:

- Dynamic Host Configuration Protocol (DHCP) IP addressing – IP addresses for Ethernet port 1 are assigned dynamically from a DHCP server running bootstrap protocol (BOOTP) services. By default, this occurs automatically at initial power-on. An IP address assigned to an Ethernet port is held only as long as needed.
- Static IP addressing – You assign a specific IP address to Ethernet port 1 of each controller. Static IP addresses remain in effect until you modify or remove them or you change the method of IP addressing for the Ethernet port to DHCP.

By default, if the array controllers cannot find a DHCP server upon initial power-on, an internal IP address is assigned to Ethernet port 1 of each controller:

- Ethernet port 1 of Controller A is assigned IP address `192.168.128.101.`
- Ethernet port 1 of Controller B is assigned IP address `192.168.128.102.`

The following subsections describe how to configure Ethernet port 1 on a controller with dynamic and static IP addressing.

Configuring Dynamic (DHCP) IP Addressing

If BOOTP services are available on the DHCP server at initial array power-on, this server assigns a dynamic IP address for Ethernet port 1 on each controller.

If a DHCP server is not available, the controller tray defaults to internal static IP addresses. For instructions on restoring DHCP IP addressing to Ethernet port 1 of either controller see "Configuring Static IP Addressing" on page 46.

If you want to set up a DHCP server, refer to Appendix A for a description of how to configure BOOTP services in a Sun Solaris or Microsoft Windows environment.

Configuring Static IP Addressing

There are two methods of assigning static IP addresses to the Ethernet ports of a controller:

- Using the serial port interface, as described in the following text.

■ Using the Sun StorageTek Common Array Manager browser interface, as described in the *Sun StorageTek Common Array Manager Software Installation Guide*.

Note – It is recommended that you use the serial port interface to assign IP addresses to Ethernet port 1 of each controller, if possible.

To use the serial port interface to configure IP addressing for Ethernet port 1 of each controller, you must complete the tasks described in the following sections:

■ "Connecting a Terminal to the Serial Port" on page 47
■ "Setting Up the Terminal Emulation Program" on page 47
■ "Establishing a Connection With the Serial Port" on page 48
■ "Configuring the IP Addresses" on page 49

Connecting a Terminal to the Serial Port

You will establish a serial connection to each controller, Controller A and Controller B.

Note – You can use any null serial extension cable that connects to a serial port base cable.

To connect a terminal to the serial port of a controller:

1. **Connect your terminal (using a null modem cable) to the DB9 port on each controller.**

Setting Up the Terminal Emulation Program

To set up a terminal emulation program to connect to the serial port:

1. **Select VT100 emulation.**

2. **Remove any modem strings from the connection profile.**

3. **Set up the connection profile with the following communication settings:**
   ■ Data Rate: 57600
   ■ Data Bits: 8
   ■ Parity: None
   ■ Stop Bits: 1
   ■ Flow Control: None

Establishing a Connection With the Serial Port

To establish a connection with the serial port and display the Service Interface menu:

1. **Send a Break using your emulation program. For example, use Ctrl-Break with PC programs.**

Note – Press Break to synchronize the serial port to a different terminal port rate.

Send a break or several breaks until the serial port responds with a request to synchronize the with the baud rate of the terminal:

```
Set baud rate: press <space> within 5 seconds
```

2. **Press the space bar within five seconds.**

The serial port confirms the established baud rate for the connection:

```
Baud rate set to 57600
```

3. **Use the key sequence Ctrl-Break. Ctrl-Break.**

Send a break or several breaks until the serial port responds with the following message:

```
Press within 5 seconds: <S> for Service Interface, <BREAK> for
baud rate
```

4. **Press S to display the Service Interface menu.**

Note – The menu commands are case sensitive. Be sure to enter an uppercase S.

The serial port requests the serial port password:

```
Enter Password to access Service Interface (60 sec timeout):
->
```

5. **Type the serial port password,** `kra16wen`**, and press Enter.**

The Service Interface menu is displayed.

```
Service Interface Main Menu
  ============================
1) Display IP Configuration
2) Change IP Configuration
3) Reset Storage Array (SYMbol) Password
Q) Quit Menu


Enter Selection:
```

Configuring the IP Addresses

The serial port Service Interface menu enables you to set up the IP address configuration for Ethernet port 1 on the controller.

Note – Ethernet port 2 is reserved for future use.

To set up the IP address configuration for Ethernet port 1 on *each* controller:

1. **Select option 2, Change IP Configuration:**

```
Service Interface Main Menu
  ==============================
1) Display IP Configuration
2) Change IP Configuration
3) Reset Storage Array (SYMbol) Password
Q) Quit Menu

Enter Selection: 2
```

The Select Ethernet Port menu is displayed.

2. **Specify the Ethernet port for which you want to configure IP addressing:**

```
Select Ethernet Port
  ==============================
1) Ethernet Port: 1
2) Ethernet Port: 2
Q) Quit

Enter Selection: 1
```

3. **Specify that you do not want dynamic IP addressing, using a DHCP server, used for this port:**

```
Configure using DHCP ? (Y/N): n
```

The current or default IP configuration for the selected Ethernet port is displayed.

4. **Enter the static IP address and, optionally, a subnet mask for the Ethernet port:**

```
Press '.' to clear the field;
Press '-' to return to the previous field;
Press <ENTER> and then ^D to quit (Keep Changes)


                Current Configuration          New Configuration
IP Address         if1 : 192.168.128.101       IP-address
Subnet Mask        if1 : 255.255.255.0         <ENTER>
Gateway IP Address if1:                        <ENTER>
```

5. **When prompted, confirm the specified IP addressing.**

   The Service Interface menu is redisplayed.

6. **Select option 1, Display IP Configuration, to confirm the IP address changes.**

```
Service Interface Main Menu
  ==============================
1) Display IP Configuration
2) Change IP Configuration
3) Reset Storage Array (SYMbol) Password
Q) Quit Menu

Enter Selection: 1
```

   The Select Ethernet Port menu is displayed.

7. **Specify the Ethernet port for which you want to display IP addressing:**

```
Select Ethernet Port
 ==============================
1) Ethernet Port: 1
2) Ethernet Port: 2
Q) Quit


Enter Selection: 1
```

The IP address configuration of the selected Ethernet port is displayed, and the Service Interface menu is redisplayed.

8. **Press Q to quit the Service Interface menu.**

9. **Repeat these steps for the second controller Ethernet port.**

When you have completed the IP address configuration for the Ethernet port on *each* array controller, you are ready to register and configure the array, as described in the *Sun StorageTek Common Array Manager Software Installation Guide*.

Configuring the IP Address of the Management Host

The method you use to configure the IP address on the host depends on the platform you are using. Follow the instructions in one of the following sections, depending on your platform:

- "Configuring the IP Address on the Management Host for the Solaris Operating System" on page 52
- "Configuring the IP Address for Windows 2008" on page 52
- "Configuring the IP Address for Windows Server 2003" on page 52

Additionally, you might have to establish a virtual subnet in order to temporarily access the array from the management host. Refer to "Creating and Deleting a Temporary Virtual Subnet on a Management Host" on page 53 for additional information.

Configuring the IP Address on the Management Host for the Solaris Operating System

For information about changing the IP address on a Solaris server, see the `ifconfig` man page.

Configuring the IP Address for Windows 2008

1. **From the Control Panel, select Network and Sharing Center.**

2. **Under Tasks at the left, click Manage network connections.**

3. **Right click on the LAN you want to manage (for example, Local Area Connection), and select Properties.**

4. **Selected Internet Protocol Version 6 or 4 (TCP/IPv6 or TCP/IPv4)).**

5. **Make sure that a static IP address is configured, and click Properties.**

6. **To set the IP address and DNS server as static, select "Use the following IP address:" and "Use the following DNS server addresses:" and fill in the appropriate addresses.**

7. **Click OK at the bottom of Local Area Connection Properties and close the window.**

8. **Open a command window and try to ping the IP addresses of the controller's Ethernet ports, as shown in the following example:**

   `> ping 192.188.128.101`

If the `ping` is unsuccessful, try rebooting the server and `ping` the IP address again.

Configuring the IP Address for Windows Server 2003

1. **From the Control Panel, select Network and Dial-Up Connections.**

2. **Select Local Area Connection > Properties > Internet Protocol (TCP/IP).**

3. **Make sure a static IP address is configured, and click Advanced.**

4. **In Advanced TCP/IP Settings, click Add directly below the IP addresses listing.**

5. **Type an IP address that is on the same subnet as Controller A** (`192.168.128.101`) **and Controller B** (`192.168.128.102`)**.**

   For example, you can use `192.168.128.100` because it is on the same subnet and does not conflict with the controller IP addresses.

6. **Click Add.**

   The new IP address is added to the IP addresses listing.

Creating and Deleting a Temporary Virtual Subnet on a Management Host

To configure IP addressing for an array, you might have to establish a virtual subnet in order to temporarily access the array from the management host. You should delete the virtual subnet after you configure IP addressing for the array.

This section contains the following subsections:

■
■

Creating a Temporary Virtual Subnet on a Management Host

1. **To display the Ethernet ports that are in use on the server, type the following:**

`ifconfig -a`

The Ethernet ports that are in use are displayed, as shown in the following example:

```
lo0: flags=1000849<UP,LOOPBACK,RUNNING,MULTICAST,IPv4> mtu 8232
index 1
        inet 127.0.0.1 netmask ff000000
bge0: flags=1000843<UP,BROADCAST,RUNNING,MULTICAST,IPv4> mtu 1500
index 2
        inet 10.4.30.110 netmask ffffff00 broadcast 10.4.30.255
        ether 0:3:ba:32:4d:f1
```

2. **As** `root`**, configure a temporary virtual subnet by typing the following:**

`# ifconfig` *ethernet-port*`:1 plumb`

```
# ifconfig ethernet-port:1 192.168.128.100 up
```

For example:

```
# ifconfig bge0:1 plumb
```

```
# ifconfig bge0:1 192.168.128.100 up
```

3. **Type the following command to view the changes and thereby verify that you have established IP connectivity between the management host and the array controllers:**

```
ipconfig -a
```

Deleting a Temporary Virtual Subnet on a Management Host

After you have assigned static IP addresses to the controllers, you can delete the temporary virtual subnet.

1. **Enter the following commands as** `root`:

```
# ifconfig ethernet-port:1 down
```

```
# ifconfig ethernet-port:1 unplumb
```

2. **View the changes:**

```
ifconfig -a
```

Next Steps

You are now ready to use the management software to set up the array, as described in the document *Sun StorageTek Common Array Manager Software Installation Guide*.

Among the tasks that you will perform:

- Register the arrays
- Initial configuration
- Create volumes and attach hosts

Configuring a DHCP Server

This appendix describes how to configure bootstrap protocol (BOOTP) services in a Sun Solaris and Microsoft Windows environment. It contains the following sections:

Dynamic IP addresses are assigned through Dynamic Host Control Protocol (DHCP) server BOOTP services.

Before You Begin

You need each controller's media access control (MAC) address to configure the DHCP server. The MAC address is located on the bar code label at the back of each redundant array of independent disks (RAID) controller. Since there are two controllers per array, you need two MAC addresses.

Setting Up a Solaris DHCP Server

The following procedure provides an example of how to set up a DHCP server with the BOOTP option for the Solaris 8, 9, and 10 Operating Systems. Your environment may require different steps.

1. Modify the `netmasks` **line of the** `/etc/nsswitch.conf` **file as shown here:**

```
#netmasks:    nis [NOTFOUND=return] files
```

```
netmasks:    files nis [NOTFOUND=return]
```

2. Start the DHCP wizard by issuing the following command at the command line:

/usr/sadm/admin/bin/dhcpmgr &

The following window is displayed:
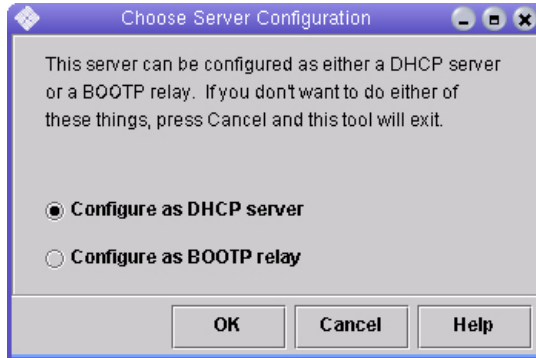
The wizard will prompt you for information related to the configuration, network address, and subnet mask of the controller tray. Select or enter the following information:

- Data storage format: **Text files**
- Nameservice to store host records: **Do not manage hosts records**
- Length of lease:
- Network Address: *Network address of Controller A*
- Subnet Mask: For example, 255.255.255.0
- Network Type: **Local-Area (LAN)**
- Router: **Use router discovery protocol**

Your summary page should look similar to the following example:
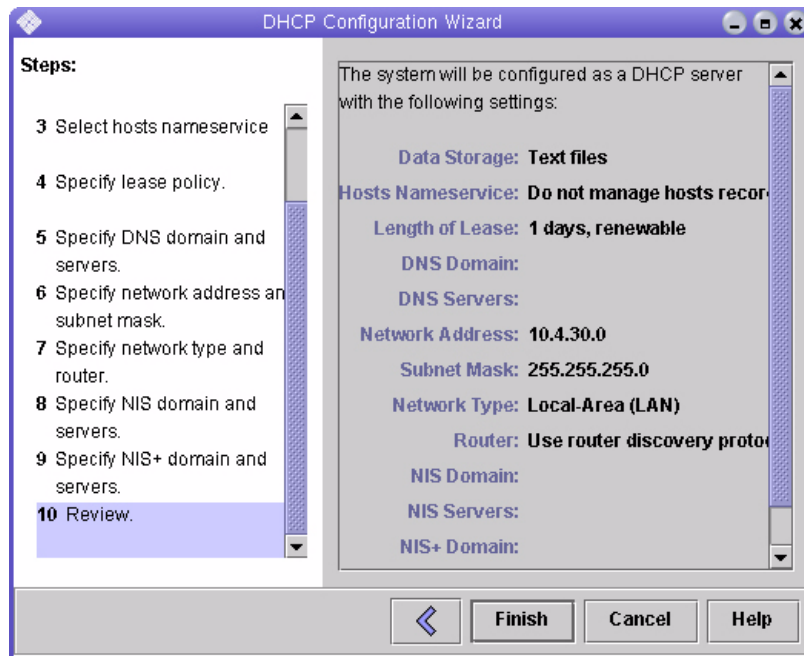
3. **Verify your configuration information and click Finish.**

4. **When you are prompted to configure addresses for the server, click Yes.**
   The Add Address to Network wizard is displayed.

5. **Enter the following information:**

   - Number of IP addresses
   - Name of managing server
   - Starting IP address
   - Configuration macro to be used for configuring the clients
   - Lease type

Your summary page should look similar to the following example:
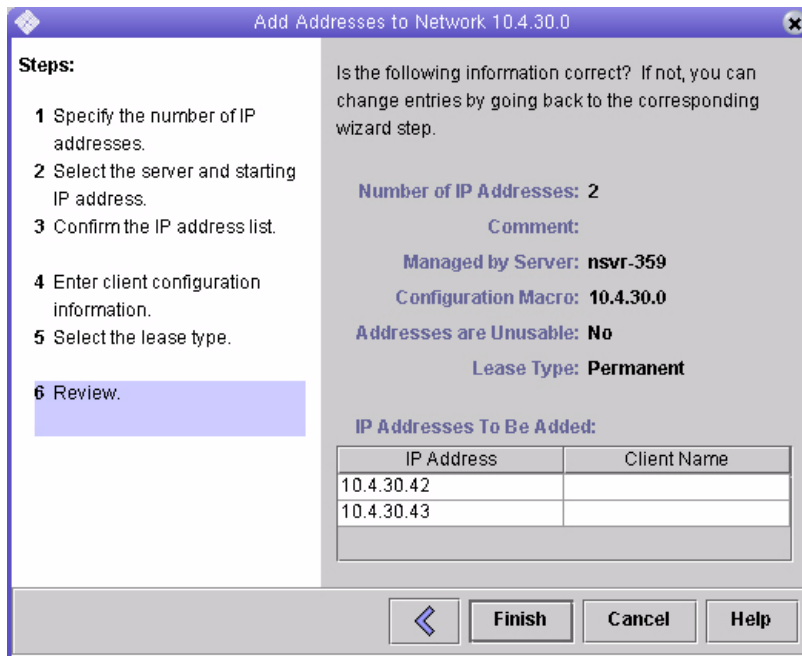
6. Verify your configuration information and click Finish.

The DHCP Manager displays the following:

7. In the Address Properties window, do the following for each RAID controller:

a. In the Client ID field, enter `01` followed by the MAC address that is printed on the back of the RAID controller. For example:

`0100A0E80F924C`

b. Toward the bottom of the window, select "Assign only to BOOTP clients."
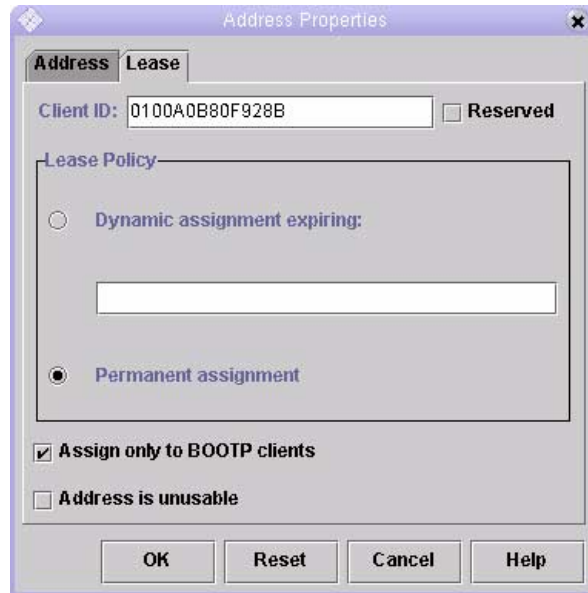
c. **Click OK.**

The DHCP manager updates the status and client ID, as shown in the following example:

8. **Go to Modify Service Options and do the following:**

a. **Select Detect Duplicate IP addresses.**

b. **Under BOOTP Compatibility, select Automatic.**

c. **Select Restart Server, as shown in the following example.**
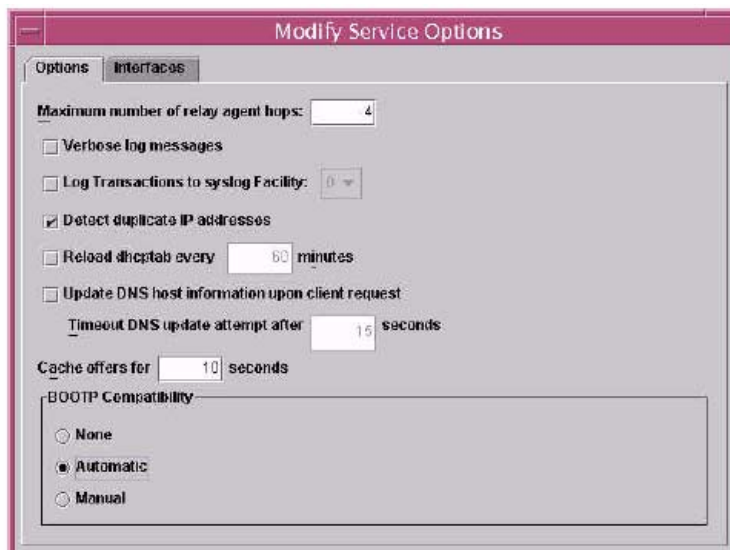
> **d. Click OK.**

After the configuration process has finished, the DHCP server provides BOOTP services to the MAC address you entered for each RAID controller.

9. To verify that the BOOTP service is running, go to Service > Restart.

10. After you power on the array, ping the address.

If the ping responds with 'alive', the DHCP server BOOTP operation was successful.

Setting Up DHCP on a Windows 2000 Advanced Server

Before you begin, make sure the following requirements are met:

- Windows 2000 server and the array are on the same subnet.
- IP addresses that are assigned to the RAID controllers do not conflict.
- The array is in BOOTP IP addressing mode (the default setting for a new array).
- The Windows 2000 Server setup CD is available.

The following procedure provides an example of how to set up DHCP with the BOOTP option on the Windows 2000 Advanced Server. Your environment may require different steps.

Installing the DHCP Server

To install DHCP server on the Windows 2000 Advanced Server:

1. **From the Control Panel, go to Administrative Tools > Configure Your Server.**

2. **Select DHCP from the Networking drop-down menu on the left.**

   The wizard instructs you to use the Windows Components wizard to add the DHCP component.

3. **Start the Windows Components wizard and double-click Networking Services.**

4. **Select Dynamic Host Configuration Protocol (DHCP), click the check box to its left, and click OK.**

   The Windows Components wizard is displayed.

5. **Click Next.**

6. **If Terminal Services Setup is displayed, select Remote administration mode. Click Next.**

   If your server has obtained an address from a DHCP server for its own address, a warning is displayed.

7. **Click OK to accept the warning.**

   Local Area Connection Properties is displayed.

8. **Assign a static IP address to the server, or click Server to keep DHCP addressing for the server. Click OK.**

9. **Click Finish to exit the Windows Components wizard.**

   The DHCP server is now installed. The next step is to configure the server.

Configuring the DHCP Server

To configure the DHCP server:

1. **From the Control Panel, go to Administrative Tools > Computer Management > Services and Application > DHCP.**

2. **From the Action menu, select New Scope.**

   The New Scope wizard is displayed.

3. **Enter the following information as prompted:**

- Scope name and description:
- IP address range (for example, `192.168.0.170` to `192.168.0.171`)

- Subnet mask (for example, `255.255.255.0`)
- Add exclusions (do not exclude any IP addresses)
- Lease duration (accept the default of 8 days)
- Router (default gateway) of your subnet (for example, `192.168.0.1`)
- Domain name, WINS server (these are not needed)
- Activate Scope? (select "Yes, I want to activate this scope now")

4. **Click Finish to exit the wizard.**

   The contents of the DHCP server are listed.

5. **Right-click Scope [*ipaddress*] *scope-name* and select Properties.**

6. **In the Scope Properties box, click the Advanced tab.**

7. **Select BOOTP only, set the lease duration to Unlimited, and click OK.**

8. **Right-click Reservations.**

   The Controller A Properties box is displayed.

9. **Enter the IP address and the MAC address for Controller A. Click Add.**

   The Controller B Properties box is displayed.

10. **Enter the IP address and the MAC address for Controller B. Click Add.**

    The controllers are added to the right of the Reservations listing.

11. **Right-click Scope [*ipaddress*] *scope-name* to disable the scope.**

12. **Click Yes to confirm disabling of the scope.**

13. **Right-click Scope and select Activate.**

    The DHCP server is now configured with the BOOTP option for the array network.

14. **Power on or power cycle the array modules.**

15. **Click Address Leases in the left pane to check the DHCP server leases.**

    The lease expiration displays the following status for each RAID controller:

    ```
    Reservation (active)
    ```

    If the lease expiration for the controllers is inactive, try refreshing the list. If the lease is still inactive, check the following:

- Are the IP addresses allocated for BOOTP conflicting?
- Were the correct MAC addresses added to the DHCP server for the array controllers?
- Are the DHCP server and array on the same subnet?

- Is the gateway configured correctly on the DHCP server?

  The RAID controllers can gain a lease and an IP address, but they cannot respond out of the subnet for the software if the gateway is not configured properly.

- Are the RAID controllers set up for BOOTP access?

  It is possible that they were previously configured to have static IP addresses. You must be sure when you move an array that you change the array's IP addresses to IP addresses on the new subnet before setting up BOOTP services.

Installing and Cabling Rack-Ready Trays

This appendix describes the process of installing independent components that make up the Sun Storage 6580 and 6780 Arrays. It contains the following sections:

Installation Checklist

The following checklist (TABLE B-1) outlines all of the tasks required for assembling and mounting an array in a cabinet. To ensure a successful installation, perform the tasks in the order in which they are presented.

TABLE B-1   Sun Storage 6580 and 6780 Arrays Rack-Ready Installation Checklist

Step	Task	Where to Find Procedure
1.	Prepare the site	*Sun Storage Regulatory and Safety Compliance Manual* *Site Preparation Guide for Sun Storage 6580 and 6780 Arrays*
2.	Check for late-breaking information related to the installation of the array	*Release Notes for Sun Storage 6580 and 6780 Arrays*
3.	Determine which rack you will use to mount the array:	
	If you are using a Sun Rack II, gather required tools, install the Sun Rack II, PDUs, and mounting rails • Install the controller tray and expansion trays in a Sun Rack II	• "Preparing for the Installation Using Sun Rack II" on page 67 • "Installing a Controller Tray in the Sun Rack II" on page 68 • "Installing an Expansion Tray in the Sun Rack II" on page 72
	If you are using an existing rack, install the universal rail kit • Install the controller tray, and expansion trays in the selected cabinet	• "Universal Rail Kit Installation" on page 111 • "Installing a Controller Tray in a Cabinet" on page 123 • "Installing an Expansion Tray in a Cabinet" on page 140
4.	Connect the controller tray to expansion trays	"Intertray Cabling" on page 75
5.	Set the disk tray link rate	"Setting the Tray Link Rate" on page 97
6.	Attach the power cables to the power source	"Connecting the Power Cables" on page 98
7.	Connect the management host	"Connecting the Management Host" on page 27
8.	Attach the host interface cables	"Connecting Data Hosts" on page 31

TABLE B-1 Sun Storage 6580 and 6780 Arrays Rack-Ready Installation Checklist

Step	Task	Where to Find Procedure
9.	Turn on the power	"Powering On the Array" on page 24
10.	Configure IP addresses for the array controllers (if DHCP is not used)	"Configuring the IP Address of the Array Controllers" on page 46
11.	Install CAM on a central management host (for out-of-band management) or a data host (for in-band management)	*Sun StorageTek Common Array Manager Software Installation Guide*

Preparing for the Installation Using Sun Rack II

Before you begin to install controller and expansion trays, do the following:

1. **Gather the following items:**

   - T30 Torx wrench (provided with the Sun Rack II). Alternately, you can use an 18-volt variable-speed portable drill with a T30 Torx bit extension.

   - Phillips head #2 screwdriver (minimum 4-inch length recommended).

   - Antistatic protection.

Caution – Electrostatic discharge can damage sensitive components. Touching the array or its components without using a proper ground might damage the equipment. To avoid damage, use proper antistatic protection before handling any components.

---

2. **Install the Sun Rack II cabinet, as described in the** *Sun Rack II User's Guide* **(820-4759).**

3. **Install the power distribution units (PDUs) in the Sun Rack II, as described in** *Power Distribution Unit Installation Guide for Sun Storage 6580 and 6780 Arrays and Sun StorageTek 2500 and 6000 Array Series* **(820-6200).**

4. **Install the rails for each tray in the Sun Rack II, as described in the** *Sun Storage Modular Rail Kit Installation Guide* **(820-5774).**

Installing a Controller Tray in the Sun Rack II

Required Items:

- Sun Storage 6580 or 6780 array controller tray
- Four M6 cage nuts (supplied with the Sun Rack II)
- Four M6 screws (supplied with the Sun Rack II)
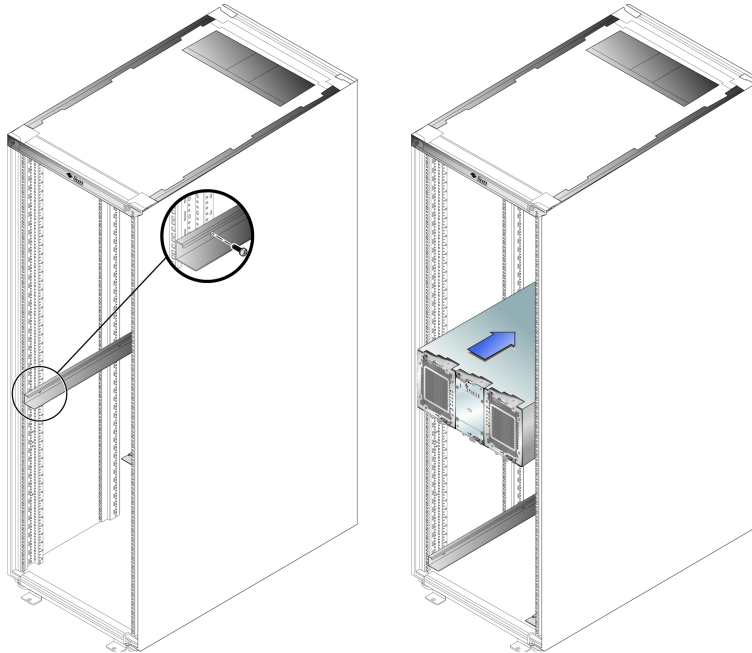- Cage nut mounting tool (supplied with the Sun Rack II)

1. **Unpack the controller tray.**

Caution – Two people are needed to lift and move the tray. Use care to avoid injury. A controller tray weighs up to 81.1 pounds (36.79 kg).

2. **Install the controller tray in the fifth slot from the bottom of the cabinet, where you have attached the rails.**

**FIGURE B-1**   Positioning the Tray in the Cabinet

3. **At the front of the cabinet, insert four cage nuts (supplied with the Sun Rack II) into the vertical cabinet rails.**

   a. **Position the cage nut with the tabs at each side as shown in** FIGURE B-2**.**

Note – Positioning the cage nut tabs horizontally allows for maximum amount of vertical movement when securing the array to the rack.

---

   b. **Insert the cage nut behind the vertical rail, press it through the mounting hole, and snap it into place.**
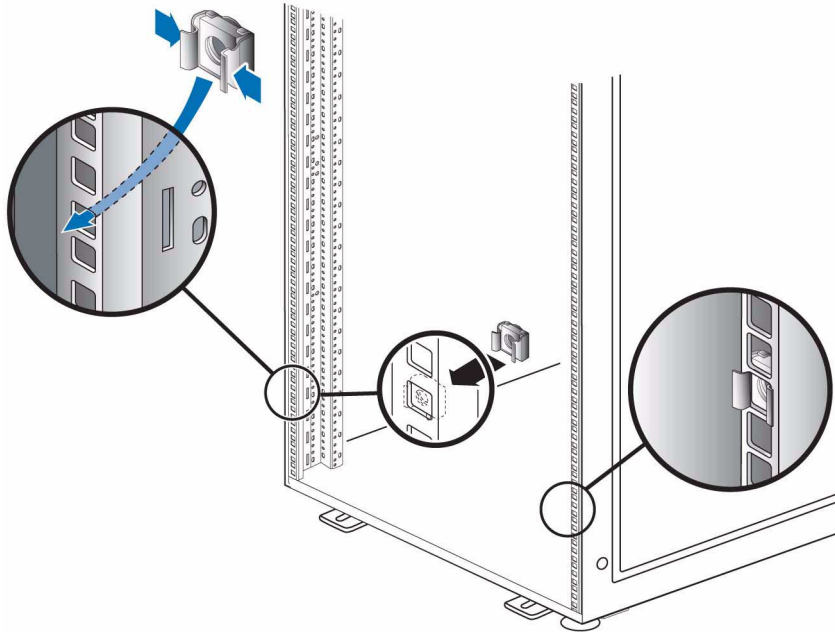
4. **Carefully slide the controller tray into the cabinet until the front flanges of the tray touch the vertical face of the cabinet.**

5. **Install and tighten four M6 screws to secure the front of the controller tray to the cabinet.**

FIGURE B-3   Securing the Controller Tray in the Cabinet
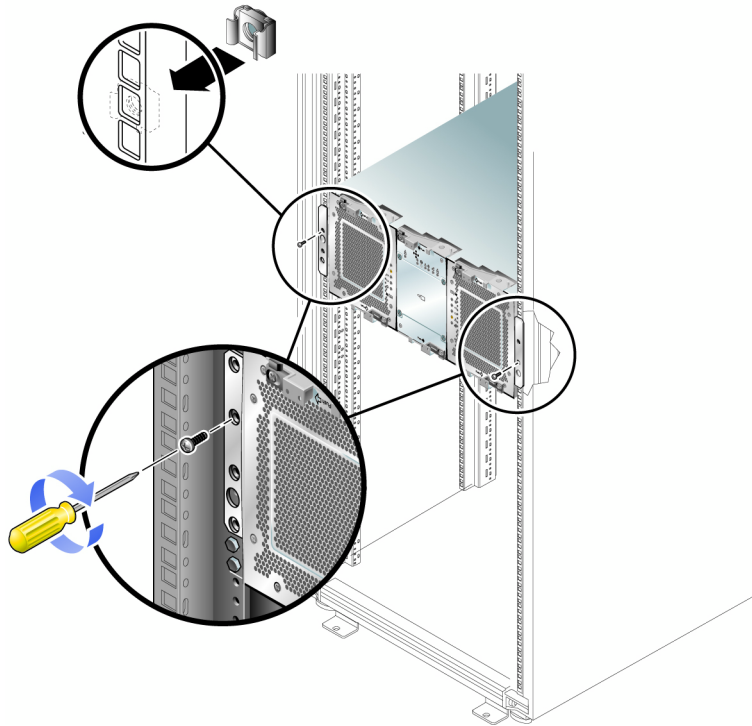
6. **If the controller tray is the topmost tray in the array stack, install a pair of static rails (provided with the Sun Rack II) directly above the tray (see** FIGURE B-4**). The static rails serve as a top restraint for the tray positioned at the top of the array stack.**
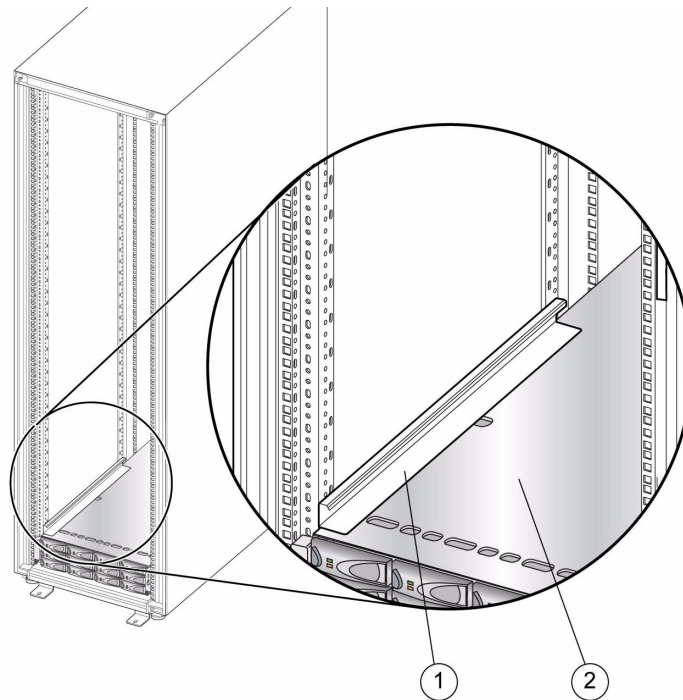
Figure Legend

1	Top rail restraint	**2**	Expansion tray

Installing an Expansion Tray in the Sun Rack II

When you add a new CSM200 or 6140 expansion tray to an existing array in a production or active environment, it is best practice to cable and add the trays while the RAID controller module is powered on, to avoid a variety of issues including those listed below.

Only Sun Service should install expansion modules with data. See the *Sun StorageTek Common Array Manager Release Notes* for more information about supported expansion modules by array.

Combining Disk Tray Types

If you combine CSM200 expansion trays with 6140 expansion trays in one system, consider the following:

- The total number of drives might be more than the maximum number that each drive channel can support. The maximum number of drives in any configuration is 448.

- Each I/O tray type must be on a separate loop.

Required Items:

- CSM200 or 6140 Expansion tray
- Two copper cables (supplied with each expansion tray)
- Four cage nuts (supplied with Sun Rack II)
- Four M6 screws (supplied with Sun Rack II)
- One pair of static rails (for top array stack restraint)

1. **Unpack the expansion tray.**

2. **Using two people, one at each side of the tray, carefully lift and rest the tray on the bottom ledge of the left and right rails.**

Caution – Two people are needed to lift and move an expansion tray. Use care to avoid injury. An expansion tray can weigh up to 95 pounds (45 kg).

3. **Carefully slide the tray into the cabinet until the front flanges of the tray touch the vertical face of the cabinet.**

4. **At the front of the cabinet, insert four cage nuts (supplied with the Sun Rack II) into the vertical cabinet rails.**

5. **Install and tighten four M6 screws to secure the front of the controller tray to the cabinet.**

**FIGURE B-5** Installing an Expansion Tray in a Sun Rack II
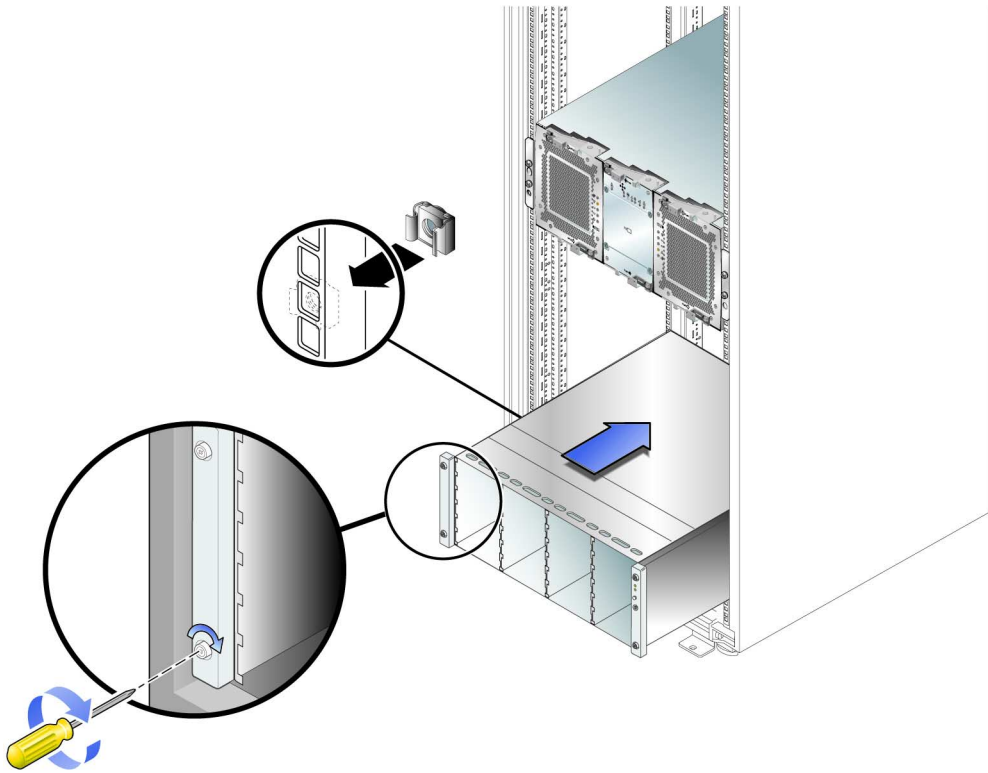
6. **If the expansion tray is the topmost tray in the array stack, install a pair of static rails (provided with the Sun Rack II) directly above the tray. (See** FIGURE B-4**.)**

Intertray Cabling

This section describes how to cable a controller tray to expansion trays for several different configurations. The controller tray uses Controller A and Controller B drive ports to connect to the expansion ports at the back of each expansion tray.

FIGURE B-6   Drive Ports on the Controller Tray
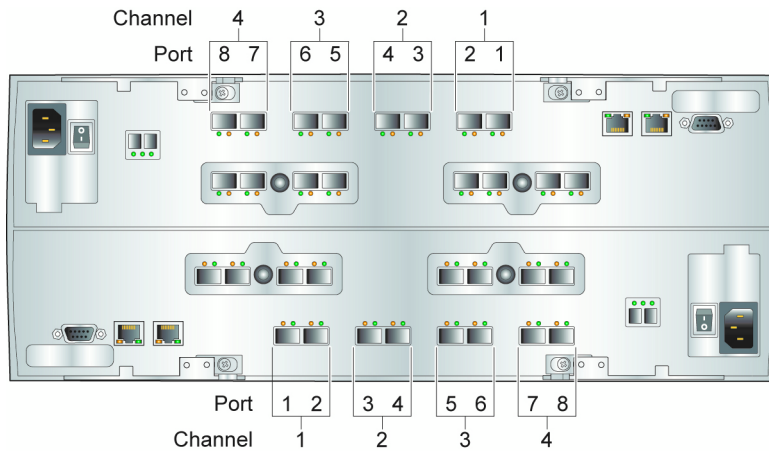
Controller Tray Redundant Path Pairs

A controller tray has eight redundant path pairs that are formed using one drive channel of Controller A and one drive channel of Controller B. TABLE B-2 shows the redundant pairs in a controller tray. TABLE B-3 lists the numbers of the redundant path pairs and the drive ports of the drive ports from which the redundant path pairs are formed.

Note – To maintain data access in the event of the failure of a controller, an expansion tray, or a drive port, you must connect an expansion tray or a string of expansion trays to both drive ports on a redundant path pair.

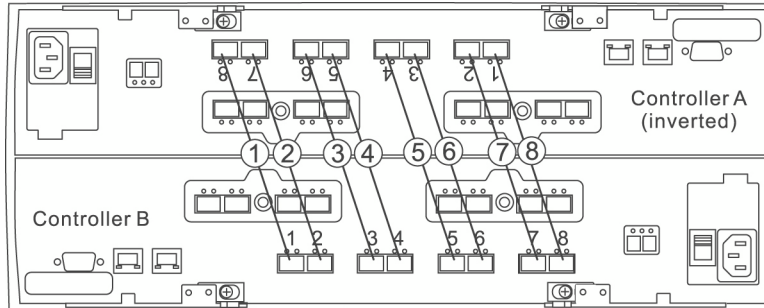**FIGURE B-7**   Controller Tray Physical Redundant Path Pairs

TABLE B-2   Controller Tray Redundant Path Pairs

Legend (Physical Pair)	Drive Ports on Controller A	Drive Channels on Controller A	Ports on Controller B	Drive Channels on Controller B
1	Port 8	Channel 1	Port 1	Channel 5
2	Port 7	Channel 1	Port 2	Channel 5
3	Port 6	Channel 2	Port 3	Channel 6
4	Port 5	Channel 2	Port 4	Channel 6
5	Port 4	Channel 3	Port 5	Channel 7
6	Port 3	Channel 3	Port 6	Channel 7
7	Port 2	Channel 4	Port 7	Channel 8
8	Port 1	Channel 4	Port 8	Channel 8

Rack Positioning and Tray IDs

TABLE B-3   Rack Position and Tray ID for Controller Tray and Up to Twelve Expansion Trays

Rack Position	Tray ID	Array Number	Controller Tray or CSM2 Expansion Tray
13	86	12	Expansion Tray
12	72	11	Expansion Tray
11	66	10	Expansion Tray

TABLE B-3 Rack Position and Tray ID for Controller Tray and Up to Twelve Expansion Trays *(Continued)*

Rack Position	Tray ID	Array Number	Controller Tray or CSM2 Expansion Tray
10	52	9	Expansion Tray
9	85	8	Expansion Tray
8	71	7	Expansion Tray
7	65	6	Expansion Tray
6	51	5	Expansion Tray
5	99		6x80 Controller Tray
4	45	4	Expansion Tray
3	31	3	Expansion Tray
2	25	2	Expansion Tray
1	11	1	Expansion Tray

Interconnections Between the Controller and Expansion Trays

For array configurations with seven or fewer expansion trays, you can cable the controller tray to the expansion trays using a sequential or non-sequential port cabling method. Using the non-sequential method provides improved performance, but might be more difficult to implement.

Sequential Drive Port Connections

With the sequential interconnection method, you use a left-to-right consecutive drive port sequence. This means you start with the left-most drive port of each controller (port 8 on controller A and port 1 on controller B) to connect the first expansion tray. Use the drive ports immediately to the right of each controller to connect the second expansion tray. Continue connecting to the next drive port until all drive ports are used. The ninth expansion tray is then daisy-chained with the first tray, the tenth with the second, and so forth until the maximum tray (14) configuration is reached.

Non-sequential Drive Port Connections

With the non-sequential interconnection method, you use a left-to-right non-consecutive drive port sequence. This means you start with the left-most drive port of each controller (port 8 on controller A and port 1 on controller B) to connect the first expansion tray. Then skip the next drive port pair (controller A port 7 and controller B port 2) and use the third drive port pair (controller A port 6 and controller B port 3). Repeat for the controller A port 4/controller B port 5 and lastly for the controller A port 2/controller B port 7 pairs.

Connect the fifth expansion tray to the first drive port pair that you skipped (controller A port 7 and controller B port 2). Connect the expansion trays six through eight to the remaining unused drive port pairs (controller A port 5 and controller B port 4) (controller A port 3 and controller B port 6) and (controller A port 1 and controller B port 8).

FIGURE B-8   Non-sequential Drive Port Connections for Expansion Trays 1 Through 4
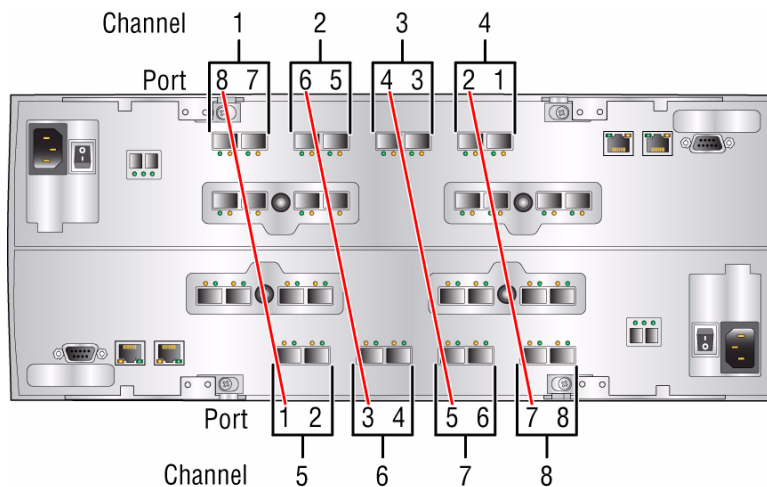
TABLE B-4   Non-sequential Port Connections for Expansion Trays 1 through 7

	Drive Port Pair	
Expansion Tray	**Controller A Drive Port**	**Controller B Drive Port**
1	8	1
2	6	3
3	4	5
4	2	7

Drive Port Pair		
Expansion Tray	Controller A Drive Port	Controller B Drive Port
5	7	2
6	5	4
7	3	6

Note – The CSM200 expansion tray, with mixed SATA and Fibre Channel drives, can lead to uneven performance if they share the same drive channel. The same is true for drives running at different access speeds (2Gb/sec and 4Gb/sec).
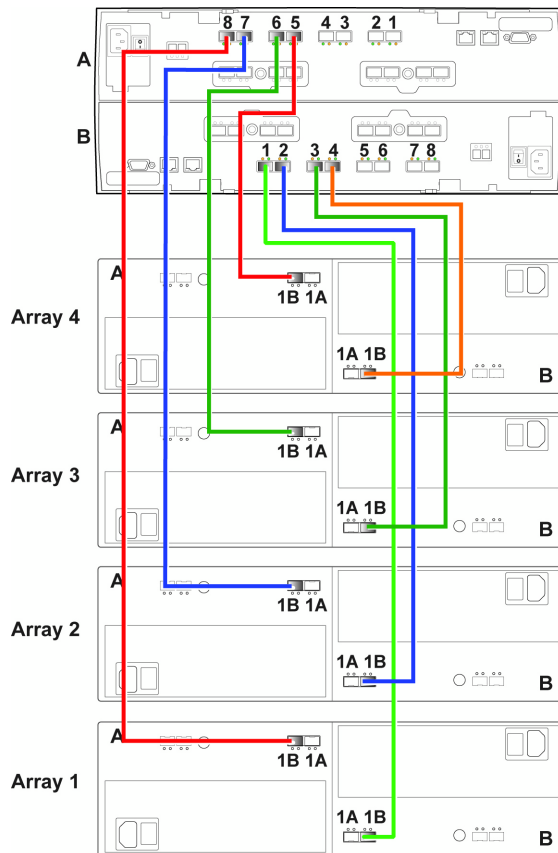
Cabling Controller and Expansion Trays

Use the following instructions to connect the dual-RAID controller tray to one or more expansion trays.

Cabling One Controller Tray To Four Expansion Trays

FIGURE B-9   Cabling One Controller Tray and Four Expansion Trays

See TABLE B-3 for tray IDs and rack location.

Cabling for Four Expansion Trays

Cable	Controller Tray ID 99 – Controller A - Upper								Controller Tray ID 99 – Controller B - Lower								Exp Tray (L = Port 1A or 1B on the Left IOM, R = Port 1A or 1B on the Right IOM) ID 11 (1)		ID 25 (2)		ID 31 (3)		ID 45 (4)	
	Ch1		**Ch2**		**Ch3**		**Ch4**		**Ch5**		**Ch6**		**Ch7**		**Ch8**		**L**	**R**	**L**	**R**	**L**	**R**	**L**	**R**
	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8								
1	X																B							
2									X									B						
3		X																	B					
4										X										B				
5			X																		B			
6											X											B		
7				X																			B	
8												X												B

Cabling One Controller Tray and Eight Expansion Trays

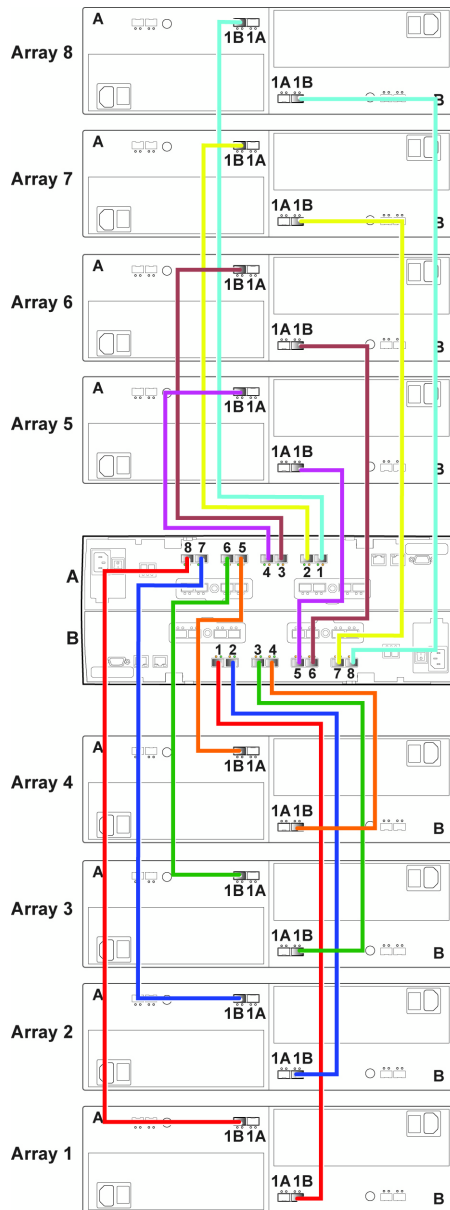**FIGURE B-11**   Cabling One Controller and Eight Expansion Trays

Cable	Controller Tray ID 99																Exp Tray (L = Port 1A or 1B on the Left IOM, R= Port 1A or 1B on the Right IOM)															
	Controller A - Upper								Controller B - Lower								ID 11		ID 25		ID 31		ID 45		ID 51		ID 65		ID 71		ID 85	
	Ch1		Ch2		Ch3		Ch4		Ch5		Ch6		Ch7		Ch8		1		2		3		4		5		6		7		8	
	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R
1	X																B															
2									X									B														
3		X																	B													
4										X										B												
5			X																		B											
6											X											B										
7				X																			B									
8												X												B								
9					X																				B							
10													X													B						
11						X																					B					
12														X														B				
13							X																						B			
14															X															B		
15								X																							B	
16																X																B

Cabling One Controller Tray To More Than Eight Expansion Trays

If you are adding expansion trays to an existing configuration so that the total number of attached expansion trays will increase from eight or fewer to a total of more than eight, you will need to re-cable some of the drive trays that were previously installed.

When the number of expansion trays exceeds eight, the cabling pattern changes significantly. At this point you will begin to use the A ports on the expansion trays, and the expansion trays beyond the eighth one will connect to the controller tray indirectly, through another expansion tray.

Cabling One Controller Tray and Twelve Expansion Trays

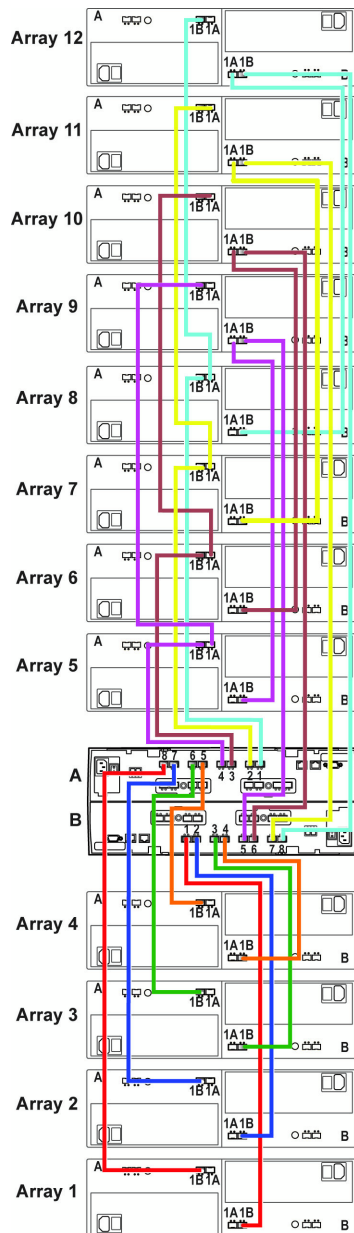**FIGURE B-13** Cabling One Controller Tray and Twelve Expansion Trays

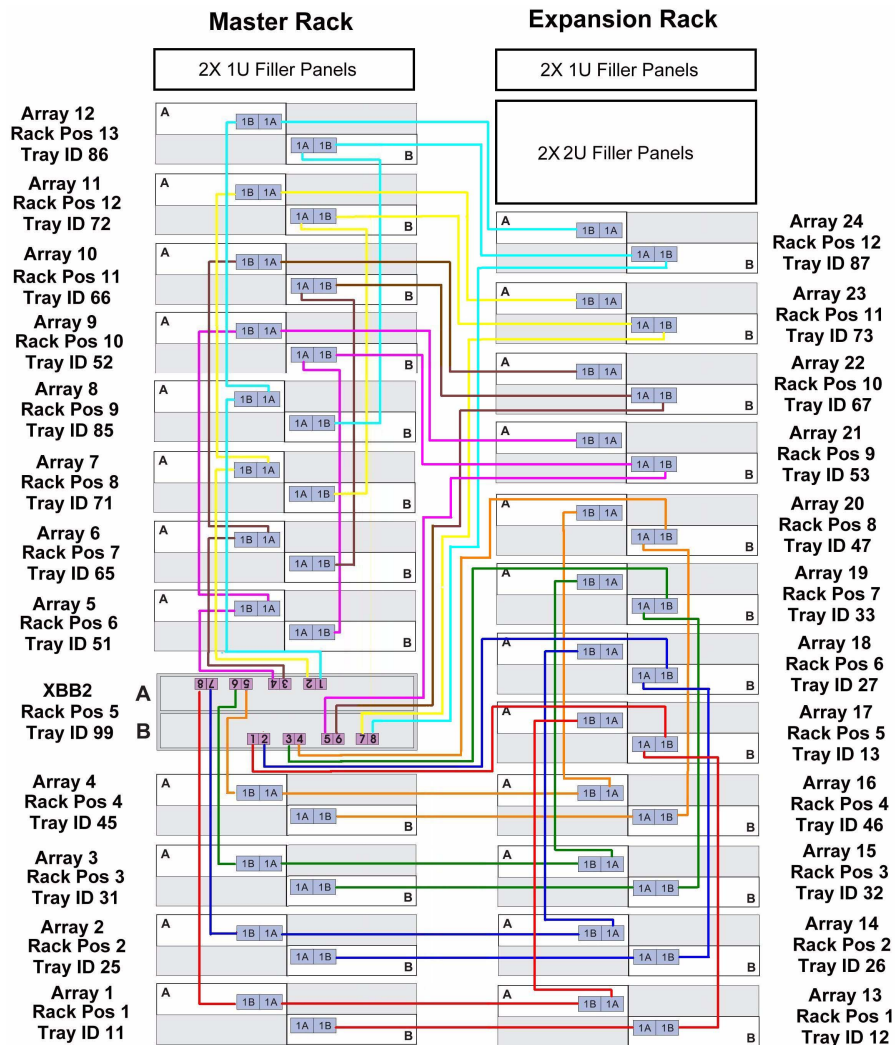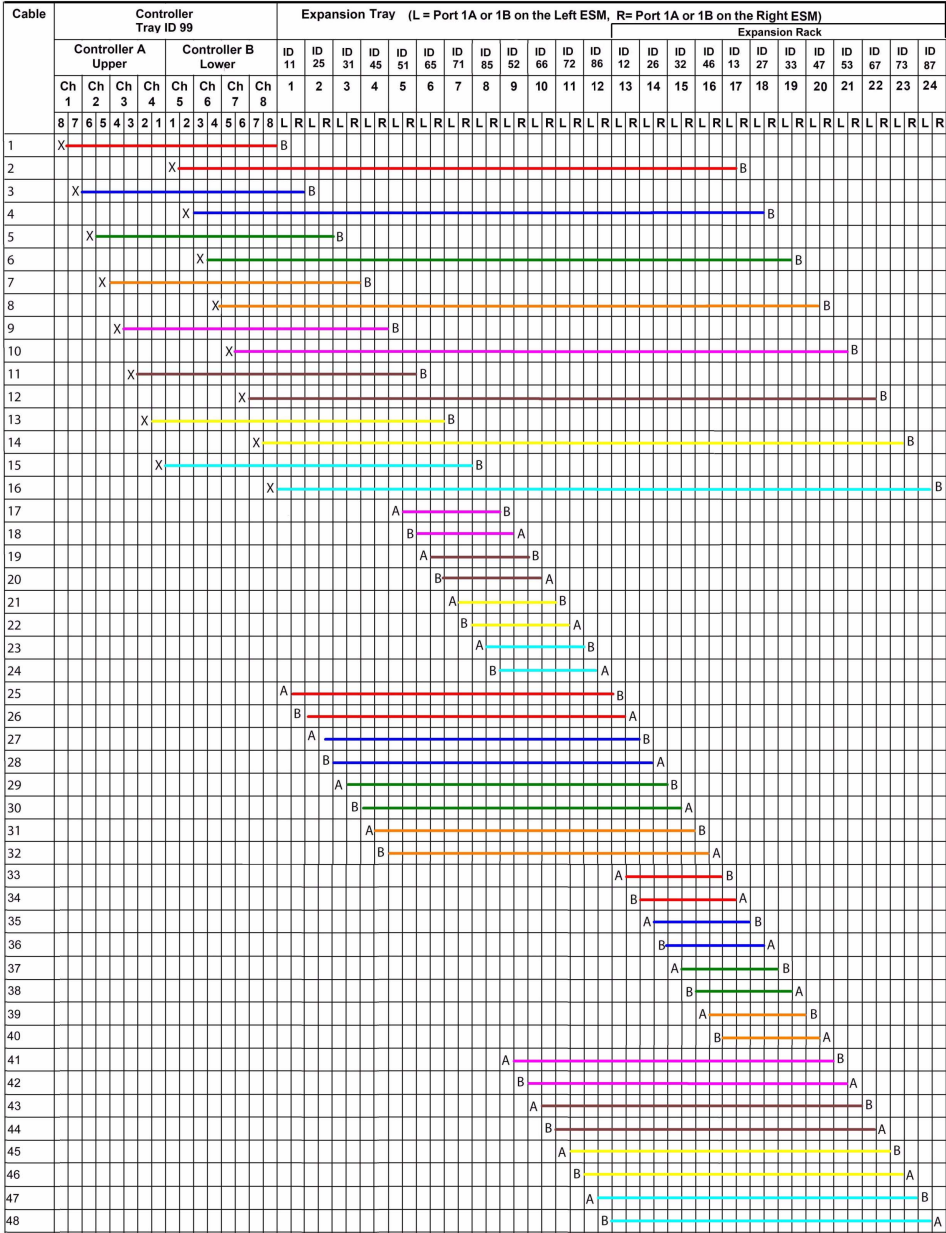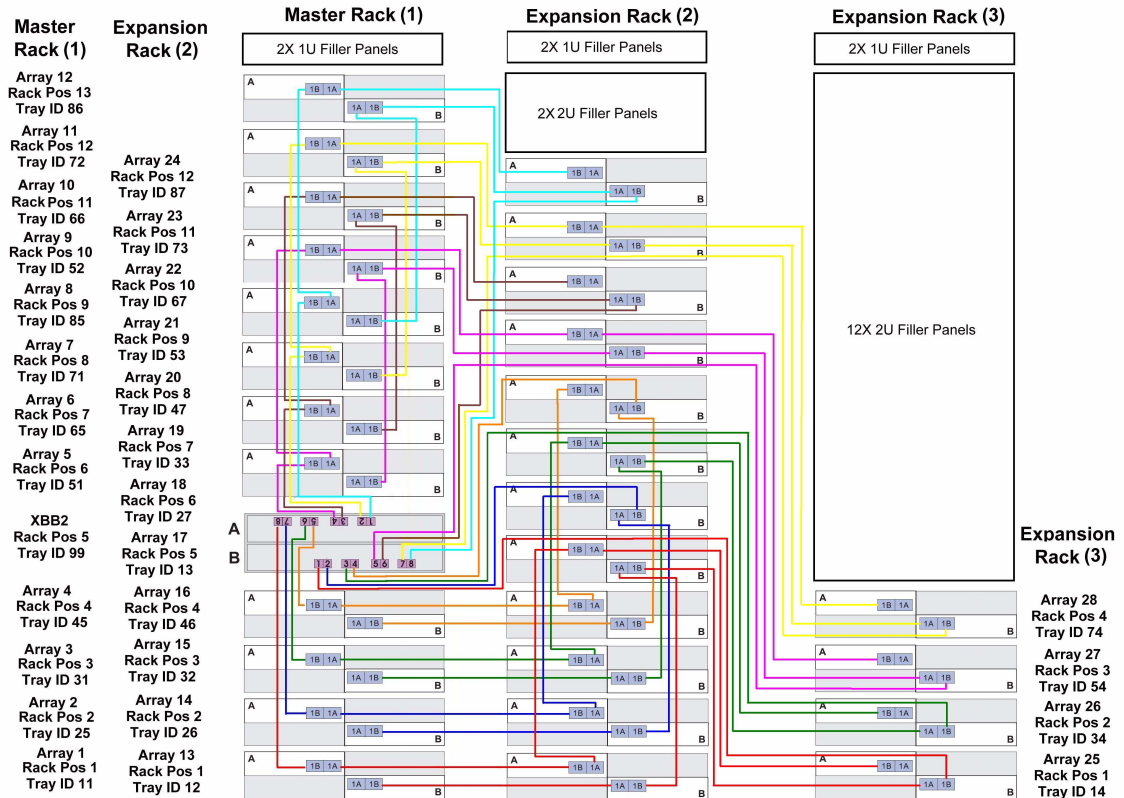**FIGURE B-14** Cable Connections for Twelve Expansion Trays

Column structure of the table:

- **Controller Tray ID 99**
  - **Controller A Upper:** Ch 1 (pins 8, 7), Ch 2 (pins 6, 5), Ch 3 (pins 4, 3), Ch 4 (pins 2, 1)
  - **Controller B Lower:** Ch 5 (pins 1, 2), Ch 6 (pins 3, 4), Ch 7 (pins 5, 6), Ch 8 (pins 7, 8)
- **Expansion Tray** (L = Port 1A or 1B on the Left IOM, R = Port 1A or 1B on the Right IOM)
  - ID 11 (1), ID 25 (2), ID 31 (3), ID 45 (4), ID 51 (5), ID 65 (6), ID 71 (7), ID 85 (8), ID 52 (9), ID 66 (10), ID 72 (11), ID 86 (12), each with L and R

Cable	A8	A7	A6	A5	A4	A3	A2	A1	B1	B2	B3	B4	B5	B6	B7	B8	11L	11R	25L	25R	31L	31R	45L	45R	51L	51R	65L	65R	71L	71R	85L	85R	52L	52R	66L	66R	72L	72R	86L	86R
1	X																B																							
2									X									B																						
3			X																B																					
4											X									B																				
5				X																	B																			
6													X									B																		
7		X																					B																	
8															X									B																
9					X																				B															
10														X																				B						
11						X																					B													
12												X																								B				
13							X																						B											
14										X																												B		
15								X																							B									
16																X																								B
17																												A					B							
18																												B					A							
19																														A					B					
20																														B					A					
21																																A					B			
22																																B					A			
23																																		A					B	
24																																		B					A	

Cabling One Controller Tray and Sixteen Expansion Trays

Expansion trays 13 through 16 are located in an expansion cabinet.

TABLE B-5   Tray ID for Up to Four Expansion Trays in Expansion Cabinets

Rack Position	Tray ID	Array Number	CSM2 Expansion Tray
4	46	16	Expansion Tray
3	32	15	Expansion Tray
2	26	14	Expansion Tray
1	12	13	Expansion Tray

For master cabinet rack positiongs and tray IDs, see TABLE B-3.

Two 2-meter FC cables are required to connect a controller tray to an expansion tray that is located side-by-side. Longer cables are required if the cabinets are farther apart.

TABLE B-6   Number of Expansion Trays and Required FC Cables.

Number of Expansion Trays	Number of 2-Meter FC Cables	Number of Longer FC Cables
12	21	3
13	23	3
14	22	6

FIGURE B-15 Cabling One Controller Tray and Sixteen Expansion Trays
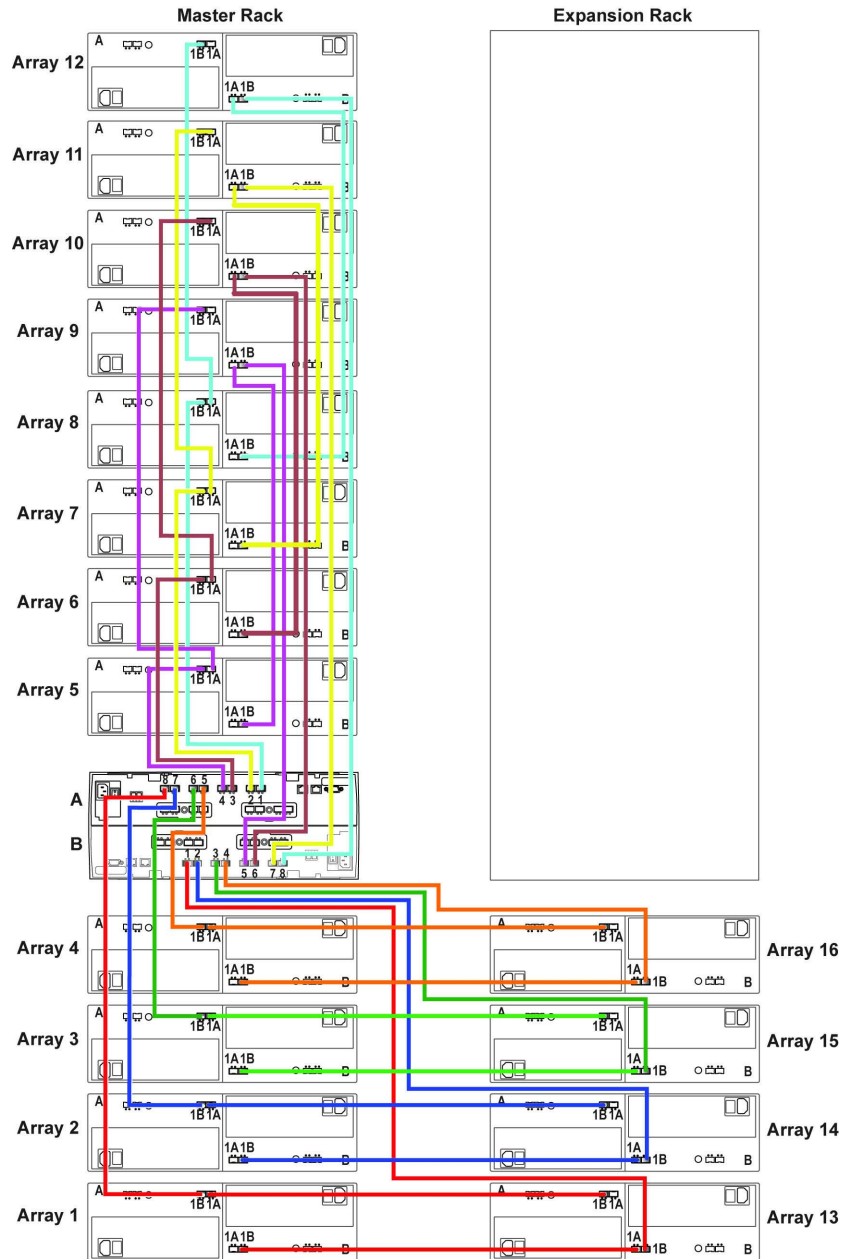
FIGURE B-16 Cable Connections for Sixteen Expansion Trays

Cable	Controller Tray ID 99								Expansion Tray (L = Port 1A or 1B on the Left ESM, R = Port 1A or 1B on the Right ESM)															
	Controller A Upper				Controller B Lower				ID 11	ID 25	ID 31	ID 45	ID 51	ID 65	ID 71	ID 85	ID 52	ID 66	ID 72	ID 86	ID 12	ID 26	ID 32	ID 46
	Ch 1	Ch 2	Ch 3	Ch 4	Ch 5	Ch 6	Ch 7	Ch 8	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Connection grid (sub-columns 8 7 6 5 4 3 2 1 / 1 2 3 4 5 6 7 8 for the Controller, and L R for each Expansion Tray ID):

Cable	Connection
1	X (Ch 1) → B (ID 11)
2	X (Ch 5) → B (ID 32)
3	X (Ch 1) → B (ID 45)
4	X (Ch 5) → B (ID 32)
5	X (Ch 2) → B (ID 51)
6	X (Ch 6) → B (ID 32)
7	X (Ch 2) → B (ID 45)
8	X (Ch 6) → B (ID 46)
9	X (Ch 3) → B (ID 51)
10	X (Ch 7) → B (ID 52)
11	X (Ch 3) → B (ID 71)
12	X (Ch 7) → B (ID 72)
13	X (Ch 4) → B (ID 71)
14	X (Ch 8) → B (ID 72)
15	X (Ch 4) → B (ID 85)
16	X (Ch 8) → B (ID 86)
17	A (ID 51) → B (ID 85)
18	B (ID 51) → A (ID 85)
19	A (ID 65) → B (ID 86)
20	B (ID 65) → A (ID 86)
21	A (ID 51) → B (ID 72)
22	B (ID 65) → A (ID 72)
23	A (ID 71) → B (ID 86)
24	B (ID 71) → A (ID 86)
25	A (Ch 8 / ID 11) → B (ID 26)
26	B (ID 11) → A (ID 32)
27	A (ID 11) → B (ID 32)
28	B (ID 25) → A (ID 46)
29	A (ID 25) → B (ID 32)
30	B (ID 31) → A (ID 46)
31	A (ID 45) → B (ID 32)
32	B (ID 45) → A (ID 46)

Cabling One Controller Tray and Twenty Expansion Trays

Cable	Controller Tray ID 99								Expansion Tray (L = Port 1A or 1B on the Left ESM, R= Port 1A or 1B on the Right ESM)																				
	Controller A Upper				Controller B Lower															Expansion Rack									
									ID 11	ID 25	ID 31	ID 45	ID 51	ID 65	ID 71	ID 85	ID 52	ID 66	ID 72	ID 86	ID 12	ID 26	ID 32	ID 46	ID 13	ID 27	ID 33	ID 47
	Ch 1	Ch 2	Ch 3	Ch 4	Ch 5	Ch 6	Ch 7	Ch 8	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

(Cable rows 1–40 with X/A/B endpoints and colored connection lines across the expansion tray ports.)
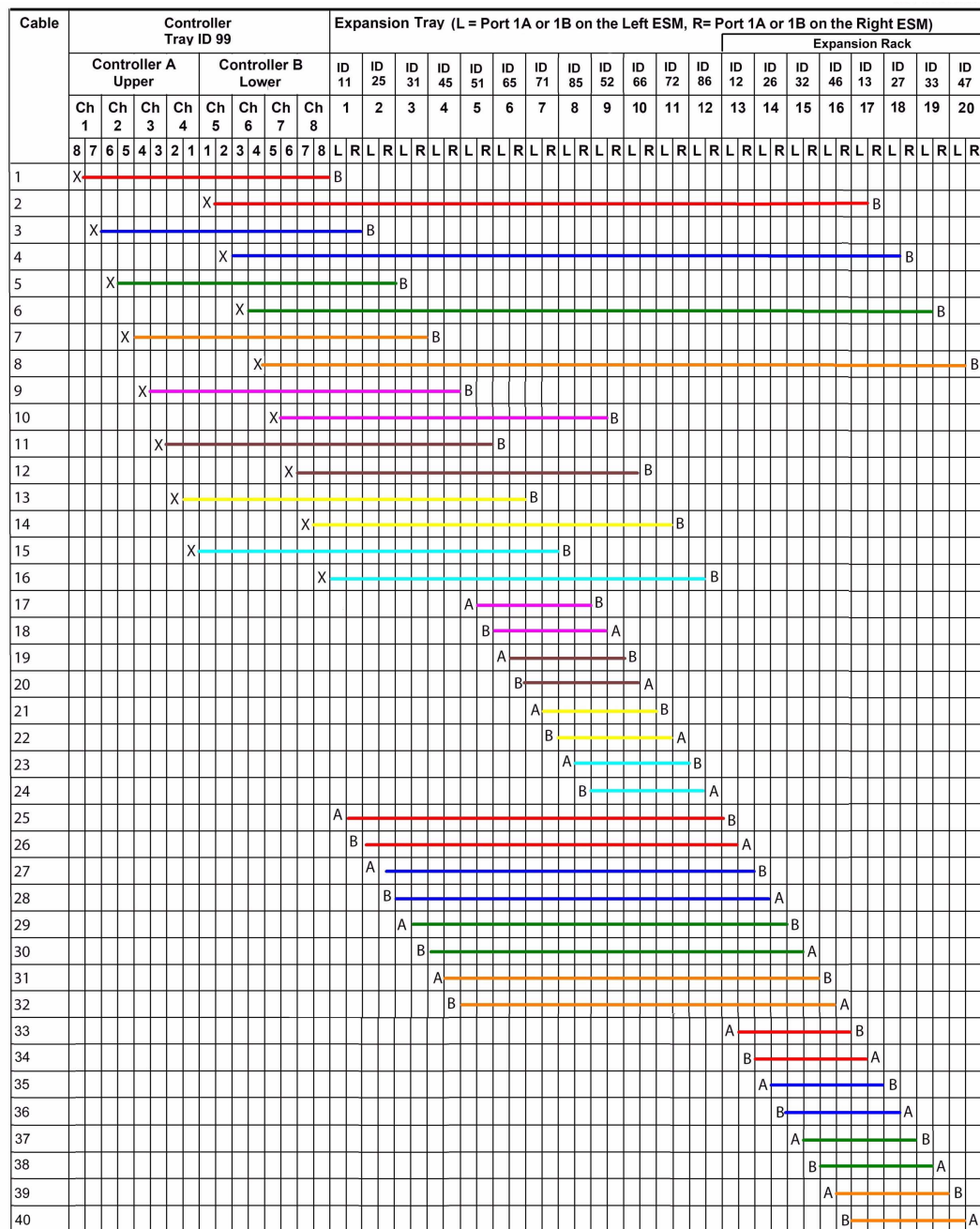
Cabling One Controller Tray and Twenty Four Expansion Trays

FIGURE B-19 Cabling One Controller Tray and Twenty Four Expansion Trays

Cabling One Controller Tray and Twenty Eight Expansion Trays

FIGURE B-21 Cabling One Controller Tray and Twenty Eight Expansion Trays

FIGURE B-22   Cabling for One Controller Tray and Twenty Eight Expansion Trays (1 of 2)

Setting the Tray Link Rate

To set the tray link rate for an expansion tray:

1. **Determine the speed of the disk drives in the tray.**

   a. **Remove one of the disk drives and examine its label.**

   b. **Next to the disk name on the label is a number indicating the RPM and speed of the disk. For example, the number 15k.4 indicates the disk is 15,000 RPMs and 4 Gbytes.**

2. **If the disk speed rate is 4 Gbits/second, verify that all expansion cables and SFPs are rated at 4 Gbits/second.**

Note – Change the position of a Tray Link Rate switch only when the tray is powered off. If you change the setting after power up, you must power cycle the tray.

---

3. **Locate the Tray Link Rate switch at the lower right front of the expansion tray.**

FIGURE B-24   Expansion Tray Link Rate Switch
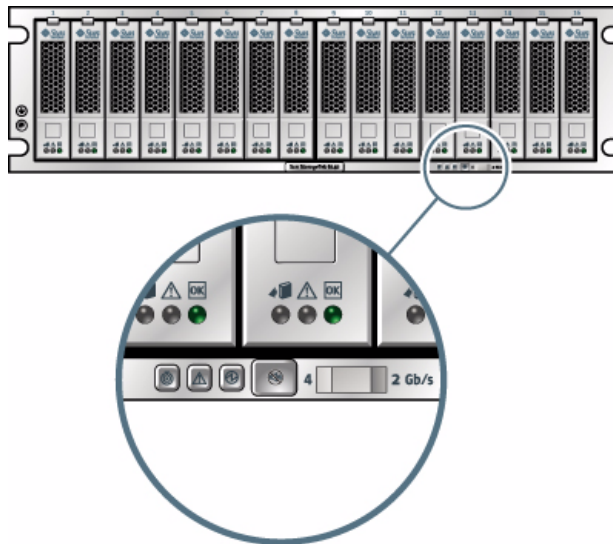
Figure Legend

1	Tray Link Rate switch, Left = 4 Gbits/second

4. Set the default link rate for the tray as follows:

- For 4 Gbits/second, slide the Tray Link Rate switch to the left position.
- For 2 Gbits/second, slide the Tray Link Rate switch to the right position.
- If the expansion tray has mixed drive speeds (4 Gbits/second and 2 Gbits/second), set the Tray Link Rate switch to 2 Gbits/second.

Note – If a data transfer speed mismatch exists between an expansion tray and controller, the LED error code segment display at the rear of the controller tray will indicate a code of: `H7` – Current Enclosure Fibre Channel Rate Different than Rate Switch.

Connecting the Power Cables

1. Verify that both power switches are off for each tray in the cabinet.

2. Connect each power supply in the tray to a different power source in the cabinet.

3. Connect the power cables from the cabinet to the external power source.

Note – The power-on sequence is described in "Powering On the Array" on page 24.

Next Steps

After installing and cabling the trays, you are ready to connect the management and data hosts, as described in Chapter 3.

Troubleshooting and Operational Procedures

This appendix contains the following section:

Troubleshooting and Servicing the Array

The Sun StorageTek Common Array Manager Service Advisor provides array troubleshooting information and removal and replacement procedures for customer-replaceable units (CRUs). Service Advisor also includes field-replaceable units (FRUs) that can be replaced by Sun field engineers or by Sun-trained customer administrators.

To access Service Advisor:

1. **Log in to Sun StorageTek Common Array Manager (CAM).**

2. **From the Storage System Summary page, click the name of the array you want to service.**

3. **At the top right of the page, click Service Advisor.**

   The Service Advisor opens in a new window.

4. Expand the Removal/Replacement procedure for the component you want to replace, and select the failed component.

The corresponding procedure is displayed in the right pane.

Service Advisor guides you through the following procedures:

- CRU and FRU Removal and Replacement
- Troubleshooting and Recovery
- X-Option upgrades
- Portable Virtual Disk Management

Controller Tray Components

FIGURE C-1 describes the components of the controller tray with the front bezel removed.

FIGURE C-1   Sun Storage 6580 and 6780 Array Controller Tray (Front View)
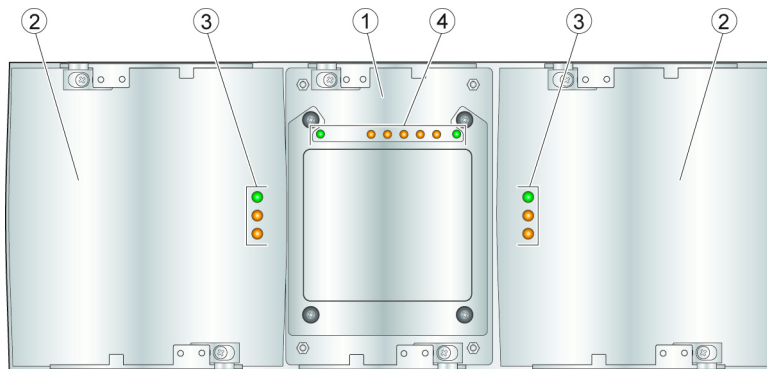
Figure Legend

1	Interconnect battery canister	**3**	Power supply-fan LEDs
2	Power supply-fan assemblies	**4**	Interconnect battery LEDs

TABLE C-1 Controller Tray Front LED Descriptions

LED	Symbol	Location	Function
Power		Power-fan Interconnect battery	• On: The canister has power. • Off: The canister does not have power. **Note**: The controller canisters do not have a power LED. They receive their power from the power supplies inside the power-fan canisters.
Battery Needs Attention		Interconnect battery	On: A problem exists with the battery.
Service Action Allowed		Power-fan Interconnect battery	On: You can remove the canister safely. See "Service Action Allowed LED" on page 101.
Service Action Required (Fault)		Power-fan Interconnect battery	On: A problem exits with the canister.
Locate		Interconnect battery	On: A tray is located.

Service Action Allowed LED

Each controller canister, power-fan canister, and interconnect-battery canister has a Service Action Allowed LED, which is a blue LED. The Service Action Allowed LED lets you know when you can remove a canister safely.

Caution – Possible loss of data access. Never remove a controller canister, a power-fan canister, or an interconnect-battery canister unless the Service Action Allowed LED is turned on.

If a controller canister or a power-fan canister fails and must be replaced, the Service Action Required (Fault) LED (an amber LED) on that canister comes on to indicate that service action is required. The Service Action Allowed LED also comes on if it is

safe to remove the canister. If data availability dependencies exist or other conditions that dictate a canister should not be removed, the Service Action Allowed LED stays off.

The Service Action Allowed LED automatically comes on or goes off as conditions change. In most cases, the Service Action Allowed LED comes on when the Service Action Required (Fault) LED comes on for a canister.

Note – If the Service Action Required (Fault) LED comes on but the Service Action Allowed LED is off for a particular canister, you might need to service another canister first. Check your storage management software to determine the action that you should take.

Controller Tray Diagnostic Codes

TABLE C-2 Diagnostic Codes

Code	Description
L0	The controller types are mismatched.
L1	The interconnect-battery CRU is missing.
L2	A persistent memory error has occurred.
L3	A persistent hardware error has occurred.
L4	A persistent data protection error has occurred.
L5	The auto-code synchronization (ACS) has failed.
L6	An unsupported host interface card is installed.
L7	The sub-model identifier is not set or is mismatched.
L8	A memory configuration error has occurred.

About the Controller Tray ID Numeric Display and Diagnostic Display

The Sun Storage 6580 and 6780 controllers have a pair of 7-segment displays located at the back of the controller tray that form a 2-digit display. This section defines the indicators and what conditions they represent when activated.

TABLE C-3   FC 4Gb Host Card LED Link Rate Indicators

L1	L2	Definition
Off	Off	No connection or link down
On	Off	1 Gb link rate
Off	On	2 Gb link rate
On	On	4 Gb link rate

Each digit has a decimal point, and is rotated 180 degrees relative to the other digit as shown in FIGURE C-2. With this orientation, the display looks the same regardless of controller orientation.

The decimal point for the lower digit is defined as the Diagnostic Light. The decimal point for the upper digit is defined as the Heartbeat light.

FIGURE C-2   Tray ID Display
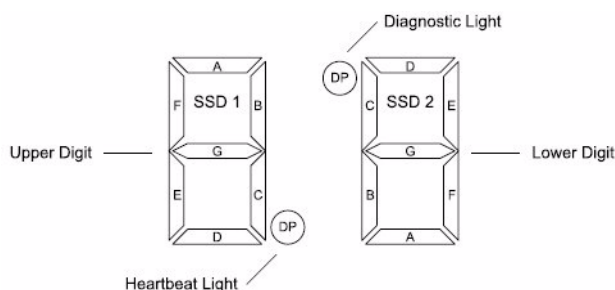
The values on each display (Controller A and Controller B) are shown as if the digits had the same orientation. For example, if the tray ID is set to 43, the top controller display might appear as shown in FIGURE C-3, while the bottom controller display would then appear as shown in FIGURE C-4.

FIGURE C-3   Controller A Tray ID Example
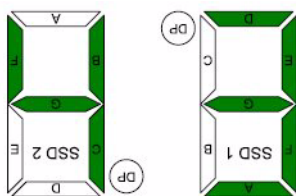
FIGURE C-4   Controller B Tray ID Example
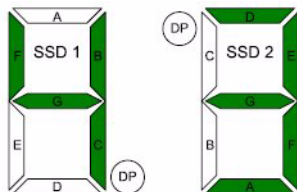
Alphanumeric characters are represented on the display as shown in FIGURE C-5. During normal operation, the tray ID display on each controller is used to display the enclosure tray ID. The display is also used for diagnostic codes. The Diagnostic Light indicates current usage. The Diagnostic Light is off when the display is used to show the current tray ID.

FIGURE C-5   Seven-Segment Alphanumeric Characters

The tray ID is an attribute of the enclosure. In other words, both controllers will always display the same tray ID. It is possible, however, that one controller may display the tray ID, while the other controller displays a diagnostic code.

Sequence Category Codes

TABLE C-4 defines the sequence category codes and their associated detail codes. Startup errors and operational states can be displayed in sequences by themselves. If the display is used to identify a component failure, information about the controller state in which the error was identified will also be displayed, as indicated in TABLE C-5.

Note – If the Sun Storage 6580 or 6780 controller module is powered on when the interconnect canister is missing, or if Controller B is inserted when the interconnect canister is missing, the values shown on the Controller B tray ID display will be inverted.

TABLE C-4   Seven-Segment Display Sequence Code Definitions

Category	Category Code	Detail Codes
		(Notation described in the notes at the end of this table)
Startup Error	SE+	• 88+ Power-on default • dF+ Power-on diagnostic fault
Operational Error	OE+	• Lx+ Lock-down codes (Note 3)
Operational State	OS+	• OL+ Offline (held in reset, Note 11) • bb+ Battery Backup (operating on batteries) • CF+ Component failure (Note 12)
Component Failure	CF+	• dx+ Processor/Cache DIMM (x = location, Note 6) • Cx+ Cache DIMM (x = location, Note 7) • Px+ Processor DIMM (x = location, Note 8) • Hx+ Host card (x = location) • Fx+ Flash drive (x = location)

TABLE C-4   Seven-Segment Display Sequence Code Definitions *(Continued)*

Category	Category Code	Detail Codes
		(Notation described in the notes at the end of this table)
Category Delimiter	dash+	• Separator between category-detail code pairs (Notes 4, 9)
End-of-Sequence Delimiter	blank-	• End-of-sequence indicator (Notes 5, 10)

Note -

1. xy+ 2-digit code with the Diagnostic light ON.
2. xy- 2-digit code with the Diagnostic light OFF.
3. Lx+ Lock-down codes (see "Seven-Segment Display Lock-Down Codes" on page 107).
4. dash+ All segments off except for the middle segments and with the Diagnostic light ON.
5. blank- All segments off with the Diagnostic light OFF.
6. dx+ Used when there is a single memory system for processor and data cache.
7. Cx+ Used when there are separate processor and data cache memory systems.
8. Px+ Used when there are separate processor and data cache memory systems.
9. Category-Detail separator used when there is more than one category-detail code pair in the sequence. See Table 38 for examples.
10. End-of-Sequence indicator automatically inserted by hardware at the end of the sequence. Example: SE+ 88+ blank- (repeat)
11. If a tray ID is being displayed, this sequence is programmed to display if the controller is subsequently held in reset.
12. The tray ID is nominally displayed during normal operation. This operational state is displayed if an internal controller component failure occurs while the controller is online. An additional detail code identifies the failed component as defined for the Component Failure category. This sequence will continue to be displayed even if the controller is subsequently placed offline (held in reset) to service the failed component.

TABLE C-5   Seven-Segment Display Sequence Use Cases

Use Case	Repeating Sequence
Controller power-on	
Normal power-on or controller insertion	SE+ 88+ blank-
Controller inserted while held in reset	SE+ 88+ blank-
Operational states	
Normal operation	xy- (static controller tray ID)
Controller placed in reset while displaying tray ID	OS+ OL+ blank-

TABLE C-5 Seven-Segment Display Sequence Use Cases *(Continued)*

Use Case	Repeating Sequence
Controller is operating on batteries (cache backup)	OS+ bb+ blank-
Component failure when the controller is operational (Notes 1, 2)	
Failed host card	OS+ CF+ Hx+ blank-
Failed flash drive	OS+ CF+ Fx+ blank-
Power-on diagnostic failure (Note 1)	
Non-FRU component failure	SE+ dF+ blank-
Processor DIMM failure	SE+ dF+ dash+ CF+ Px+ blank-
Cache memory DIMM failure	SE+ dF+ dash+ CF+ Cx+ blank-
Processor/cache DIMM failure	SE+ dF+ dash+ CF+ dx+ blank-
Controller is suspended and there are no other errors to report	
All lock-down conditions	OE+ Lx+ blank-
Controller is suspended due to component errors	
Persistent processor DIMM ECC errors	OE+ L2+ dash+ CF+ Px+ blank-
Persistent cache DIMM ECC errors	OE+ L2+ dash+ CF+ Cx+ blank-
Persistent processor/cache DIMM ECC errors	OE+ L2+ dash+ CF+ dx+ blank-
Controller is suspended due to persistent cache backup configuration errors	
Write-protect switch set during cache restore	OE+ LC+ blank-
Memory size changed with dirty data in flash drives	OE+ LC+ dd+ blank-

Note -
1. If more than one component failure occurs, only the first component failure detected will be identified on the seven-segment display.
2. If a component failure is indicated on the seven-segment display while the controller is operational, other event notification (MEL events, recovery guru procedures, etc.) that normally occurs for that condition will continue to occur.

Seven-Segment Display Lock-Down Codes

Diagnostic codes are used to indicate controller state information. In general, these codes are displayed only when the controller is in a non-operational state. The controller might be non-operational due to a configuration problem (such as mismatched controller types), or it might be non-operational due to a hardware

fault. If the controller is non-operational due to system configuration, the controller Fault Light will be off. If the controller is non-operational due to a hardware fault, the controller Fault Light will be on.

TABLE C-6 provides a definition of the diagnostic lock-down codes. The code is displayed as a sequence.

TABLE C-6 Tray ID Display Diagnostic Codes

Value	Controller State	Description
L0	Suspended	Mismatched controller types
L1	Suspended	Missing interconnect canister
L2	Suspended	Persistent memory errors
L3	Suspended	Persistent hardware errors
L4	Suspended	Persistent data protection errors
L5	Suspended	ACS failure
L6	Suspended	Unsupported host card
L7	Suspended	Submodel identifier not set or mismatched
L8	Suspended	Memory configuration error
L9	Suspended	Link speed mismatch
LA	Suspended	Reserved
Lb	Suspended	Host card configuration error
LC	Suspended	Persistent cache backup configuration error
Ld	Suspended	Mixed cache memory DIMMs
LE	Suspended	Uncertified cache memory DIMM sizes
LF	Suspended	Lock-down with limited SYMbol support
LH	Suspended	Controller firmware mismatch

Expansion Tray LED Status Codes

The following is a list of the meanings of the status codes that may display on the numerical LEDs on the 6140 expansion trays.

FF – ESM Boot Diagnostic executing

88 – This ESM is being held in Reset by the other ESM

AA – ESM-A application is booting up

bb – ESM-B application is booting up

L0 – Mismatched ESM types

L2 – Persistent memory errors

L3 – Persistent hardware errors

L9 – Over Temperature

H1 – SFP Speed Mismatch (2 Gb/s SFP installed when operating at 4 Gb/s)

H2 – Invalid/Incomplete Configuration

H3 – Maximum Reboot Attempts Exceeded

H4 – Cannot Communicate with Other ESM

H5 – Midplane Harness Failure

H6 – Firmware Failure

H7 – Current Enclosure Fibre Channel Rate Different than Rate Switch

H8 – SFP(s) Present in Currently Unsupported Slot (2A or 2B)

Powering Off the Array

The array rarely needs to be powered off. You remove power only when you plan to physically move the array to another location.

To power off the array, do the following:

1. **Stop all I/O from the hosts, if connected, to the array.**

2. **Wait approximately 2 minutes until all disk drive LEDs have stopped flashing.**

   After a 2-minute period, data residing in cache is written to disk and the battery mechanisms are disengaged.

Note – If Media Scan is enabled (default), the disk drive LEDs will continue to flash after the 2-minute period has elapsed. However, the LED flash rate during a media scan (slow, periodic blink) is different from the flash rate of I/O (fast, random).

---

3. **Check the Cache Active LED on the controller to determine if any outstanding cache needs to be written.**

   If the LED is on, there is still data that needs to be flushed and written to disk.

Note – Ensure that the Cache Active LED is no longer flashing before powering off the array.

---

4. **Press each power switch at the back of the controller tray to the Off position.**

5. **Press the power switches at the back of each expansion tray to the Off position.**

Universal Rail Kit Installation

This appendix describes how to install the Sun Storage 6580 or 6780 controller tray and expansion trays into an existing cabinet. Use the universal rail kit to mount the trays into any of these cabinets:

- Any standard Sun cabinet, such as the Sun Rack 900/1000 cabinet
- Any 19-inch wide, 4-post, EIA-compatible rack or cabinet with a front-to-back depth between vertical cabinet rails of 24 to 36 inches (with threaded or unthreaded cabinet rails)
- The Sun StorEdge Expansion cabinet
- The Sun Fire cabinet

Preparing the Rail Kit and Cabinet for Installation

Unpacking the Universal Rail Kit

Unpack the universal rail kit and check the contents.

The universal rail kit (part number 594-2489-02) contains the following items:

- Left main rail (part number 341-2069-01) and extender rail (part number 341-2071-01)
- Right main rail (part number 341-2070-01) and extender rail (part number 341-2072-01)

- Twelve 10-32 panhead screws
- Eight metric M panhead screws
- Four 8-32 panhead screws
- Two 6-32 flathead screws
- Two cabinet rail adapter plates (used for unthreaded cabinet rails only)

Gather the Mounting Hardware For Your Cabinet/Rack Type

The mounting hardware required for each rack or cabinet type is listed in the following table:

TABLE D-1   Mounting Hardware for Cabinet/Rack Type

Type	Quantity	Use
Sun Rack 900/1000		
10-32 panhead screw	8	Assemble main and extender sections of left and right rails (Typically, left and right rails are shipped pre-assembled)
8-32 panhead screw	4	Mount left and right rails to front of cabinet rails
Metric M6 panhead screw	4	Mount left and right rails to back of cabinet rails
Metric M6 panhead screw	4	Secure front of tray to left and right cabinet rails
6-32 flathead screw	2	Secure back of tray to left and right side rails
Sun StorEdge Expansion cabinet		
10-32 panhead screw	8	Assemble main and extender sections of left and right rails (Typically, left and right rails are shipped pre-assembled)
10-32 panhead screw	8	Mount left and right rails to inner mount points at front and back of cabinet
8-32 panhead screw	4	Mount left and right rails to front cabinet rails
10-32 panhead screw	4	Secure front of tray to left and right cabinet rails
6-32 flathead screw	2	Secure back of tray to left and right side rails

Type	Quantity	Use
19-inch wide, 4-post EIA-compatible cabinet with 10-32 threaded cabinet rails		
10-32 panhead screw	8	Assemble main and extender sections of left and right rails (Typically, left and right rails are shipped pre-assembled)
8-32 panhead screw	4	Mount left and right rails to front cabinet rails
10-32 panhead screw	4	Mount left and right rails to back cabinet rails
10-32 panhead screw	4	Secure front of tray to left and right cabinet rails
6-32 flathead screw	2	Secure back of tray to left and right side rails
19-inch wide, 4-post EIA-compatible cabinet with M5 or 12-24 threaded cabinet rails*		
10-32 panhead screw	8	Assemble main and extender sections of left and right rails (Typically, left and right rails are shipped pre-assembled)
8-32 panhead screw	4	Mount left and right rails to front cabinet rails
6-32 flathead screw	2	Secure back of tray to left and right side rails
19-inch wide, 4-post EIA-compatible cabinet with unthreaded cabinet rails**		
10-32 panhead screw	8	Assemble main and extender sections of left and right rails (Typically, left and right rails are shipped pre-assembled)
Cabinet rail adapter plate	2	Snap into left and right front cabinet rails to allow you to secure the front of the array to the left and right cabinet rails
10-32 panhead screw	4	Secure the front of the array to the adapter plates on the left and front cabinet rails
6-32 flathead screw	2	Secure back of tray to left and right side rails

*For cabinet installations with M5 or 12-24 threaded cabinet rails, the following screws are not supplied. You must acquire these to match the threading requirements of your cabinet rails:

- Four screws to secure the left and right rails to the back cabinet rail
- Four screws to secure the front of the tray to the left and right front cabinet rails

**For cabinet installations with unthreaded cabinet rails, the following hardware is not supplied. You must acquire these to match the requirements of your cabinet rails:

- Four cage nuts to snap over the rail mounting holes in the left and right front cabinet rails

- Four screws that match the cage nuts to secure the left and right rails to the left and right front cabinet rails
- Two cage nuts to snap over the rail mounting holes in the left and right back cabinet rails
- Two screws that match the cage nuts to secure the left and right rails to the back cabinet rail

Loosening the Controller Tray Rail Adjustment Screws

Use the #2 Phillips screwdriver to loosen the two rail adjustment screws on each rail to allow adjustment of each rail length (FIGURE D-1).

FIGURE D-1   Loosening the Rail Screws to Adjust the Controller Tray Rail Length
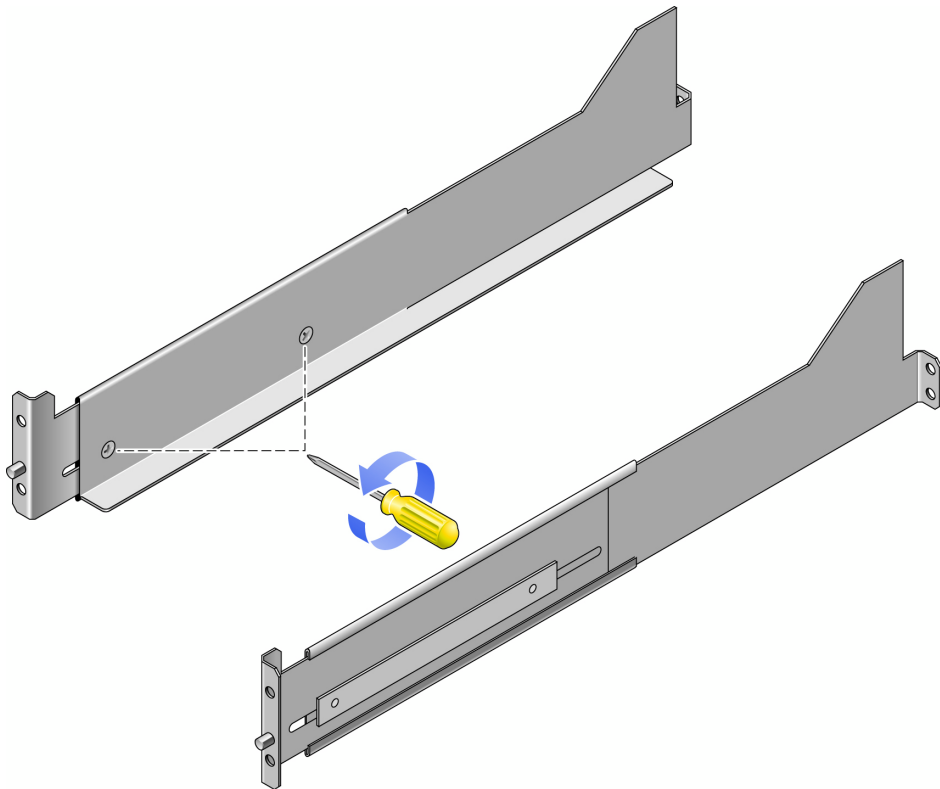
Loosening the Expansion Tray Rail Adjustment Screws

Use the #2 Phillips screwdriver to loosen the four rail adjustment screws on each rail to allow adjustment of each rail length (FIGURE D-2).

FIGURE D-2   Loosening the Rail Screws to Adjust the Expansion Tray Rail Length
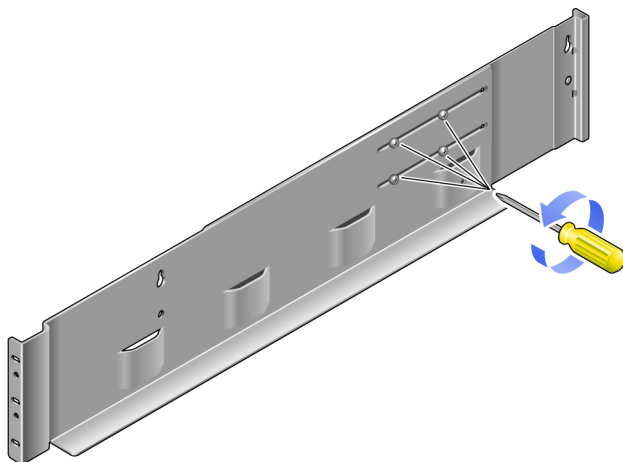
Note – The expansion tray rails are preconfigured to adjust to cabinet rail depths of between 26.18 inches (664.97 mm) and 28.93 inches (734.82 mm). For cabinet rail depths outside of this range, remove and reposition the four rail adjustment screws (FIGURE D-2) to support your required rail length.

Preparing the Tray

Caution – Two people are needed to lift and move the tray. Use care to avoid injury. An expansion tray can weigh up to 41 pounds (18.6 kg). Do not lift the front of the tray; this can cause damage to the drives.

1. **Unpack the tray.**

2. **Check the contents of the box for the following items:**

   ■ Sun Storage 6580 or 6780 array trays (controller or expansion)

- Ship kit for the controller tray
- Ship kit for each expansion tray

Preparing the Cabinet

Select the cabinet in which you will be installing the array. Be sure the cabinet is installed as described in the installation instructions provided with it.

1. **Stabilize the cabinet as described in the cabinet documentation.**

2. **If the cabinet has casters, make sure the casters are locked to prevent the cabinet from rolling.**

3. **Remove or open the top front panel.**

4. **Remove or open the vented back panel.**

Attaching the Controller Tray Rails to a Cabinet

The procedure in this section describes how to attach the rails for a standard 19-inch cabinet with threaded cabinet rails. Depending on your cabinet, the specific steps you need to follow may vary.

To attach the rails to a cabinet with threaded cabinet rails:

1. **Follow these steps first for the left rail and then for the right rail:**

   c. **Position the front of the rail directly inside the front cabinet rail** (FIGURE D-3)**.**

      Make sure that you feed the back rail pin through the appropriate hole.

FIGURE D-3   Positioning the Front of the Left Rail Behind the Left Front Cabinet Rail
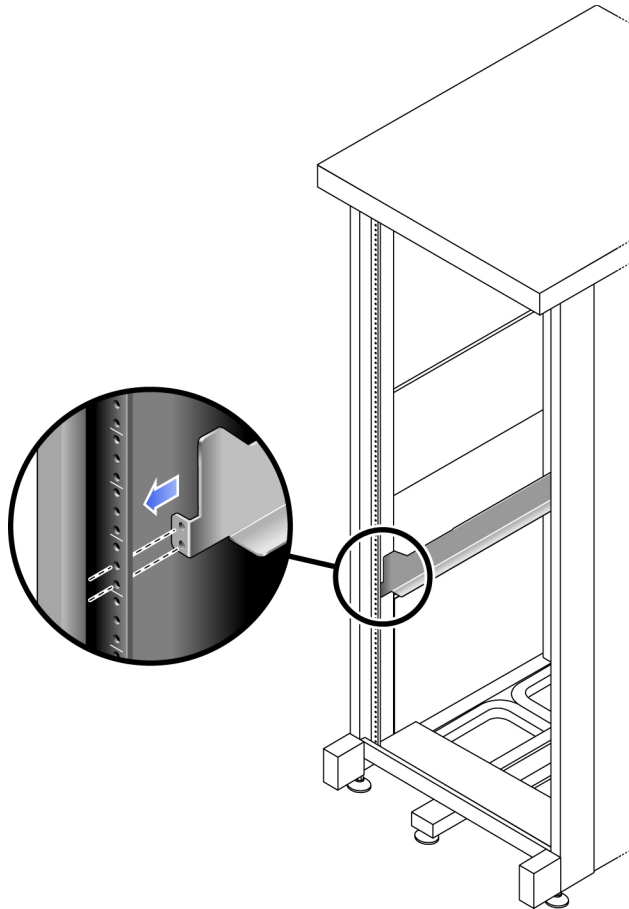
d. **Use the #2 Phillips screwdriver to insert and tighten the two screws to secure the left rail to the front of the cabinet** (FIGURE D-4)**.**

   Put the screws into the bottom two holes only. You will secure the third screw after inserting the tray.

   The controller tray requires four standard mounting units (4RU) of vertical space in the cabinet. Each standard mounting unit (U) has three mounting holes in the left and right cabinet rails. Insert the screws into the lowest two holes of the 4RU slot in which the tray is to be mounted.

   These screws pass through the cabinet rail holes and screw into threaded holes in the rail. Do not tighten the front screws until you have begun securing the back rail screws.

   When first positioning the rails, observe that the top of the rail ear (brace) is 1.25 inches below the top of where the tray will be positioned.

FIGURE D-4 Securing the Left Rail to the Front of the Cabinet
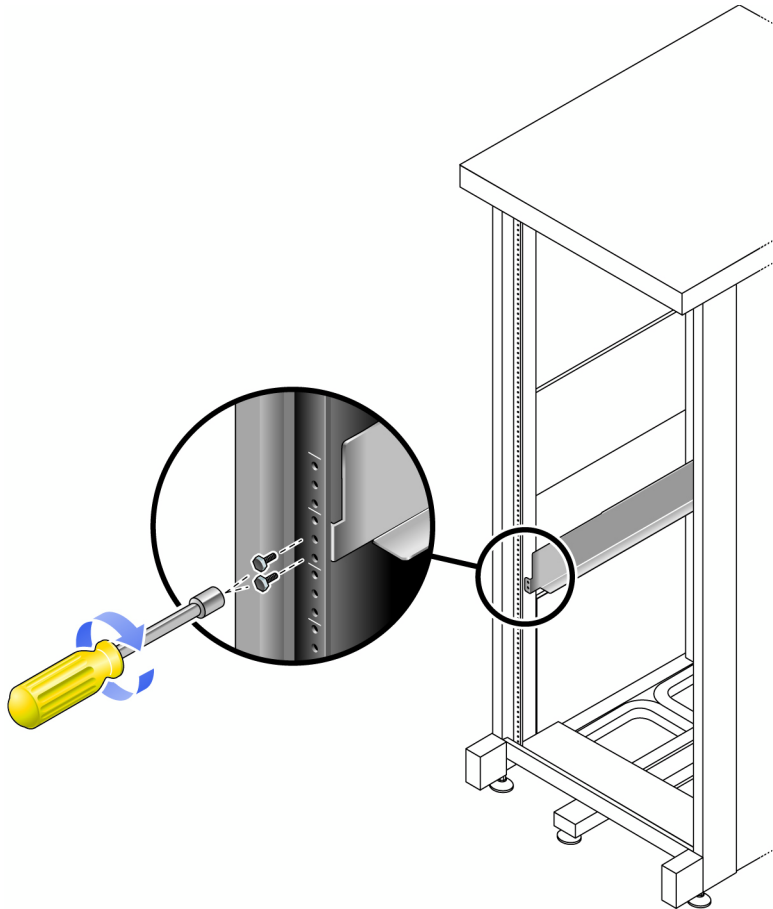
e. **At the back of the cabinet, adjust the length of the rail to position it directly inside the cabinet rail** (FIGURE D-5)**.**

Be sure to align the rail flange so that the mounting holes at the back correspond to those at the front of the cabinet.

FIGURE D-5 Adjusting the Length of the Left Rail at the Back of the Cabinet
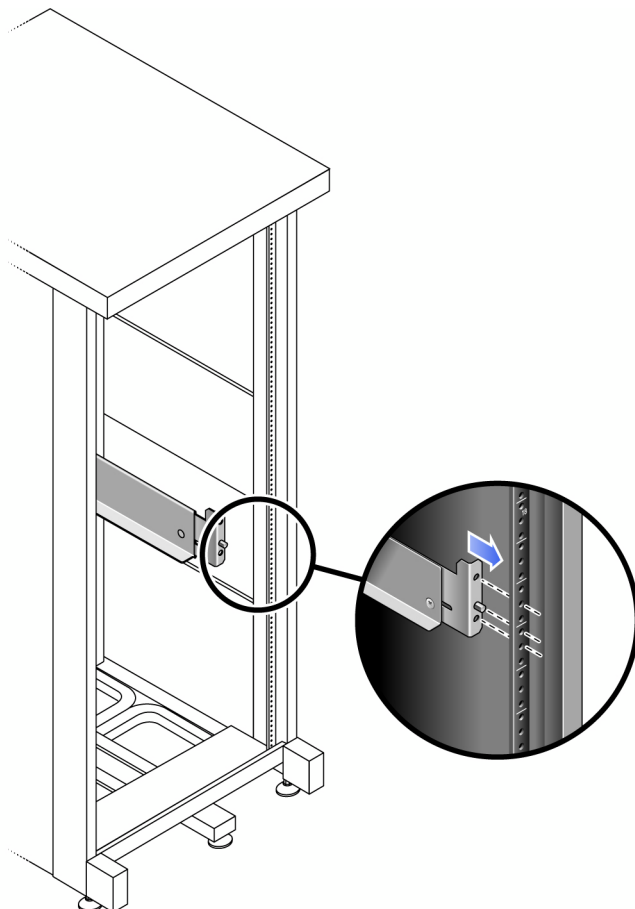
f. **Use the #2 Phillips screwdriver to insert and tighten the three screws at the back of the rail** (FIGURE D-6)**.**

FIGURE D-6 Securing the Left Rail to the Back of the Cabinet
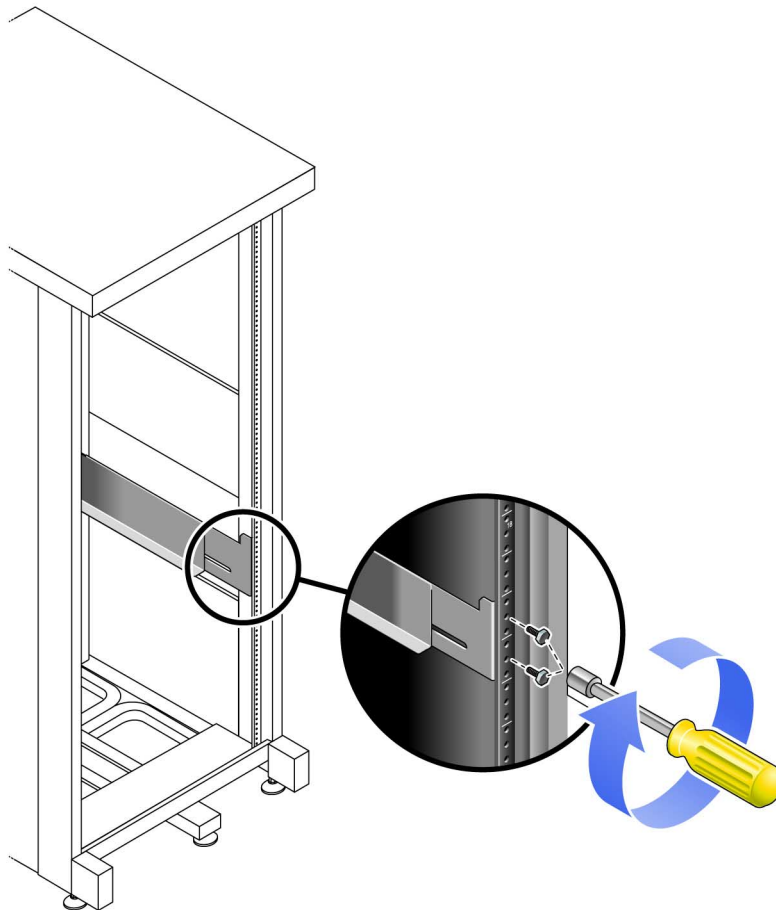
2. **Use the #2 Phillips screwdriver to tighten the adjustment screws at the back of each rail** (FIGURE D-7)**.**

FIGURE D-7   Tightening the Rail Adjustment Screws
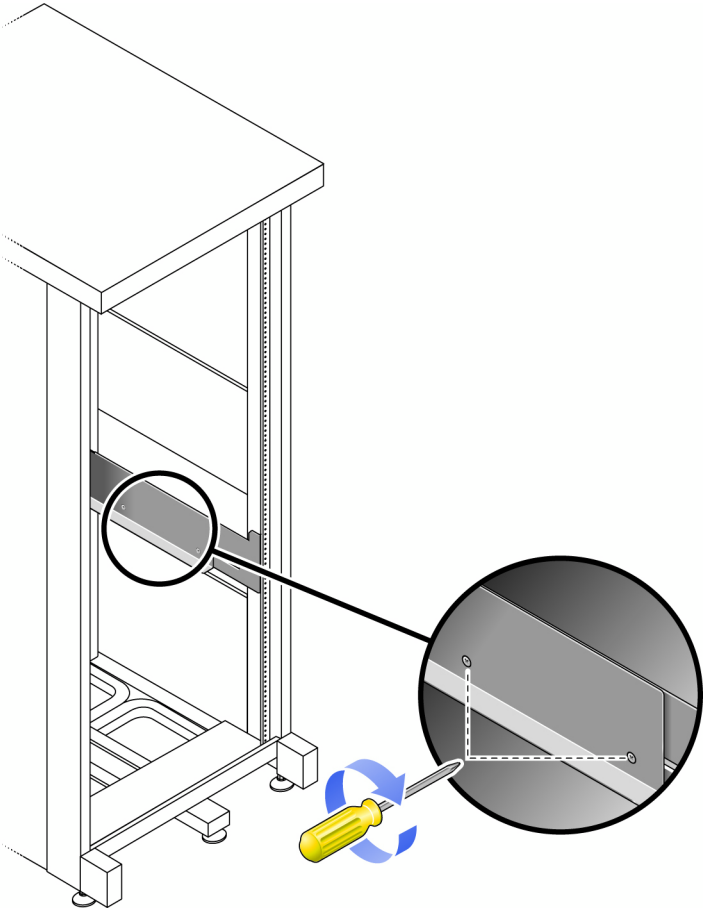
Installing a Controller Tray in a Cabinet

Install the controller tray in the fifth slot up from the bottom of the cabinet, where you have attached the rails.

1. **Using two people, one at each side of the tray, carefully lift and rest the tray on the bottom ledge of the left and right rails** (FIGURE D-8).

⚠ **Caution –** Use care to avoid injury. A tray can weigh up to 95 pounds (45 kg). Use two people to lift the tray.

FIGURE D-8   Positioning the Controller Tray in the Cabinet Rack Slot 5
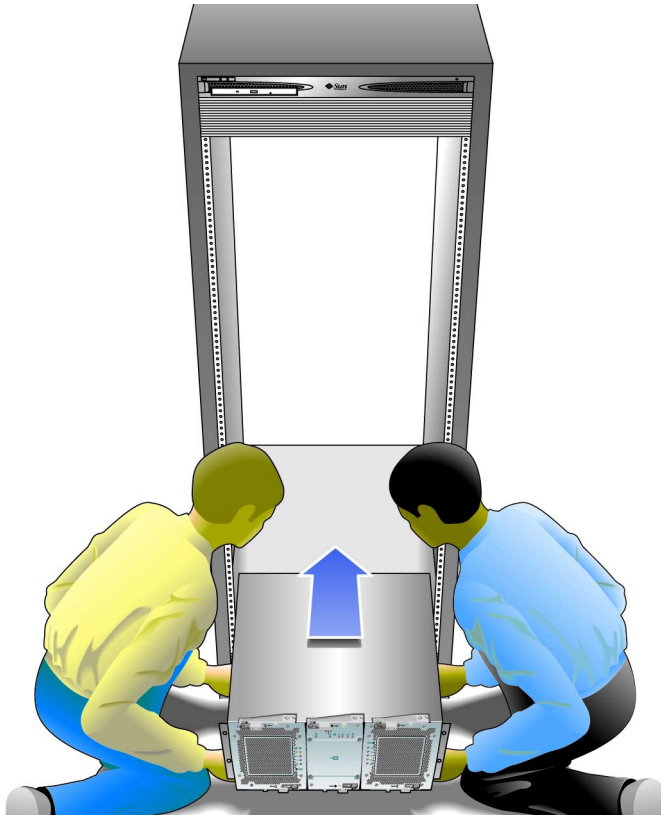
2. **Carefully slide the tray into the cabinet until the front flanges of the tray touch the vertical face of the cabinet** (FIGURE D-9).

FIGURE D-9   Sliding the Tray Into the Cabinet
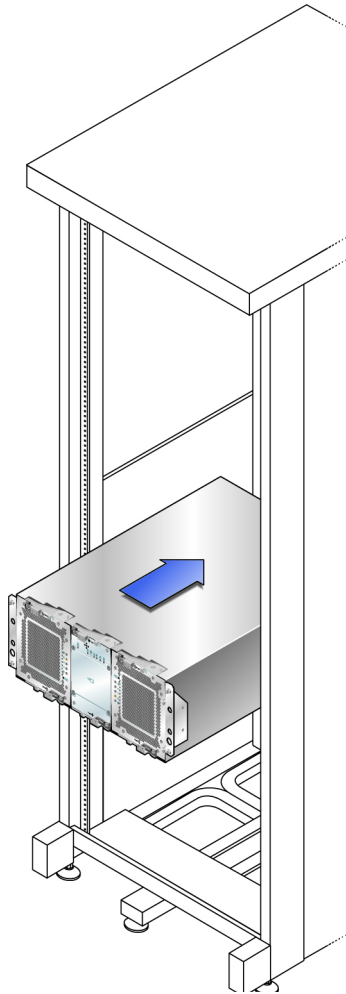
3. **Use the #2 Phillips screwdriver to install and tighten the third rail screw on each side, securing the tray to the cabinet and rail.**
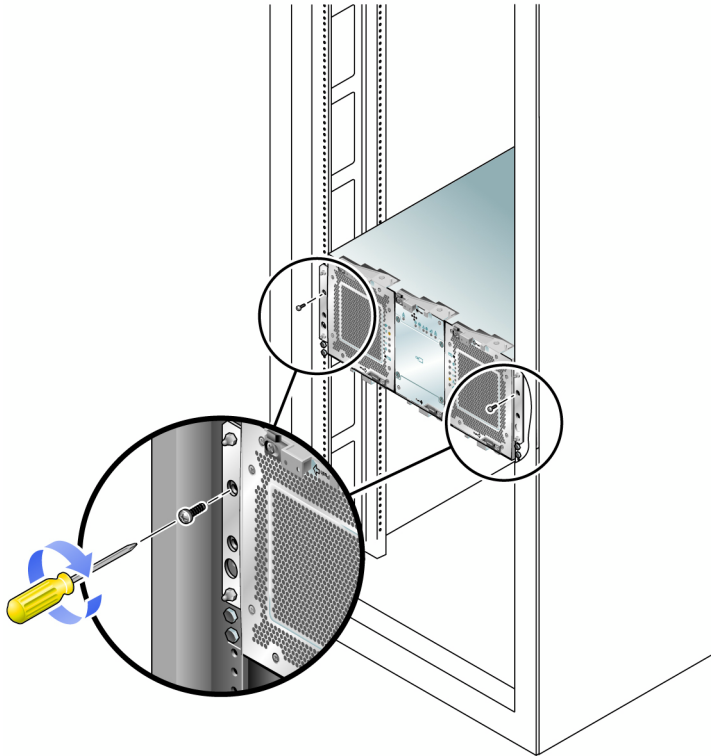
4. **Install and tighten the screw on each side of the back of the tray to secure the tray to the cabinet** (FIGURE D-11)**.**

FIGURE D-11   Securing the Tray to the Back of the Cabinet Rail
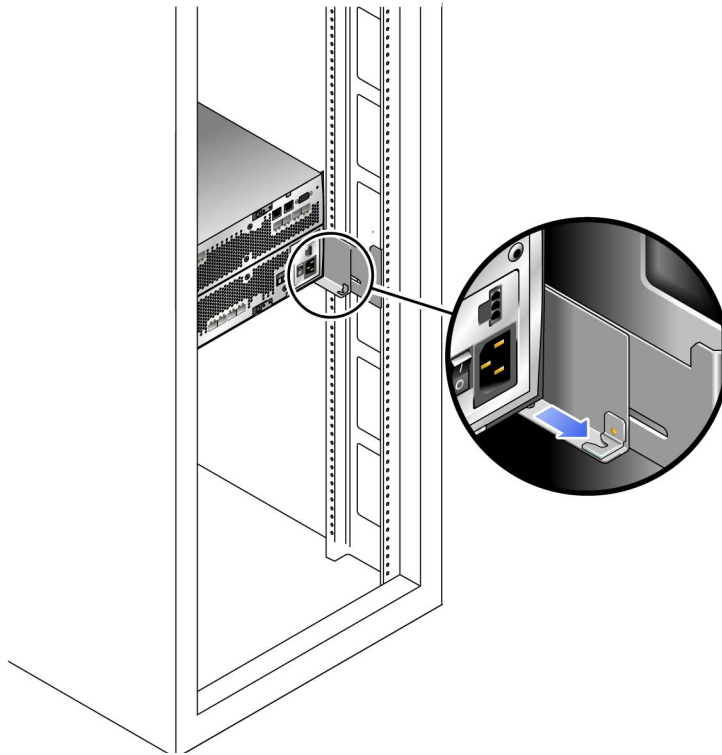
Attaching the Expansion Tray Rails to a Cabinet

You will install the expansion trays beneath the controller tray in the first empty RU slot at the bottom of the cabinet. If you are installing additional expansion trays, continue installing the trays from the bottom up.

Depending on the type of cabinet in which you will install the expansion tray, use one of the following procedures to attach the rails:

- "Attaching the Universal Rail Kit to a Standard Sun or 19-Inch Cabinet With Threaded Cabinet Rails" on page 127

- "Attaching the Universal Rail Kit to a Sun StorEdge Expansion or Sun Fire Cabinet" on page 131

Attaching the Universal Rail Kit to a Standard Sun or 19-Inch Cabinet With Threaded Cabinet Rails

This procedure describes the steps to attach the universal rail kit to:

■ All standard Sun cabinets, including the Sun Rack 900/1000 cabinets

■ All 19-inch wide, 4-post EIA-compatible racks and cabinets with M5 or 12-24 threaded cabinet rails

To attach the universal rail kit to a Sun Rack cabinet or a cabinet with M5 or 12-24 threaded cabinet rails:

1. **Follow these steps first for the left and then for the right rail:**

   a. **Position the front of the rail directly inside the front cabinet rail** (FIGURE D-12)**.**

FIGURE D-12 Positioning the Left Rail Behind the Left Front Cabinet Rail
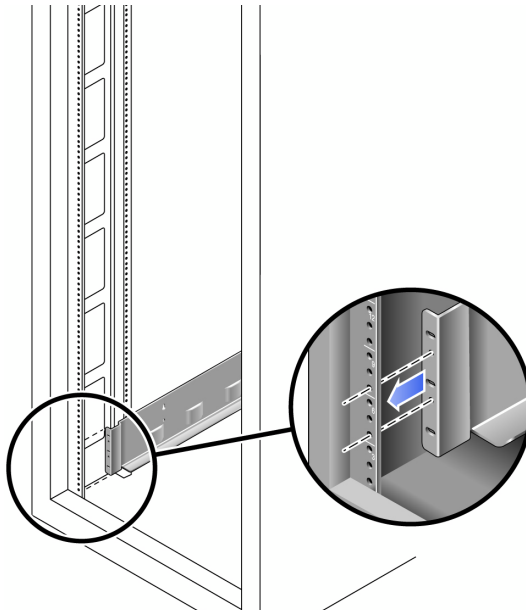
b. **Use the #2 Phillips screwdriver to insert and tighten two 8-32 screws to secure the rail to the front of the cabinet** (FIGURE D-13)**.**

Each expansion tray requires three standard mounting units (3RU) of vertical space in the cabinet. Each standard mounting unit (U) has three mounting holes in the left and right cabinet rails. Insert the screws into the lowest holes in the top two mounting units of the 3RU slot in which the tray is to be mounted.

These screws pass through the cabinet rail holes and screw into threaded holes in the left rail.

FIGURE D-13 Securing the Left Rail to the Front of the Cabinet
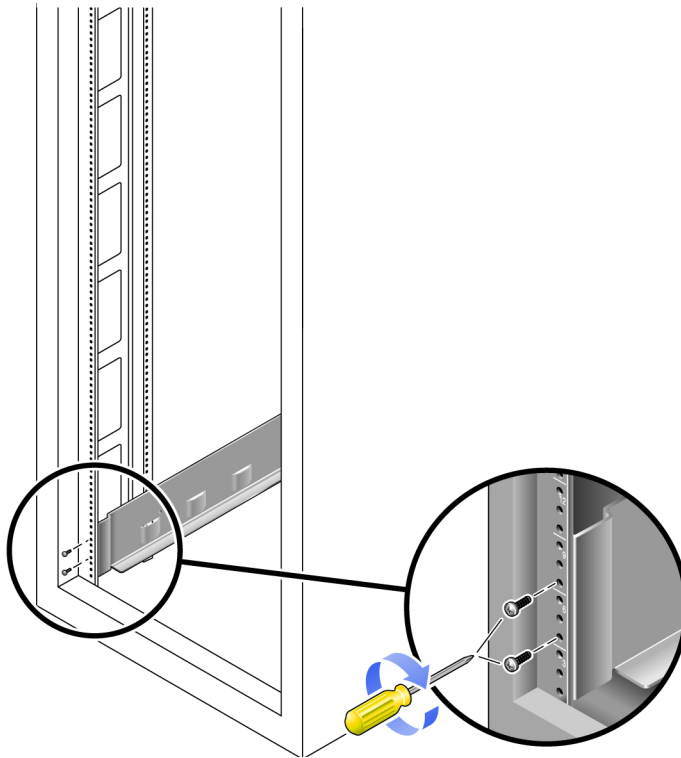
c. **At the back of the cabinet, adjust the length of the rail as needed to fit the cabinet, and position the rail flange over the face of the cabinet rail** (FIGURE D-14)**.**

FIGURE D-14 Adjusting the Length of the Left Rail at the Back of the Cabinet
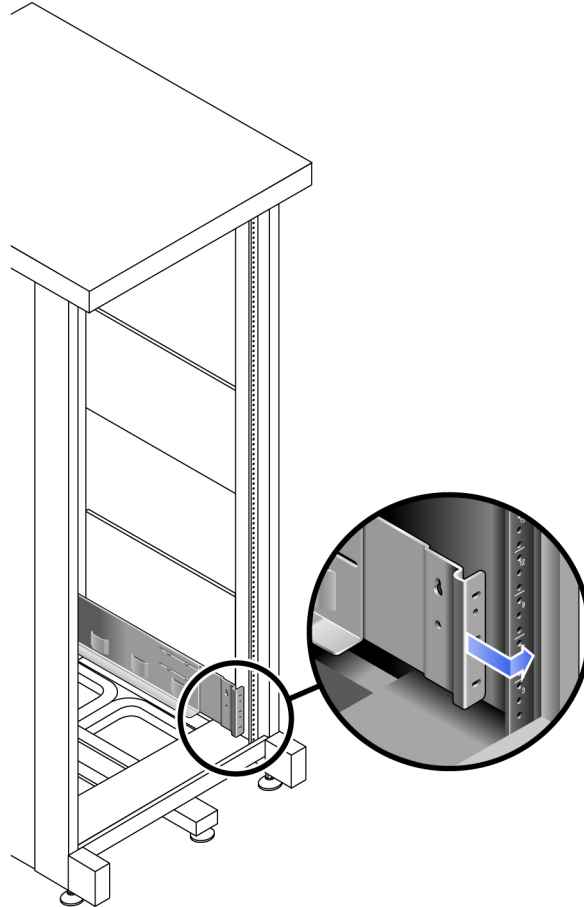
Be sure to align the rail flange so that the mounting holes at the back correspond to those at the front of the cabinet.

d. Depending on the type of cabinet you have, do one of the following
():

- For a Sun Rack 900 or Sun Rack 1000 cabinet, use the #3 Phillips screwdriver to insert and tighten four metric M6 screws (two per side) at the back of the rail.

- For cabinets with 10-32 cabinet rail threads, use the #2 Phillips screwdriver to insert and tighten four 10-32 screws (two per side) at the back of the rail.

- For other cabinets, use self-supplied screws to secure the rail to the cabinet rail.

FIGURE D-15 Securing the Left Rail to the Back of the Cabinet
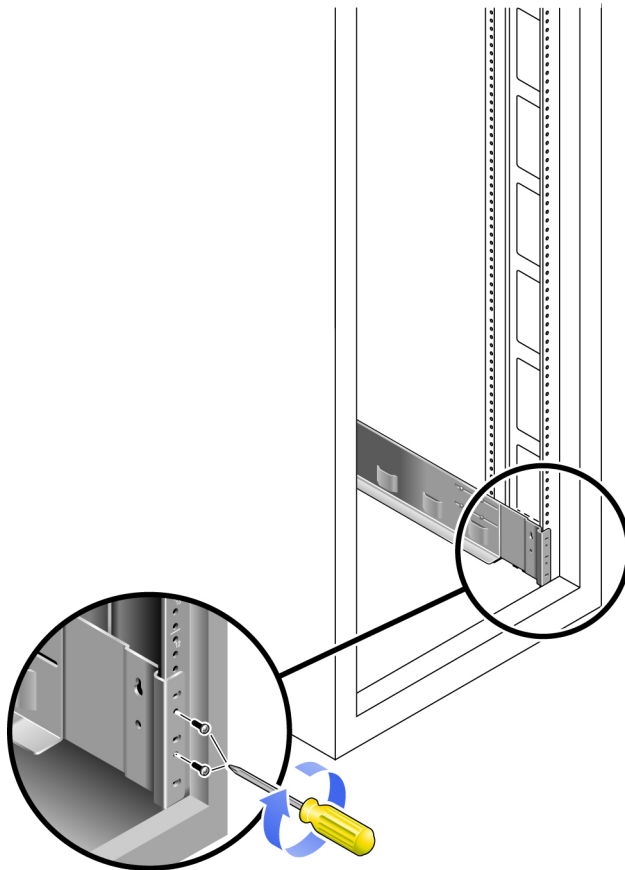
2. **Using the #2 Phillips screwdriver, tighten the eight adjustment screws (four on each side) at the back of each rail** (FIGURE D-16)**.**

FIGURE D-16 Tightening the Rail Adjustment Screws
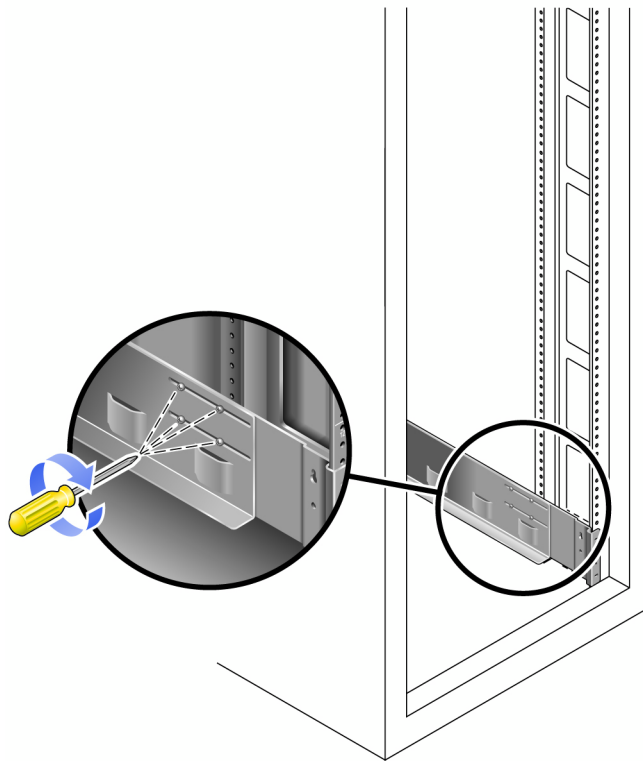
Attaching the Universal Rail Kit to a Sun StorEdge Expansion or Sun Fire Cabinet

This procedure describes the steps to attach the universal rail kit to a Sun StorEdge Expansion cabinet or a Sun Fire cabinet.

To attach the universal rail kit, follow these steps first for the left rail and then for the right rail:

1. **In each of the four inner mounting rails, insert a 10-32 screw in the center hole of the mounting unit of the 3RU slot in which the tray is to be mounted** (FIGURE D-17)**.**

   Do not tighten at this time. You will hang the side rails on these screws.

FIGURE D-17   Inserting Rail Mounting Screws in Middle Holes of the Upper Mounting
Unit of the Mounting Slot
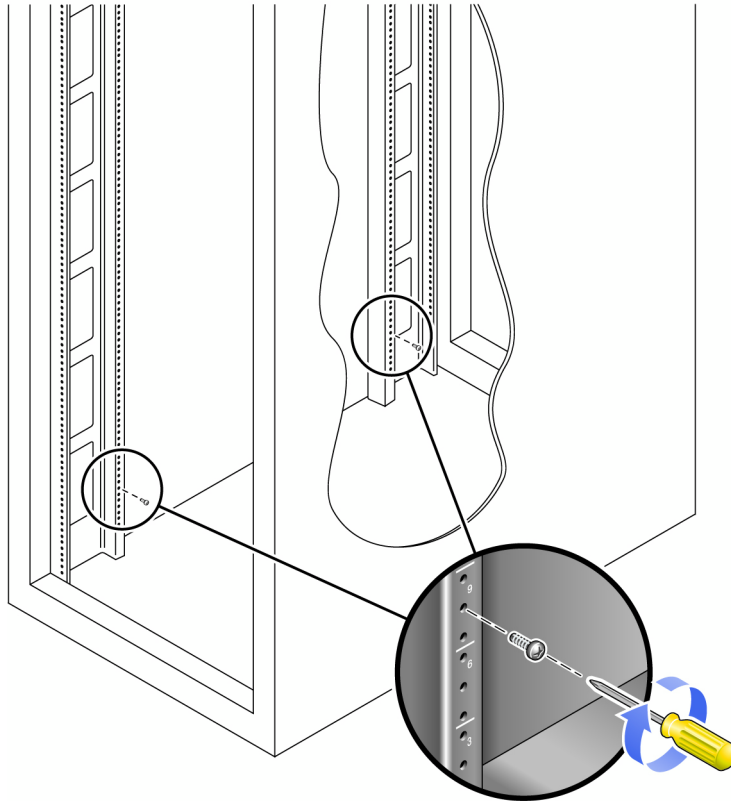
2. **Hang the rail by aligning the large slots of the rail over the front and back screws
   and then pulling the rail down so that each screw is at the top of the slot**
   (FIGURE D-18)**.**

FIGURE D-18   Hanging the Rail
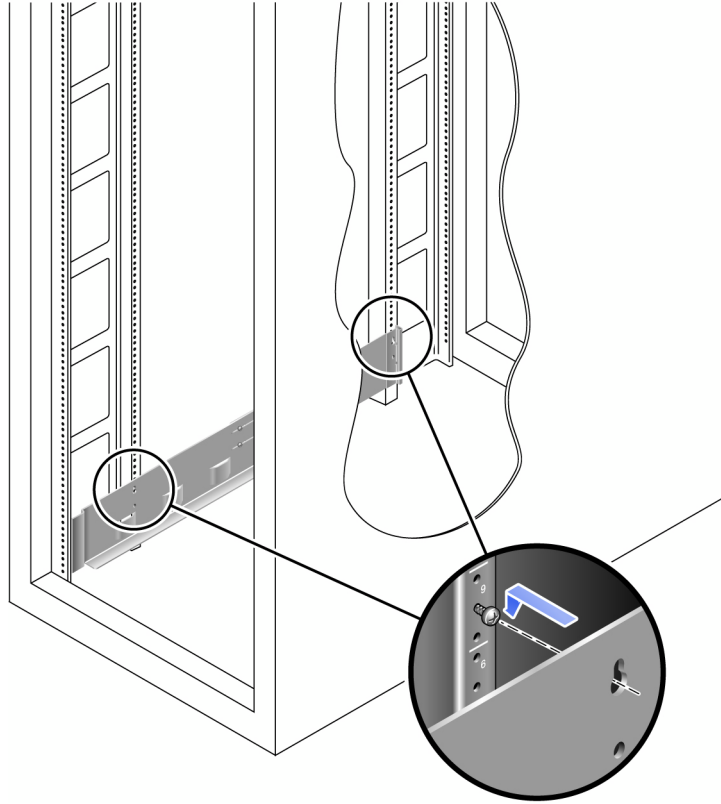
3. **Adjust the length of the rail to fit the cabinet.**

4. **Using the #2 Phillips screwdriver, insert two 10-32 screws in the lower side mounting holes for the rail** (FIGURE D-19)**.**

   The hole corresponds to the center hole of the middle mounting unit of the 3RU slot in which the rail is installed.

FIGURE D-19 Inserting Screws in the Lower Side Mounting Holes of the Cabinet
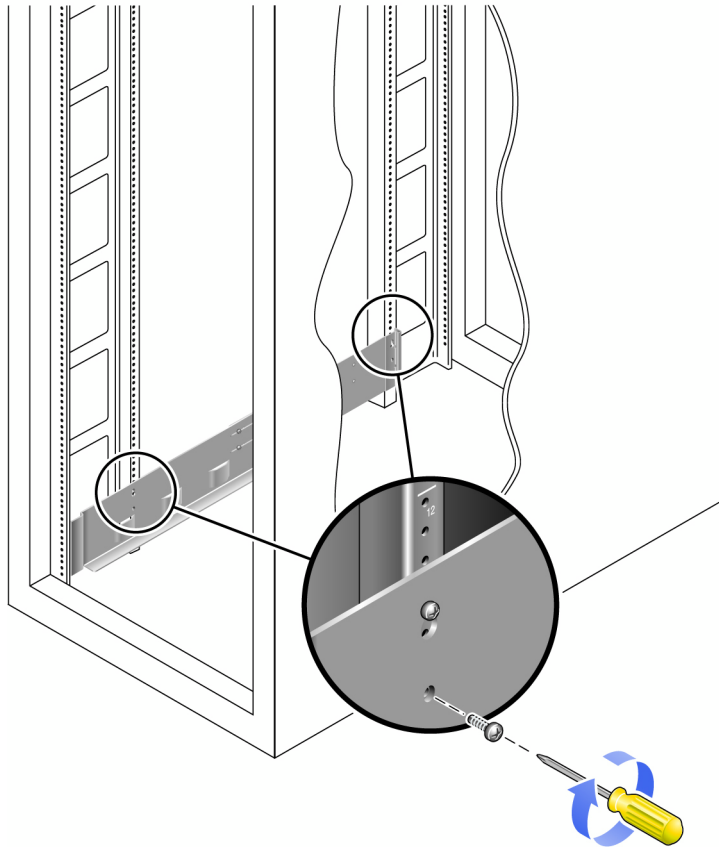
5. **Use the #2 Phillips screwdriver to insert and tighten two 8-32 screws to secure the rail to the front of the cabinet** (FIGURE D-20)**.**

   These screws pass through the cabinet rail holes and screw into threaded holes in the front of the rails.

   Insert the screws into the lowest holes in the top two mounting units of the 3RU slot in which the tray is to be mounted.

FIGURE D-20 Securing the Rail to the Front of the Cabinet
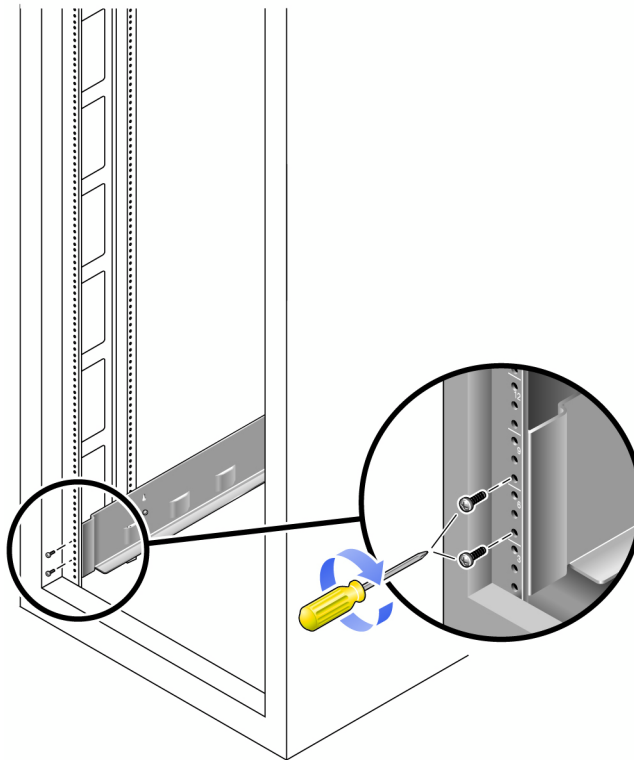
6. **Tighten all screws on the rail.**

Attaching the Universal Rail Kit to a Standard 19-Inch Cabinet With Unthreaded Cabinet Rails

This procedure describes the steps to attach the universal rail kit to any 19-inch wide, 4-post EIA-compatible rack, or cabinet with unthreaded cabinet rails.

To attach the universal rail kit, follow these steps first for the left rail and then for the right rail:

1. **Snap two cage nuts over the middle holes in the upper and lower mounting units of the 3RU cabinet slot in which you will mount the tray** (FIGURE D-21)**.**

FIGURE D-21 Inserting Cage Nuts Over Rail Mounting Holes in Cabinet Rails
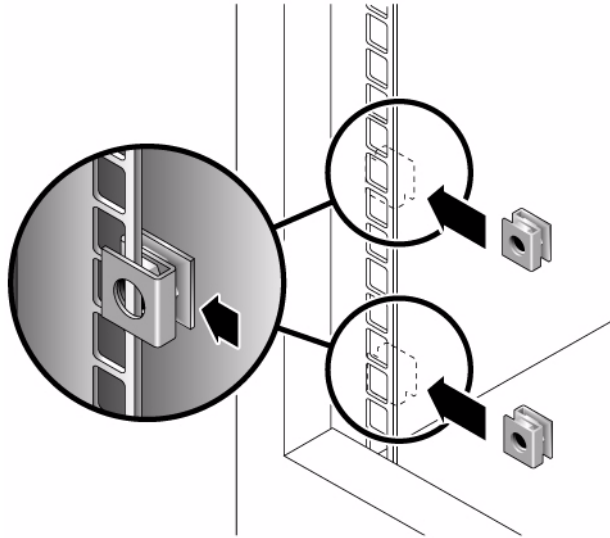
2. Hook a cabinet rail adapter plate over the front of the cabinet rail (FIGURE D-22)**.**

Position the adapter plate over the 3RU slot in which the tray is to be mounted.

FIGURE D-22   Inserting the Cabinet Rail Adapter Plate on the Cabinet Rail
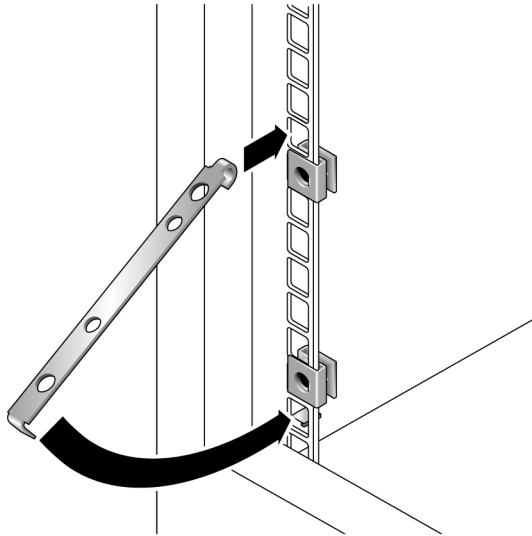
3. **Use the #2 Phillips screwdriver to insert and tighten two 8-32 screws to secure the rail to the front of the cabinet** (FIGURE D-23)**.**

   These screws pass through the unthreaded inner holes of the cabinet rail adapter plate and screw into the threaded holes in the front of the mounting rail.

FIGURE D-23   Securing the Rail to the Front of the Cabinet
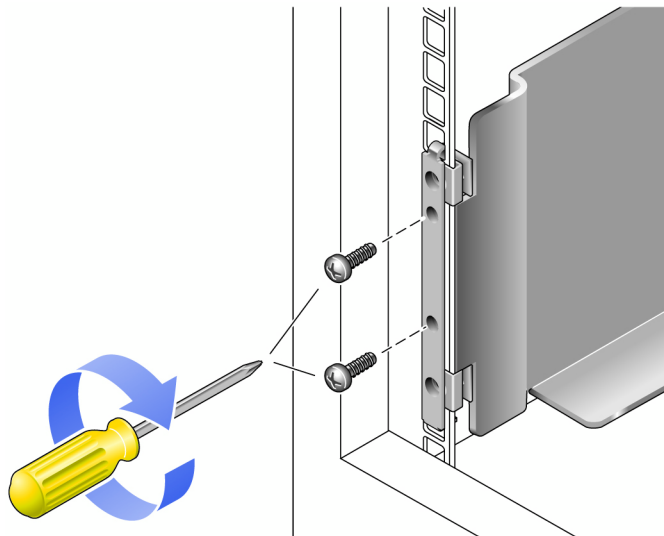
4. On the corresponding cabinet rail at the back of the cabinet, snap one cage nut over the lowest hole in the middle mounting unit of the 3RU cabinet slot in which you will mount the tray (FIGURE D-24)**.**

FIGURE D-24 Inserting a Cage Nut on the Cabinet Rail at the Back of the Cabinet
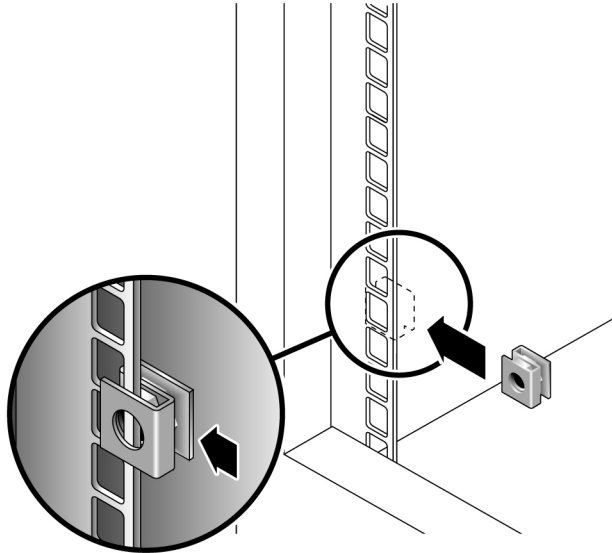
5. At the back of the cabinet, adjust the length of the rail as needed to fit the cabinet, and position the rail flange over the face of the cabinet rail (FIGURE D-25)**.**

FIGURE D-25 Adjusting the Length of the Rail at the Back of the Cabinet
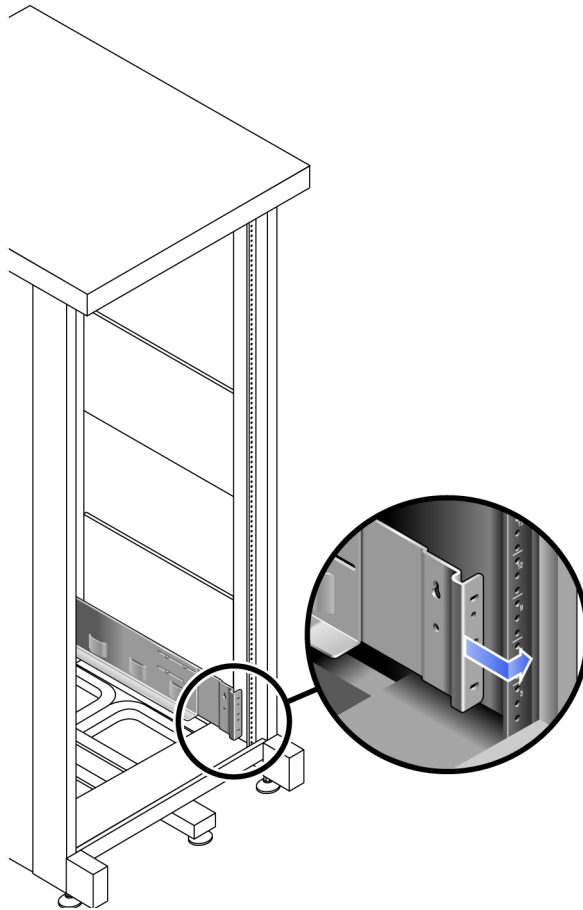
6. **Insert and tighten a screw appropriate for the cage nut to secure the rail to the back cabinet rail** (FIGURE D-26)**.**

   The screw passes through the lower unthreaded inner hole of the mounting rail and screws into the threaded hole of the cage nut.
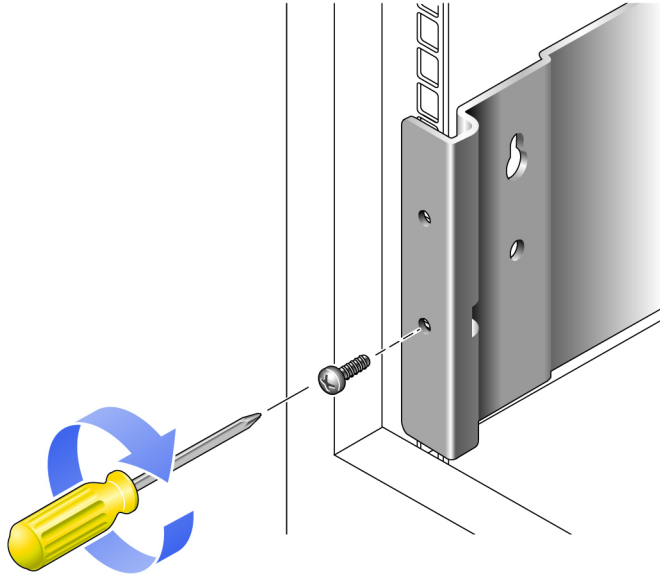
Installing an Expansion Tray in a Cabinet

1. **Using two people, one at each side of the tray, carefully lift and rest the tray on the bottom ledge of the left and right rails** (FIGURE D-27)**.**

![Caution symbol] **Caution –** Use care to avoid injury. A tray can weigh up to 95 pounds (45 kg).

FIGURE D-27   Positioning the Tray in the Cabinet
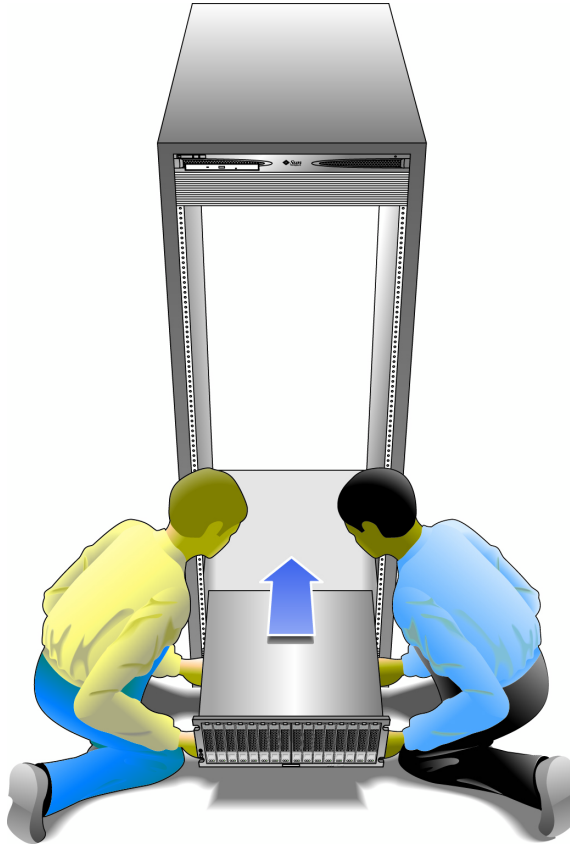
2. **Carefully slide the tray into the cabinet until the front flanges of the tray touch the vertical face of the cabinet** (FIGURE D-28)**.**

FIGURE D-28   Sliding the Tray Into the Cabinet
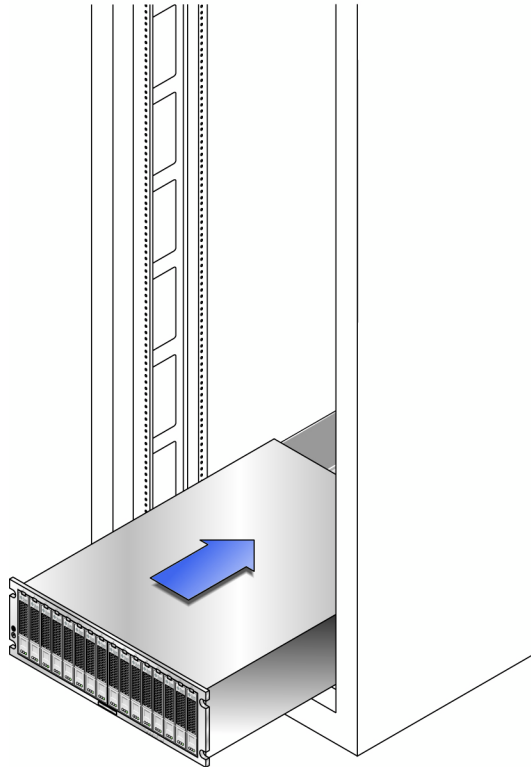
3. **Depending on the type of cabinet you have, do one of the following:**

   ■ For a Sun Rack 900 or Sun Rack 1000 cabinet, use the #3 Phillips screwdriver to insert and tighten four metric M6 screws (two per side) at the back of the rail. (FIGURE D-29).

FIGURE D-29 Securing the Tray to the Front of a Cabinet
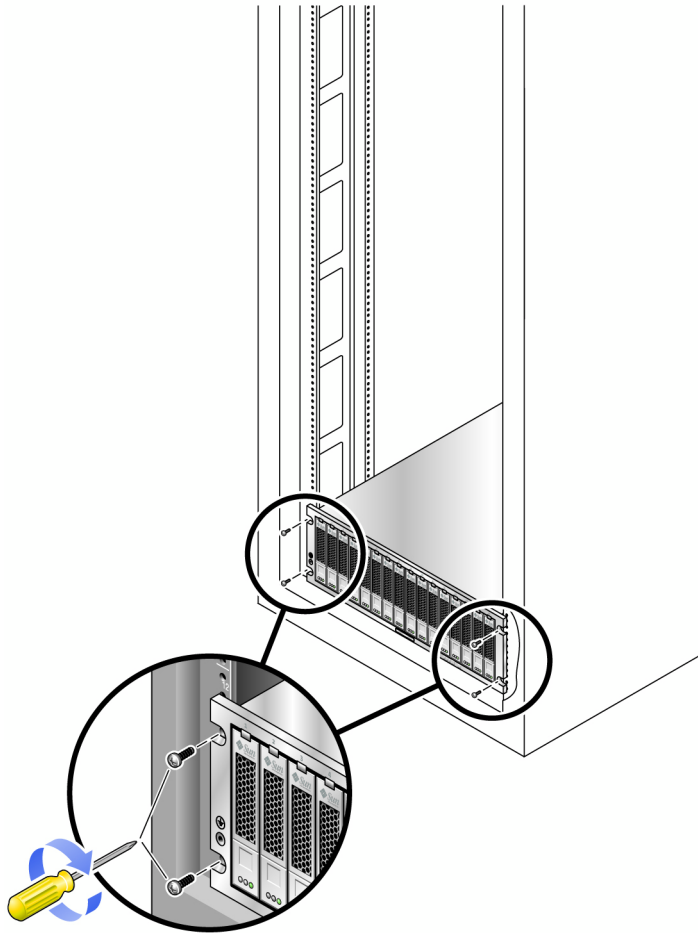
- For the Sun StorEdge Expansion cabinet or for cabinets with 10-32 cabinet rail threads, use the #2 Phillips screwdriver to insert and tighten four 10-32 screws (two per side) to secure the tray to the front of the cabinet (FIGURE D-10).

- For a cabinet with other cabinet rail threads, secure the tray to the front of the cabinet with metric M5 or 12-24 screws.

- For a cabinet with unthreaded cabinet rails, secure the tray to the front of the cabinet with screws that match the inserted cage nuts.

4. **Install and tighten the 6-32 screw on each side of the back of the tray to secure the tray to the cabinet** (FIGURE D-30)**.**

FIGURE D-30   Securing the Tray to the Back of the Cabinet Rail
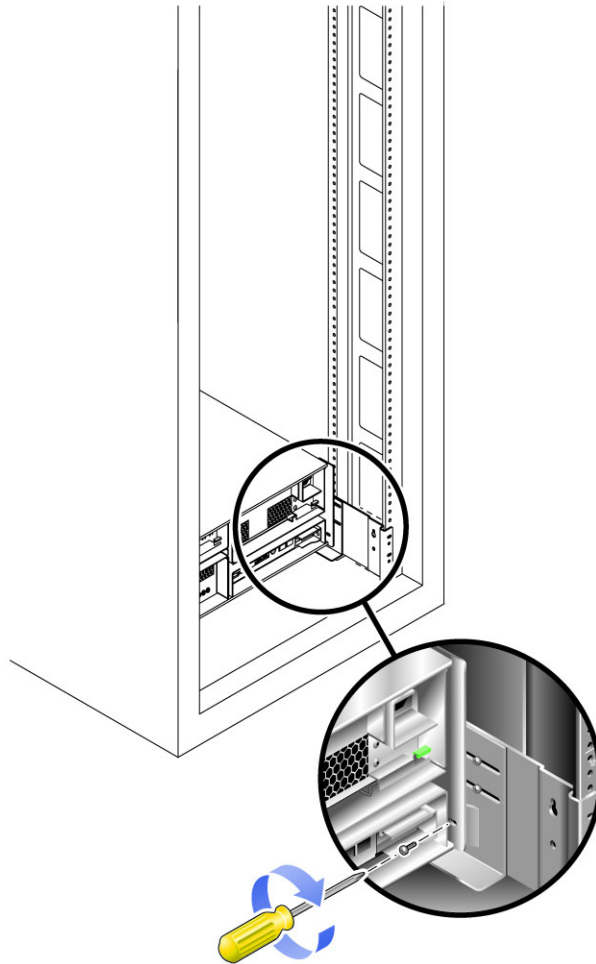
Next Steps

After you install the controller and expansion trays, following the cabling diagrams for your configuration in "Intertray Cabling" on page 75.

Glossary

Definitions obtained from the Storage Networking Industry Association (SNIA) Dictionary are indicated with "(SNIA)" at the end. For the complete SNIA Dictionary, go to www.snia.org/education/dictionary.

array	Multiple disk drives that function as a single storage device. A high-availability (HA) array configuration has redundant controllers and expansion trays of disk drives.
array hot-spare	A disk that serves as a hot-spare within an array as part of the storage pool; a reserve disk that can be made available to all virtual disks within an array. See also hot spare.
block	The amount of data sent or received by the host per I/O operation; the size of a data unit.
controller tray	A tray with an installed redundant RAID controller pair.
control path	The route used for communication of system management information, usually an out-of-band connection.
customer LAN	See site LAN.
DAS	See direct attached storage (DAS).
data host	Any host that uses the system for storage. A data host can be connected directly to the array (direct attach storage, or DAS) or can be connected to an external switch that supports multiple data hosts (storage area network, or SAN).
data path	The route taken by a data packet between a data host and the storage device.
direct attached storage (DAS)	A storage architecture in which one or two hosts that access data are connected physically to a storage array.
disk	A physical drive component that stores data.

expansion tray
A tray that does not have a RAID controller, used to expand the capacity of an array. This type of tray must be attached to a controller tray to function.

extent
A set of contiguous blocks with consecutive logical addresses on a physical or virtual disk.

FC
See Fibre Channel (FC).

Fibre Channel (FC)
A set of standards for a serial I/O bus capable of transferring data between two ports at up to 100 megabytes/second, with standards proposals to go to higher speeds. Fibre Channel supports point to point, arbitrated loop, and switched topologies. Fibre Channel was completely developed through industry cooperation, unlike SCSI, which was developed by a vendor and submitted for standardization after the fact.

Fibre Channel switch
A networking device that can send packets directly to a port associated with a given network address in a Fibre Channel storage area network (SAN). Fibre Channel switches are used to expand the number of servers that can connect to a particular storage port. Each switch is managed by its own management software. (SNIA)

field-replaceable unit (FRU)
An assembly component that is designed to be replaced on site, without the system having to be returned to the manufacturer for repair.

FRU
See field-replaceable unit (FRU).

HBA
See host bus adapter (HBA).

host bus adapter (HBA)
An I/O adapter that connects a host I/O bus to a computer's memory system. (SNIA)

Abbreviated HBA. Host bus adapter is the preferred term in SCSI contexts. Adapter and NIC are the preferred terms in Fibre Channel contexts. The term NIC is used in networking contexts such as Ethernet and token ring. See also initiator.

hot-spare
The drive used by a controller to replace a failed disk. See also array hot-spare.

in-band traffic
System management traffic that uses the data path between a host and a storage device.

initiator
A system component that initiates an I/O operation over a Fibre Channel (FC) network. If allowed by FC fabric zoning rules, each host connection within the FC network has the ability to initiate transactions with the storage array. Each host in the FC network represents a separate initiator, so if a host is connected to the system through two host bus adapters (HBAs), the system identifies two different initiators (similar to multi-homed, Ethernet-based hosts). In contrast,

	when multipathing is used in round-robin mode, multiple HBAs are grouped together, and the multipathing software identifies the group of HBAs as a single initiator.
IOPS	A measure of transaction speed, representing the number of input and output transactions per second.
LAN	Local area network.
logical unit number (LUN)	The SCSI identifier for a volume as it is recognized by a particular host. The same volume can be represented by a different LUN to a different host.
LUN	See logical unit number (LUN).
MAC address	See media access control (MAC) address.
management host	A Solaris or Windows host serving the configuration, management, and monitoring software for a Sun StorageTek array. The software on the station can be accessed with a browser to run the browser interface or with a remote scripting command-line interface (CLI) client.
master / alternate master	A design for reliability that uses redundant configuration. Array configurations share master/alternate master configurations: each array configuration has two controller trays that are grouped as one host. In each case, the master component uses the IP address and name. If the master fails, the alternate master assumes the IP address and name and takes over the master's functions.
media access control (MAC) address	The physical address identifying an Ethernet controller board. The MAC address, also called an Ethernet address, is set at the factory and must be mapped to the IP address of the device.
multipathing	A design for redundancy that provides at least two physical paths to a target.
out-of-band traffic	System management traffic outside of the primary data path that uses an Ethernet network.
PDU	See power distribution unit (PDU).
power distribution unit (PDU)	The assembly that provides power management for the system. The redundant design uses two PDUs in each system so that the system's data path continues to function if one of the PDUs fails.
provisioning	The process of allocation and assignment of storage to hosts.

RAID	An acronym for Redundant Array of Independent Disks, a family of techniques for managing multiple disks to deliver desirable cost, data availability, and performance characteristics to host environments. (SNIA)
	Also, a phrase adopted from the 1988 SIGMOD paper A Case for Redundant Arrays of Inexpensive Disks.
remote monitoring	Monitoring of the functions and performance of a hardware system from a location other than where the hardware resides.
remote scripting CLI client	A command-line interface (CLI) that enables you to manage the system from a remote management host. The client communicates with the management software through a secure out-of-band interface, HTTPS, and provides the same control and monitoring capability as the browser interface. The client must be installed on a host that has network access to the system.
SAN	See storage area network (SAN).
site LAN	The local area network at your site. When the system is connected to your LAN, the system can be managed through a browser from any host on the LAN.
SFP	Small Form-factor Pluggable transceivers.
SSCS	Sun Storage Command System. The command-line interface (CLI) that can be used to manage the array.
storage area network (SAN)	An architecture in which the storage elements are connected to each other and to a server that is the access point for all systems that use the SAN to store data.
stripe size	The number of blocks in a stripe. A striped array's stripe size is the stripe depth multiplied by the number of member extents. A parity RAID array's stripe size is the stripe depth multiplied by one less than the number of member extents. See also striping.
striping	Short for data striping; also known as RAID Level 0 or RAID 0. A mapping technique in which fixed-size consecutive ranges of virtual disk data addresses are mapped to successive array members in a cyclic pattern. (SNIA)
target	The system component that receives a SCSI I/O command. (SNIA)
thin-scripting client	See remote scripting CLI client.
tray	See controller tray and expansion tray.
WWN	World Wide Name. A unique 64-bit number assigned by a recognized naming authority such as the Institute of Electrical and Electronics Engineers (IEEE) that identifies a connection (device) or a set of connections to the network. The

World Wide Name (WWN) is constructed from the number that identifies the naming authority, the number that identifies the manufacturer, and a unique number for the specific connection.

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