



Sun Fire™ V445 Server Service Manual

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Preface

The *Sun Fire V445 Server Service Manual* includes detailed service procedures for the Sun Fire™ V445 server. This book is intended for technicians, system administrators, qualified Sun service providers, and advanced computer system end users who have experience removing and installing server hardware.

For information about the Sun Fire V445 server and detailed instructions for configuring, administering, and diagnosing problems with the server, see the *Sun Fire V445 Server Administration Guide*.

This book does not cover the initial installation of the server. For those instructions, see the *Sun Fire V445 Server Installation Guide*.

Before You Read This Book

Follow the instructions for mounting the server in a cabinet before continuing with the removal and installation instructions in this book.

You can find rackmounting instructions on the system top cover label and in the *Sun Fire V445 Server Installation Guide*.

How This Book Is Organized

The procedures in this book are organized as follows:

- **Before You Begin** – This section lists the procedures that you must complete before proceeding to the next section. Complete these prerequisite procedures in the sequence in which they are printed.
- **What to Do** – This section explains the procedure. Complete the steps in the sequence in which they are printed, paying special attention to notes and cautions.
- **What Next** – This section lists the procedures that you must complete to finish the current procedure or to return the system to operation. Complete these procedures in the sequence in which they are printed.

This book contains the following chapters:

- **Chapter 1** illustrates the front panel and back panel features and LED indicators.
- **Chapter 2** offers procedures for powering on and powering off the system. In addition, it describes how to prepare the system for service, including the tools required, and how to avoid electrostatic discharge.
- **Chapter 3** provides procedures for servicing customer-replacable units (CRUs), including serially attached SCSI (SAS) drives, power supplies, and fan trays.
- **Chapter 4** provides procedures for servicing the motherboard components.
- **Chapter 5** provides procedures for servicing miscellaneous components, including the hard drive backplane, input/output board, and power distribution board.

This book also includes the following reference appendixes:

- **Appendix A** is a reference for connector pinouts.
- **Appendix B** lists physical and environmental specifications.
- **Appendix C** shows system components and links to relevant service procedures.
- **Appendix D** contains information about cable routing and board connectors.

Using UNIX Commands

This document might not contain information about basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices. Refer to the following for this information:

- Software documentation that you received with your system
- Solaris™ Operating System documentation, which is at:

<http://docs.sun.com>

Shell Prompts

Shell	Prompt
C shell	<i>machine-name%</i>
C shell superuser	<i>machine-name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#
ALOM	sc>
OpenBoot firmware	ok
OpenBoot Diagnostics	obdiag>

Typographic Conventions

Typeface*	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
AaBbCc123	What you type, when contrasted with on-screen computer output	% su Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this.
<code>AaBbCc123</code>	Command-line variable; replace with a real name or value	To delete a file, type <code>rm filename</code> .

* The settings on your browser might differ from these settings.

Related Documentation

Application	Title	Part Number	Format	Location
Late-breaking product information	<i>Sun Fire V445 Server Product Notes</i>	819-3744	PDF	Online
Installation overview	<i>Sun Fire V445 Server Getting Started Guide</i>	819-4664	Printed	Shipping kit
			PDF	Online
Installation	<i>Sun Fire V445 Server Installation Guide</i>	819-3743	PDF	Online
Administration	<i>Sun Fire V445 Server Administration Guide</i>	819-3741	PDF	Online
Site planning	<i>Site Planning Guide for Sun Servers</i>	819-5730	PDF	Online
Site planning data sheet	<i>Sun Fire V445 Server Site Planning Data Sheet</i>	819-3745	Printed	Shipping kit
			PDF	Online
Sun Advanced Lights Out Manager (ALOM) system controller	<i>Sun Advanced Lights Out Manager (ALOM) 1.6 Online Help</i>	817-1960	PDF	Online

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

Sun Fire V445 Server Service Manual, part number 816-7729

Identifying Front Panel and Back Panel Features

This chapter contains the following sections:

- [“Locating Front Panel Features” on page 2](#)
- [“Locating Back Panel Features” on page 9](#)

For background information about the Sun Fire V445 server and detailed instructions for installing, configuring, and administering the server, see:

- *Sun Fire V445 Server Installation Guide*
- *Sun Fire V445 Server Administration Guide*

Locating Front Panel Features

The illustration below shows the system features that you can access from the front panel.

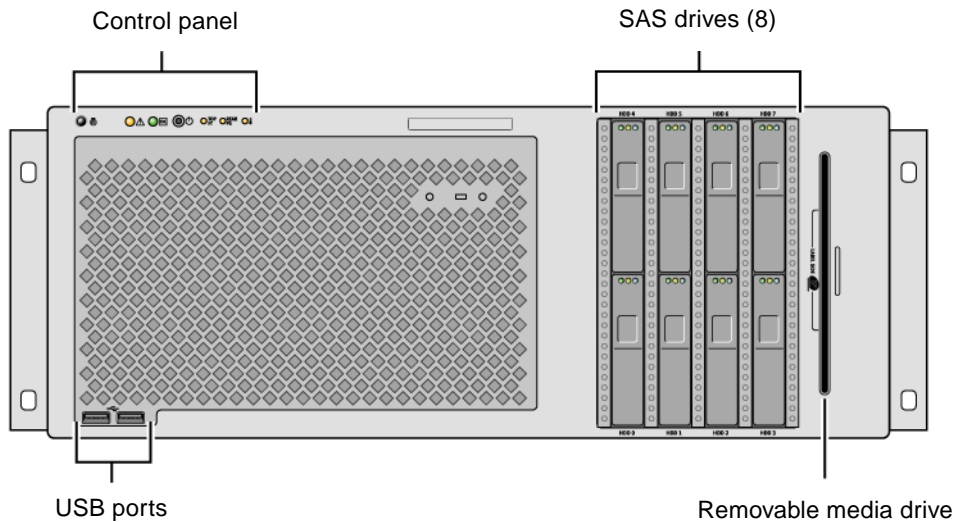


FIGURE 1-1 Front Panel Features

For information about front panel indicators, see [“Front Panel Indicators”](#) on page 3.

The system is configured with up to eight serially attached SCSI (SAS) drives, which are accessible from the front of the system. In addition, there are a removable media drive and two USB ports.

Front Panel Indicators

Several front panel indicators provide general system status, alert you to system problems, and help you to determine the location of system faults.

During system startup, the indicators are toggled on and off to verify that each one is working correctly. Indicators located on the front panel work in conjunction with specific fault indicators. For example, a fault in the power supply subsystem illuminates the power supply Service Required indicator on the affected power supply, as well as the system Service Required indicator. Since all front panel status indicators are powered by the system's standby power source, fault indicators remain lit for any fault condition that results in a system shutdown.

At the top left of the system as you look at its front are six system status indicators. Power/OK indicator and the Service Required indicator provide a snapshot of the overall system status. The Locator indicator helps you to quickly locate a specific system even though it might be one of numerous systems in a room. The Locator indicator/button is at the far left in the cluster, and is lit remotely by the system administrator, or toggled on and off locally by pressing the button.

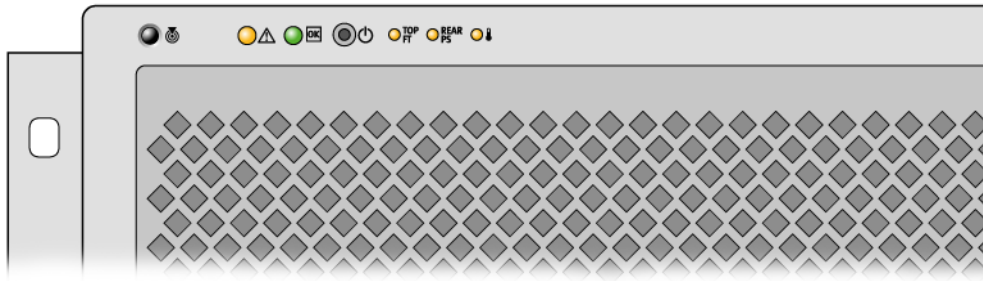





FIGURE 1-2 Front Panel Indicators

Each system status indicator on the front panel has a corresponding system status indicator on the back panel.




Listed from left to right, the system status indicators operate as described in the following table.

TABLE 1-1 System Status Indicators

Icon	Name	Description
	Locator	This white indicator is lit by Solaris command, Sun Management Center command, Advanced Lights Out Manager (ALOM) commands, or Locator button to help you locate the system in a data center. See the <i>Sun Fire V445 Server Administration Guide</i> for information about turning on the Locator indicator.
	Service Required	This amber indicator lights steadily when a system fault is detected. For example, the system Service Required indicator lights when a fault occurs in a power supply or fan tray. In addition to the system Service Required indicator, other fault indicators might also be lit, depending on the nature of the fault. If the system Service Required indicator is lit, check the status of other fault indicators on the front panel and other components to determine the nature of the fault. See the <i>Sun Fire V445 Server Administration Guide</i> for more information.
	OK	This green indicator blinks slowly, then quickly during startup. The OK indicator lights continuously when the system power is on and the Solaris Operating System is loaded and running.

Additional fault indicators indicate the type of service required. These indicators are described in [TABLE 1-2](#).

TABLE 1-2 System Diagnostic Indicators

Icon	Name	Location
	Fan Tray Fault	Indicates a fault in a fan tray. Additional indicators on the top panel indicate which fan tray requires service.
	Power Supply Fault	Indicates a fault in a power supply. Look at the individual power supply status indicators (on the back panel) to determine which power supply requires service.
	CPU Overtemperature	Indicates that a CPU has detected an overtemperature condition. Look for any fan failures, as well as increased ambient air temperature around the server.

Power Button

The system Power button is recessed to prevent accidentally turning the system on or off. If the operating system is running, pressing and releasing the Power button initiates a graceful software system shutdown. Pressing and holding in the Power button for four seconds causes an immediate hardware shutdown.



Caution – Whenever possible, use the graceful shutdown method. Forcing an immediate hardware shutdown can cause hard drive corruption and loss of data.

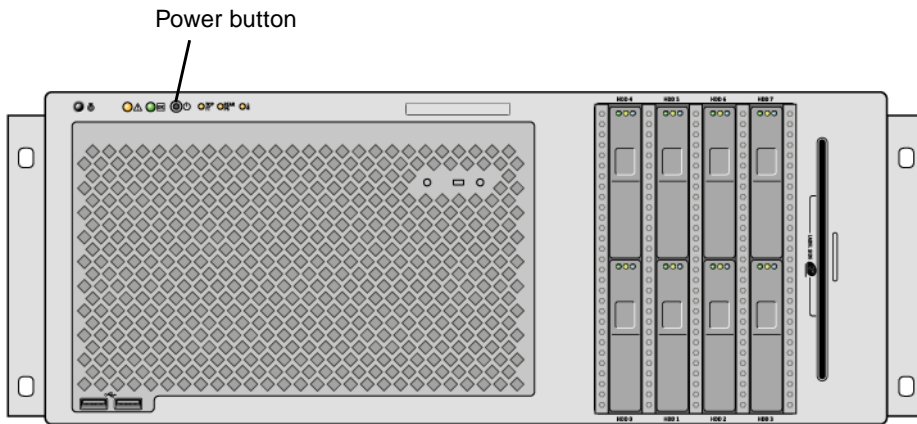


FIGURE 1-3 Location of Power Button

USB Ports

The Sun Fire V445 server has four Universal Serial Bus (USB) ports, two on the front panel and two on the back panel. All four USB ports comply with the USB 2.0 specification.

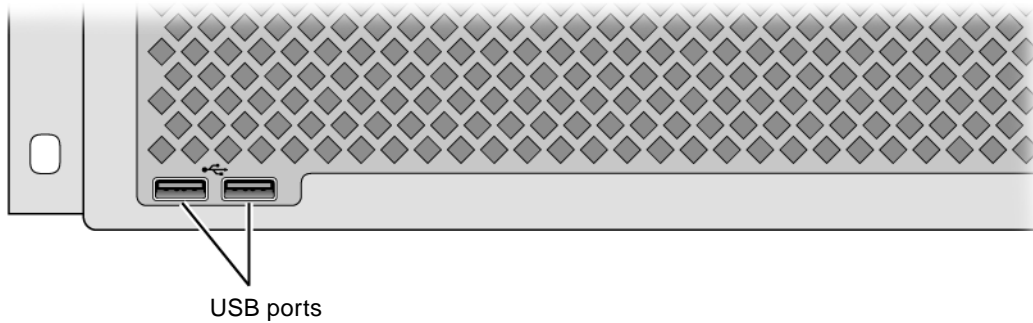


FIGURE 1-4 Location of Front USB Ports

For more information about the USB ports, see your *Sun Fire V445 Server Administration Guide*.

SAS Hard Drives

The system has up to eight hot-pluggable internal serially attached SCSI (SAS) hard drives.

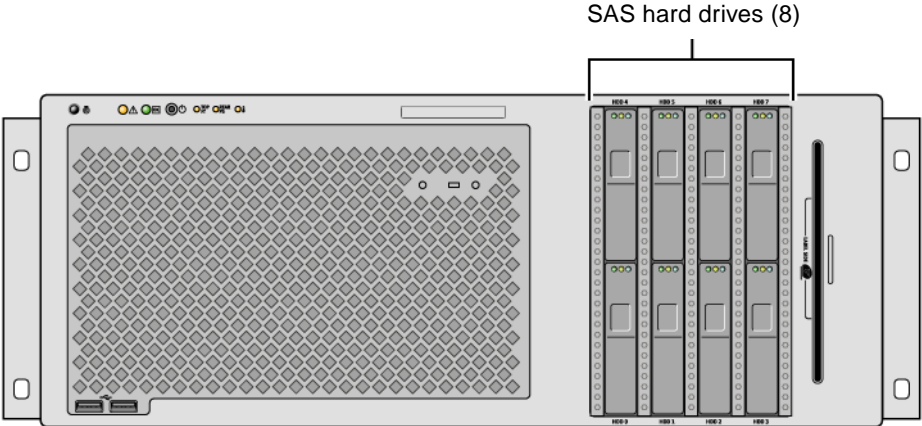


FIGURE 1-5 Location of SAS Hard Drives

For more information about the SAS drives, see the following sections:

- “About Hot-Pluggable and Hot-Swappable Components” on page 46
- “Removing a Hard Drive” on page 51
- “Installing a Hard Drive” on page 53
- “Removing a Hard Drive Using a Hot-Plug Operation” on page 55
- “Installing a Hard Drive Using the Hot-Plug Operation” on page 57
- “Reference for Hard Drive Status Indicators” on page 75

For more information about how to configure internal hard drives, see the *Sun Fire V445 Server Administration Guide*.

Removable Media Drive

The Sun Fire V445 server has a DVD-ROM drive in a removable media bay.

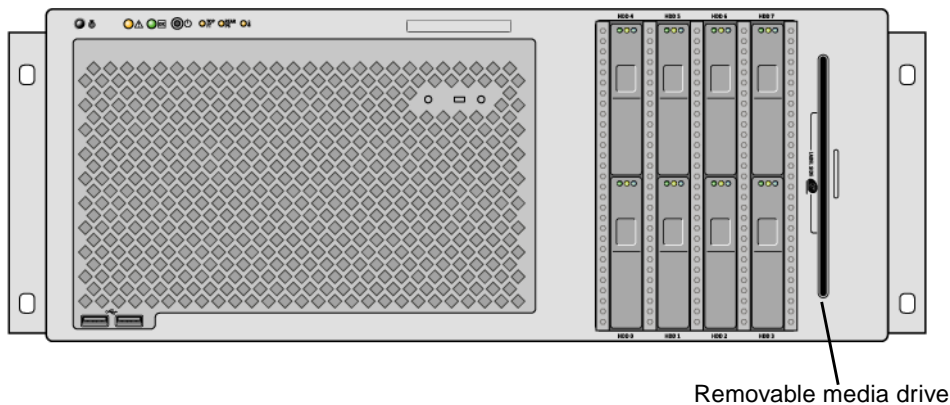


FIGURE 1-6 Location of Removable Media Drive

For more information about servicing the DVD-ROM drive, see the following sections:

- “Removing the Removable Media Drive” on page 71
- “Installing the Removable Media Drive” on page 73

Locating Back Panel Features

The following illustration shows the system features that are accessible from the back panel.

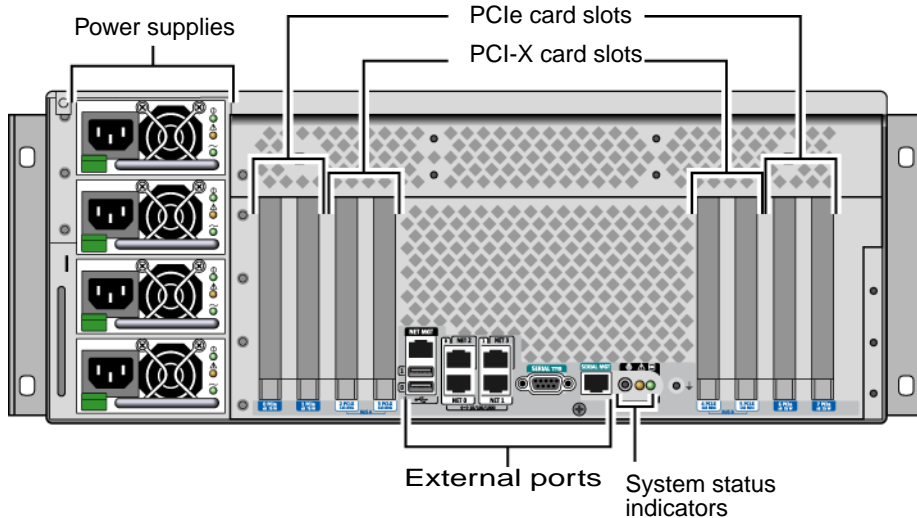


FIGURE 1-7 Back Panel Features

Power Supplies

There are four power supplies, which provide fully redundant AC/DC capabilities (N+N).

For more information about power supplies, see the following sections:

- [“About Hot-Pluggable and Hot-Swappable Components” on page 46](#)
- [“Removing a Power Supply” on page 58](#)
- [“Installing a Power Supply” on page 60](#)
- [“Reference for Power Supply Status Indicators” on page 76](#)

More information about power supplies is also available in the *Sun Fire V445 Server Administration Guide*.

PCI Slots

The Sun Fire V445 server has four PCIe slots and four PCI-X slots. These are identified from left to right (as you look at the back panel) as PCI0 through PCI7 in OpenBoot™ firmware.

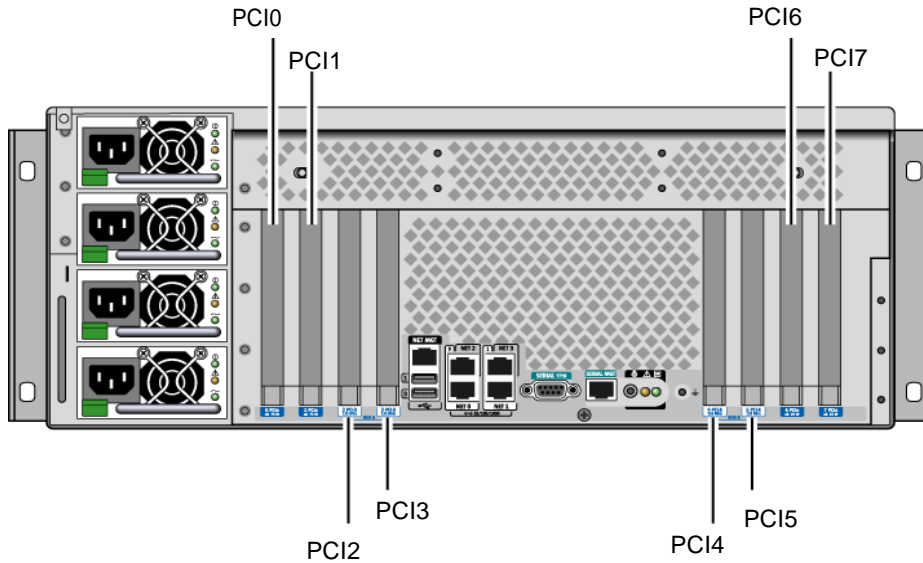


FIGURE 1-8 PCIe and PCI-X Slots as Identified in OpenBoot Firmware

For more information about how to install a PCI card, see:

- [“Installing a PCI Card” on page 66](#)

More information about PCI cards is available in the *Sun Fire V445 Server Administration Guide*.

System Controller Ports

There are two system controller ports. Both ports use an RJ-45 connector.

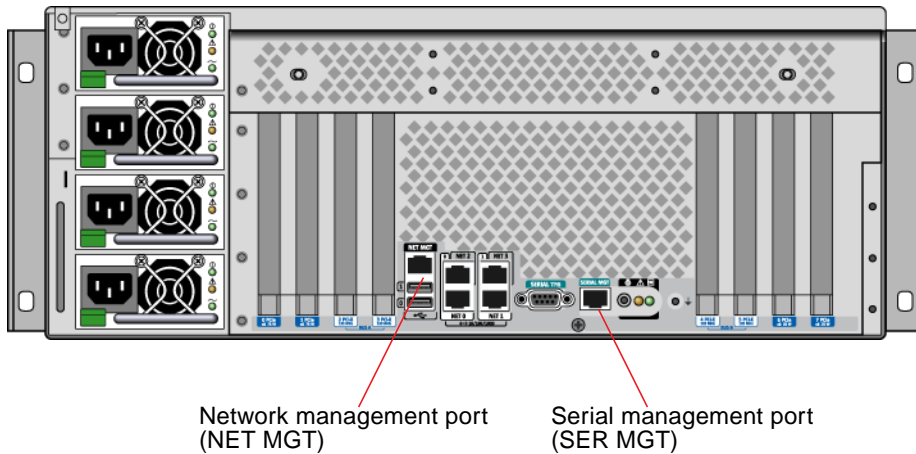


FIGURE 1-9 System Controller Port Locations

Network Management Port

The Network Management port, labeled NET MGT, provides direct network access to the ALOM system controller, when configured, and can access the ALOM prompt and system console output.

Note – The system controller is accessed through the serial management port by default. You must reconfigure the system controller to use the network management port. For more information, see the *Sun Fire V445 Server Administration Guide*.

The network management port has a Link indicator that operates as described in [TABLE 1-3](#).

TABLE 1-3 Network Management Port indicator

Name	Description
Link	This green indicator is lit when an Ethernet connection is present.

Serial Management Port

The serial management port, labeled SER MGT, provides the default connection to the system controller. You can connect to the serial management port using a VT100 terminal, a TIP connection, or a terminal server.

System I/O Ports

In addition to the ALOM ports, the system includes additional I/O ports. These are described in the following sections.

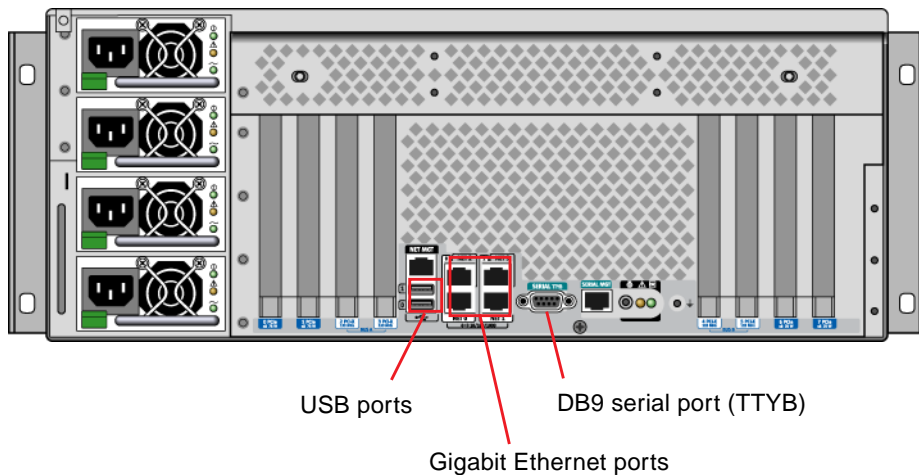


FIGURE 1-10 System I/O Port Locations

USB Ports

There are two USB ports on the back panel. These comply with the USB 2.0 specification.

For more information about the USB ports, see the *Sun Fire V445 Server Administration Guide*.

Gigabit Ethernet Ports

The Sun Fire V445 server has four Gigabit Ethernet ports.

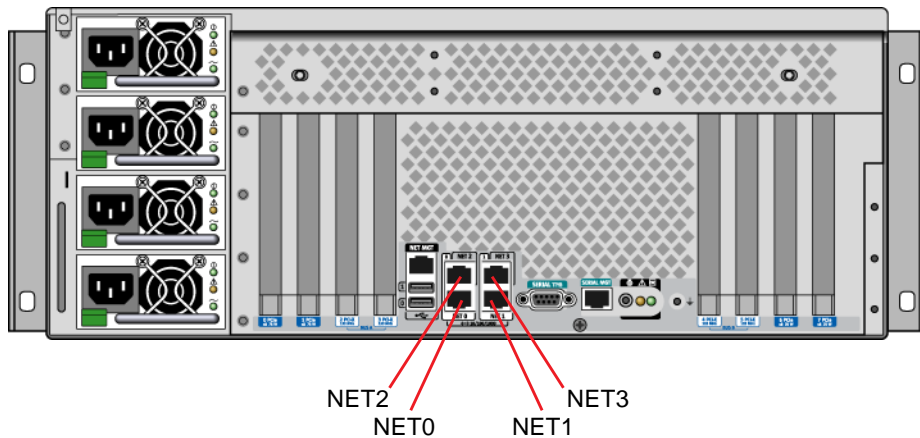


FIGURE 1-11 Gigabit Ethernet Port Locations

Each gigabit Ethernet port has a corresponding status indicator, described in [TABLE 1-4](#).

TABLE 1-4 Ethernet indicators

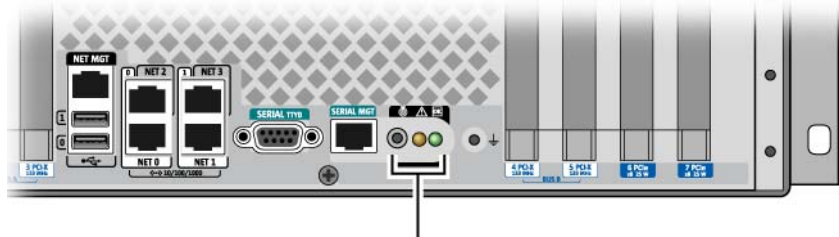
Color	Description
(None)	No connection present.
Green	This indicates a 10/100 Megabit Ethernet connection. The indicator blinks to indicate network activity.
Amber	This indicates a Gigabit Ethernet connection. The indicator blinks to indicate network activity.

DB-9 Serial Port

There is a DB-9 serial port, labeled TTYB. For more information about using these serial ports, see the *Sun Fire V445 Server Administration Guide*.

System Status Indicators

The back panel system status indicators consist of the System Activity indicator, the system Service Required indicator, and the Locator indicator. These indicators are located in the bottom center of the back panel, and operate as described in [TABLE 1-1](#).



System status indicators

FIGURE 1-12 Back Panel System Status Indicators

Preparing to Service the System

This chapter contains the following sections:

- “Service Guidelines” on page 16
- “Tools Required for Installation and Service” on page 16
- “Powering On the System” on page 17
- “Powering Off the System” on page 18
- “Initiating a Reconfiguration Boot” on page 19
- “Sliding the Server Out of the Cabinet” on page 22
- “Sliding the Server Into the Cabinet” on page 26
- “Removing the Top Cover” on page 28
- “Installing the Top Cover” on page 29
- “Removing the Server From the Cabinet” on page 30
- “Installing the System Into the Cabinet” on page 36
- “Avoiding Electrostatic Discharge” on page 41

Service Guidelines

Keep the following guidelines in mind when servicing the system:

- Except for the procedures described in [Chapter 3](#), the system must be serviced only by qualified service providers.
- Only power supplies, fan trays, and hard drives can be serviced while the system is running. You must power off the system to service any other component.

Note – You must issue software commands to prepare the hard drives for removal and installation. For more information, see [Chapter 3](#).

- You must disconnect the AC power cords when servicing the following components:
 - Motherboard
 - Power distribution board (PDB)
 - Advanced Lights Out Manager (ALOM) system controller card

Tools Required for Installation and Service

The following tools are required to install and service the system:

- Screwdriver, Phillips No. 2
- Adjustable wrench
- Electrostatic discharge (ESD) mat, Sun part number 250-1088, or equivalent
- Grounding strap, wrist or foot

The last two items help protect the system against damage due to electrostatic discharge. For more information, see:

- [“Avoiding Electrostatic Discharge” on page 41](#)

Powering On the System

Before You Begin

Do not use this power-on procedure if you have just added any new internal option or external storage device, or if you have removed a storage device without replacing it. To power on the system under those circumstances, you must initiate a reconfiguration boot. For those instructions, see:

- [“Initiating a Reconfiguration Boot” on page 19](#)



Caution – Never move the system when the system power is on. Movement can cause catastrophic hard drive failure. Always power off the system before moving it.



Caution – Before you power on the system, make sure that all access panels are properly installed.

What to Do

1. Turn on power to any external peripherals and storage devices.

Read the documentation supplied with the device for specific instructions.

2. Establish a connection to the system console.

If you are powering on the system for the first time, connect a device to the serial management port using one of the methods described in the *Sun Fire V445 Server Administration Guide*. Otherwise, use one of the methods for connecting to the system console, also described in the *Sun Fire V445 Server Administration Guide*.

3. Connect the AC power cords.

As soon as the AC power cords are connected to the system, the ALOM boots and displays its power-on self-test (POST) messages. Though the system power is still off, the ALOM is up and running, and monitoring the system. Regardless of system power state, as long as the power cords are connected and providing standby power, the ALOM is on and monitoring the system.

4. Press the Power button.

Output is immediately displayed to the system console if diagnostics are enabled at power-on, and the system console is directed to the serial and network management ports.

The system can take anywhere from 30 seconds to 20 minutes before video is displayed on the system monitor or the `ok` prompt appears on an attached terminal. This time depends on the system configuration (number of CPUs, memory modules, PCI cards) and the level of power-on self-test (POST) and OpenBoot™ Diagnostics tests being performed.

What Next

To power off the system, complete this task:

- [“Powering Off the System” on page 18](#)

Powering Off the System

Before You Begin



Caution – Applications running on the Solaris Operating System (Solaris OS) can be adversely affected by a poorly executed system shutdown. Ensure that you have gracefully shut down any applications before powering off the system.

What to Do

1. **Notify users that you are powering down the system.**
2. **Back up the system files and data, if necessary.**
3. **Press and release the Power button on the system front panel.**

The system begins a graceful software system shutdown.

Note – Pressing and releasing the Power button initiates a graceful software system shutdown. Pressing and holding in the Power button for four seconds causes an immediate hardware shutdown.



Caution – Whenever possible, you should use the graceful software shutdown method. Forcing an immediate hardware shutdown can cause hard drive corruption and loss of data. Use that method only as a last resort.

What Next

Continue with your parts removal and installation, as needed.

Initiating a Reconfiguration Boot

After installing any new internal option or external storage device, you must perform a reconfiguration boot so that the operating system is able to recognize the newly installed devices. In addition, if you remove any device and do not install a replacement device prior to rebooting the system, you must perform a reconfiguration boot in order for the operating system to recognize the configuration change. This requirement also applies to any component that is connected to the system I²C bus including memory modules, CPU/Memory modules, and power supplies.

This requirement *does not* apply to any component that is:

- Installed or removed as part of a hot-plug operation
- Installed or removed before the operating system is installed
- Installed as an identical replacement for a component that is already recognized by the operating system

Before You Begin



Caution – Before you power on the system, ensure that all access panels are properly installed.

To issue software commands, you need to set up the system console. This procedure assumes you are accessing the system console using the serial or network management port. For more information, see:

- *Sun Fire V445 Server Administration Guide*

What to Do

1. Turn on power to any peripherals and external storage devices.

Read the documentation supplied with the device for specific instructions.

2. Turn on power to the alphanumeric terminal or local graphics monitor, or log into the ALOM system controller.

3. Do one of the following to obtain the `ok` prompt:

- If you are logged into the `sc>` prompt, type the following commands:

```
sc> poweron
sc> console
```

- If you are not logged into the `sc>` prompt, press the Power button, then do an abort.

When the initializing memory messages appear on the system console, immediately abort the boot process to access the system `ok` prompt.

The initializing memory messages appear after the system banner is displayed. The system banner contains the Ethernet address and the host ID.

```
Sun Fire V445, No Keyboard
Copyright 1998-2006 Sun Microsystems, Inc. All rights reserved.
OpenBoot 4.10.0.build_03, 8192 MB memory installed, Serial
#02914931.
Ethernet address 0:5:ba:27:f0:4b, Host ID: 8127e54b.

Initializing      1MB of memory at addr      323feca000 -
```

To abort the boot process, use one of the following methods:

- Press the L1-A (Stop-A) keys on your keyboard.
- Press the Break key on the terminal keyboard.

4. At the `ok` prompt, type the following commands:

```
ok setenv autoboot? false
ok reset-all
```

You must set the `autoboot?` variable to `false` and issue the `reset-all` command to ensure that the system correctly initializes upon reboot. If you do not issue these commands, the system might fail to initialize because the boot process was aborted in Step 3..

5. At the `ok` prompt, type:

```
ok setenv autoboot? true
```

You must set the `autoboot?` variable back to `true` so that the system boots automatically after a system reset.

6. At the `ok` prompt, type:

```
ok boot -r
```

The `boot -r` command rebuilds the device tree for the system, incorporating any newly installed options so that the operating system recognizes them.

Note – The system can take anywhere from 30 seconds to 20 minutes before the system banner appears. This time depends on the system configuration (number of CPUs, memory modules, PCI cards) and the level of POST and OpenBoot Diagnostics tests being performed.

What Next

The system status indicators provide power-on status information. For information about the system indicators, see:

- [“Front Panel Indicators” on page 3](#)

Sliding the Server Out of the Cabinet

This procedure describes placing the server in position for service by sliding it out of the cabinet without removing it from the rack. All service procedures can be performed while the server is still attached to the rack.

Note – Sliding the system out of the cabinet is not required for servicing hard drives, power supplies, or the removable media drive.

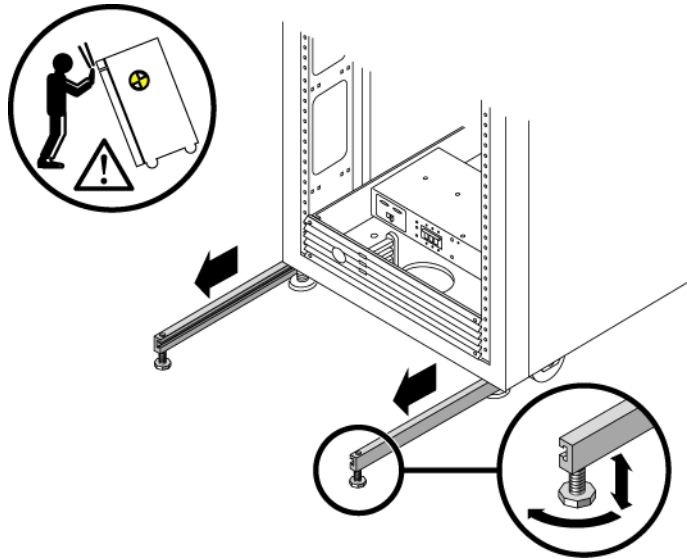
Before You Begin



Caution – Unless the cabinet is bolted to the floor, you must extend the cabinet's antitip legs and adjust their stabilizing feet to the floor. You must level and secure the cabinet to provide a safe working environment. See [“Tools Required for Installation and Service” on page 16](#) for tools required for this procedure.

What to Do

1. Extend and adjust the cabinet's antitip legs.

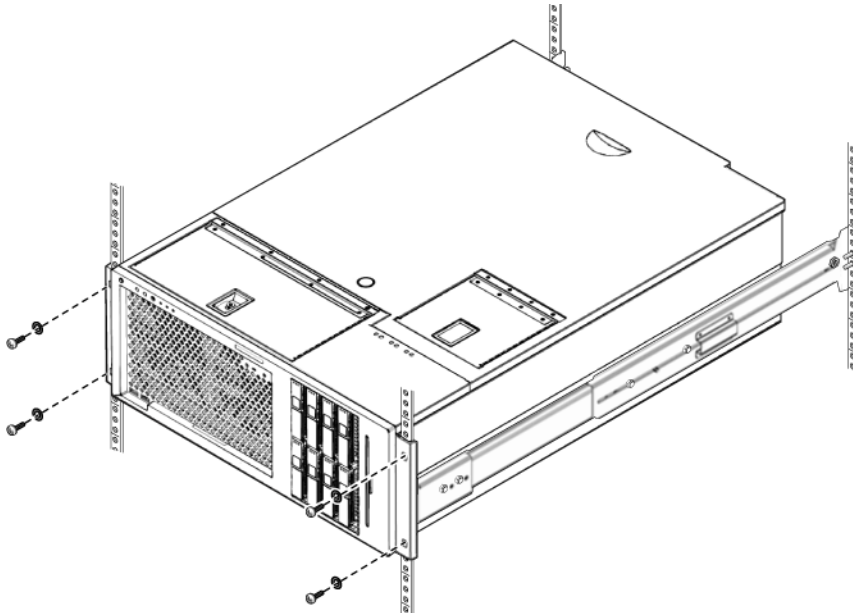


2. Open or remove the front and back cabinet doors.
3. Note each cable's origin and its terminating connection.
4. If you have not installed a cable management arm, disconnect all external cables from the back panel of the server.



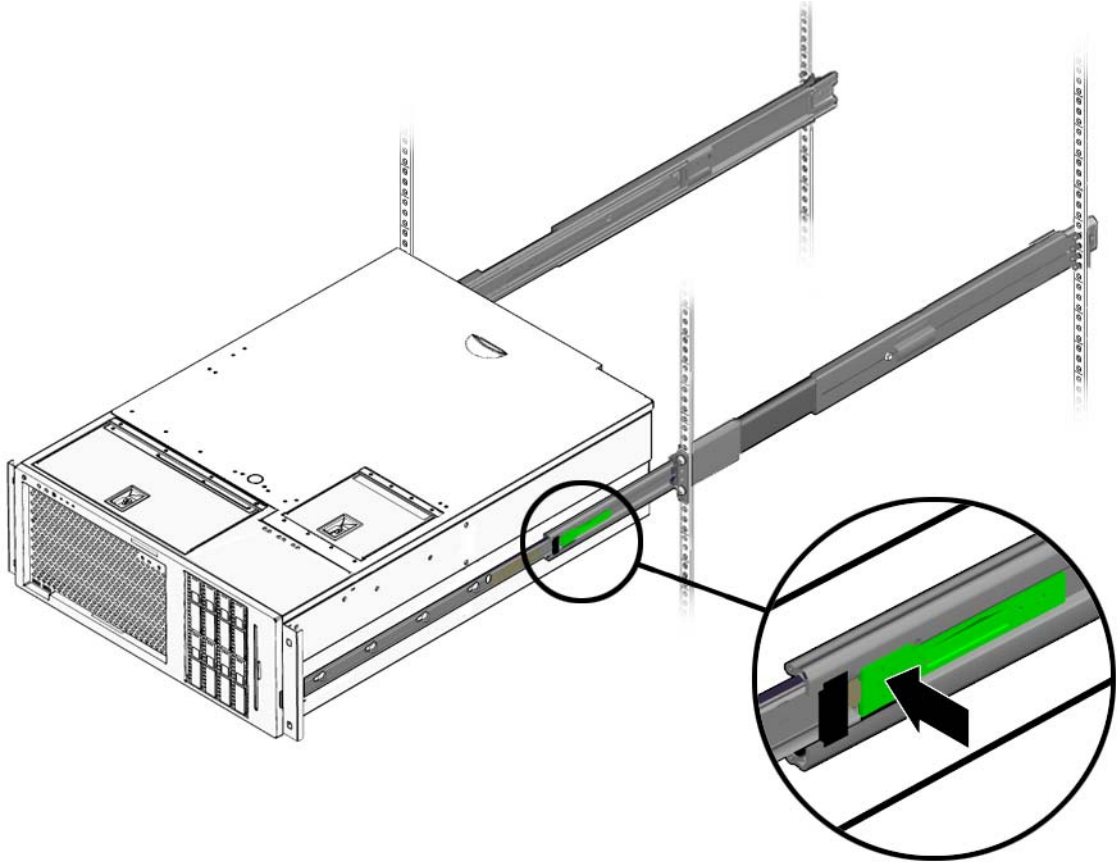
Caution – Do not disconnect the power cords from the system power inlets unless you are installing or replacing the motherboard, the power distribution board (PDB), the Advanced Lights Out Manager (ALOM) system controller card, the front input/output (I/O) board, the front indicator board, or the hard drive backplane. The power cords ground the system.

5. Remove the four screws securing the server to the left and right vertical rails at the front of the cabinet.



6. Slide the server evenly out of the cabinet until the inner glides stop in the slide.

Grasp the server's front bezel and pull the server smoothly out of the cabinet. Continue pulling the server until the back of the chassis clears the cabinet and you hear the flat spring catches in the glides engage with an audible clicking sound. The server is then fully extended and secure.



What Next

To slide the server into the cabinet, see:

- [“Sliding the Server Into the Cabinet” on page 26](#)

Sliding the Server Into the Cabinet

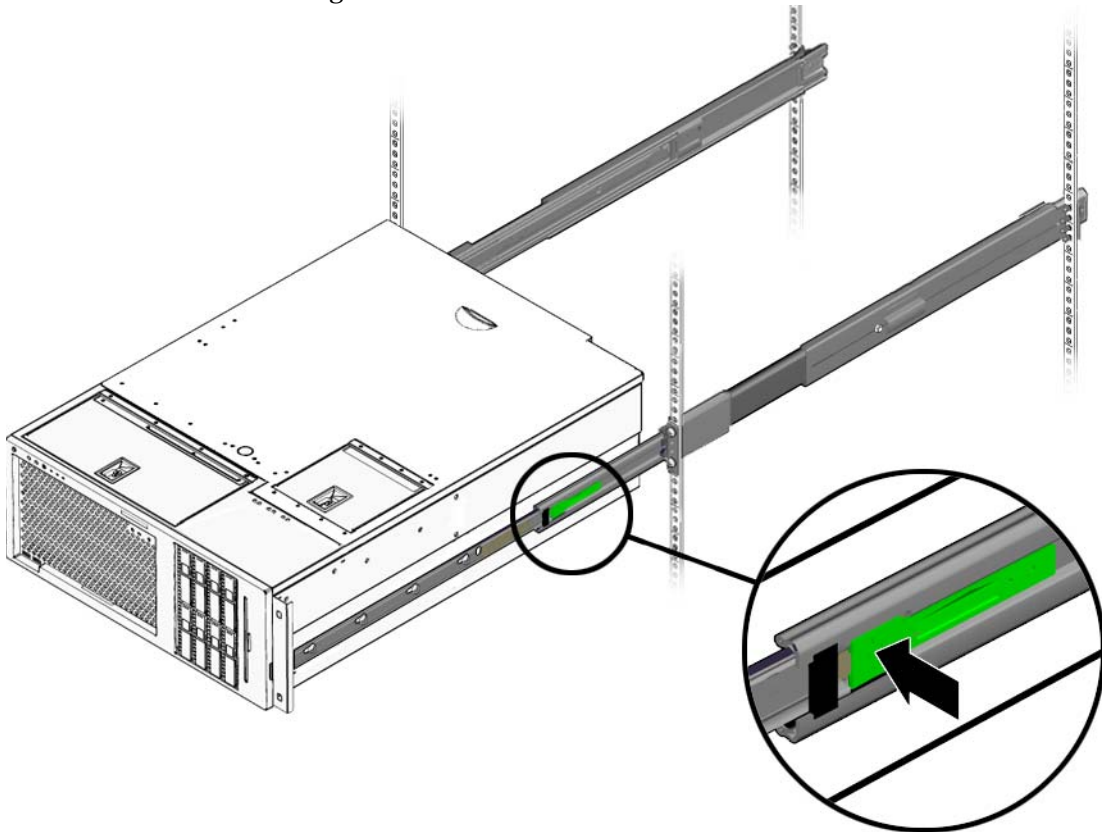
Before You Begin

If you have been working inside the server, see:

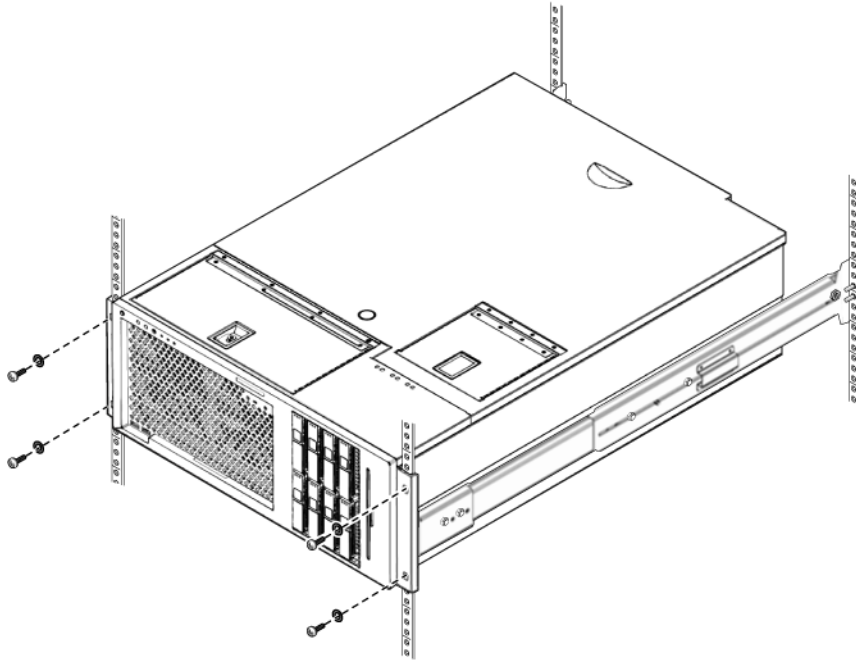
- [“Installing the Top Cover” on page 29](#)

What to Do

- 1. Press the two green spring catches that lock the server into its current position.**
Press both spring catches to free the server glides. One flat spring catch is attached to each inner glide on the server.



2. Slide the server evenly into the cabinet until the server stops moving.
3. Replace the four screws that secure the server to the left and right vertical rails at the front of the cabinet.



4. Connect all external cables that were attached to the back panel of the server.
Examine each cable for information indicating the cable's origin and its terminating connection.
5. Replace, close, and lock the cabinet doors, as appropriate.

What Next

To power on the server, see:

- [“Powering On the System” on page 17](#)

Removing the Top Cover

Caution – The system powers off immediately if the top cover is removed. To avoid possible component damage or loss of data, power off the system before removing the top cover.

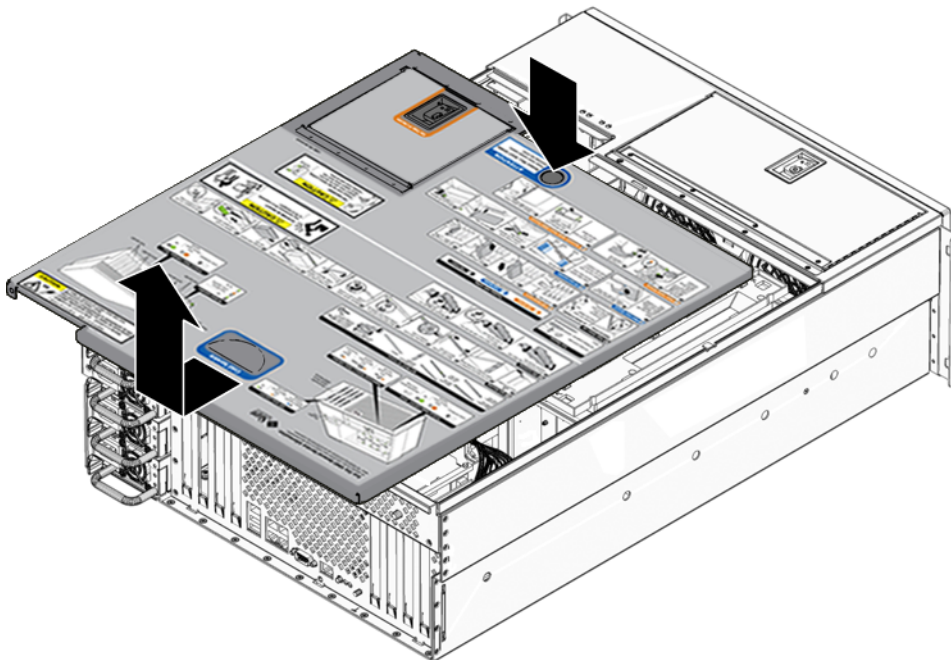
Before You Begin

Complete these tasks:

- “Powering Off the System” on page 18
- “Sliding the Server Out of the Cabinet” on page 22

What to Do

1. Press the release button on the top cover, and slide the top cover back toward the back of the server.



2. **Lift the cover up and off the chassis.**

What Next

To replace the top cover, see:

- [“Installing the Top Cover” on page 29](#)

Installing the Top Cover

Note – The system cannot be powered on with the top cover removed. Install the top cover before attempting to power on the system.

Before You Begin

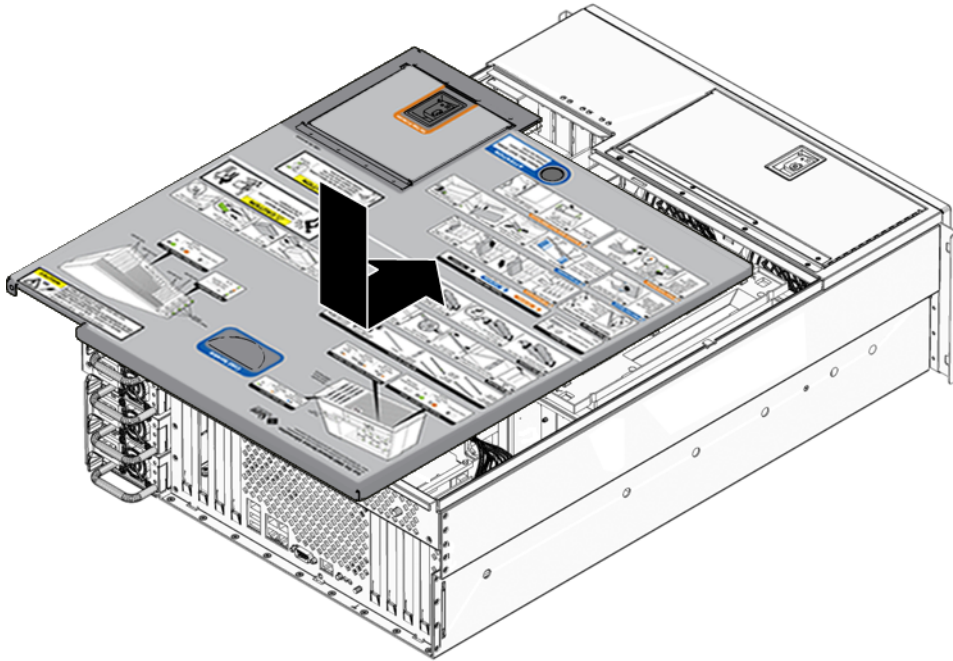
Complete this task:

- [“Removing the Top Cover” on page 28](#)

What to Do

1. **Insert the front edge of the top cover under the lip on the front panel.**
2. **Lower the top cover onto the chassis.**

3. Slide the top cover forward until it snaps into place.



What Next

To power on the server, see:

- [“Sliding the Server Into the Cabinet” on page 26](#)
- [“Powering On the System” on page 17](#)

Removing the Server From the Cabinet

You can perform all service procedures while the server is still attached to the rails extended from the cabinet. If you want to remove the server from the cabinet for any other reason, follow the instructions in this section.



Caution – The server is heavy. Two people are required to remove the server from the cabinet in the following procedure.

Before You Begin

Complete these tasks:

- Identify a helper to assist you in removing the server.
- Verify that your helper can safely lift and carry 40 lb (18 kg), which is approximately half the weight of a fully equipped server.
- Review the steps in the next section with your helper and discuss how to coordinate your efforts to ensure your mutual safety.
- Assemble the correct tools for the procedure. See [“Tools Required for Installation and Service” on page 16](#).
- Turn off system power. See [“Powering Off the System” on page 18](#).
- Open and remove the cabinet front door and back door.



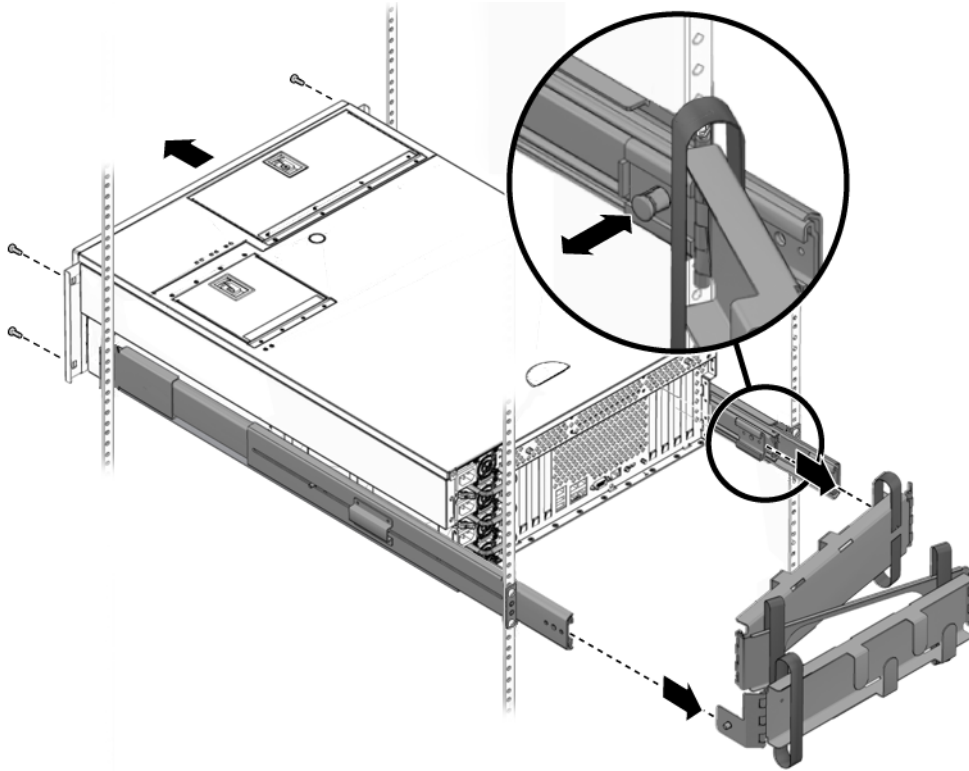
Caution – When completing a two-person procedure, always communicate your intentions clearly before, during, and after each step to minimize confusion.

What to Do

1. **Disconnect all external cables from the back panel of the server.**

Note each cable's origin and its terminating connection.

2. Disconnect the cable management arm from the server.

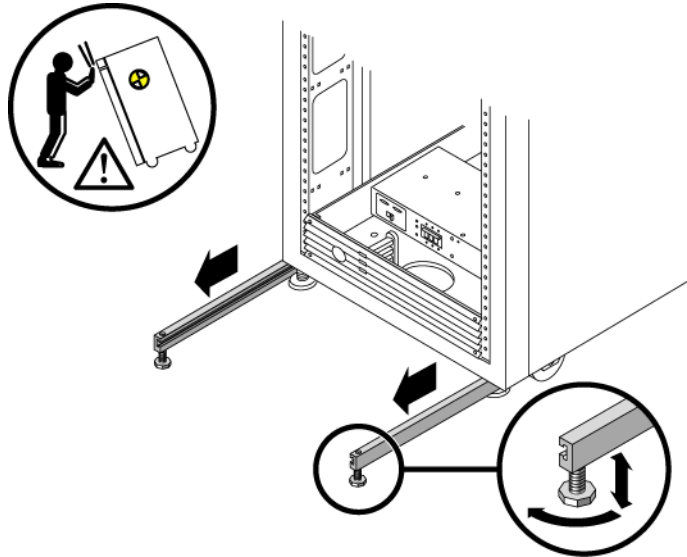


Note – To secure the cable management arm at the back of the cabinet (when the server is removed from the cabinet) connect its end to the outer slide.

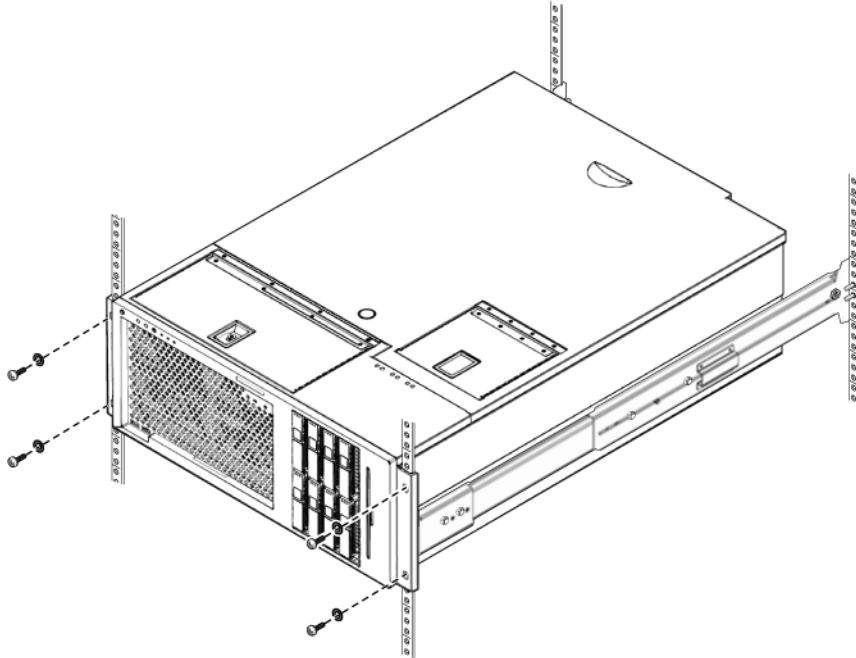
3. Extend the cabinet's antitip legs.



Caution – Unless the cabinet is bolted to the floor, you must extend the cabinet's antitip legs and adjust their stabilizing feet to the floor. Level and secure the cabinet to provide a safe working environment. See [“Tools Required for Installation and Service” on page 16](#) for tools required for this procedure.



4. Remove the four M4, M6, or 10-32 screws securing the server to the front mounting rails.



5. Extend the server from the cabinet, until the server locks into the extended position.

6. Position one person on each side of the server, facing the server glides.

When you are both in position, verify that your helper understands what to do with the server after you release the server and remove it. Also agree on a route to follow, and visually inspect the route for potential safety hazards (for example, cables on the floor, other people working in the vicinity, and so on).

7. Locate the flat spring catches.

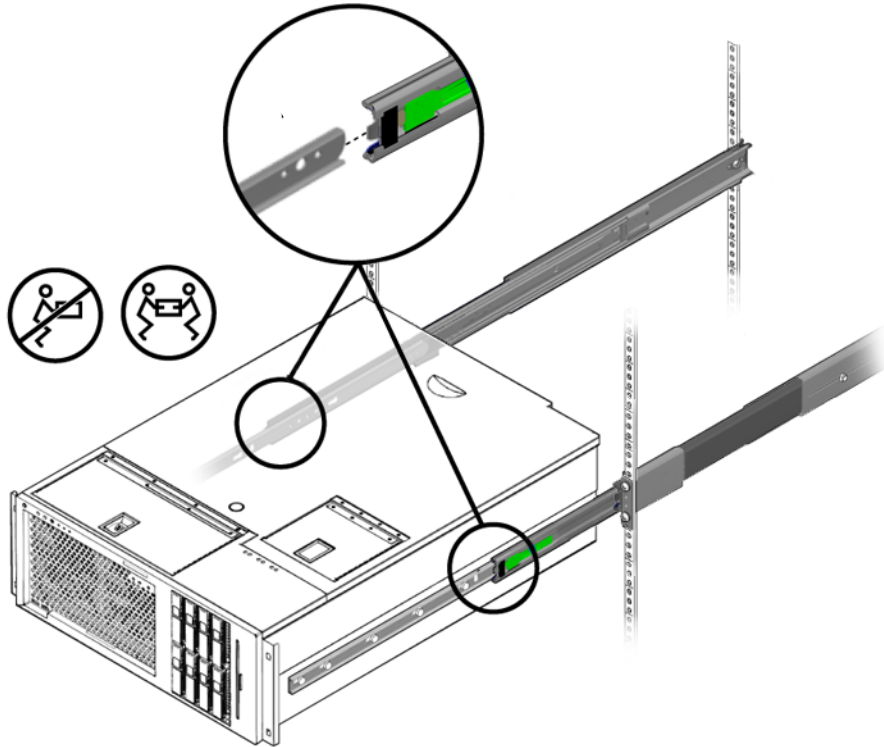
Each person should visually locate one of the two flat spring catches that release the server from the slide assemblies. One catch is attached to each inner glide.

8. Prepare to remove the server.

Each person should place one hand on the flat spring catch and the other hand beneath the server, palm up, ready to support the weight of the server.

9. Simultaneously press in on both flat spring catches to release them, and then slide the system out of the slide assemblies.

Each person presses one flat spring catch and helps slide the system free of the slide assemblies, supporting the weight of the system with both hands as the system slides free of the cabinet.



Note – The inner slides lock into the extended position.

10. Set the system on a workbench or other stable surface.
11. If you are not immediately installing the server back into the cabinet, push the empty slides back into their protective slide assemblies.

Note – Release the spring catch to push the inner slides into the cabinet.

12. Replace, close, and lock the cabinet doors, as appropriate.

What Next

To install the system into the cabinet, see:

- [“Installing the System Into the Cabinet” on page 36](#)

Installing the System Into the Cabinet

This procedure assumes that the slide assemblies are already installed in the cabinet. For information about installing the slide assemblies, see:

- *Sun Fire V445 Server Installation Guide*



Caution – The system is heavy. Two people are required to install the system into the cabinet.

Before You Begin

Complete these tasks:

- Identify a helper to assist you in installing the server.
- Verify that your helper can safely lift and carry 40 lb (18 kg), which is approximately half the weight of a fully equipped server.
- Review the steps in the next section with your helper and discuss how to coordinate your efforts to ensure your mutual safety.
- Assemble the correct tools for the procedure. See [“Tools Required for Installation and Service” on page 16](#).
- Open and remove the cabinet front door and back door.

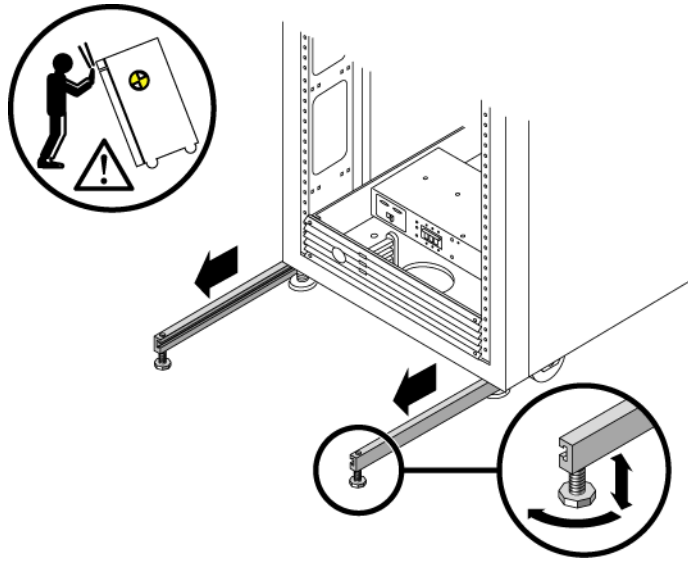


Caution – Before you install the system into the cabinet, make sure that the cabinet is stabilized so that it cannot move or tip forward. See the cabinet documentation for information about stabilizing the cabinet.

Note – Ensure that each slide assembly is fully retracted into the rack and check that the ball-bearing runner on each slide assembly is all the way forward.

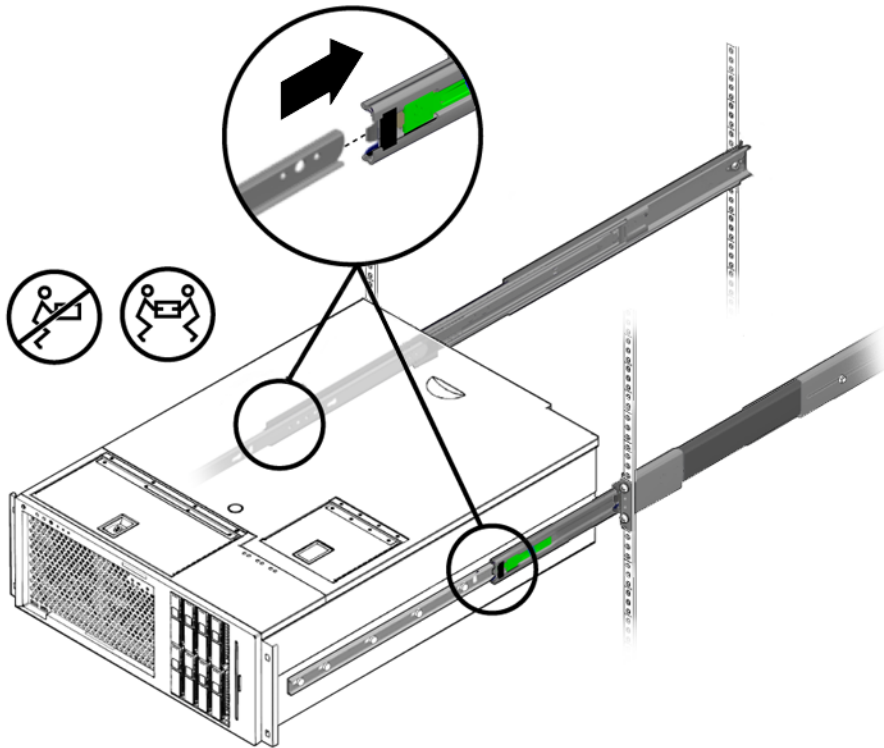
What to Do

1. **Extend the cabinet antitip legs.**



2. **With one person on each side of the server, lift the server and approach the cabinet with the back of the server facing the front of the cabinet.**

3. Align the rounded ends of the inner glides on the system with the slide assemblies in the cabinet.



Note – Ensure that the inner glides attached to the server are inserted within the ball-bearing runners.

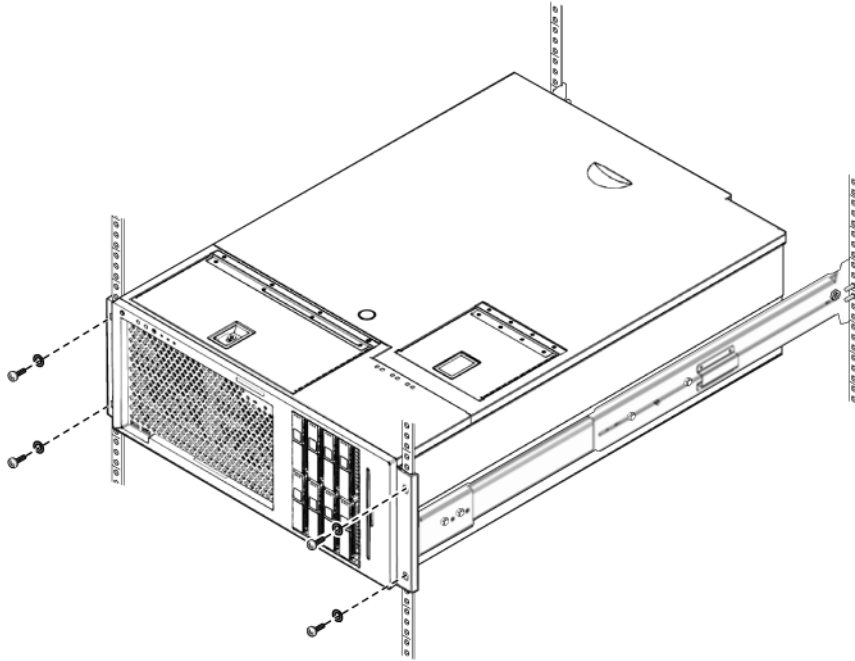
4. Holding the system level, slide it evenly all the way into the cabinet until the inner glides stop.

Note – The server locks into the extended position.

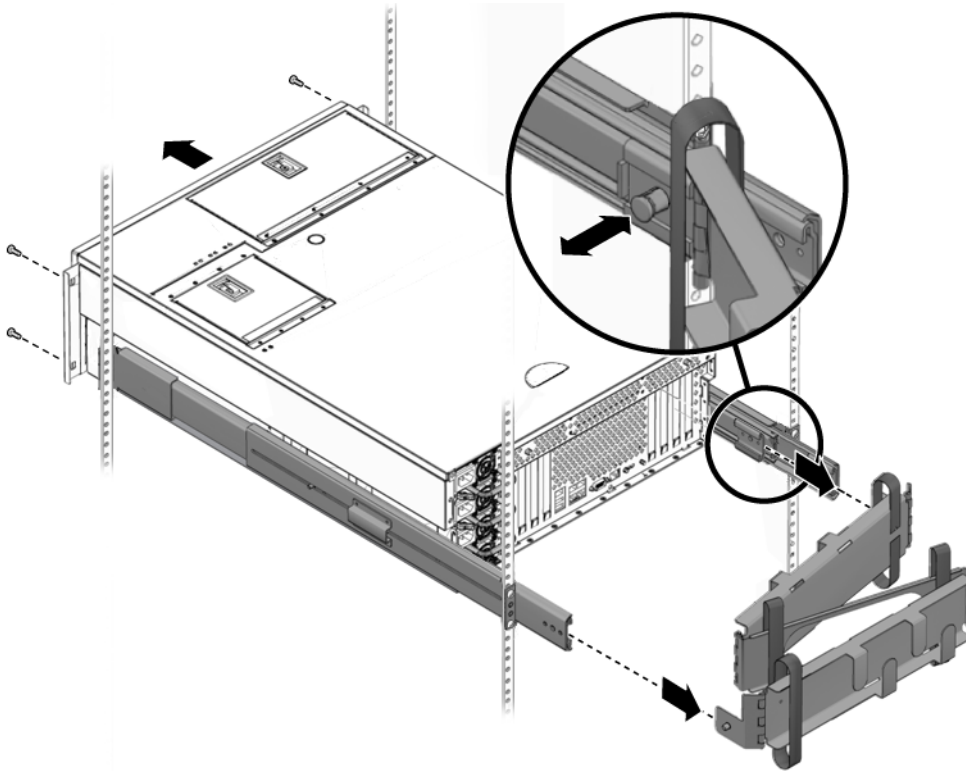
5. Press the catch on each inner glide in order to slide the server all the way back into the cabinet.

Tip – Slide the server in and out of the cabinet slowly and carefully to ensure that the slide assemblies are working correctly and are free from obstructions.

6. Slide the system evenly into the cabinet until the system stops moving.
7. Secure the system to the front rails using four M6, or 10-32 screws, depending on your cabinet, to attach the chassis brackets to the rack.



- 8. Attach the cable management arm to the system, if applicable.**
Route the cables through the cable management arm.



- 9. Connect all external cables that were attached to the back panel of the system.**
Examine each disconnected cable for information indicating the cable's origin and its terminating connection.
- 10. Replace, close, and lock the cabinet doors, as appropriate.**

What Next

To power on the system, see:

- [“Powering On the System” on page 17](#)

Avoiding Electrostatic Discharge

Use the following procedure to prevent static damage whenever you are accessing any of the internal components of the system.

Before You Begin

Complete these tasks:

- “Powering Off the System” on page 18
- “Sliding the Server Out of the Cabinet” on page 22

If you are servicing any internal components, complete this task:

- “Removing the Top Cover” on page 28

You must have the following items:

- Antistatic wrist or foot strap
- Antistatic mat (or the equivalent)

What to Do



Caution – Printed circuit boards and hard drives contain electronic components that are extremely sensitive to static electricity. Ordinary amounts of static from your clothes or the work environment can destroy components. Do not touch the components or any metal parts without taking proper antistatic precautions.

1. Disconnect the AC power cords only when performing the following procedures:

- Removing and installing the motherboard
- Removing and installing the power distribution board (PDB)
- Removing and installing the Advanced Lights Out Manager (ALOM) card
- Removing and installing the front input/output (I/O) card
- Removing and installing the front indicator board
- Removing and installing the hard drive backplane

The AC power cords provide a discharge path for static electricity, so they should remain connected except when you are servicing the parts noted above.

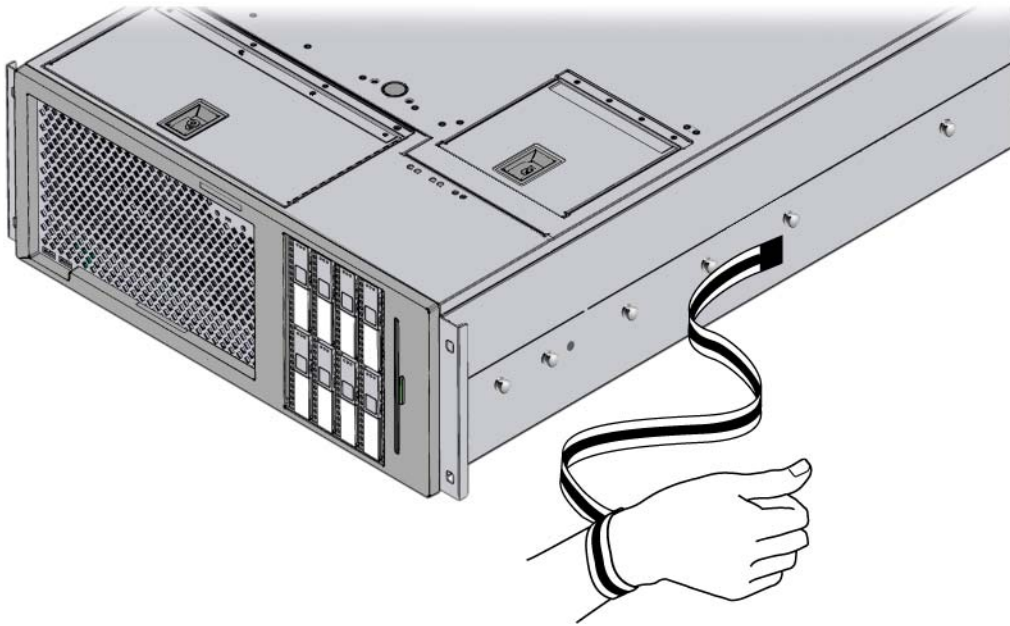
2. Use an antistatic mat or similar surface.

When performing any installation or service procedure, place static-sensitive parts, such as boards, cards, and hard drives, on an antistatic surface. The following items can be used as an antistatic surface:

- The bag used to wrap a Sun replacement part
- The shipping container used to package a Sun replacement part
- Sun electrostatic discharge (ESD) mat, Sun part number 250-1088 (available through your Sun sales representatives)
- Disposable ESD mat, shipped with replacement parts or options

3. Use an antistatic wrist strap.

Attach the appropriate end of the strap to the system chassis sheet metal and attach the other end of the strap to your wrist. Refer to the instructions that come with the strap.



Note – Ensure that the wrist strap is in direct contact with the metal on the chassis.

4. Detach both ends of the strap after you have completed the installation or service procedure.

What Next

To reassemble the system, see:

- [“Installing the Top Cover”](#) on page 29

Servicing Customer-Replacable Units

This chapter describes procedures for servicing customer-replacable units (CRUs). It contains the following sections:

- “About Hot-Pluggable and Hot-Swappable Components” on page 46
- “About the Fan Trays” on page 46
- “Removing a Fan Tray” on page 47
- “Installing a Fan Tray” on page 49
- “Removing a Hard Drive” on page 51
- “Installing a Hard Drive” on page 53
- “Removing a Hard Drive Using a Hot-Plug Operation” on page 55
- “Installing a Hard Drive Using the Hot-Plug Operation” on page 57
- “Removing a Power Supply” on page 58
- “Installing a Power Supply” on page 60
- “Removing a PCI Card” on page 62
- “Installing a PCI Card” on page 66
- “Removing the Front Bezel” on page 70
- “Installing the Front Bezel” on page 71
- “Removing the Removable Media Drive” on page 71
- “Installing the Removable Media Drive” on page 73
- “Reference for Fan Tray Status Indicators” on page 74
- “Reference for Hard Drive Status Indicators” on page 75
- “Reference for Power Supply Status Indicators” on page 76

About Hot-Pluggable and Hot-Swappable Components

Hot-pluggable components are those that you can install or remove while the system is running, without impacting system operation. Hot-pluggable components require issuing a software command as part of the remove or install procedure. In a Sun Fire V445 server, SAS hard drives are hot-pluggable components.

For information about performing a hot-plug operation on a mirrored hard disk, see:

- *Sun Fire V445 Server Administration Guide*

Hot-swappable components can be removed or installed while the system is running, without issuing a software command. In a Sun Fire V445 server, fan trays and power supplies are hot-swappable.

About the Fan Trays

The Sun Fire V445 server contains six fan trays (labeled FT0, FT1, FT2, FT3, FT4 and FT5), arranged in three pairs. Fans FT0 through FT3 provide cooling for the motherboard, CPU/Memory modules and related components. FT4 and FT5 provide cooling for the power supplies, SAS disk drives, and removable media drive.

Each pair of fan trays provides N+1 redundancy. For example, FT0 and FT1 are a redundant pair. If FT0 fails, FT1 provides enough cooling to maintain proper operating temperature in the system.



Caution – If both fan trays in a pair fail, the system might experience an overtemperature condition.

Each fan tray has a corresponding status indicator visible in the top panel. For more information about fan tray status indicators, see [“Reference for Fan Tray Status Indicators” on page 74](#).

Removing a Fan Tray

Before You Begin

Before removing a fan tray, read the following:

- [“About Hot-Pluggable and Hot-Swappable Components” on page 46](#)
- [“About the Fan Trays” on page 46](#)
- [“Reference for Fan Tray Status Indicators” on page 74](#)

Complete the following:

- [“Sliding the Server Out of the Cabinet” on page 22](#)

What to Do

- 1. Determine which fan tray needs to be removed.**

See [“Reference for Fan Tray Status Indicators” on page 74](#) for more information.

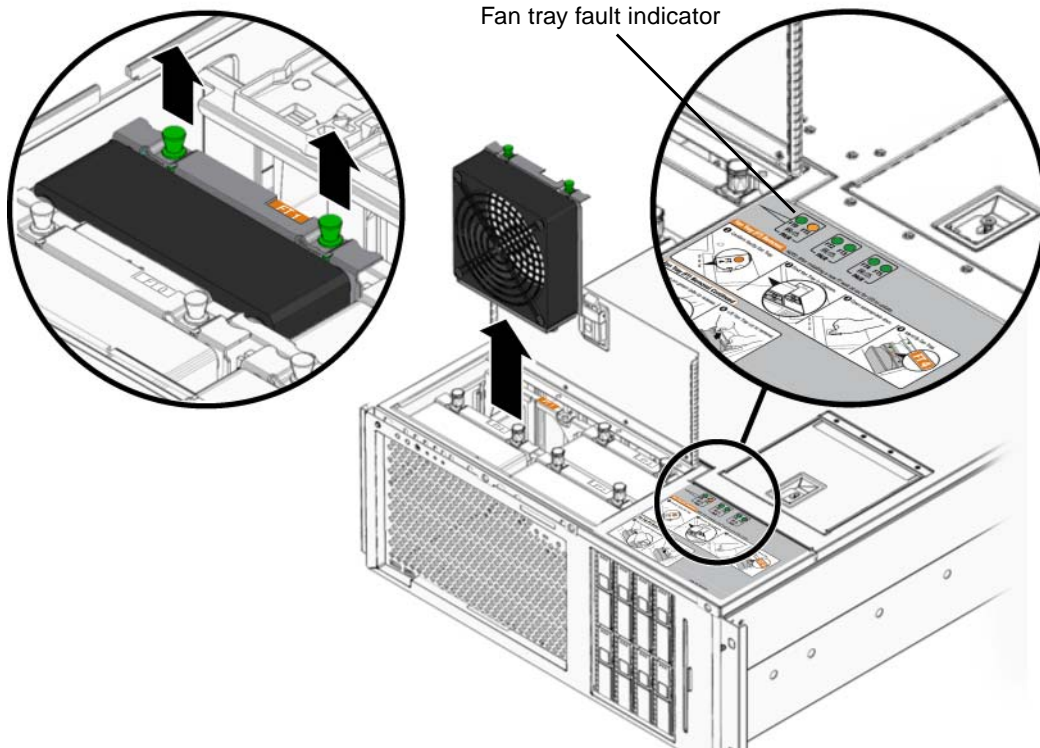
- 2. Open the appropriate fan tray door.**

A latch secures the fan tray door to the chassis top panel.

- 3. Release the fan tray from its bracket.**

Pull the two green release pins up.

4. Grasp the fan tray by its release pins and pull the fan tray up and out of the system.



What Next

Complete the following:

- [“Installing a Fan Tray” on page 49](#)

Installing a Fan Tray

Before You Begin

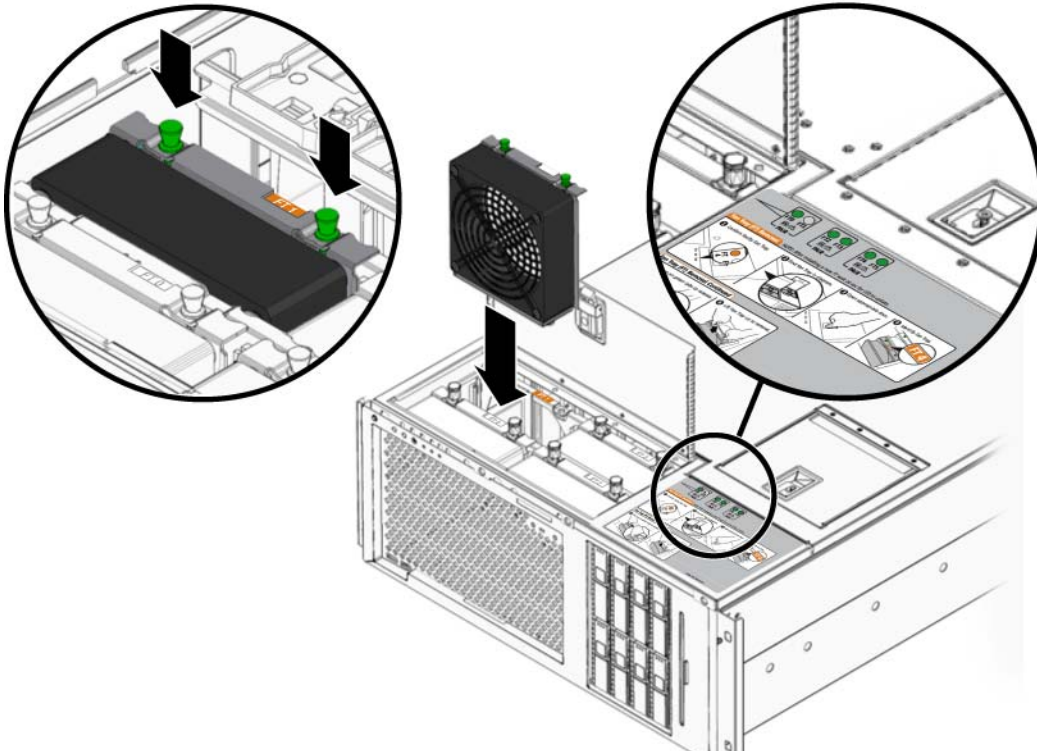
Complete the following:

- [“Removing a Fan Tray” on page 47](#)

What to Do

- 1. Slide the fan tray into its frame in the system chassis.**
The fan tray is keyed to prevent it from being installed incorrectly.
- 2. Press down firmly to seat the fan tray connector into its socket.**

3. Press the release pins down to secure the fan tray in its bay.



4. Confirm that the new fan tray is working.

The fan tray indicator should be green. See [“Reference for Fan Tray Status Indicators” on page 74](#) for more information.

5. Close the fan tray door.

A latch secures the door to the chassis top panel.

What Next

Complete the following:

- [“Sliding the Server Into the Cabinet” on page 26](#)

Removing a Hard Drive

This procedure describes the physical hard drive removal. The procedure is different if you are removing a hard drive using the hot-plug operation. If you want to perform a hard drive hot-plug removal, see:

- [“Removing a Hard Drive Using a Hot-Plug Operation” on page 55](#)

Before You Begin

Read the following:

- [“Reference for Hard Drive Status Indicators” on page 75](#)

For more information about the hard drives and managing hard drive arrays, see:

- *Sun Fire V445 Server Administration Guide*

You must follow antistatic precautions when handling a hard drive.

Complete these tasks:

- [“Powering Off the System” on page 18](#)
- [“Avoiding Electrostatic Discharge” on page 41](#)

What to Do

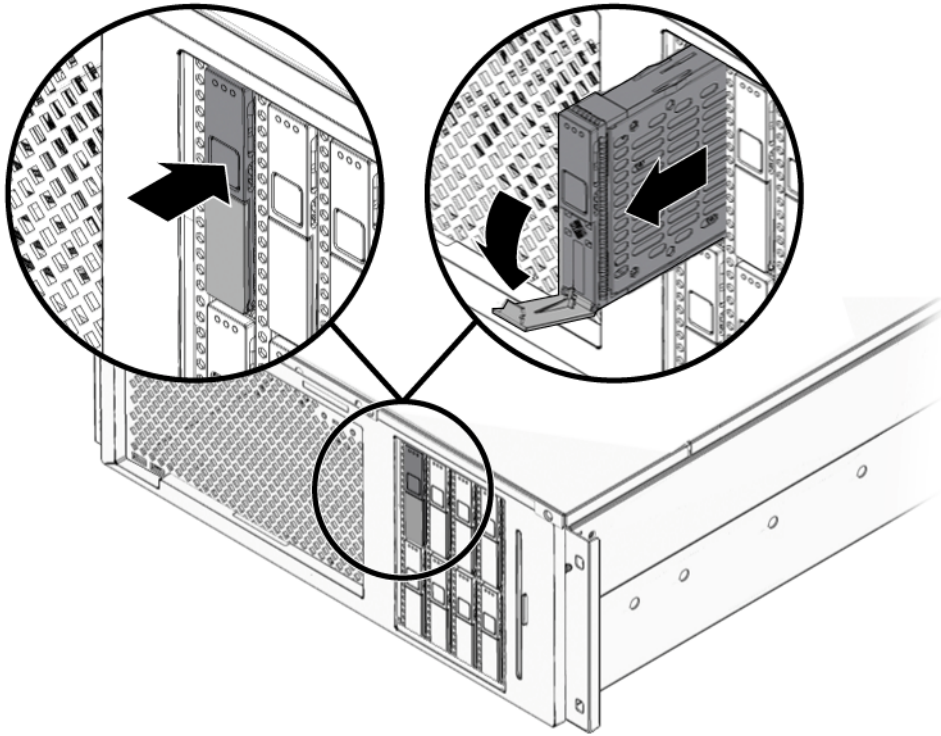
- 1. Identify the hard drive to be removed and note the bay in which it is installed.**

See the *Sun Fire V445 Server Administration Guide* for more information about isolating failed parts.

Note – The lower bay is the default system disk drive location.

- 2. Press the button to release the hard drive handle.**

3. Holding the hard drive by the handle, slide the hard drive out of the hard drive bay.



Note – When you reinstall the hard drive (or a replacement drive), be sure to install the hard drive into the same drive bay as the one from which it was just removed.

Note – If you intend to power up and operate the system without reinstalling the hard drive, you must install a hard drive blank to ensure proper system cooling.

What Next

To install a hard drive, complete this task:

- [“Installing a Hard Drive” on page 53](#)

Installing a Hard Drive

This procedure describes the physical installation of a hard drive. The procedure is different if you are installing a drive using the hot-plug operation. If you want to perform a hard drive hot-plug installation, see:

- [“Installing a Hard Drive Using the Hot-Plug Operation” on page 57](#)

Before You Begin

For additional information about internal hard drives and configuring hard drive arrays, see:

- *Sun Fire V445 Server Administration Guide*

Complete these tasks:

- [“Powering Off the System” on page 18](#)
- [“Avoiding Electrostatic Discharge” on page 41](#)

What to Do

- 1. Release the hard drive handle on the hard drive.**

Press the button to release the handle.

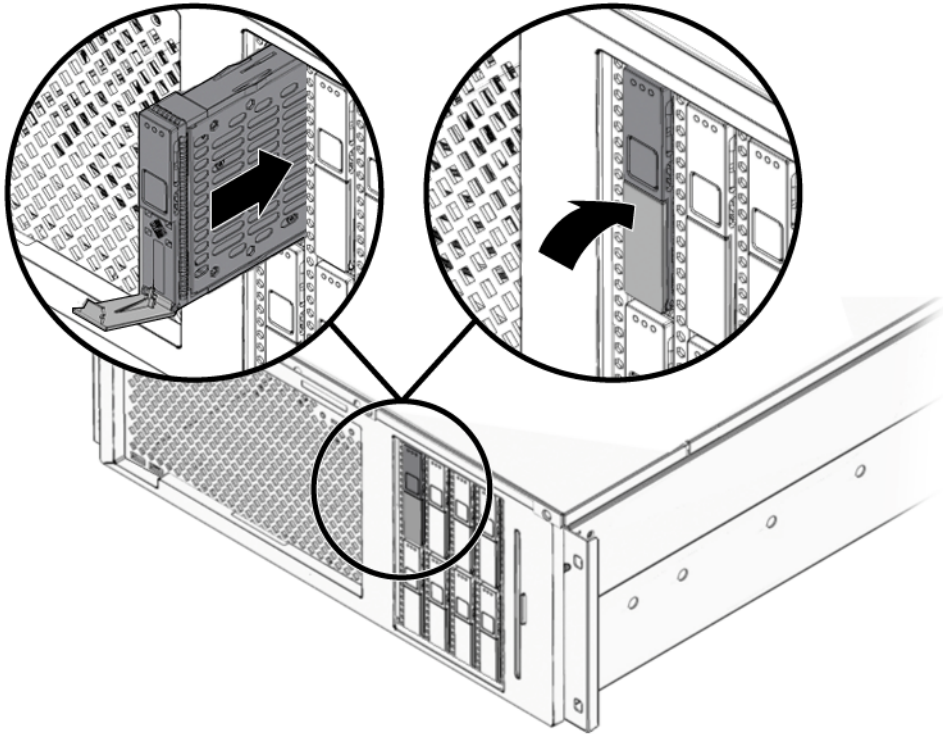
- 2. Align the hard drive to its drive bay.**

Orient the hard drive so that the hard drive latch is on the bottom.

Note – If you are replacing a drive that you removed previously, ensure that you install the hard drive into the same drive bay from which it was removed.

3. Insert the hard drive into the hard drive bay guide rails.

Slide the hard drive into the bay until it barely contacts the backplane.



4. Firmly press the center of the hard drive handle toward the hard drive until the latch closes, securing the hard drive in place.

What Next

Complete this task:

- [“Powering On the System” on page 17](#)

Removing a Hard Drive Using a Hot-Plug Operation

The system's disk hot-plug feature enables you to remove a hard drive without shutting down the operating system or turning off the system power. The way in which you remove a hard drive depends on the application you are using and whether you are replacing a drive, adding a new one, or removing a drive permanently.

When you remove a drive using the hot-plug operation, you need to stop the hard drive and take it offline to remove the logical software links to the hard drive, and to reconfigure the file systems so that they now ignore the removed drive. You might also have to reconfigure your application software to operate without the removed drive.

Use the `cfgadm` command to remove a Sun Fire V445 server's internal hard drive using the hot-plug operation. The following procedure describes the general steps involved, but your specific device names might be different.

The following procedure assumes that you are accessing the system console by the default method of connecting to the serial management port (SERIAL MGT) of the Sun Fire V445 server.



Caution – Do not hot-plug drives without the correct preparations. The system supports hot-plugging hard drives, but you must issue a software command before you remove or install a hard drive.

Before You Begin

If a hard drive fails, a console message indicates which hard drive failed.

If you have not configured the system with two boot disks, you cannot hot-plug a single boot disk. You can only hot-plug the boot disk when you have configured a two-disk mirror of the boot disk for hot-plugging. If the system is configured with a boot disk and data disks, you can hot-plug the data disks, but not the boot disk. For more information on disk mirroring, see:

- *Sun Fire V445 Server Administration Guide*

Complete these tasks:

- Obtain the logical device names for the devices you plan to remove. See the *Sun Fire V445 Server Administration Guide* for more information.
- Select the disk and stop any activity or applications accessing the hard drive.
- Unmount any file systems mounted on the hard drive.
- Perform [“Avoiding Electrostatic Discharge” on page 41](#).

What to Do

1. Log in as superuser:

```
% su
Password:
#
```

2. Remove the hard drive from the device tree using the following command:

```
# cfgadm -c unconfigure c1::dsk/c1t3d0
```

where *c1t3d0* is the name of the hard drive to be removed.

The blue OK to Remove hard drive indicator lights.

3. Allow the disk to spin down completely.

4. Physically remove the hard drive from the system.

Follow [Step 1](#) through [Step 3](#) of the procedure, [“Removing a Hard Drive” on page 51](#).

What Next

To install a hard drive using the hot-plug operation, complete this task:

- [“Installing a Hard Drive Using the Hot-Plug Operation” on page 57](#)

Installing a Hard Drive Using the Hot-Plug Operation

The system's disk hot-plug feature enables you to insert a hard drive without shutting down the operating system or turning off the system power. When installing a disk, you must insert the hard drive and wait for it to spin up to operating speed. Then you re-create or reconfigure the file systems so that the Solaris OS recognizes the hard drive. Finally, you configure your application (if necessary) to operate with this new drive.

Use the `cfgadm` command to install a Sun Fire V445 server's internal hard drive using the hot-plug operation. The following procedure describes the general steps involved, but your specific device names might be different.

The following procedure assumes that you are accessing the system console by the default method of connecting to the serial management port (SERIAL MGT) of the Sun Fire V445 server.



Caution – Do not hot-plug drives without the correct preparations. The system supports hot-plugging hard drives, but you must issue a software command before you remove or install a hard drive.

Before You Begin

If you have not configured the system with two boot disks, you cannot hot-plug a single boot disk. You can only hot-plug the boot disk when you have configured a two-disk mirror of the boot disk for hot-plugging. If the system is configured with a boot disk and data disks, you can hot-plug the data disks, but not the boot disk. For more information on disk mirroring, see:

- *Sun Fire V445 Server Administration Guide*

Complete this task:

- [“Avoiding Electrostatic Discharge” on page 41](#)

What to Do

Note – If you are installing a new hard drive, such as one shipped to you as an option, you must assign a label to it before you can add the drive to the device tree. See your Solaris documentation for more information.

1. Insert the hard drive into its bay.

Follow [Step 1](#) through [Step 4](#) of “[Installing a Hard Drive](#)” on page 53.

2. Log in as superuser:

```
% su
Password:
#
```

3. Configure the new hard drive using this command:

```
# cfgadm -c configure /dev/rdisk/c0t0d0
```

where *c0t0d0* is the name of the hard drive to be configured.

The blue OK to Remove indicator goes out, and the green Activity indicator flashes as the hard drive is added to the device tree.

What Next

Mount any file systems associated with the hard drive. Restart any applications accessing the hard drive.

Removing a Power Supply



Caution – If a power supply fails and you do not have a replacement available, leave the failed power supply installed to ensure proper system cooling.

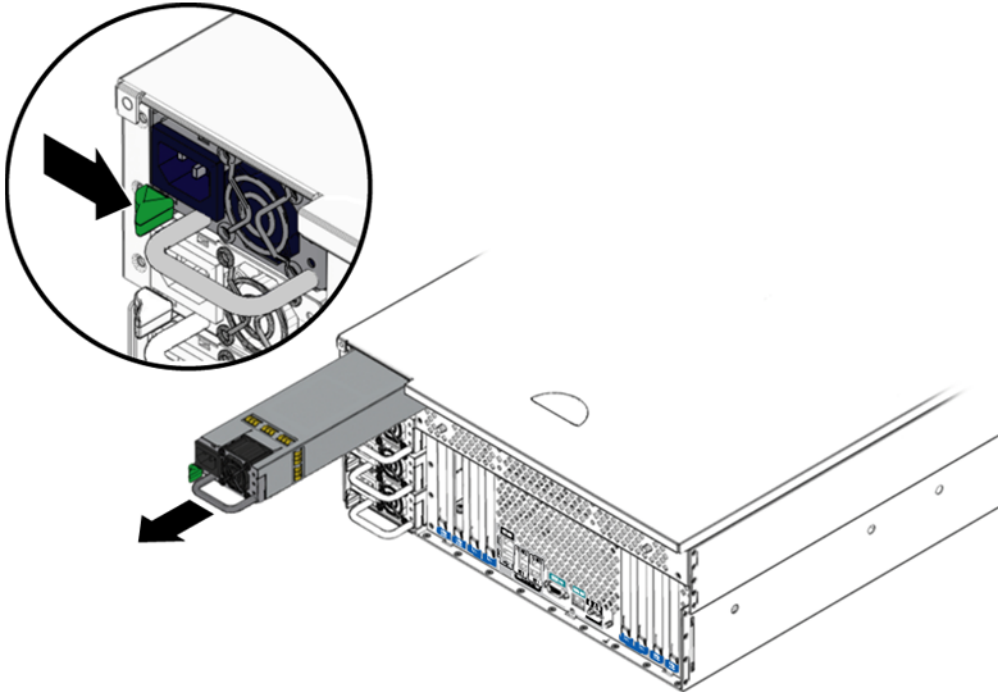
Before You Begin

If you are replacing a faulty power supply, review the following section:

- [“About Hot-Pluggable and Hot-Swappable Components”](#) on page 46
- [“Reference for Power Supply Status Indicators”](#) on page 76

What to Do

1. **Slide the system partially out of the cabinet or rack.**
2. **From the rear of the system, unlatch the cable management arm from the inner glide and move it out of the way.**
Pull the release pin out to disengage the cable management arm from the inner glide.
3. **Disconnect the AC power cord from the power supply you want to remove.**
4. **Grasp the power supply by its handle and press the release latch with your thumb.**



5. Slide the power supply out of the system.

Support the power supply with your other hand as you pull the power supply out of the system.

What Next

Complete the following:

- [“Installing a Power Supply” on page 60](#)

Installing a Power Supply

Before You Begin

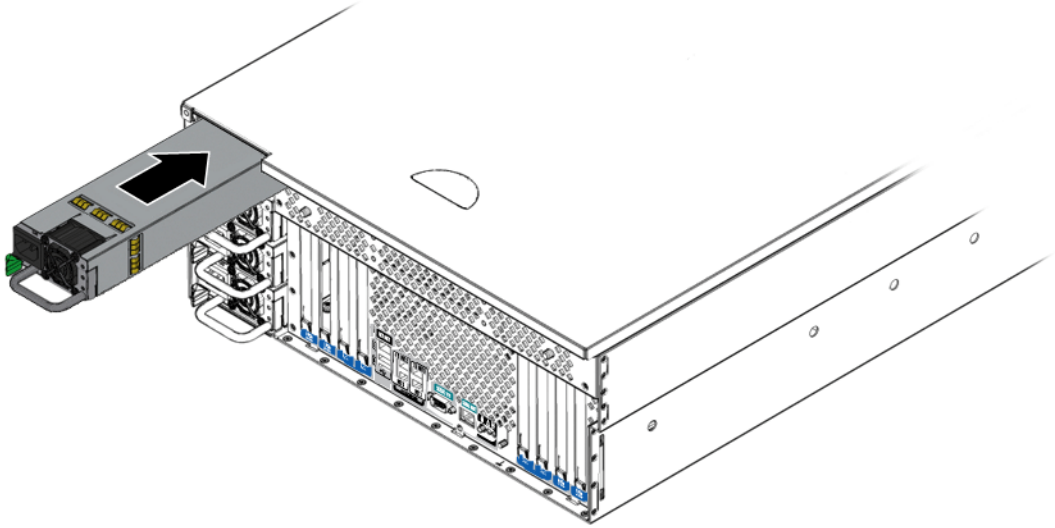
Complete the following:

- [“Removing a Power Supply” on page 58](#)

What to Do

1. Slide the power supply into its bay in the system.

Support the power supply with one hand as you slide it in with the other hand.



2. Press the power supply firmly until it latches into place.

You hear an audible click as the power supply latch engages with the chassis.

3. Connect the AC power cord to the power supply.

4. Reattach the cable management arm to the inner glide.

Pull the release pin out until it clears the mounting tab on the inner glide.

5. Slide the system back into its cabinet or rack.

Removing a PCI Card

Note – This procedure describes how to remove a PCI card, including the SAS controller included with your system.

Before You Begin

Complete these tasks:

- [“Powering Off the System” on page 18](#)
- [“Sliding the Server Out of the Cabinet” on page 22](#)
- [“Avoiding Electrostatic Discharge” on page 41](#)
- [“Removing the Top Cover” on page 28](#)

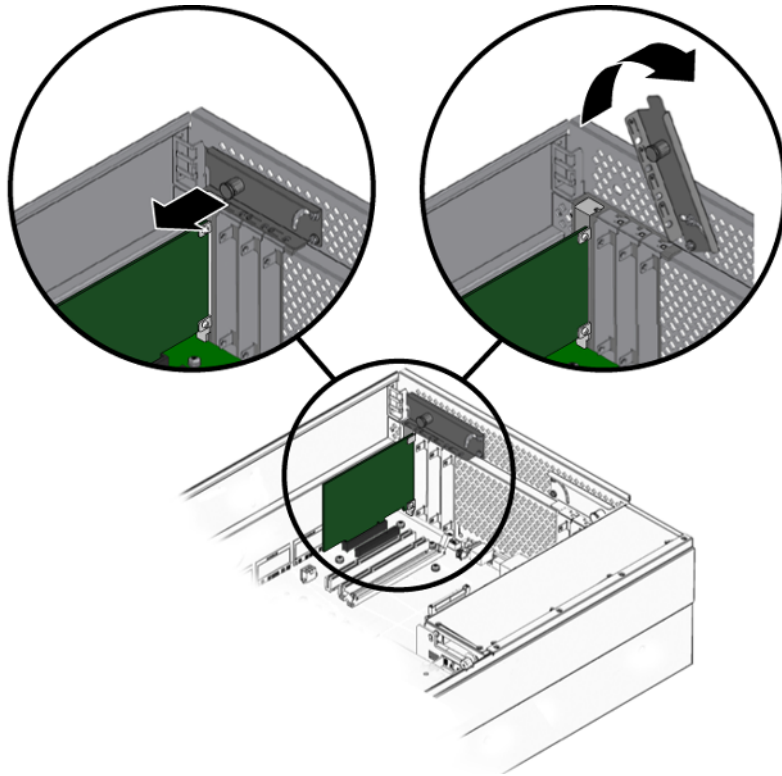
What to Do

1. **Disconnect any external cables attached to the faceplate of the PCI card.**
2. **Disconnect any internal cables connected to the PCI card internal connectors.**

Note – If you are removing the SAS controller card, press the release buttons on either side of the multilane data cable connectors to eject them from the controller card. Make note of how the cables were attached to the SAS controller so that you can connect them correctly when reinstalling the card.

3. Release the latch securing the PCI card to the chassis.

Pull the pin forward and rotate the latch up and out of the way.



4. Pull the PCI card from its slot.

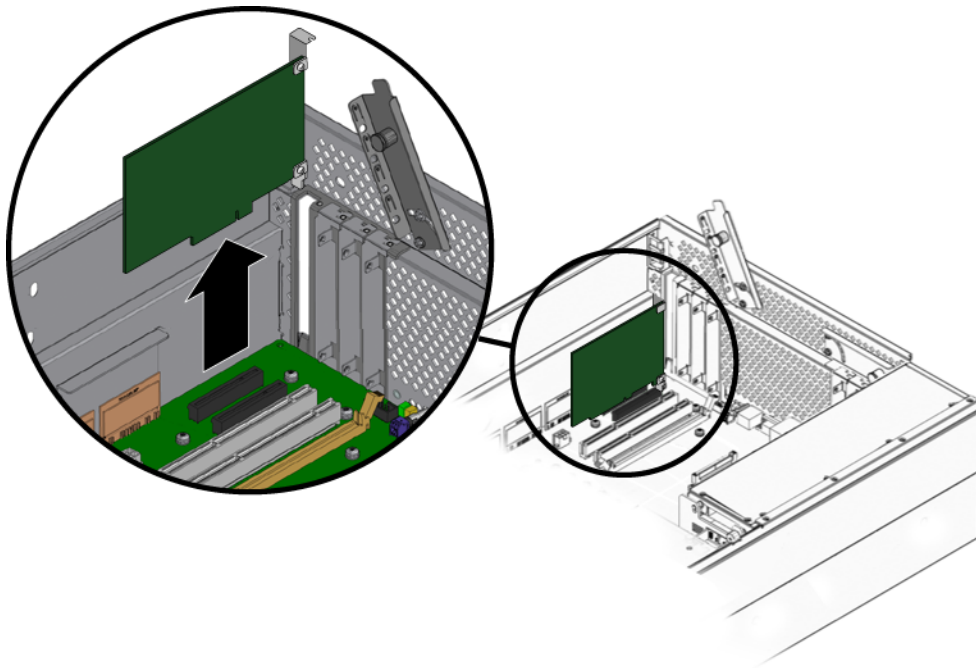
Hold the card by the faceplate and its opposite edge. Pull up while rocking the card from end to end until it is freed from its slot.



Caution – Do not apply excessive force to one end or one side of the card. Doing so could damage the card or the motherboard connector.



Caution – Do not touch any internal cable connectors while removing the card. Doing so could damage the card.



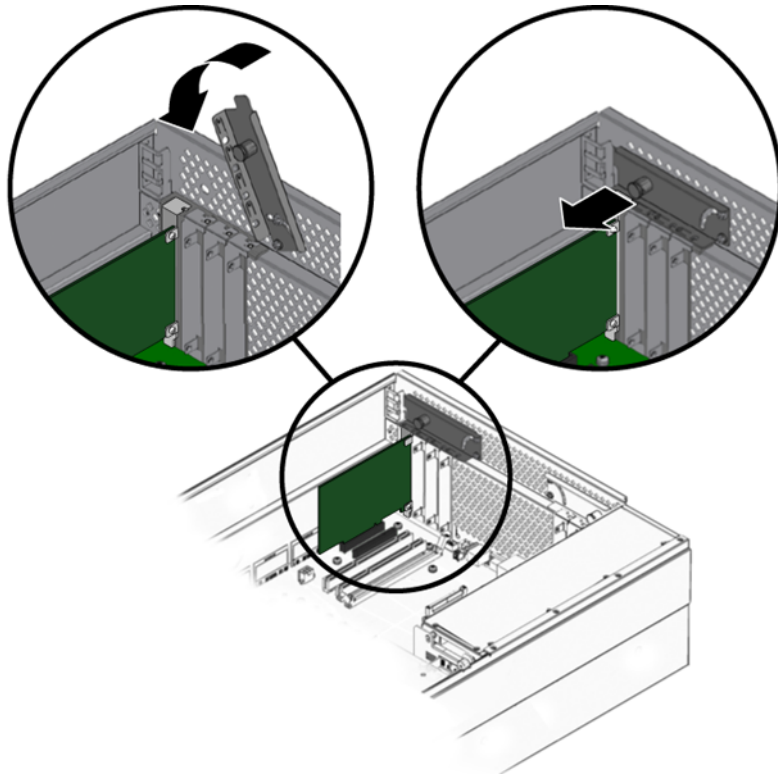
5. Place the PCI card on an antistatic mat.

6. If you are not replacing the PCI card, install a PCI filler panel.

The PCI filler panel prevents debris from entering the system and ensures proper cooling.

7. Replace the PCI card latch.

Rotate the latch down and secure it with the retaining pin.



What Next

To install a PCI card, complete this task:

- [“Installing a PCI Card” on page 66](#)

To reassemble the system, complete these tasks:

- [“Installing the Top Cover” on page 29](#)
- [“Sliding the Server Into the Cabinet” on page 26](#)
- [“Powering On the System” on page 17](#)

Installing a PCI Card

Note – This procedure describes how to install a PCI card, including the SAS controller included with your system.

Before You Begin

Complete these tasks:

- [“Powering Off the System” on page 18](#)
- [“Sliding the Server Out of the Cabinet” on page 22](#)
- [“Avoiding Electrostatic Discharge” on page 41](#)
- [“Removing the Top Cover” on page 28](#)

Read the documentation supplied with the PCI card for information about jumper settings, PCI slot requirements, and cable connections.

What to Do

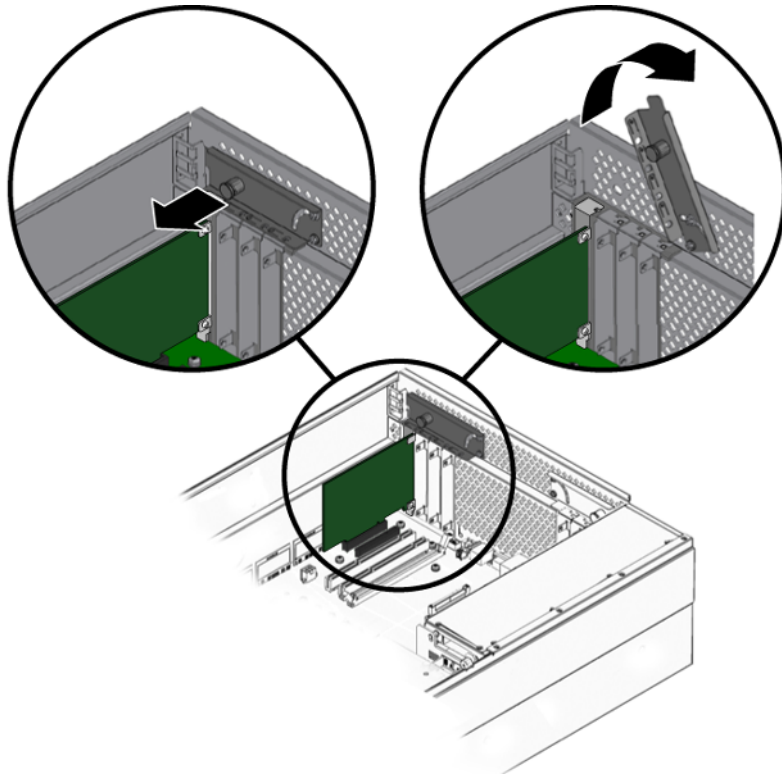
1. Locate an unused PCI slot.

Note – PCI slots 0, 1, 6, and 7 can handle PCIe cards. Slots 2, 3, 4, and 5 can handle PCI-X cards.

Note – Use PCI Slot 4 for the SAS controller card.

2. Release the latch securing the PCI cards to the system.

Pull the pin forward and rotate the latch up and out of the way.



3. If you are installing a PCI card into an unused slot, remove the corresponding filler panel from the system rear panel. Otherwise, go to Step 4.

Lift out the filler panel and save it for future use.

4. Insert the PCI card into the appropriate slot on the motherboard.

Make sure that the faceplate of the PCI card is not bent. A bent faceplate could affect the installation of the card.

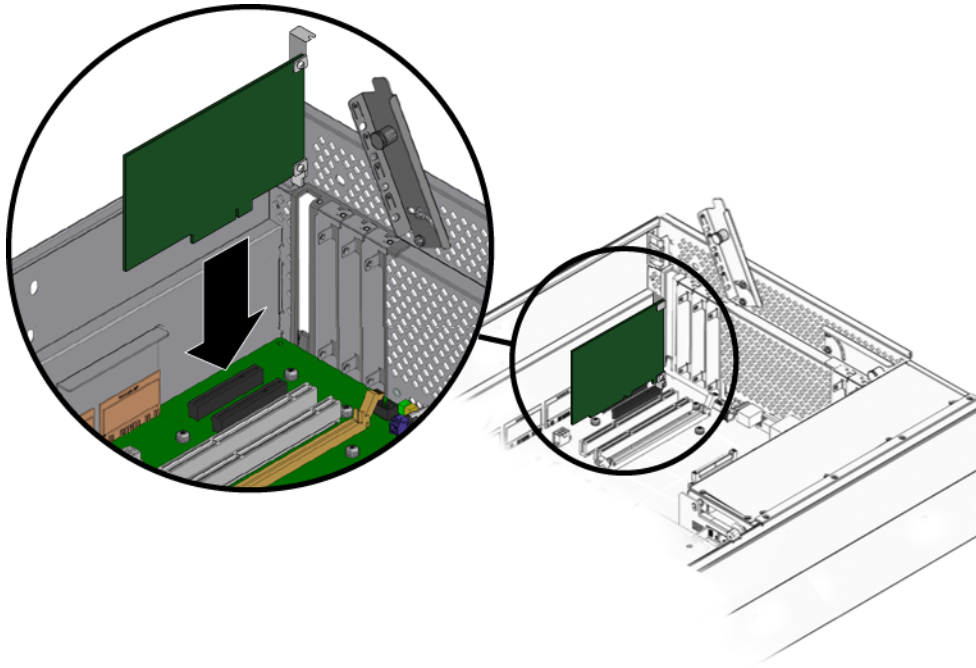
a. Insert the faceplate end of the card into the appropriate opening in the rear panel.

b. Push the card into the corresponding connector on the motherboard.

Apply even pressure along each edge of the card.

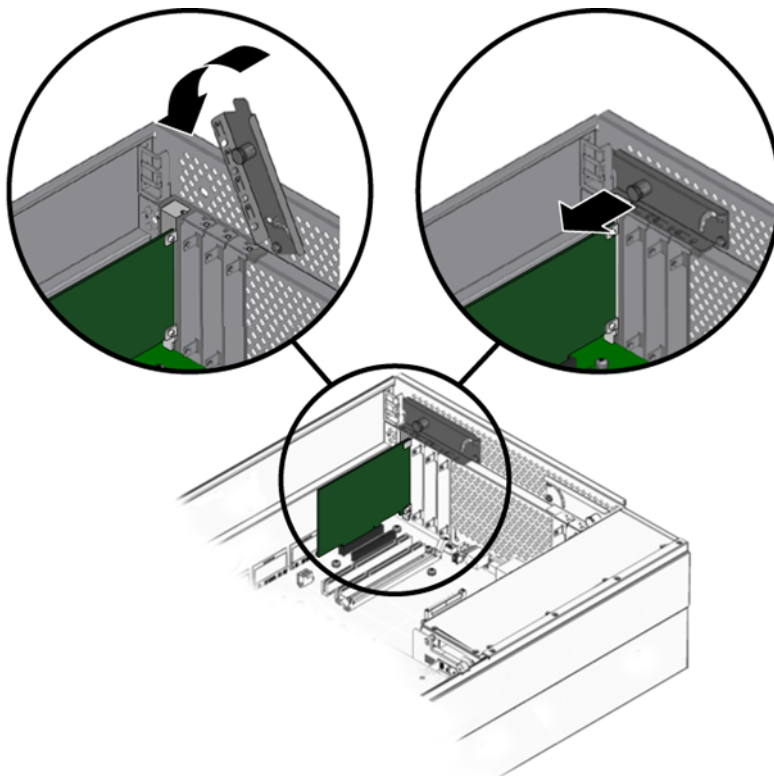


Caution – Do not apply excessive force to one end or one side of the card. Doing so could damage the card or the motherboard connector.



5. Replace the PCI card latch.

Rotate the latch down and secure it with the retaining pin.



6. If necessary, connect any internal cables to the PCI card internal connectors.

Note – If you are replacing the SAS controller card, attach the multilane data cables to their connectors on the SAS controller. Be sure to connect the cables into the appropriate connectors on the SAS controller.

Press the connectors in until they snap into place.

7. If necessary, connect any external cables to the PCI card.

What Next

To reassemble the system, complete these tasks:

- [“Installing the Top Cover” on page 29](#)

- [“Installing the System Into the Cabinet” on page 36](#)

When you are ready to restart the system, be sure to run OpenBoot Diagnostics tests to verify that the system functions correctly with the new parts you have just installed. For additional information, see:

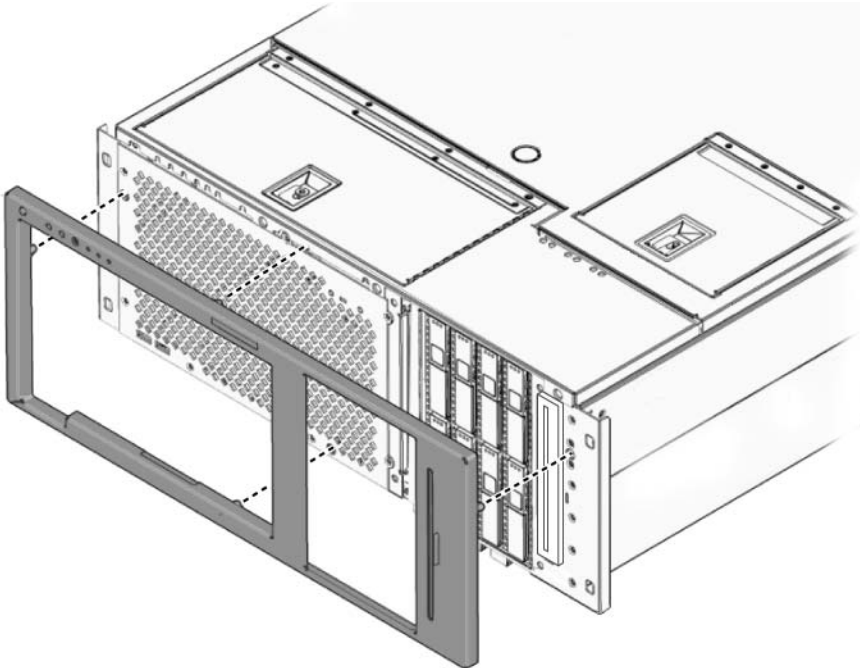
- *Sun Fire V445 Server Administration Guide*

You must also perform a reconfiguration boot so that your system is able to recognize the new PCI card. For additional information, see:

- [“Initiating a Reconfiguration Boot” on page 19](#)

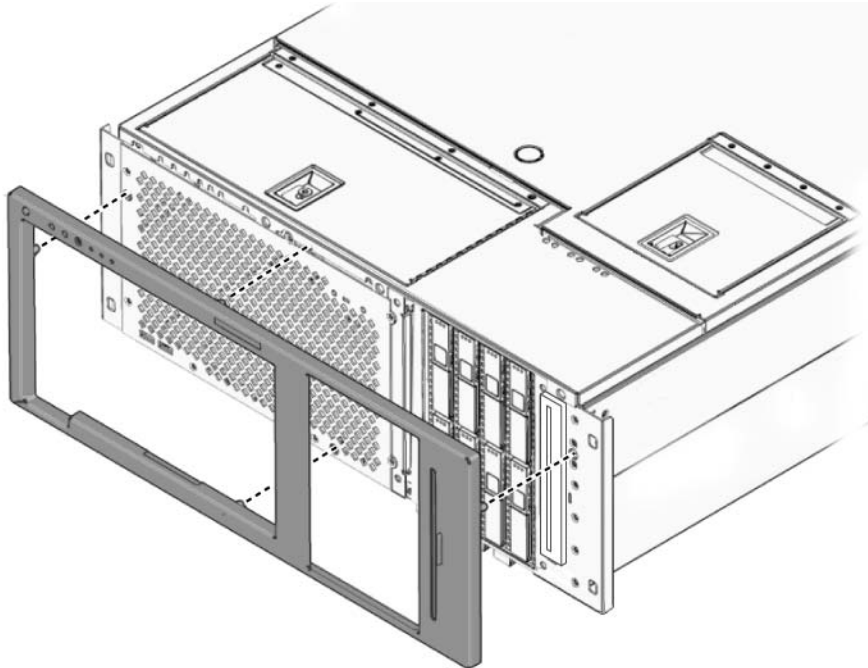
Removing the Front Bezel

- **Carefully pull the front bezel off the front panel of the system.**
The bezel is secured to the front panel with four standoff snaps.



Installing the Front Bezel

1. Position and orient the front bezel in front of its mounting points on the front panel.
2. Carefully press the front bezel onto the front panel.
The bezel is secured to the front panel with four standoff snaps.



Removing the Removable Media Drive

Before You Begin

Complete the following step:

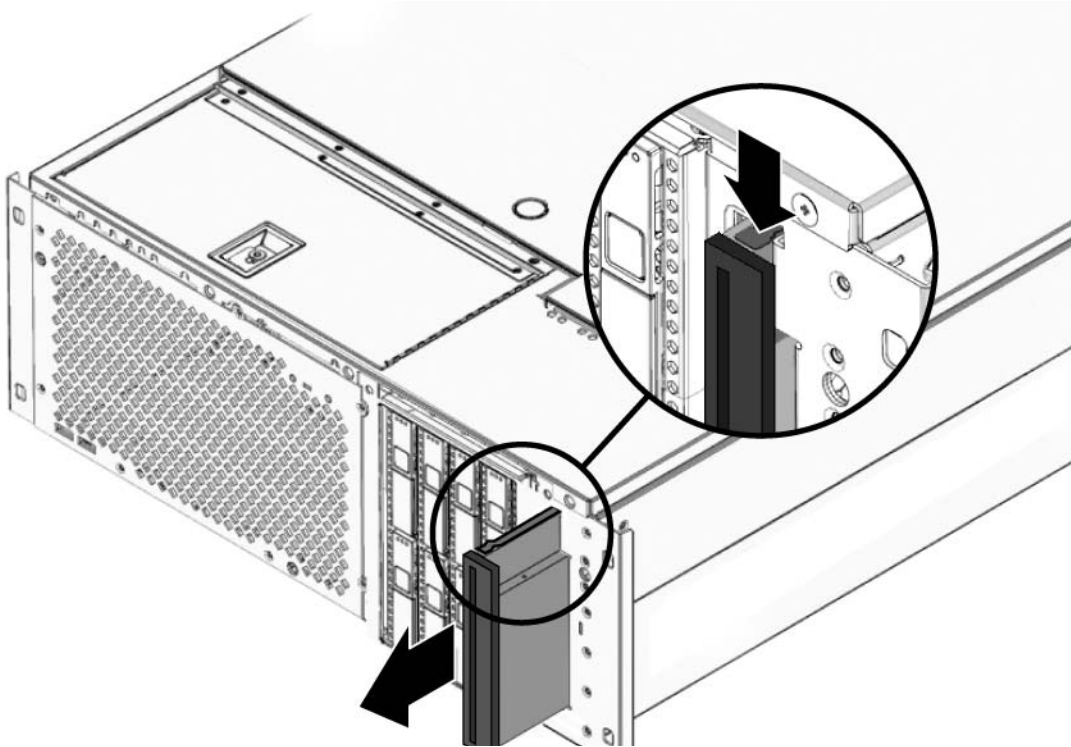
- [“Removing the Front Bezel” on page 70](#)

What to Do

1. Press the tabs above and below the removable media drive to release it from the chassis.



Caution – Do not squeeze the sides of the drive, or pull against its front panel. Doing so could seriously damage the drive.



2. Pull the drive forward and out of the system.

What Next

Complete the following:

- [“Installing the Removable Media Drive” on page 73](#)

Installing the Removable Media Drive

Before You Begin

Complete the following:

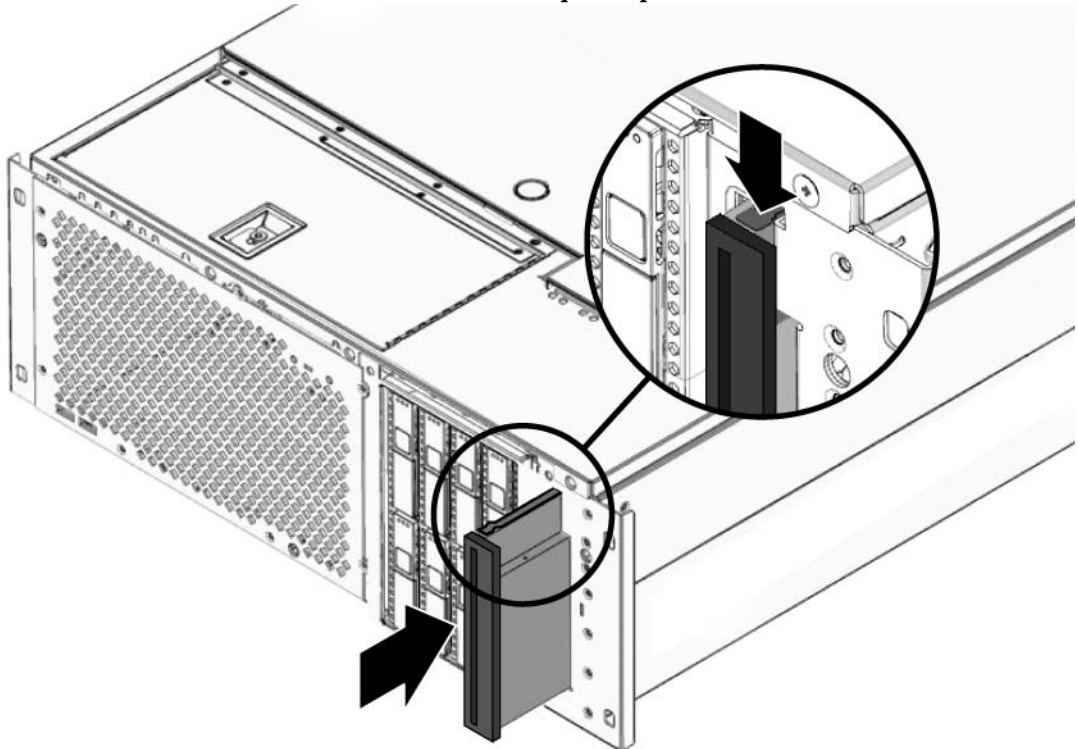
- [“Removing the Removable Media Drive”](#) on page 71

What to Do

1. **Insert the removable media drive into its bay in the chassis.**

Note – Hold the drive by its top and bottom tabs.

2. **Press the drive in until the tabs snap into place.**



What Next

Complete the following:

- “Installing the Front Bezel” on page 71

Reference for Fan Tray Status Indicators

The system top panel contains an array of fan tray status indicators. Refer to these indicators to determine which fan tray needs to be replaced. The fan tray status indicator label is located on the top panel.

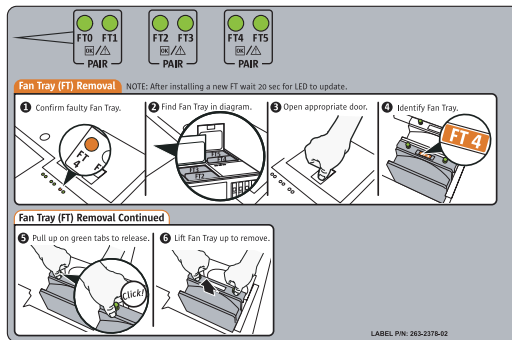


FIGURE 3-1 Fan Tray Status Indicator Label

See TABLE 3-1 for a description of the fan tray indicator and its function.

TABLE 3-1 Fan Tray Status Indicator

State	Meaning
Green	The indicator is green when AC power is applied to the system, and the fan is rotating at a speed above the low warning level.
Yellow	The indicator is yellow when the fan is failing: either not rotating at all, or rotating below the low warning speed.
Off	The indicator is off when there is no fan tray installed or AC power is not applied.

Note – If a fan tray is not present, its corresponding indicator is not lit.

Note – If a fan tray is faulty, the system Service Required indicator is also lit. See [“Front Panel Indicators” on page 3](#) for more information.

Reference for Hard Drive Status Indicators

Each hard drive has a series of status indicators.

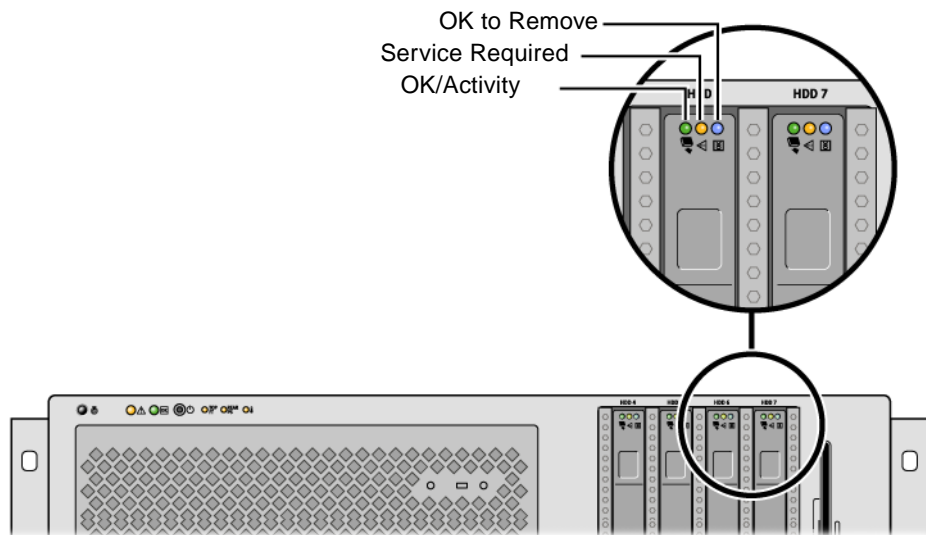





FIGURE 3-2 Location of Hard Drive Status Indicators

See [TABLE 3-2](#) for a description of hard drive indicators and their function.

TABLE 3-2 Hard Drive Status Indicators

LED		Color	Notes
Activity		Green	On - Drive is receiving power. Solidly lit if drive is idle. Flashes while the drive processes a command. Off - Power is off.
Unused		Amber	
OK to Remove		Blue	On - The drive is ready for hot-plug removal. Off - Normal operation.

Reference for Power Supply Status Indicators

Each power supply contains a series of status indicators, visible when looking at the back panel of the system.

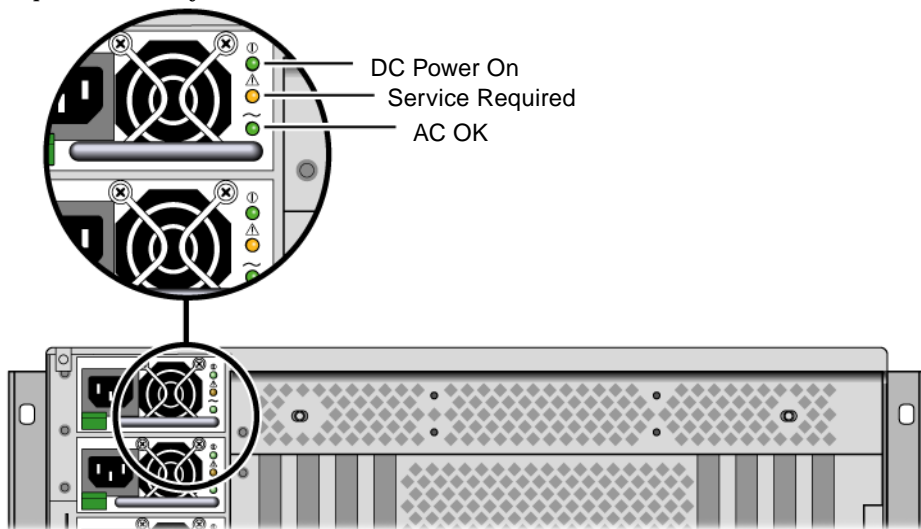





FIGURE 3-3 Location of Power Supply Status Indicators

See [TABLE 3-3](#) for a description of power supply indicators and their function, listed from top to bottom.

TABLE 3-3 Power Supply Status Indicators

Indicator	Icon	Color	Notes
DC Power On		Green	Lit when the system is powered on and the power supply is operating normally.
Service Required		Amber	Lit if there is a fault in the power supply.
AC OK		Green	Lit when the power supply is plugged in and AC power is available, regardless of system power state.

Note – If a power supply is faulty, the system status Service Required indicator is also lit. See [“Front Panel Indicators” on page 3](#) for more information.

Servicing the Motherboard Components

This chapter contains the following sections:

- “About Predictive Self-Healing” on page 80
- “About the DIMMs” on page 80
- “About the IDPROM” on page 82
- “Removing a CPU/Memory Module” on page 83
- “Installing a CPU/Memory Module” on page 86
- “Removing a DIMM” on page 89
- “Installing a DIMM” on page 92
- “Removing the System Controller Card” on page 93
- “Installing the System Controller Card” on page 96
- “Removing the IDPROM” on page 98
- “Installing the IDPROM” on page 99
- “Removing the System Controller Battery” on page 100
- “Installing the System Controller Battery” on page 101
- “Removing the CPU/Memory Module Bracket” on page 102
- “Installing the CPU/Memory Module Bracket” on page 104
- “Removing the Motherboard” on page 106
- “Installing the Motherboard” on page 109

About Predictive Self-Healing

In Solaris 10 systems, the Solaris Predictive Self-Healing (PSH) technology enables Sun Fire V445 server to diagnose problems while the Solaris OS is running, and mitigate many problems before they negatively affect operations.

The Predictive Self-Healing technology covers the following Sun Fire V445 server components:

- UltraSPARC IIIi processors
- DIMMs
- I/O bus

The PSH console message provides the following information:

- Type
- Severity
- Description
- Automated Response
- Impact
- Suggested Action for System Administrator

For more information about PSH, see the *Sun Fire V445 Server Administration Guide* and your Solaris 10 documentation.

About the DIMMs

The Sun Fire V445 server uses 2.5-volt, high-capacity double datarate dual inline memory modules (DDR DIMMs) with error-correcting code (ECC). Within each CPU/Memory module, the four DIMM slots are organized into groups of two. The system reads from, or writes to, both DIMMs in a group simultaneously. DIMMs,

therefore, must be added in pairs. The figure below shows the DIMM slots and DIMM groups on a Sun Fire V445 server CPU/Memory module. Adjacent slots belong to the same DIMM group. The two groups are designated 0 and 1.

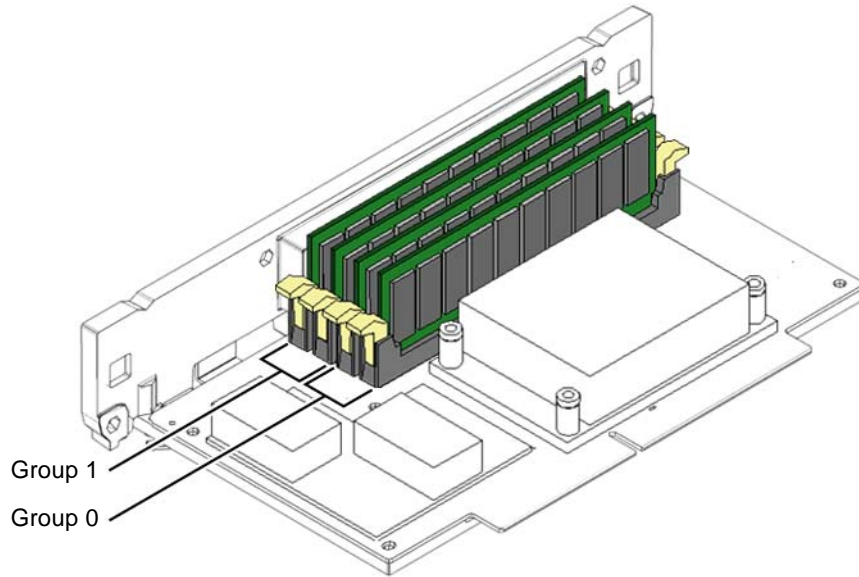


FIGURE 4-1 Location of DIMM Groups 0 and 1

You must physically remove a CPU/Memory module from the system before you can install or remove DIMMs. The DIMMs must be added in pairs within the same DIMM group, and each pair used must have two identical DIMMs installed, that is, both DIMMs in each group must be from the same manufacturing vendor and must have the same capacity (for example, two 512-Mbyte DIMMs or two 1-Gbyte DIMMs).

Note – Each CPU/Memory module must be populated with a minimum of two DIMMs, installed in either group 0 or group 1.



Caution – DIMMs are made of electronic components that are extremely sensitive to static electricity. Static electricity from your clothes or work environment can destroy the DIMM. Do not remove a DIMM from its antistatic packaging until you are ready to install it on the CPU/Memory module. Handle the DIMM only by its edges. Do not touch the components or any metal part. Always wear an antistatic grounding strap when you handle the DIMM. For more information, see [“Avoiding Electrostatic Discharge” on page 41](#).

You can use the PSH features in Solaris 10 to diagnose and identify problems in DIMMs. For more information, see the *Sun Fire V445 Server Administration Guide*.

Memory Interleaving

You can maximize the system's memory bandwidth by taking advantage of its memory interleaving capabilities. The Sun Fire V445 server supports two-way interleaving. In most cases, higher interleaving results in improved system performance. However, actual performance results can vary depending on the system application. Two-way interleaving occurs automatically in any DIMM bank where the DIMM capacities in DIMM group 1 do not match the capacities used in a DIMM group 2. For optimum performance, install identical DIMMs in all four slots in a CPU/Memory module.

Configuration Rules

- DIMMs must be added in pairs within the same group of DIMM slots. Adjacent slots belong to the same DIMM group.
- Each group used must have two identical DIMMs installed, that is, both DIMMs must be from the same manufacturing vendor and must have the same capacity (for example, two 512-Mbyte DIMMs or two 1-Gbyte DIMMs).
- For maximum memory performance and to take full advantage of the Sun Fire V445 server's memory interleaving features, use identical DIMMs in all four slots of a CPU/Memory module.
- Only 333-MHz DIMMs are supported.

Note – If DIMMs of different densities and speeds are installed as a pair, both DIMMs operate at the lower density and slower speed.

About the IDPROM

The IDPROM stores system configuration variables and Media Access Control (MAC) addresses. For more information about system variables stored on the IDPROM, see the *Sun Fire V445 Server Administration Guide*.

You can replace a functioning IDPROM and install it into another system, thereby preserving the system's host ID information and configuration settings. Thus, migrating an IDPROM from one system to another can smooth transitions to new or upgraded systems, or quickly bring up a backup system if a primary system becomes unavailable without disrupting the system's identity on the network.

If the system fails to retain host ID settings or MAC address settings, it could be due to a faulty or defective IDPROM. Contact your Sun service representative to obtain a new IDPROM.

Note – Failure to retain host ID settings or system variables could also be due to a faulty or depleted system controller battery.

If you are replacing a defective IDPROM, you must contact a Sun service representative to obtain a new card with the existing server's host ID and MAC address.



Caution – Do not handle the IDPROM unless you need to transfer it to another system.

Note – If the system fails to retain OpenBoot configuration settings but the Ethernet address is retained, it could be due to a faulty or depleted system configuration controller battery. Replace the system controller battery first before attempting to replace the IDPROM. See [“Removing the System Controller Battery” on page 100](#).

Removing a CPU/Memory Module

Before You Begin

If a CPU/Memory module fails POST diagnostics, OpenBoot forwards a message string to ALOM, and the system Service Required indicator illuminates. Check system console messages to determine which CPU/Memory module has failed.

Complete these tasks:

- [“Powering Off the System” on page 18](#)
- [“Sliding the Server Out of the Cabinet” on page 22](#)
- [“Avoiding Electrostatic Discharge” on page 41](#)

- “Removing the Top Cover” on page 28

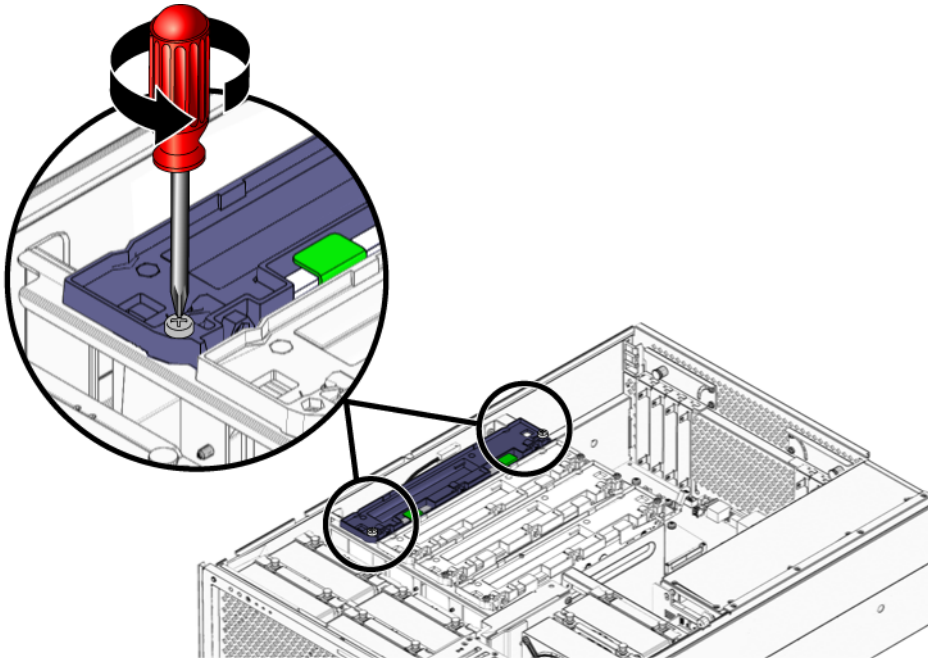
What to Do

1. Identify the CPU/Memory module to be removed.

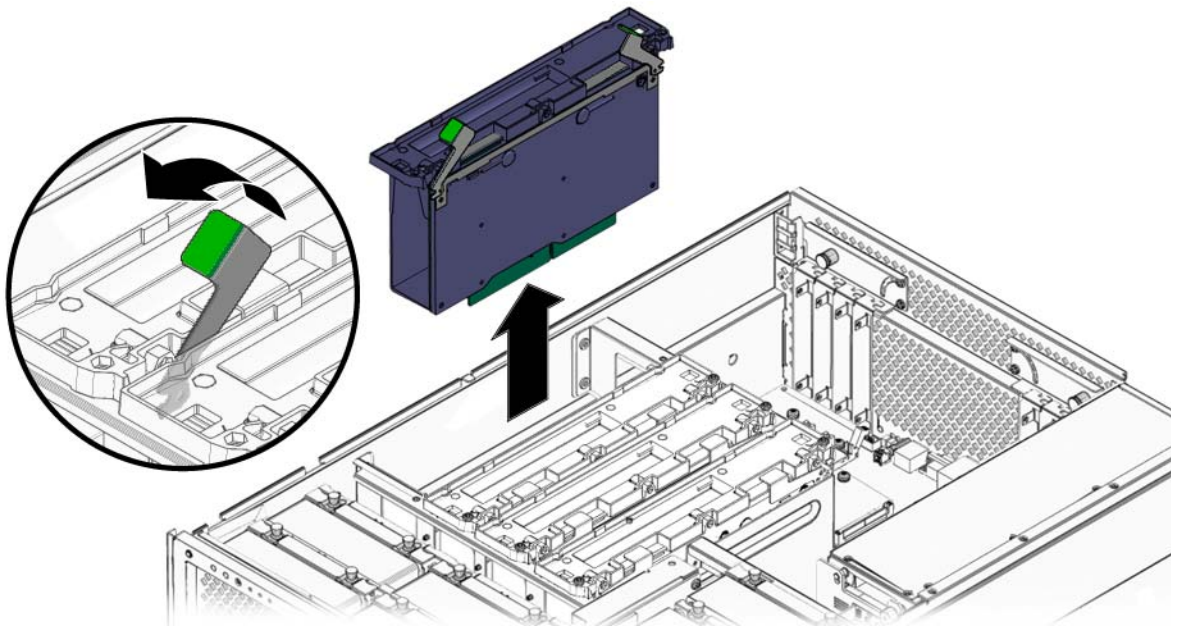
See the *Sun Fire V445 Server Administration Guide* for information about isolating failed parts.

Note – Faulty CPU/Memory modules can be isolated and brought offline using the PSH features in Solaris 10. For more information, see the *Sun Fire V445 Server Administration Guide* and the Solaris 10 documentation.

2. Loosen the two captive Phillips screws securing the CPU/Memory module to the CPU cage.



3. Rotate the CPU/Memory module ejector levers upward so that the CPU/Memory module connectors disengage from the CPU cage.



4. Pull the CPU/Memory module from the chassis by the levers and place it on an antistatic mat.

Support the CPU/Memory module from underneath as you transfer it to the antistatic mat.



Caution – The CPU/Memory module can be hot. Handle the CPU/Memory module carefully to avoid injury.

What Next

To replace the CPU/Memory module, complete this task:

- [“Installing a CPU/Memory Module” on page 86](#)

Installing a CPU/Memory Module

Before You Begin

Complete these tasks:

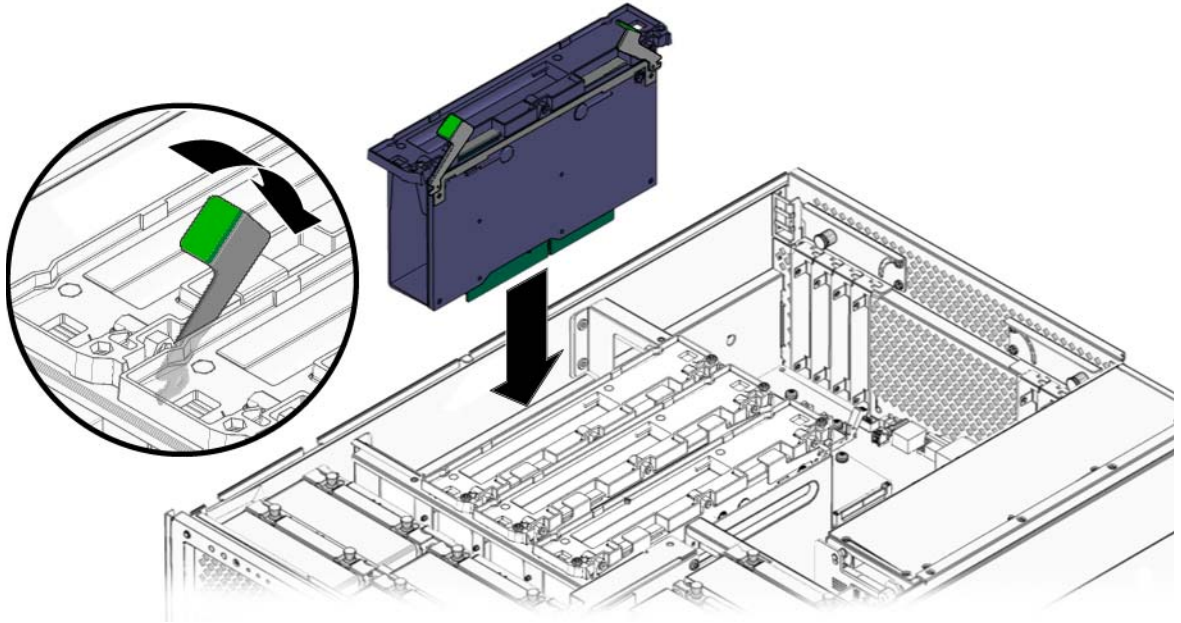
- [“Avoiding Electrostatic Discharge” on page 41](#)
- [“Removing a CPU/Memory Module” on page 83](#)

What to Do

- 1. Identify the CPU/Memory module slot into which you want to install the CPU/Memory module.**
The CPU/Memory module slots are marked at the top of the CPU cage.
- 2. Inspect the CPU/Memory module connector and the motherboard connector for foreign objects.**
- 3. Ensure that the ejector levers on the CPU/Memory module are rotated up to a 90-degree angle.**

4. Slide the CPU/Memory module into the guides in the CPU cage.

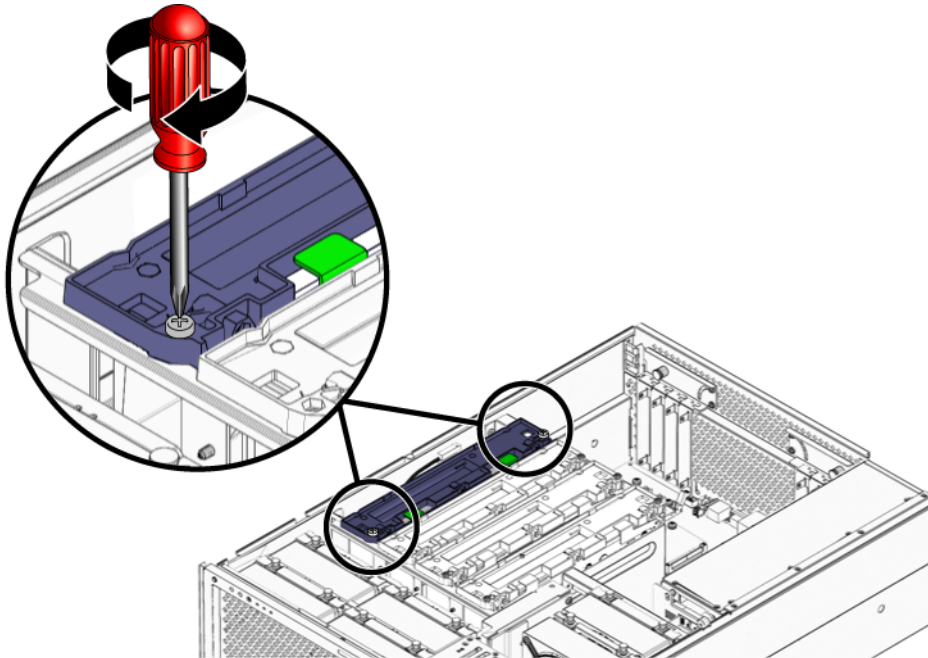
Slide the CPU/Memory module into the chassis until the connectors on the module begin to engage the socket on the motherboard.



5. Push down on both ejector levers, simultaneously, until the levers are completely pressed into their slots.

Note – Do not press down directly on the CPU/Memory module. Let the levers press the CPU/Memory module into its socket.

6. Tighten the two captive screws that secure the CPU/Memory module to the CPU cage.



What Next

To reassemble the system, complete these tasks:

- [“Installing the Top Cover” on page 29](#)
- [“Sliding the Server Into the Cabinet” on page 26](#)
- [“Powering On the System” on page 17](#)

Note – If you used the PSH utilities in Solaris 10 to isolate a faulty CPU/Memory module, you must reactivate the relevant CPU/memory address to bring the new module online. For more information, see the *Sun Fire V445 Server Administration Guide* and the Solaris 10 documentation.

Removing a DIMM

Before You Begin

If a memory module (DIMM) fails POST diagnostics, OpenBoot forwards a message to ALOM, and the system status Service Required indicator illuminates.

Read the section:

- [“About the DIMMs” on page 80](#)

Complete these tasks:

- [“Avoiding Electrostatic Discharge” on page 41](#)
- [“Removing a CPU/Memory Module” on page 83](#)

What to Do

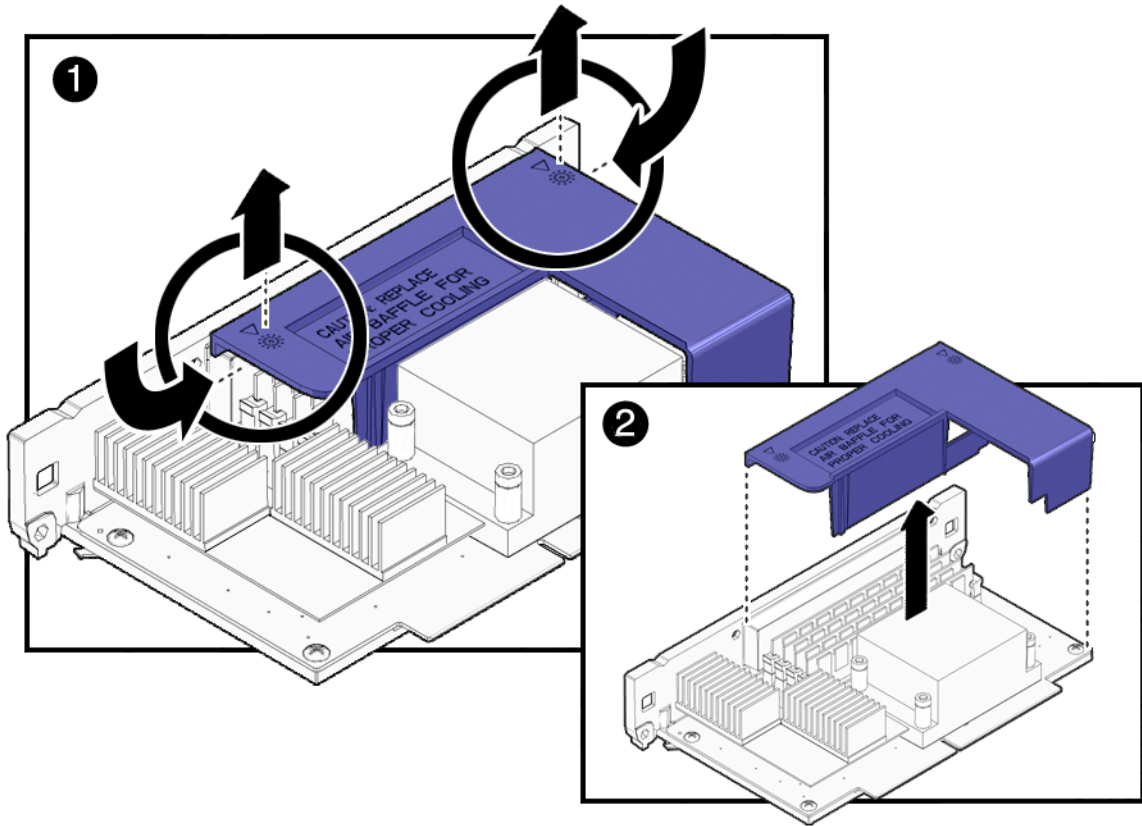


Caution – DIMMs are made of electronic components that are extremely sensitive to static electricity. Static electricity from your clothes or work environment can destroy the DIMM. Do not remove a DIMM from its antistatic packaging until you are ready to install it on the CPU/Memory module. Handle the DIMM only by its edges. Do not touch the components or any metal part. Always wear an antistatic grounding strap when you handle the DIMM. For more information, see [“Avoiding Electrostatic Discharge” on page 41](#).



Caution – The CPU/Memory module and the DIMMs can be hot. Handle the CPU/Memory module and the DIMMs carefully to avoid injury.

1. Remove the air baffle from the CPU/Memory module.
 - a. Release the air baffle tabs from the top of the CPU/Memory module.
 - b. Rotate the air baffle away from the CPU/Memory module.
 - c. Lift the air baffle up off the module.

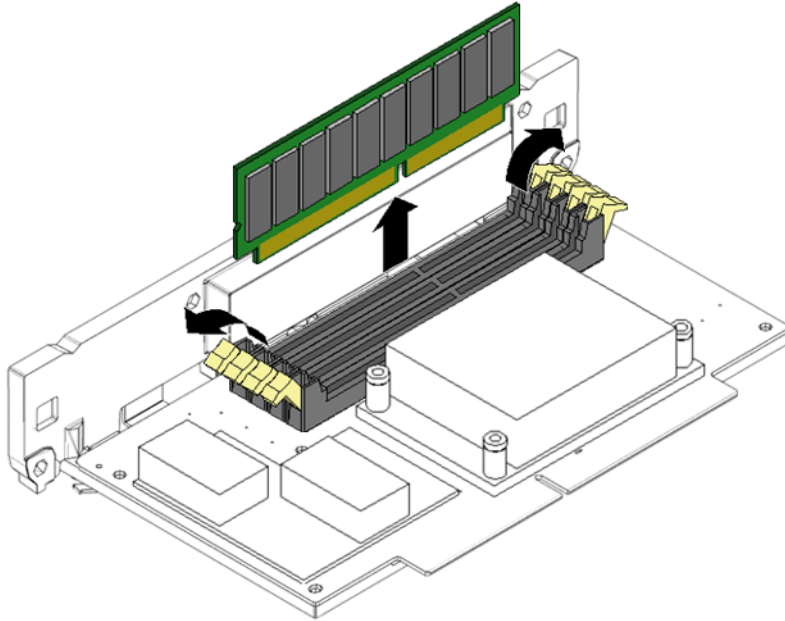


2. Identify the DIMM to be removed.

See the *Sun Fire V445 Server Administration Guide* for information about isolating failed parts.

Note – Faulty DIMMs can be isolated and brought offline using the PSH features in Solaris 10. For more information, see the *Sun Fire V445 Server Administration Guide* and the Solaris 10 documentation.

- 3. Push down on the ejector levers on each side of the DIMM, simultaneously, until the DIMM ejects from its socket.**
Apply even pressure on both levers.



- 4. Grasp the top corners of the DIMM and pull it up and out of its socket.**
- 5. Place the DIMM on an antistatic mat.**
- 6. Repeat Step 1 through Step 4 for all the DIMMs to be removed.**

What Next

To replace a memory module, complete this task:

- [“Installing a DIMM” on page 92](#)

Installing a DIMM

Before You Begin

Read the section:

- [“About the DIMMs” on page 80](#)

Complete these tasks:

- [“Avoiding Electrostatic Discharge” on page 41](#)
- [“Removing a CPU/Memory Module” on page 83](#)

What to Do



Caution – DIMMs are made of electronic components that are extremely sensitive to static electricity. Static electricity from your clothes or work environment can destroy the DIMM. Do not remove a DIMM from its antistatic packaging until you are ready to install it on the CPU/Memory module. Handle the DIMM only by its edges. Do not touch the components or any metal part. Always wear an antistatic grounding strap when you handle the DIMM. For more information, see [“Avoiding Electrostatic Discharge” on page 41](#).



Caution – The CPU/Memory module and the DIMMs can be hot. Handle the CPU/Memory module and the DIMMs carefully to avoid injury.

1. **Locate the slot where you want to install the DIMM.**
2. **Rotate out the DIMM ejector levers for that slot.**
3. **Holding the bottom edge of the DIMM parallel to its socket, carefully align the DIMM so that each of its contacts is centered on a socket pin.**
Make sure that the DIMM is correctly oriented. A notch along the bottom of the DIMM corresponds to a tab on the socket.
4. **Push firmly and evenly on both ends of the DIMM until its bottom edge is firmly seated in the socket.**

You hear a click when the ejector levers lock into place.

5. Repeat Step 1 through Step 4 for all DIMMs to be installed.
6. Attach the air baffle to the CPU/Memory module.
 - a. Orient the air baffle over the CPU/Memory module.
 - b. Insert the lower tabs of the air baffle into their slots on the CPU/Memory module.
 - c. Gently snap the upper tabs into place on the module.

What Next

To reassemble the system, complete this task:

- [“Installing a CPU/Memory Module” on page 86](#)

Note – If you used the PSH utilities in Solaris 10 to isolate a faulty CPU/Memory module, you must reactivate the relevant CPU/Memory address to bring the new module online. For more information, see the *Sun Fire V445 Server Administration Guide* and the Solaris 10 documentation.

Removing the System Controller Card

Before You Begin

Complete these tasks:

- [“Powering Off the System” on page 18](#)
- [“Sliding the Server Out of the Cabinet” on page 22](#)
- [“Avoiding Electrostatic Discharge” on page 41](#)
- [“Removing the Top Cover” on page 28](#)

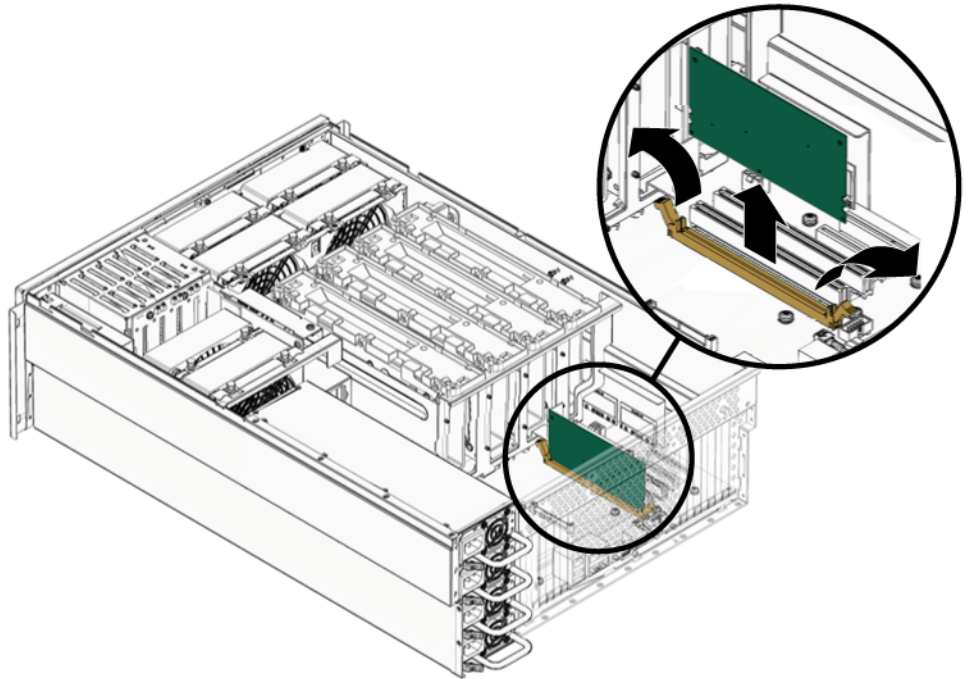
What to Do



Caution – The system supplies power to the system controller card even when the system is powered off. To avoid personal injury or damage to the system controller card, you must disconnect the AC power cords before servicing the system controller card or any of its components.

1. **Disconnect the AC power cords from the back of the system.**
2. **Locate the Advanced Lights Out Manager (ALOM) system controller card.**

3. Rotate the ejector levers outward to eject the card from its slot in the motherboard.



4. Pull the system controller card from its slot.

Hold the card by its edges.



Caution – The IDPROM can be dislodged easily. Ensure the IDPROM is not dislodged from the system controller during handling.

5. Place the system controller card on an antistatic mat.

What Next

To replace the system controller card, complete this task:

- [“Installing the System Controller Card” on page 96](#)

Installing the System Controller Card

Before You Begin

Complete this task:

- [“Removing the System Controller Card” on page 93](#)

What to Do



Caution – The system supplies power to the system controller card even when the system is powered off. To avoid personal injury or damage to the system controller card, you must disconnect the AC power cords before servicing the system controller card or any of its components.

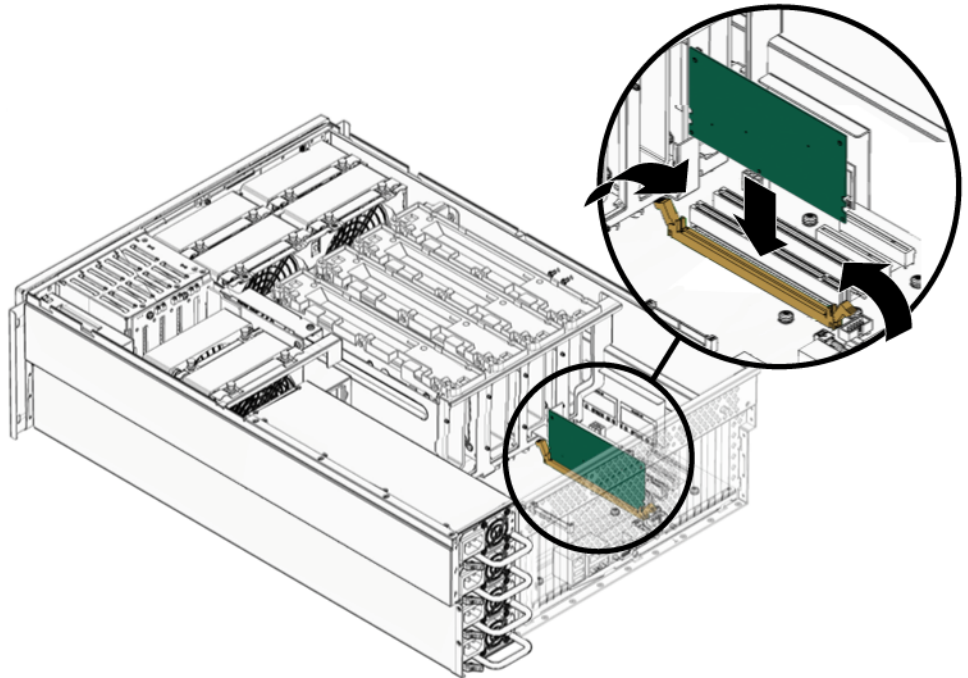
1. **Locate the slot for the system controller card.**
2. **Insert the system controller card into its slot on the motherboard.**

Push the card into the connectors on the motherboard.



Caution – The IDPROM can be dislodged easily. Ensure the IDPROM is not dislodged from the system controller during handling.

3. Apply even pressure along each edge of the card, until the ejector levers rotate up and snap into place.



4. Connect the AC power cords to the back of the system.

What Next

To reassemble the system, complete these tasks:

- [“Installing the Top Cover” on page 29](#)
- [“Sliding the Server Into the Cabinet” on page 26](#)
- [“Powering On the System” on page 17](#)

Removing the IDPROM



Caution – The system supplies power to the system controller card even when the system is powered off. To avoid personal injury or damage to the system controller card, you must disconnect the AC power cords before servicing the system controller card or any of its components.

Before You Begin

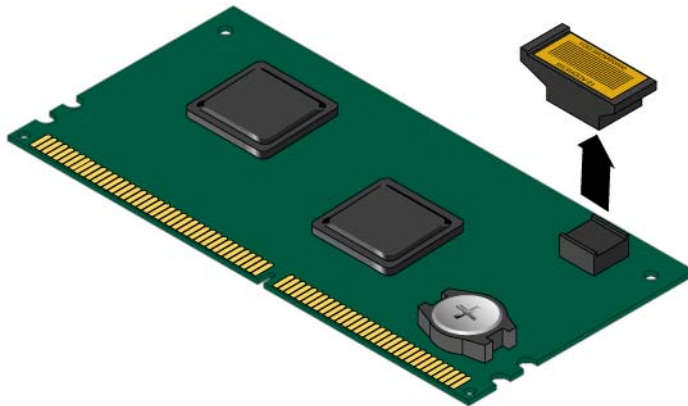
Read the section, [“About the IDPROM”](#) on page 82.

Complete these tasks:

- [“Powering Off the System”](#) on page 18
- [“Sliding the Server Out of the Cabinet”](#) on page 22
- [“Removing the Top Cover”](#) on page 28
- [“Avoiding Electrostatic Discharge”](#) on page 41
- [“Removing the System Controller Card”](#) on page 93

What to Do

1. Pull the IDPROM up off its mounting pins on the system controller card.



2. Set the IDPROM on an antistatic mat.

What Next

Complete the following:

- [“Installing the IDPROM” on page 99](#)

Installing the IDPROM



Caution – The system supplies power to the system controller card even when the system is powered off. To avoid personal injury or damage to the system controller card, you must disconnect the AC power cords before servicing the system controller card or any of its components.

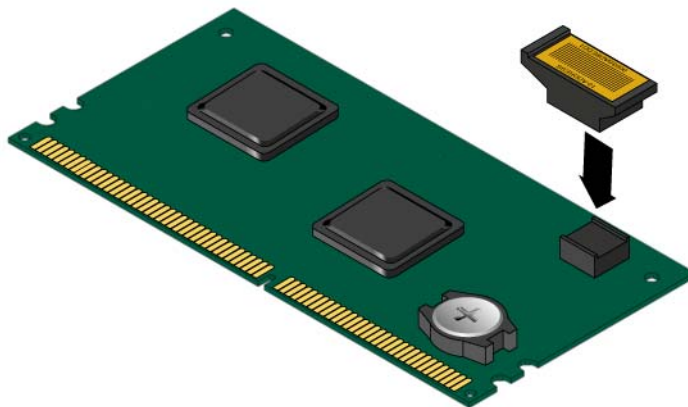
Before You Begin

Complete the following:

- [“Removing the IDPROM” on page 98](#)

What to Do

1. Orient the IDPROM so that the notch on the module aligns with the corresponding notch on the system controller card.



2. Attach the IDPROM to the system controller card.

Press down firmly and evenly to seat the module correctly.

What Next

Complete the following:

- [“Installing the System Controller Card” on page 96](#)
- [“Installing the Top Cover” on page 29](#)
- [“Sliding the Server Into the Cabinet” on page 26](#)
- [“Powering On the System” on page 17](#)

Note – If you replaced the IDPROM with a new one, you must complete a reconfiguration boot. See [“Initiating a Reconfiguration Boot” on page 19.](#)

Removing the System Controller Battery



Caution – The system supplies power to the system controller card even when the system is powered off. To avoid personal injury or damage to the system controller card, you must disconnect the AC power cords before servicing the system controller card or any of its components.

Note – The system alerts you if the system controller battery is depleted. If you do not replace the battery before voltage falls below an acceptable threshold, the system fails to boot. At that point, you must replace the system controller battery before you can restart the system.

Before You Begin

Complete these tasks:

- [“Powering Off the System” on page 18](#)
- [“Sliding the Server Out of the Cabinet” on page 22](#)
- [“Removing the Top Cover” on page 283](#)
- [“Avoiding Electrostatic Discharge” on page 41](#)
- [“Removing the System Controller Card” on page 93](#)

What to Do

1. **Press the battery mounting tabs away from the battery.**
2. **Remove the battery from its receptacle on the system controller card.**

What Next

Complete the following:

- [“Installing the System Controller Battery” on page 101](#)



Installing the System Controller Battery

Caution – The system supplies power to the system controller card even when the system is powered off. To avoid personal injury or damage to the system controller card, you must disconnect the AC power cords before servicing the system controller card or any of its components.

Before You Begin

Complete the following:

- [“Removing the System Controller Battery” on page 100](#)

What to Do

1. **Insert the battery into the carrier.**
Ensure the positive (+) side of the battery is facing inward.
2. **Press firmly and evenly to seat the battery on the system controller card.**
The latch in the connector clicks into place when the battery is seated correctly.

What Next

Complete the following:

- “Installing the System Controller Card” on page 96
- “Installing the Top Cover” on page 29
- “Sliding the Server Into the Cabinet” on page 26
- “Powering On the System” on page 17

Removing the CPU/Memory Module Bracket

Before You Begin

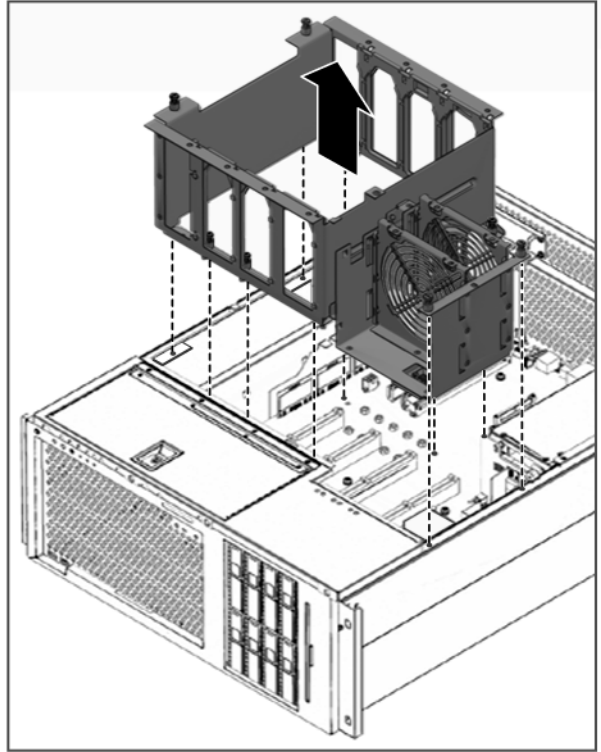
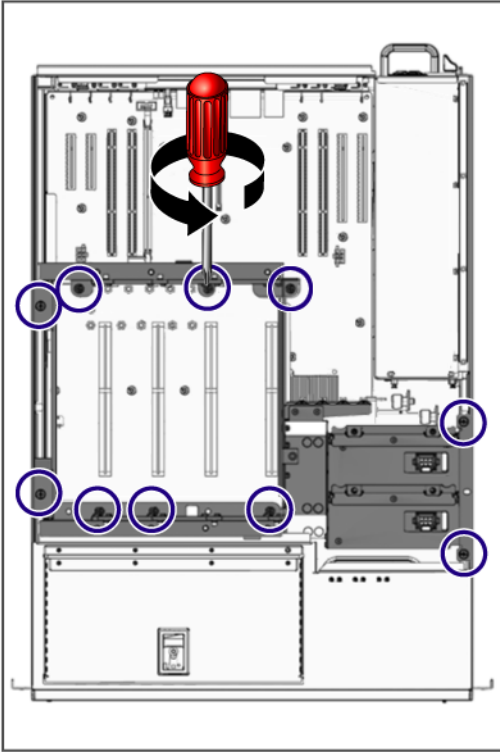
Complete these tasks:

- “Powering Off the System” on page 18
- “Sliding the Server Out of the Cabinet” on page 22
- “Removing the Top Cover” on page 28
- “Avoiding Electrostatic Discharge” on page 41
- “Removing a Fan Tray” on page 47
- “Removing the Multilane Data Cable Connector Board” on page 126
- “Removing a CPU/Memory Module” on page 83
- “Removing a PCI Card” on page 62

What to Do

1. Loosen the two captive Phillips screws securing the CPU/Memory module bracket to the right side of the chassis.
2. Loosen the two captive Phillips screws securing the CPU/Memory module bracket to the left side of the chassis.
3. Loosen the six captive Phillips screws securing the CPU/Memory module to the motherboard.

4. Gently lift the CPU/Memory module bracket up and out of the chassis.



Note – The fan tray power cables are still connected to the motherboard.

5. Disconnect the hard drive fan cable from connector J7801.

Pinch the release tab to disconnect the connector from the motherboard.

What Next

Complete this task:

- [“Installing the CPU/Memory Module Bracket” on page 104](#)

Installing the CPU/Memory Module Bracket

Before You Begin

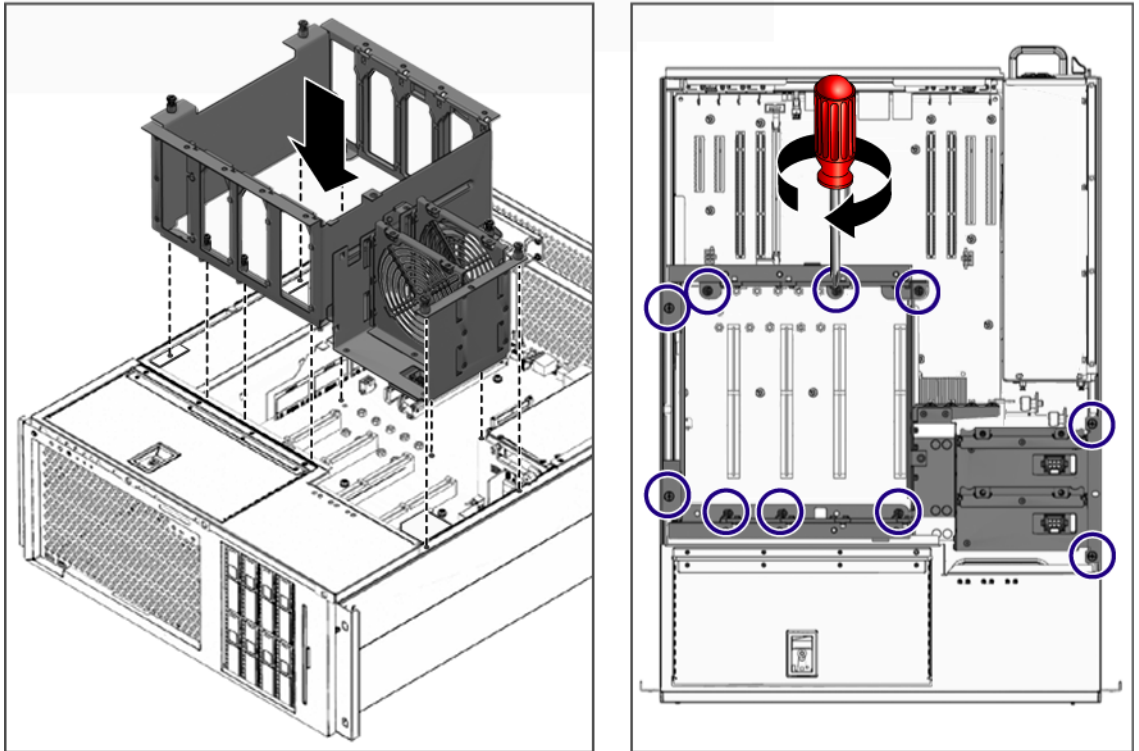
Complete this task:

- [“Removing the CPU/Memory Module Bracket” on page 102](#)

What to Do

- 1. Connect the hard drive fan cable into connector J7801 on the motherboard.**
Ensure the fan cable is routed under the SAS backplane power and data cables.

2. Lower the CPU/Memory module bracket into the system.
Make sure the bracket is aligned with its mounting holes.



3. Tighten the six captive screws securing the CPU/Memory module bracket to the motherboard.
4. Tighten the four captive Phillips screws securing the bracket to the sides of the chassis.
There are two captive screws on each side, along the edges of the bracket.

What Next

Complete these tasks:

- [“Installing a PCI Card” on page 66](#)
- [“Installing a CPU/Memory Module” on page 86](#)
- [“Installing the Multilane Data Cable Connector Board” on page 128](#)
- [“Installing a Fan Tray” on page 49](#)
- [“Installing the Top Cover” on page 29](#)

- “Sliding the Server Into the Cabinet” on page 26
- “Powering On the System” on page 17

Removing the Motherboard



Caution – The system supplies power to the motherboard even when the system is powered off. To avoid personal injury or damage to the motherboard, you must disconnect the AC power cords before servicing the motherboard.

Before You Begin

Complete these tasks:

- “Powering Off the System” on page 18
- “Sliding the Server Out of the Cabinet” on page 22
- “Avoiding Electrostatic Discharge” on page 41
- “Removing the Top Cover” on page 28
- “Removing a Fan Tray” on page 47
- “Removing a PCI Card” on page 62
- “Removing a CPU/Memory Module” on page 83
- “Removing the System Controller Card” on page 93
- “Removing the Multilane Data Cable Connector Board” on page 126
- “Removing the CPU/Memory Module Bracket” on page 102

What to Do

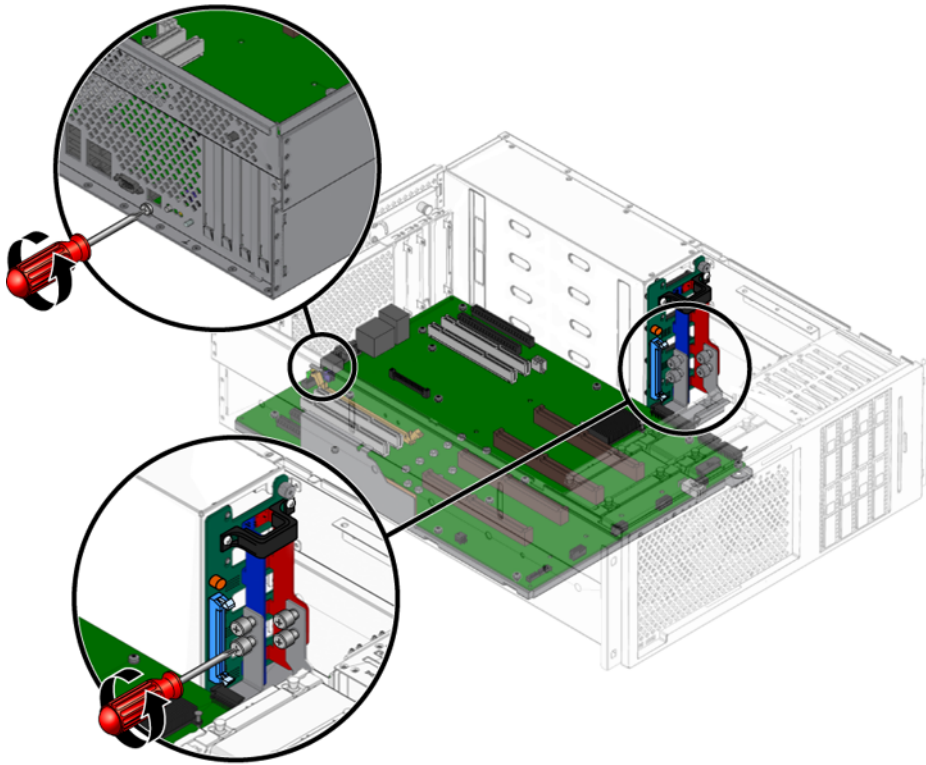
1. Disconnect the following from the motherboard:

- Power distribution board ribbon cable at J5903
- DVD-ROM drive cable at J6101
- SAS backplane power cable at J7004
- SAS backplane data cable at J7001
- Motherboard fan tray cables at J7803 and J7805
- Front I/O board ribbon cable at J7002
- Top cover interlock switch cable at J7301

Tip – Tuck the top cover interlock switch cable connector behind its cable to keep the connector securely out of the way.

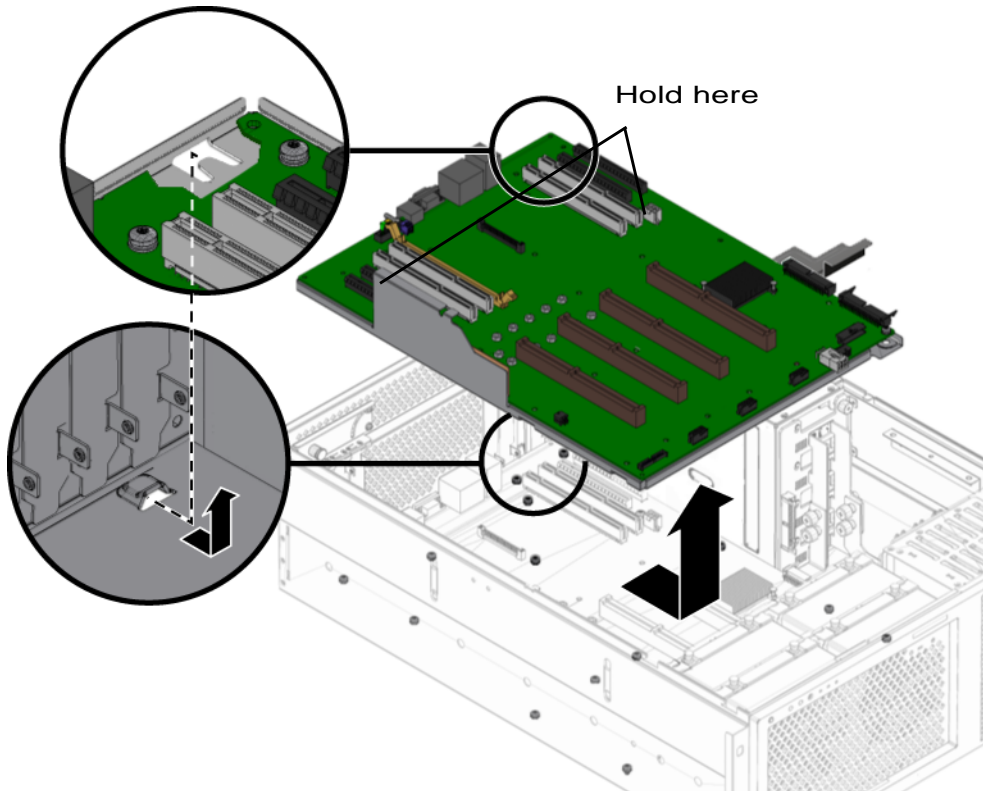
Note – For more information about system cables and cable routing, see [Appendix D](#).

2. Loosen the four captive Phillips screws securing the motherboard power poles to the power distribution board.



3. Remove the Phillips screw securing the motherboard to the system rear panel.

4. Slide the motherboard forward and tilt it away from the power distribution board.
Hold the motherboard by the green surfaces along the edges of the stiffener.



5. Lift the motherboard up and out of the system.

What Next

Complete this task:

- [“Installing the Motherboard” on page 109](#)

Installing the Motherboard



Caution – The system supplies power to the motherboard even when the system is powered off. To avoid personal injury or damage to the motherboard, you must disconnect the AC power cords before servicing the motherboard.

Before You Begin

Complete this task:

- [“Removing the Motherboard” on page 106](#)

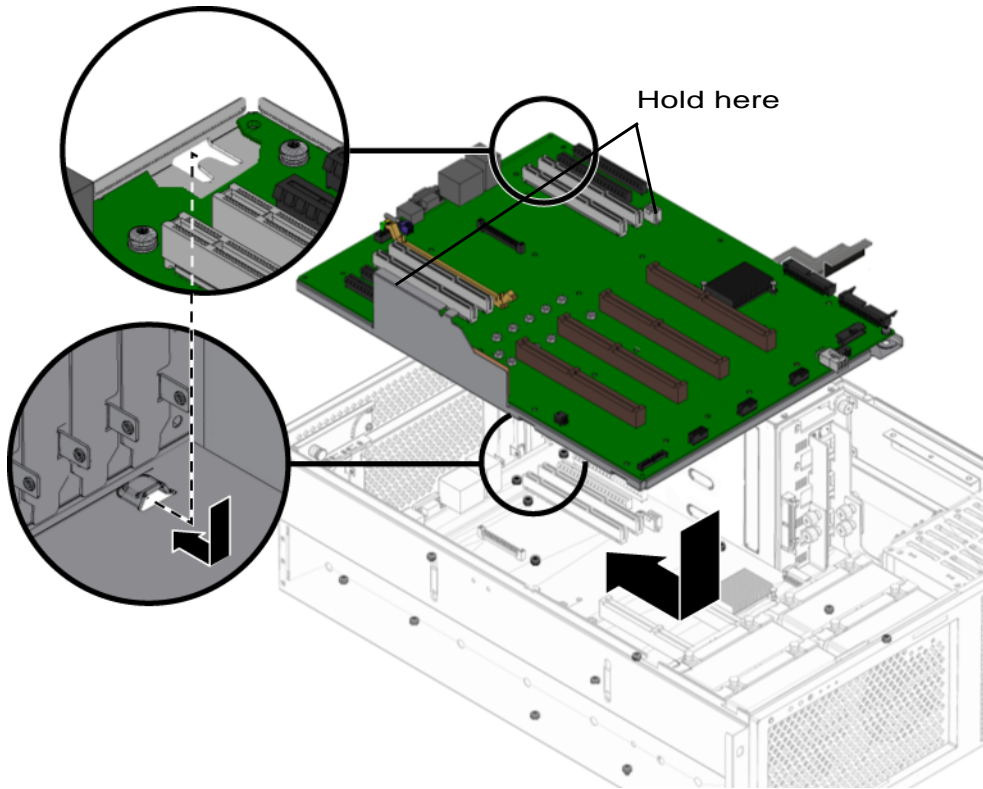
What to Do

1. **Position the motherboard inside the chassis.**

Ensure that the system cables are folded back out of the way.

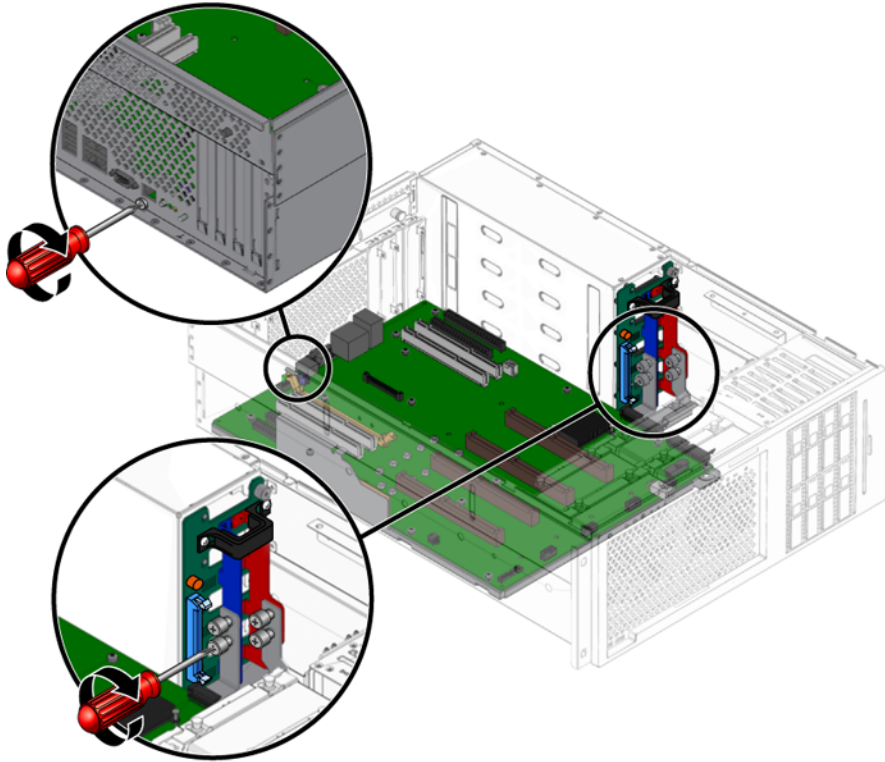
2. Slide the motherboard back toward the rear of the chassis.

Hold the motherboard by the green surfaces along the edges of the stiffener.



Ensure the motherboard stiffener is seated correctly into the tabs in the floor of the chassis.

3. Replace the Phillips screw that secures the back edge of the motherboard to the rear panel of the chassis.



4. Tighten the four captive Phillips screws to secure the power poles to the power distribution board.

Note – Tighten these screws to the torque value stated on the power distribution board (24 in/lbs, 2.7Nm).

5. Replace the following cables:

- Power distribution board ribbon cable at J5903
- DVD-ROM drive cable at J6101
- SAS backplane power cable at J7004
- SAS backplane data cable at J7001
- Motherboard fan tray cables at J7803 and J7805
- Front I/O board ribbon cable at J7002
- Top cover interlock switch cable at J7301

What Next



Caution – High Leakage Current. To prevent leakage current in excess of 3.5 mA, a maximum of two power cords can be connected to a single branch circuit. The remaining two power cords must be connected to a different branch circuit.

To reassemble the system, complete these tasks:

- [“Installing the CPU/Memory Module Bracket” on page 104](#)
- [“Installing the System Controller Card” on page 96](#)
- [“Installing a PCI Card” on page 66](#)
- [“Installing a CPU/Memory Module” on page 86](#)
- [“Installing the Top Cover” on page 29](#)
- [“Installing the System Into the Cabinet” on page 36](#)
- [“Powering On the System” on page 17](#)

Servicing Miscellaneous Components

This chapter contains the following sections:

- “Removing the Motherboard Fan Cage” on page 114
- “Installing the Motherboard Fan Cage” on page 115
- “Removing the Front I/O Board” on page 117
- “Installing the Front I/O Board” on page 119
- “Removing the Front Indicator Board” on page 121
- “Installing the Front Indicator Board” on page 123
- “About the Data Cable Connector Board/SAS Controller Configurations” on page 126
- “Removing the Multilane Data Cable Connector Board” on page 126
- “Installing the Multilane Data Cable Connector Board” on page 128
- “Removing the Multilane Data Cable” on page 130
- “Installing the Multilane Data Cable” on page 132
- “Removing the Hard Drive Backplane” on page 134
- “Installing the Hard Drive Backplane” on page 137
- “Removing the Power Distribution Board” on page 141
- “Installing the Power Distribution Board” on page 143

Removing the Motherboard Fan Cage

Before You Begin

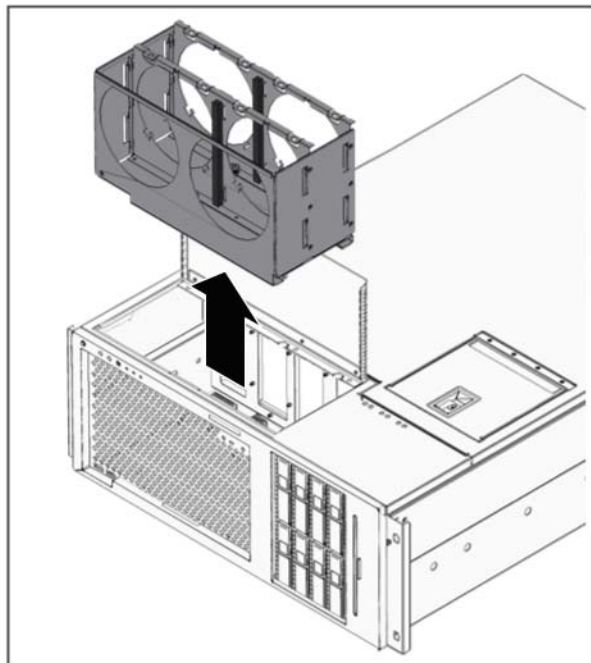
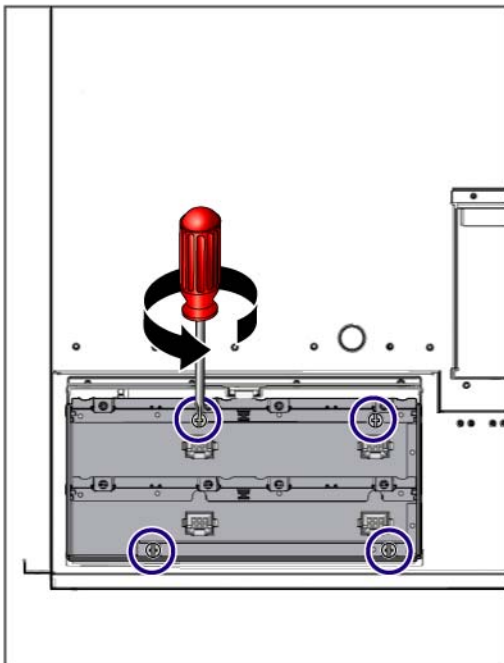
Note – You must power off the system and remove all four motherboard fan cages (labeled FT0, FT1, FT2, and FT3) before performing this procedure.

Complete the following:

- “Powering Off the System” on page 18
- “Sliding the Server Out of the Cabinet” on page 22
- “Avoiding Electrostatic Discharge” on page 41
- “Removing a Fan Tray” on page 47

What to Do

1. Loosen the four captive screws securing the fan cage to the floor of the chassis.



2. **Gently lift the fan cage up and out of the chassis.**

Note – The fan tray power cables are still connected to the motherboard.

Tilt the fan cage back and let it rest on top of the system.

3. **Disconnect the two fan tray power cables from J7803 and J7805 on the motherboard.**

Pinch the release tab to disconnect the plugs from the motherboard.

What Next

Complete this task:

- [“Installing the Motherboard Fan Cage” on page 115](#)

Installing the Motherboard Fan Cage

Before You Begin

Complete this task:

- [“Removing the Motherboard Fan Cage” on page 114](#)

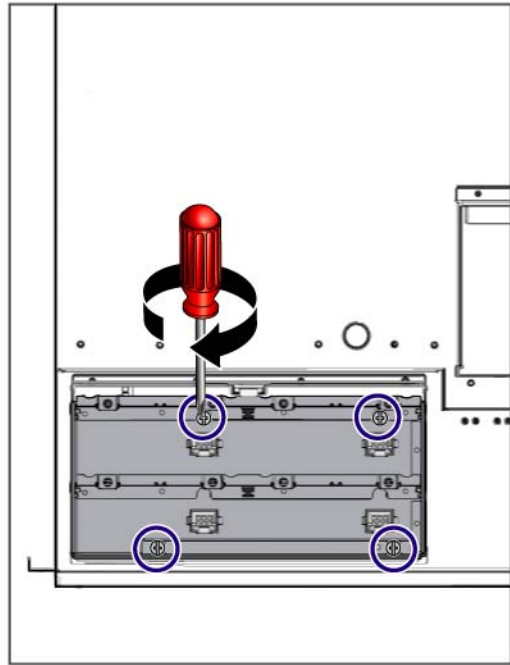
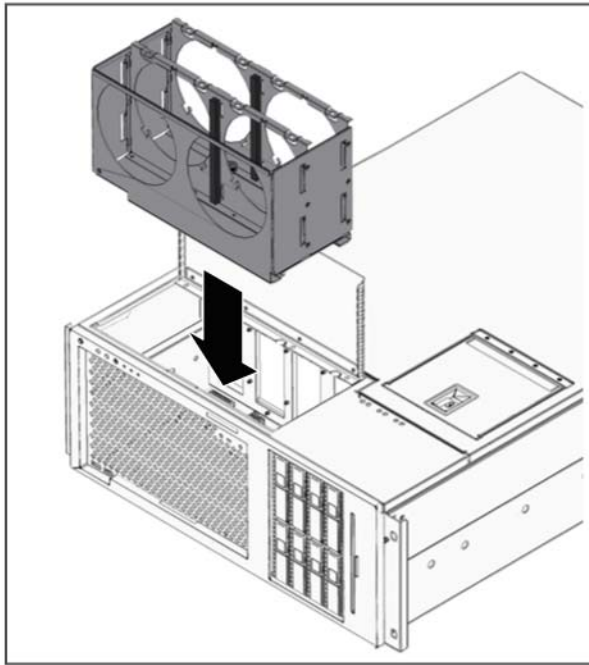
What to Do

1. **Connect the two fan tray cables to J7803 and J7805 on the motherboard.**

Press the connectors in until the locking tabs snap into place.

2. Lower the fan cage into the chassis.

Ensure the cables are routed behind the fan cage, and that the captive screws are positioned directly over the studs in the chassis.



3. Tighten the four captive screws securing the fan cage to the floor of the chassis.

What Next

Complete these tasks:

- [“Installing a Fan Tray” on page 49](#)
- [“Sliding the Server Into the Cabinet” on page 26](#)
- [“Powering On the System” on page 17](#)

Removing the Front I/O Board



Caution – The system supplies power to the front I/O board even when the system is powered off. To avoid personal injury or damage to the system controller card, you must disconnect the AC power cords before servicing the front I/O board.

Before You Begin

Note – You must remove all four motherboard fan trays (FT0, FT1, FT2, and FT3) before performing this procedure.

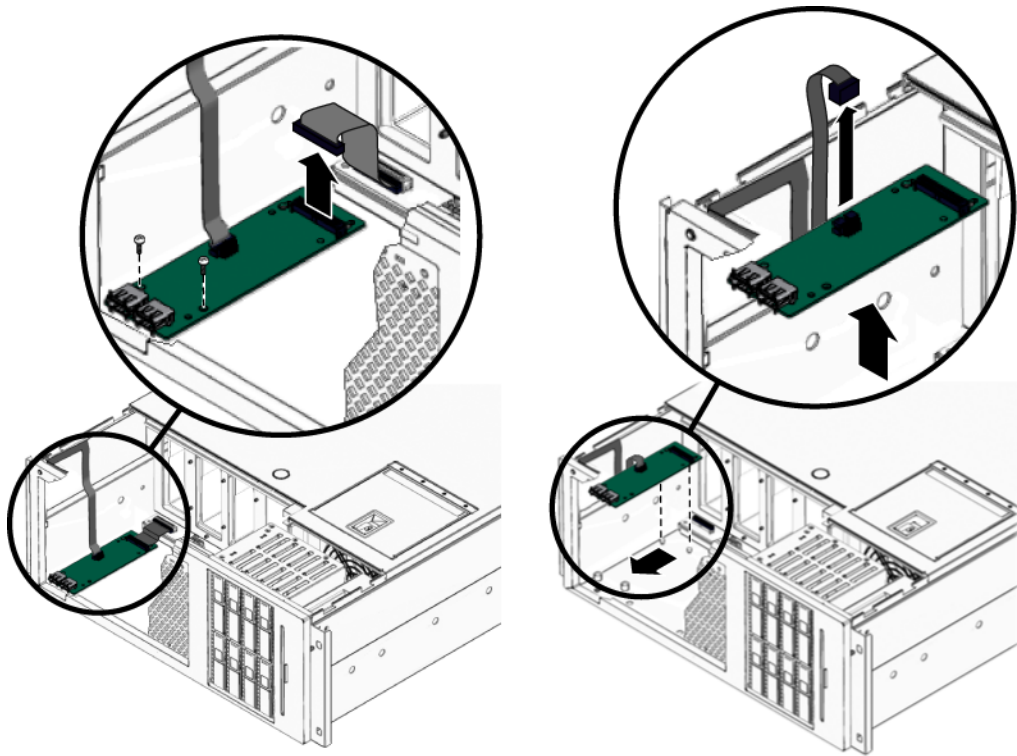
Complete the following tasks:

- [“Powering Off the System” on page 18](#)
- [“Sliding the Server Out of the Cabinet” on page 22](#)
- [“Avoiding Electrostatic Discharge” on page 41](#)
- [“Removing a Fan Tray” on page 47](#)
- [“Removing the Motherboard Fan Cage” on page 114](#)

What to Do

1. **Disconnect the I/O ribbon cable from the rear of the I/O board.**
2. **Remove the two Phillips No. 2 screws securing the I/O board to the floor of the chassis.**

3. Slide the I/O board back off its studs and lift it up.



4. Disconnect the front indicator board ribbon cable from J586 on the I/O board.
Place the I/O board on an antistatic mat.

What Next

Complete the following:

- [“Installing the Front I/O Board” on page 119](#)

Installing the Front I/O Board



Caution – The system supplies power to the front I/O board even when the system is powered off. To avoid personal injury or damage to the system controller card, you must disconnect the AC power cords before servicing the front I/O board.

Before You Begin

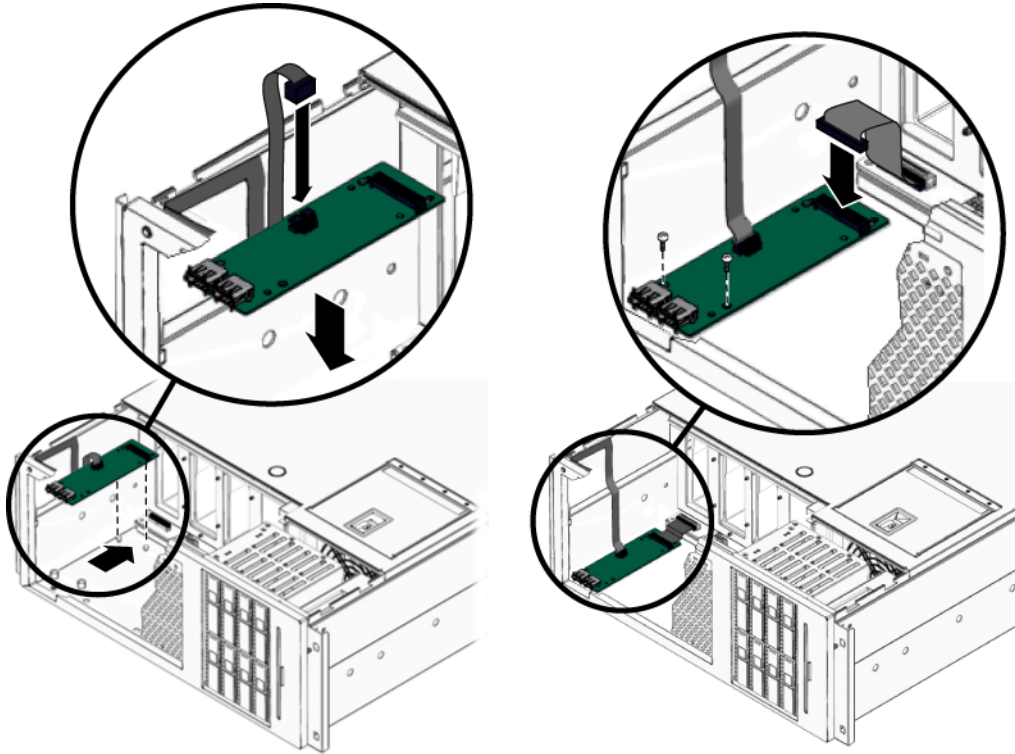
Complete the following:

- [“Removing the Front I/O Board” on page 117](#)

What to Do

1. **Connect the front indicator board ribbon cable to J586 on the I/O board.**

2. Place the I/O board on the mounting studs in the floor of the chassis and slide the I/O board forward.



3. Replace the two Phillips No. 2 screws securing the I/O board to the chassis.
4. Connect the I/O ribbon cable to the I/O board.

What Next

Complete the following:

- [“Installing the Motherboard Fan Cage” on page 115](#)
- [“Installing a Fan Tray” on page 49](#)
- [“Sliding the Server Into the Cabinet” on page 26](#)
- [“Powering On the System” on page 17](#)

Removing the Front Indicator Board

Before You Begin

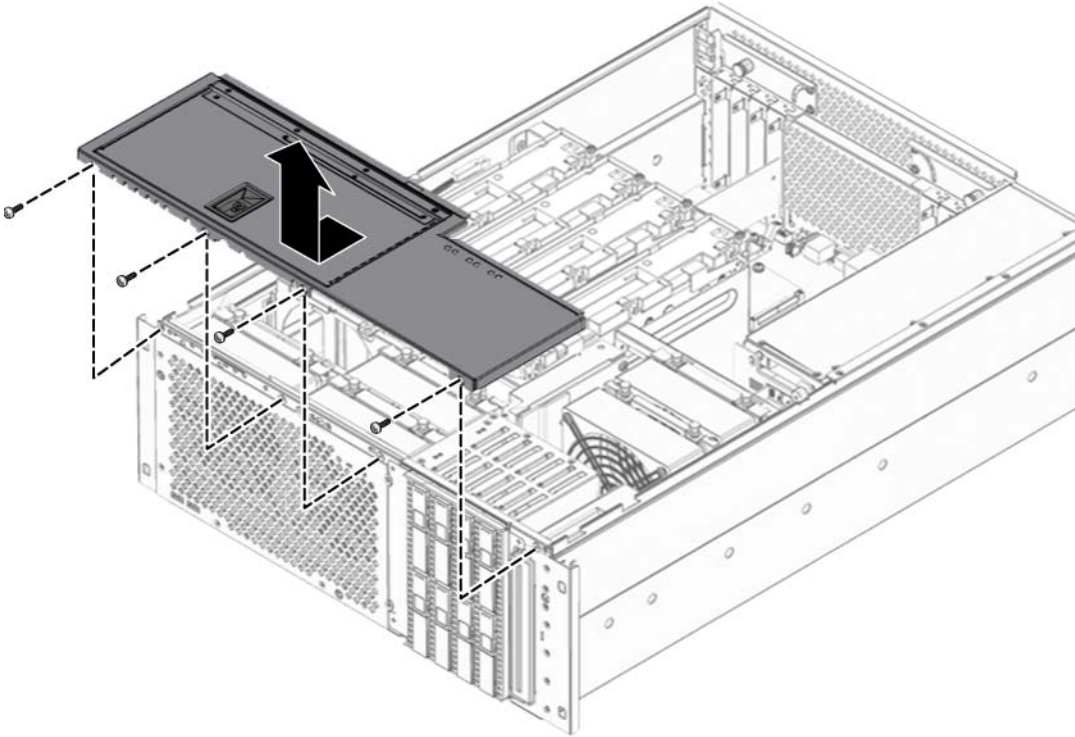
Complete the following tasks:

- “Powering Off the System” on page 18
- “Removing the Front Bezel” on page 70
- “Sliding the Server Out of the Cabinet” on page 22
- “Removing the Top Cover” on page 28
- “Avoiding Electrostatic Discharge” on page 41

What to Do

1. Remove the top front panel.

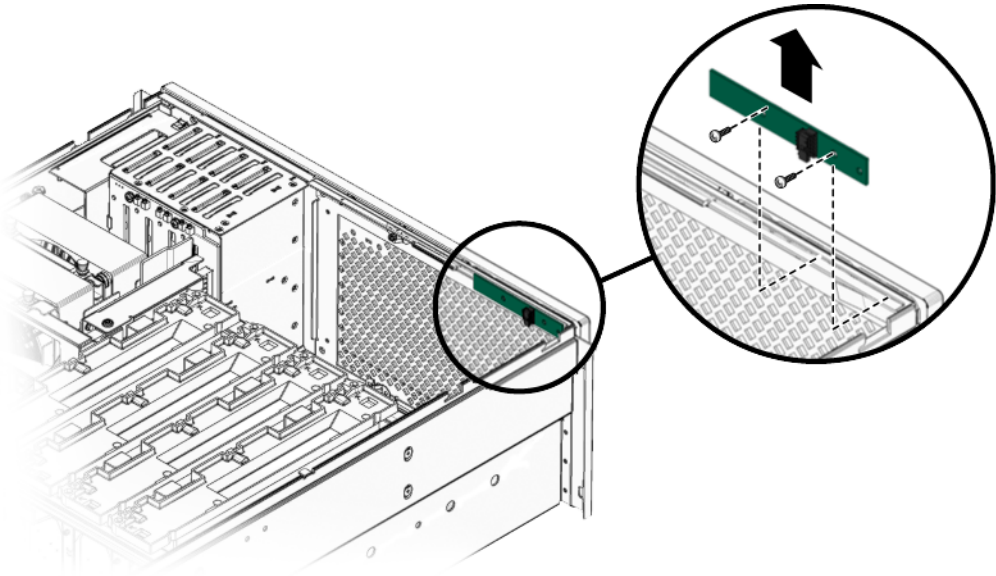
The front panel is secured with four No. 2 Phillips screws along its front edge.



2. Disconnect the indicator board cable from the I/O board and the side of the chassis.

The cable is secured to the inside of the chassis with a length of adhesive tape.

3. Remove the Phillips screws securing the indicator board to the chassis.



4. Lift the indicator board away from the front panel and out of the chassis.

What Next

- [“Installing the Front Indicator Board” on page 123](#)

Installing the Front Indicator Board

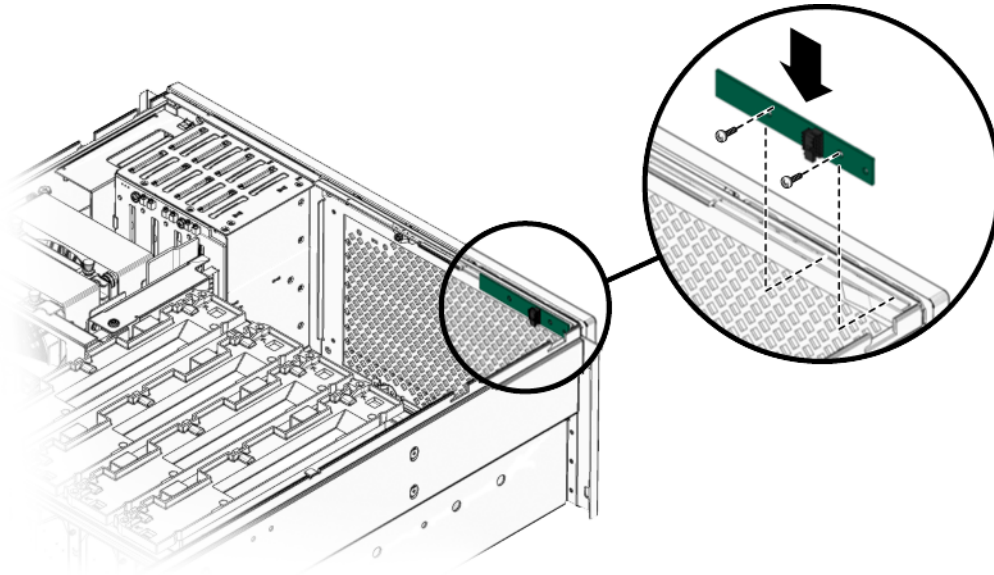
Before You Begin

Complete the following:

- [“Removing the Front Indicator Board” on page 121](#)

What to Do

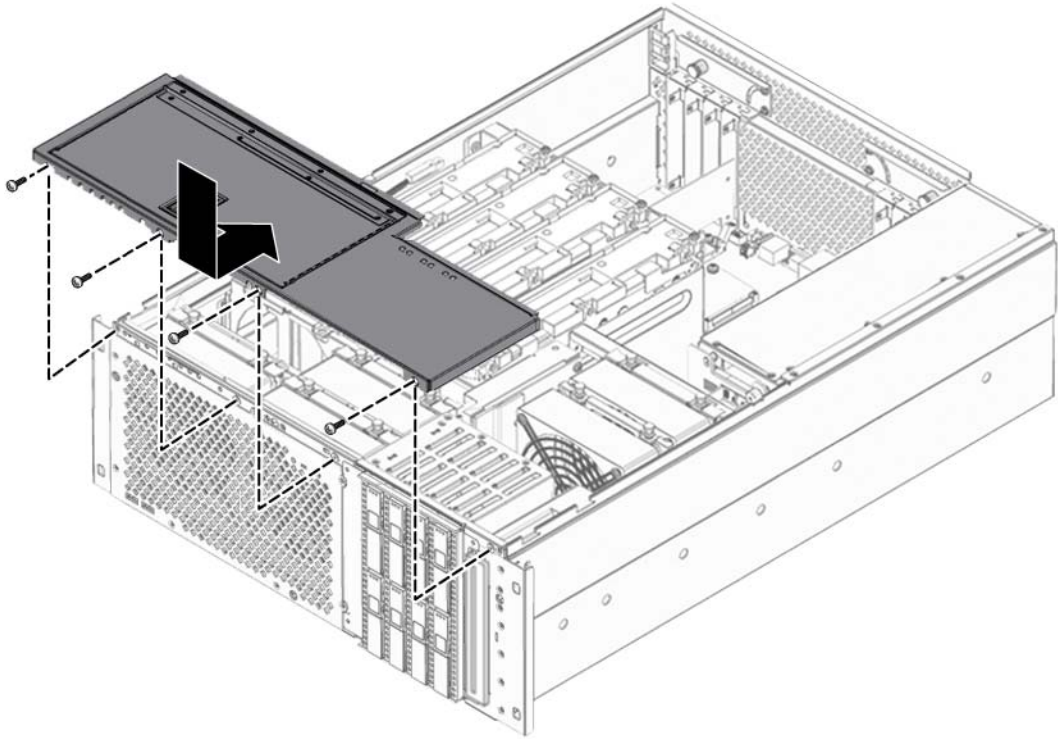
1. Fasten the front indicator board to the chassis using the two Phillips screws.



2. Connect the cable to the I/O board.
3. Secure the cable to the side of the chassis using a new piece of adhesive tape.
The tape is supplied with the new indicator board.

4. Install the top front panel.

The panel is secured with four No. 2 Phillips screws.



What Next

Complete the following:

- [“Installing the Top Cover” on page 29](#)
- [“Sliding the Server Into the Cabinet” on page 26](#)
- [“Installing the Front Bezel” on page 71](#)
- [“Powering On the System” on page 17](#)

About the Data Cable Connector Board/SAS Controller Configurations

The Sun Fire V445 server supports two configurations for the Multilane Data Cable Connector board and SAS controller; the standard configuration and the alternate configuration.

The standard configuration includes:

- SAS controller integrated into the motherboard
- One cable connecting the data cable connector board to the SAS controller connector on the motherboard

The alternate configuration includes:

- A separate SAS controller card, installed in PCI slot 5
- Two cables connecting the Data Cable Connector board to the SAS Controller board

Service information for the standard configuration is located in this chapter. Service information for the alternate configuration is located in [“Alternate Data Cable Connector Board/SAS Backplane Configuration”](#) on page 177.

Removing the Multilane Data Cable Connector Board

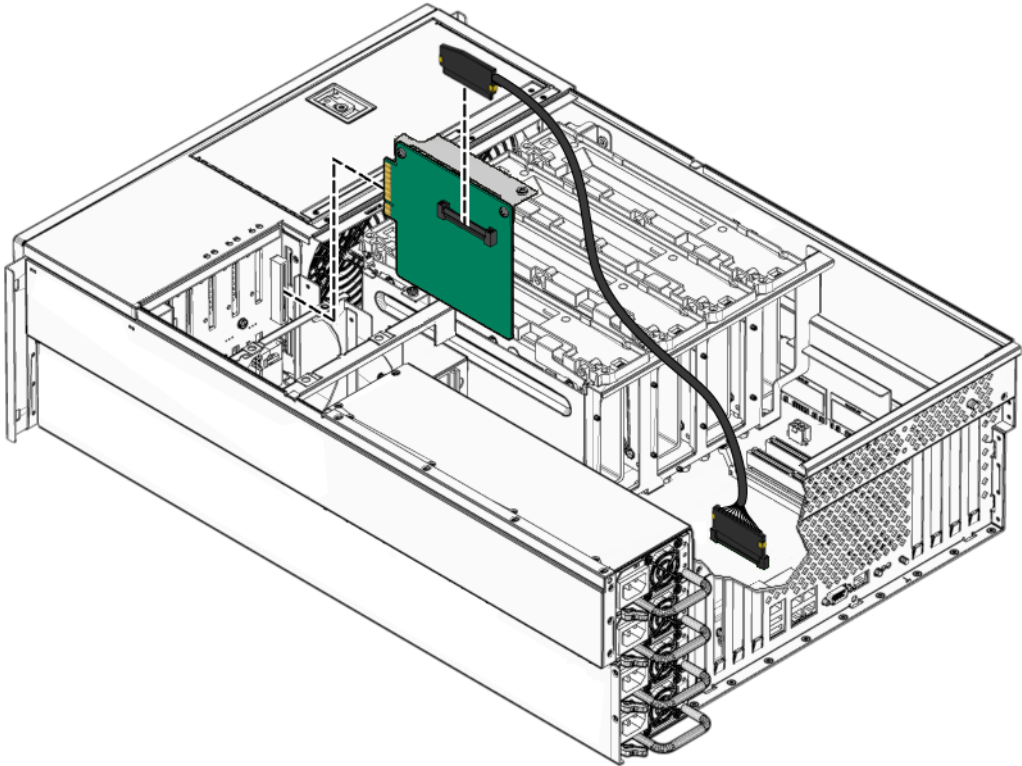
Before You Begin

Complete these tasks:

- [“Powering Off the System”](#) on page 18
- [“Sliding the Server Out of the Cabinet”](#) on page 22
- [“Avoiding Electrostatic Discharge”](#) on page 41
- [“Removing the Top Cover”](#) on page 28

What to Do

1. Remove the Phillips screw securing the connector board to the CPU/Memory module cage.
2. Lift the Connector board out of the chassis.



3. Disconnect the multilane data cable from the Connector board.
Press the ejector buttons to release the cable.
4. Set the Connector board aside on an antistatic mat.

What Next

Complete this task:

- [“Installing the Multilane Data Cable Connector Board” on page 128](#)

Installing the Multilane Data Cable Connector Board

Before You Begin

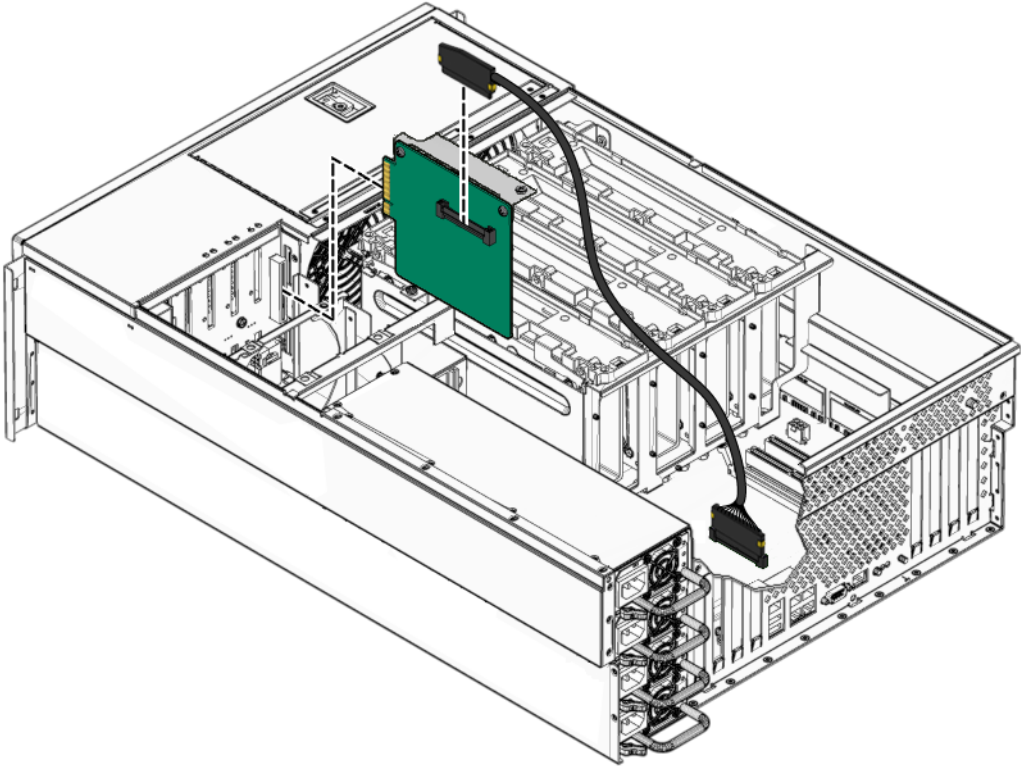
Complete this task:

- [“Removing the Multilane Data Cable Connector Board”](#) on page 126

What to Do

- 1. Connect the multilane data cable to the Connector board.**
Insert the connector until it snaps into place.

2. Insert the Connector board onto the SAS backplane.



3. Secure the Connector board by installing the Phillips screw.

What Next

To reassemble the system, complete these tasks:

- [“Installing the Top Cover” on page 29](#)
- [“Sliding the Server Into the Cabinet” on page 26](#)
- [“Powering On the System” on page 17](#)

Removing the Multilane Data Cable

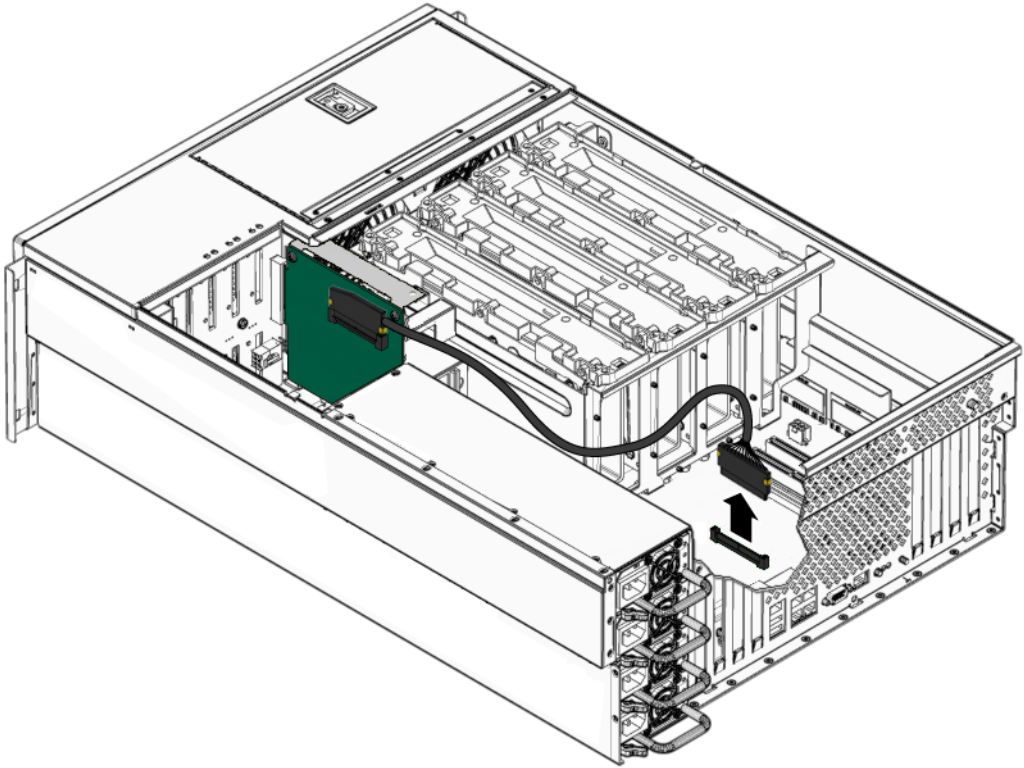
Before You Begin

Complete these steps:

- [“Powering Off the System” on page 18](#)
- [“Sliding the Server Out of the Cabinet” on page 22](#)
- [“Avoiding Electrostatic Discharge” on page 41](#)
- [“Removing the Top Cover” on page 28](#)
- [“Removing the Multilane Data Cable Connector Board” on page 126](#)

What to Do

1. **Gently remove the multilane data cable from its slot on the motherboard.**



2. Disconnect the cable from the connector board.

Press the ejector buttons to release the cable.

What Next

Complete this step:

- [“Installing the Multilane Data Cable” on page 132](#)

Installing the Multilane Data Cable

Before You Begin

Complete this step:

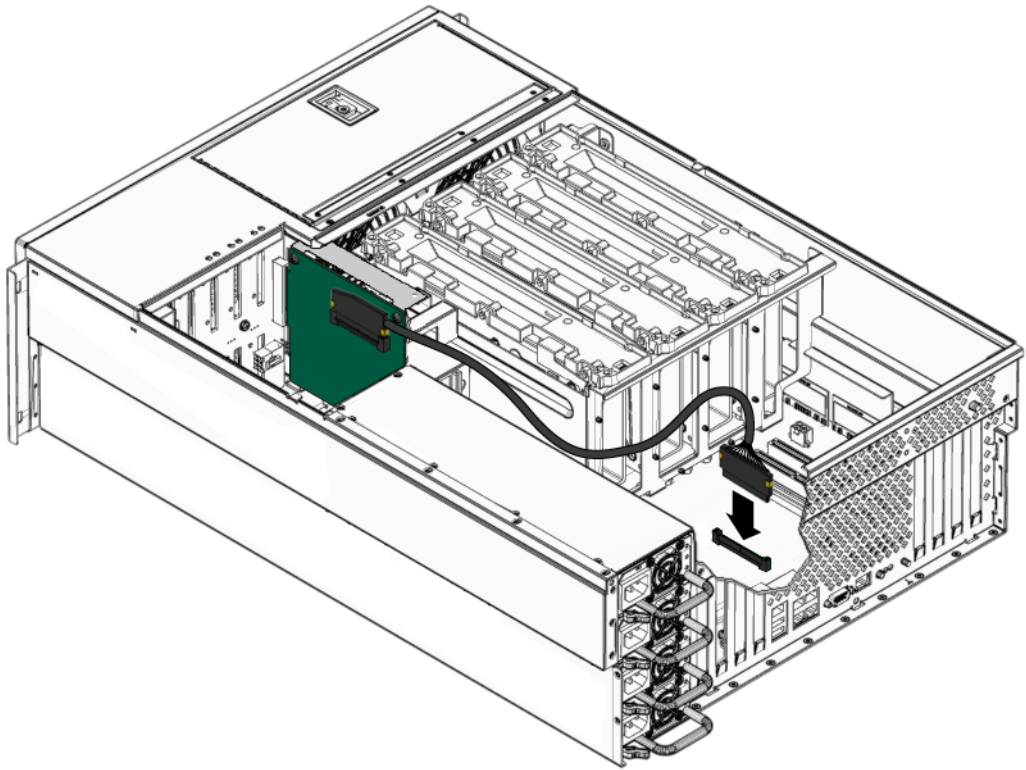
- [“Removing the Multilane Data Cable” on page 130](#)

What to Do

Complete these steps:

- 1. Connect the cable to its slot on the Connector board.**
- 2. Connect the cable to its connector on the motherboard.**

Press the cable end until it snaps into place.



What Next

Complete these steps:

- [“Installing the Multilane Data Cable Connector Board” on page 128](#)
- [“Installing the Top Cover” on page 29](#)
- [“Sliding the Server Into the Cabinet” on page 26](#)
- [“Powering On the System” on page 17](#)

Removing the Hard Drive Backplane

Before You Begin

Note – You must remove both hard drive fan trays (FT4 and FT5) and all hard drives before performing this procedure.

Complete these tasks:

- “Powering Off the System” on page 18
- “Removing the Front Bezel” on page 70
- “Sliding the Server Out of the Cabinet” on page 22
- “Avoiding Electrostatic Discharge” on page 41
- “Removing a Fan Tray” on page 47
- “Removing the Multilane Data Cable Connector Board” on page 126
- “Removing a Hard Drive” on page 51

What to Do



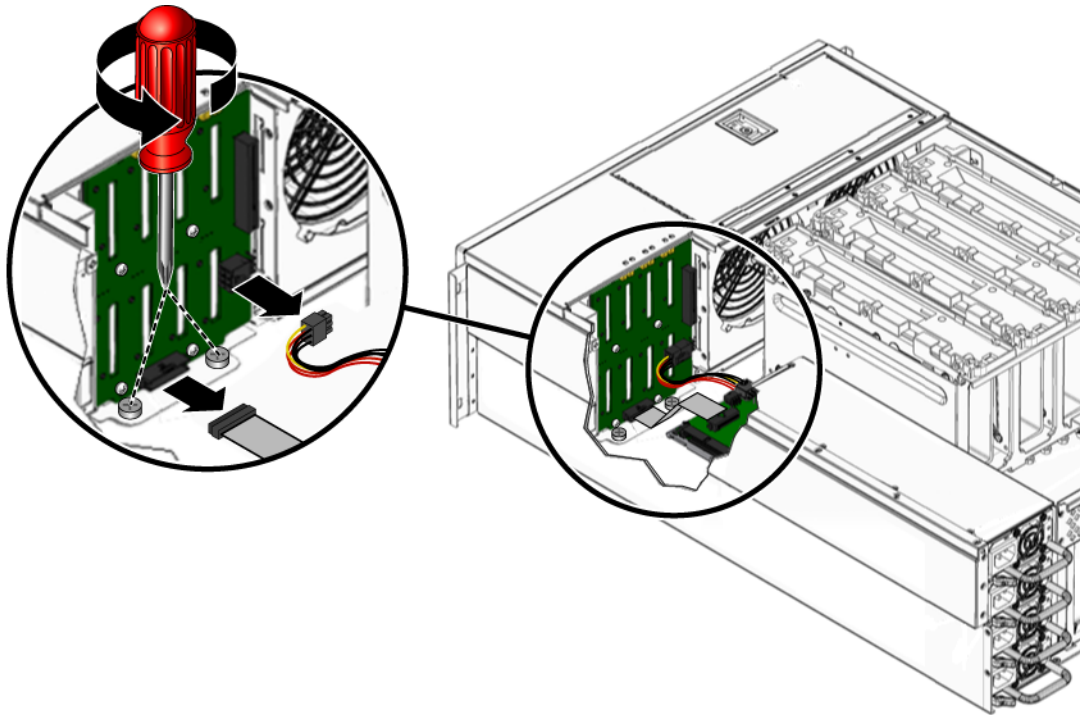
Caution – The system supplies power to the hard drive backplane even when the system is powered off. To avoid personal injury or damage to the system, you must disconnect the AC power cords before servicing the hard drive backplane.

1. Disconnect the data cable from the backplane.

Press the ejector tab to release the cable from its connector on the backplane.

2. Disconnect the power cable from the backplane.

Press the ejector tab to release the cable from its connector on the backplane.

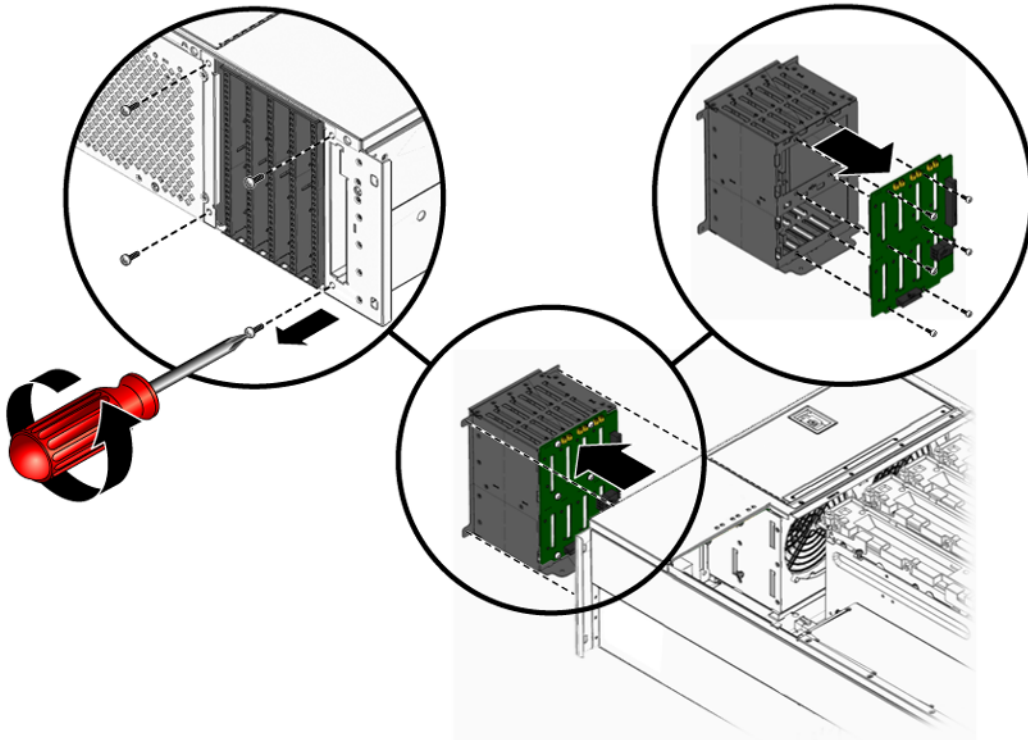


3. Loosen the two Phillips captive screws at the base of the hard drive backplane.

The two screws secure the back of the disk cage to the base of the chassis.

4. Remove the four Phillips screws securing the disk cage to the chassis front panel.

5. Slide the disk cage out of the front of the chassis.



6. Remove the six Phillips screws securing the hard drive backplane to the disk cage.
7. Place the backplane on an antistatic mat.

Note – Ensure you have enough slack in the cable to connect it to the backplane later during reassembly.

What Next

Complete this task:

- [“Installing the Hard Drive Backplane” on page 137](#)

Installing the Hard Drive Backplane

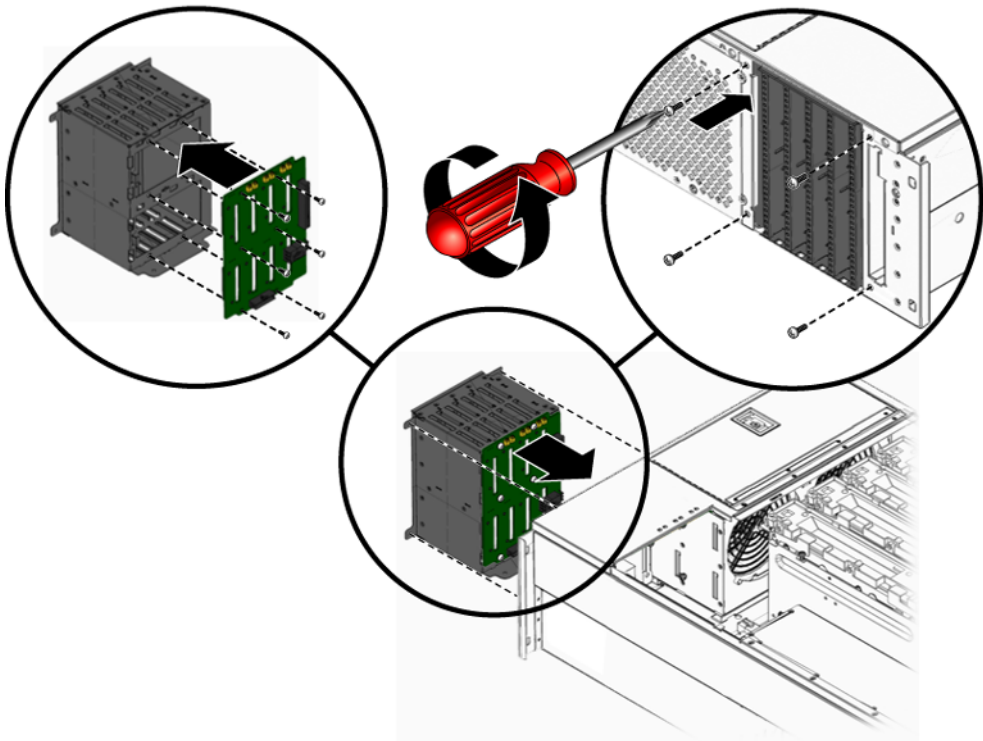
Before You Begin

Complete this task:

- [“Removing the Hard Drive Backplane” on page 134](#)

What to Do

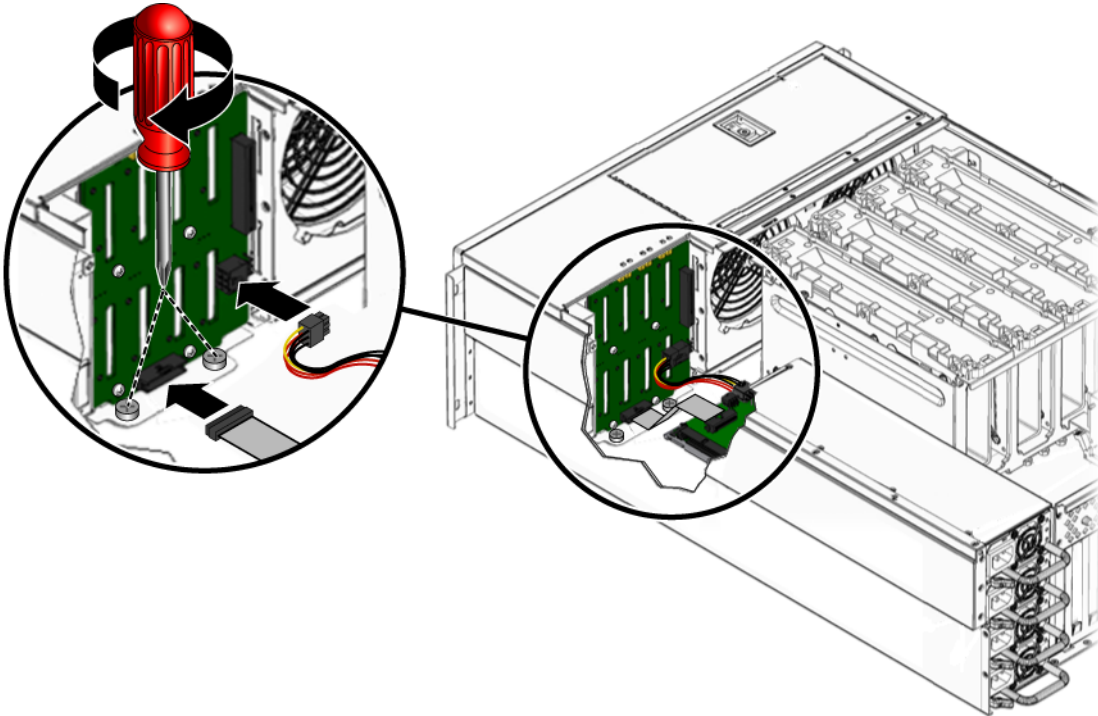
1. **Secure the backplane to the back of the disk cage using the six Phillips screws.**
Ensure that the ribbon connector is oriented along the bottom of the disk cage.



2. **Slide the disk cage in through the front of the chassis.**

3. **Connect the SAS backplane ribbon cable into its connector on the backplane.**
Press the cable in until the tab locks it into place.

Note – Ensure the SAS backplane ribbon cable is routed above the fan tray power cable.



4. **Connect the SAS backplane power cable into its connector on the backplane.**

Note – Ensure the SAS backplane power cable is routed above the fan tray power cable.

5. **Secure the front of the disk cage to the front panel using the four Phillips screws.**
6. **Secure the back of the disk cage to the floor of the chassis using the two captive Phillips screws.**

What Next

To reassemble the system, complete these tasks:

- “Installing the Multilane Data Cable Connector Board” on page 128
- “Installing a Hard Drive” on page 53
- “Installing a Fan Tray” on page 49
- “Sliding the Server Into the Cabinet” on page 26
- “Installing the Front Bezel” on page 71
- “Powering On the System” on page 17

Removing the DVD Backplane

Before You Begin

Complete the following tasks:

- “Powering Off the System” on page 18
- “Removing the Front Bezel” on page 70
- “Removing the Removable Media Drive” on page 71
- “Sliding the Server Out of the Cabinet” on page 22
- “Removing the Top Cover” on page 28
- “Avoiding Electrostatic Discharge” on page 41
- “Removing a Fan Tray” on page 47
- “Removing the Multilane Data Cable Connector Board” on page 126
- “Removing a CPU/Memory Module” on page 83
- “Removing a PCI Card” on page 62
- “Removing the CPU/Memory Module Bracket” on page 102

What to Do

- 1. Remove the captive screw securing the DVD backplane to the removable media drive bay.**
- 2. Disconnect the DVD data cable at J6101 on the motherboard.**
- 3. Lift the DVD backplane up and out of the system.**
Place the DVD backplane on an antistatic mat.

What Next

Complete the following:

- [“Installing the DVD Backplane” on page 140](#)

Installing the DVD Backplane

Before You Begin

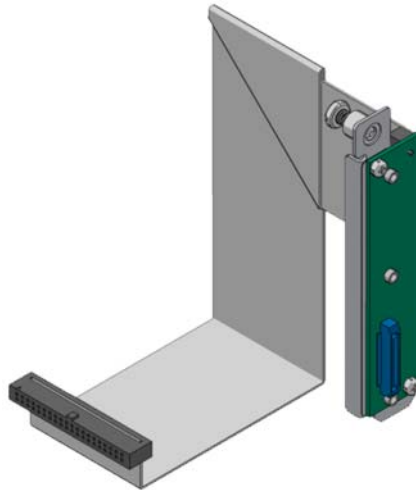
Complete the following task:

- [“Removing the DVD Backplane” on page 139](#)

What to Do

1. **Secure the DVD backplane to the removable media drive bay using the captive Phillips screw.**

Ensure the DVD backplane is oriented correctly.



2. **Connect the DVD cable into J6101 on the motherboard.**

What Next

Complete these tasks:

- “Installing the CPU/Memory Module Bracket” on page 104
- “Installing a PCI Card” on page 66
- “Installing a CPU/Memory Module” on page 86
- “Installing the Multilane Data Cable Connector Board” on page 128
- “Installing a Fan Tray” on page 49
- “Installing the Top Cover” on page 29
- “Sliding the Server Into the Cabinet” on page 26
- “Powering On the System” on page 17

Removing the Power Distribution Board

Before You Begin



Caution – Disconnect all power cords before performing this procedure.

Note – You must remove all four power supplies and both hard drive fan trays (FT4 and FT5) before performing this procedure.

Complete these tasks:

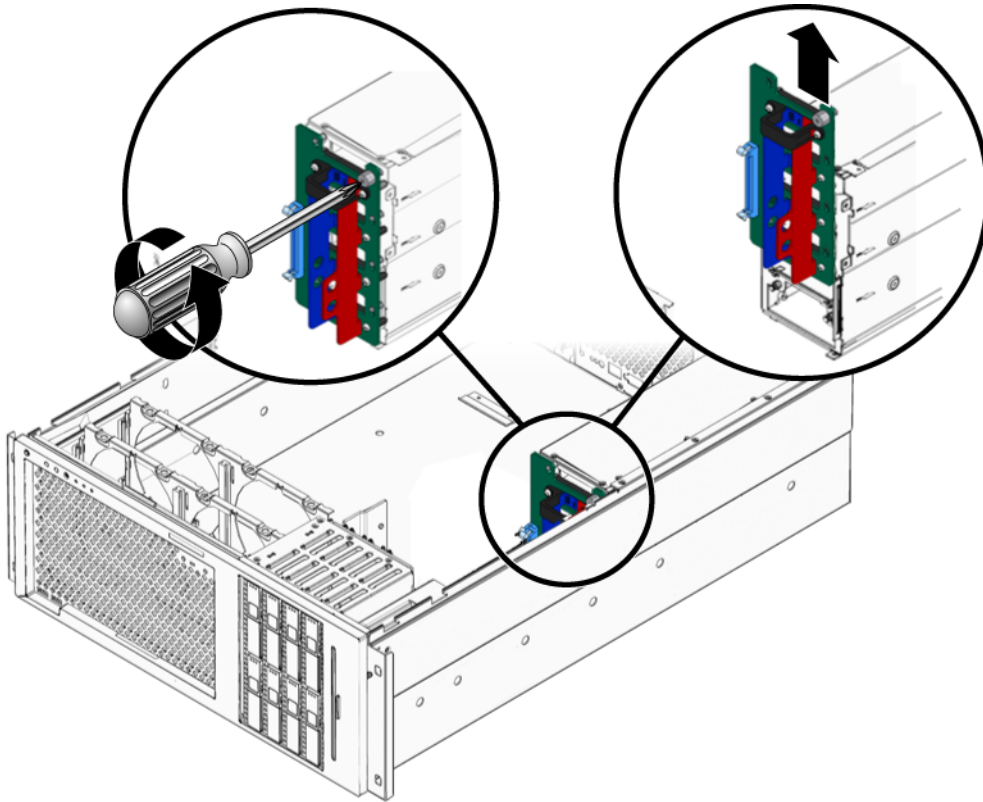
- “Removing the Server From the Cabinet” on page 30
- “Removing a Power Supply” on page 58
- “Removing the Top Cover” on page 28
- “Avoiding Electrostatic Discharge” on page 41
- “Removing a Fan Tray” on page 47
- “Removing a CPU/Memory Module” on page 83
- “Removing a PCI Card” on page 62
- “Removing the System Controller Card” on page 93
- “Removing the Multilane Data Cable Connector Board” on page 126
- “Removing the CPU/Memory Module Bracket” on page 102
- “Removing the Motherboard” on page 106

What to Do



Caution – The power distribution board is live regardless of system power state. To avoid serious injury or death, ensure that all power cords are disconnected and all four power supplies are removed before performing this procedure.

1. Loosen the captive screw securing the power distribution board to the power supply cage.



2. Slide the power distribution board up and off its retaining pins.
3. Lift the power distribution board up and out of the chassis.

What Next

Complete the following task:

- [“Installing the Power Distribution Board” on page 143](#)

Installing the Power Distribution Board

Before You Begin

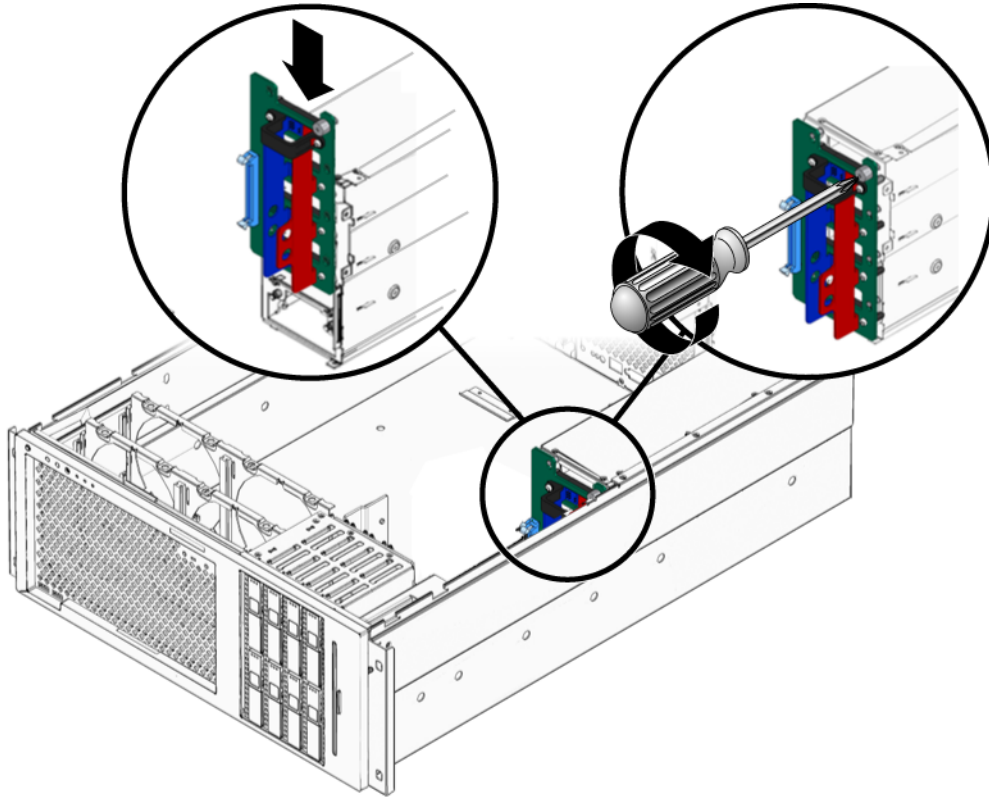
Complete the following task:

- [“Removing the Power Distribution Board” on page 141](#)

What to Do

- 1. Align the mounting holes on the power distribution board with the corresponding pins on the power supply cage.**

2. Slide the power distribution board down onto its mounting studs.



3. Tighten the Phillips captive screw on the power distribution board.

Note – Ensure the screw is secured tightly.

What Next



Caution – High Leakage Current. To prevent leakage current in excess of 3.5 mA, a maximum of two power cords can be connected to a single branch circuit. The remaining two power cords must be connected to a different branch circuit.

To reassemble the system, complete the following tasks:

- [“Installing the Motherboard” on page 109](#)
- [“Installing the CPU/Memory Module Bracket” on page 104](#)

- “Installing the System Controller Card” on page 96
- “Installing a PCI Card” on page 66
- “Installing a CPU/Memory Module” on page 86
- “Installing the Multilane Data Cable Connector Board” on page 128
- “Installing a Fan Tray” on page 49
- “Installing the Top Cover” on page 29
- “Installing the System Into the Cabinet” on page 36
- “Powering On the System” on page 17

Removing the Top Cover Interlock Switch

Before You Begin

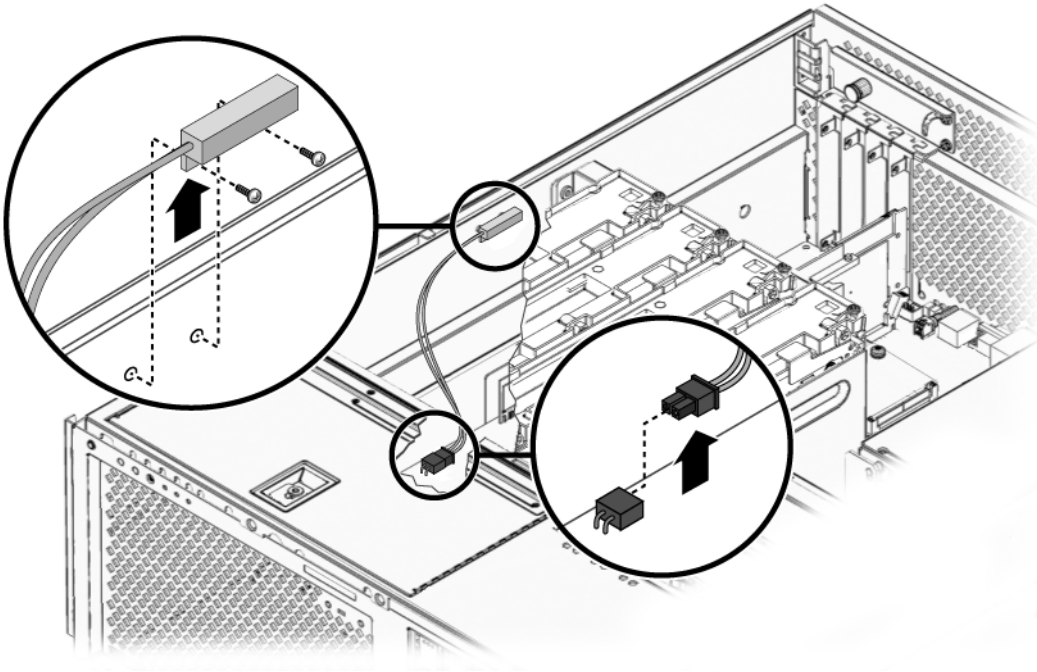
Complete these tasks:

- “Powering Off the System” on page 18
- “Sliding the Server Out of the Cabinet” on page 22
- “Avoiding Electrostatic Discharge” on page 41
- “Removing the Top Cover” on page 28
- “Removing a CPU/Memory Module” on page 83

Note – You must remove all four CPU/Memory modules in order to perform this procedure.

What to Do

1. **Disconnect the top cover interlock switch connector at J7301 on the motherboard.**



2. **Remove the two screws that secure the switch to the side of the chassis.**

What Next

Complete this task:

- [“Installing the Top Cover Interlock Switch” on page 147](#)

Installing the Top Cover Interlock Switch

Before You Begin

Complete this task:

- [“Removing the Top Cover Interlock Switch” on page 145](#)

What to Do

- 1. Replace the two screws which secure the top cover interlock switch to the side of the chassis.**
Ensure the switch is oriented correctly.
- 2. Install the switch connector into J7301 on the motherboard.**

What Next

Complete these tasks:

- [“Installing a CPU/Memory Module” on page 86](#)
- [“Installing the Top Cover” on page 29](#)
- [“Sliding the Server Into the Cabinet” on page 26](#)
- [“Powering On the System” on page 17](#)

Connector Pinouts

This appendix provides reference information about the system back panel ports and pin assignments.

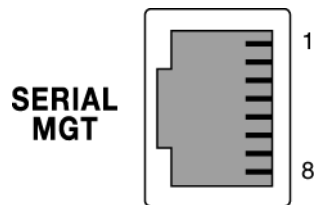
Topics covered in this appendix include:

- [“Reference for the Serial Management Port Connector” on page 150](#)
- [“Reference for the Network Management Port Connector” on page 151](#)
- [“Reference for the Serial Port Connector” on page 152](#)
- [“Reference for the USB Connectors” on page 153](#)
- [“Reference for the Gigabit Ethernet Connectors” on page 154](#)

Reference for the Serial Management Port Connector

The serial management connector (labeled SERIAL MGT) is an RJ-45 connector located on the back panel. This port is the default connection to the system console.

Serial Management Connector Diagram



Serial Management Connector Signals

For Serial Management connector signals, see [TABLE A-1](#).

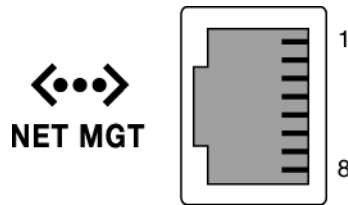
TABLE A-1 Serial Management connector signals

Pin	Signal Description	Pin	Signal Description
1	Request to Send	5	Ground
2	Data Terminal Ready	6	Receive Data
3	Transmit Data	7	Data Set Ready
4	Ground	8	Clear to Send

Reference for the Network Management Port Connector

The network management connector (labeled NET MGT) is an RJ-45 connector located on the ALOM card and can be accessed from the back panel. This port needs to be configured prior to use.

Network Management Connector Diagram



Network Management Connector Signals

For Network Management connector signals, see [TABLE A-2](#).

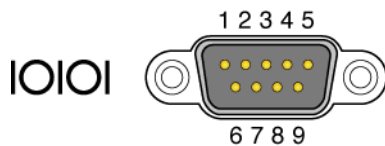
TABLE A-2 Network Management connector signals

Pin	Signal Description	Pin	Signal Description
1	Transmit Data +	5	Common Mode Termination
2	Transmit Data -	6	Receive Data -
3	Receive Data +	7	Common Mode Termination
4	Common Mode Termination	8	Common Mode Termination

Reference for the Serial Port Connector

The serial port connector (TTYB) is a DB-9 connector that can be accessed from the back panel.

Serial Port Connector Diagram



Serial Port Connector Signals

For serial port connector signals, see [TABLE A-3](#).

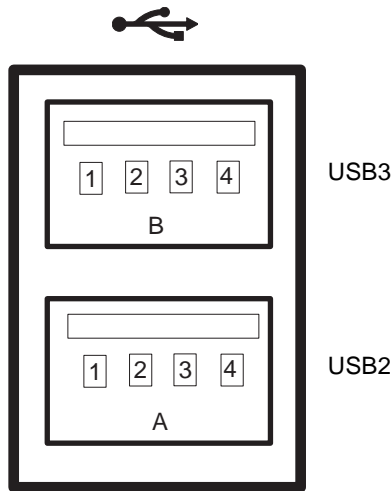
TABLE A-3 Serial port connector signals

Pin	Signal Description	Pin	Signal Description
1	Data Carrier Detect	6	Data Set Ready
2	Receive Data	7	Request to Send
3	Transmit Data	8	Clear to Send
4	Data Terminal Ready	9	Ring Indicate
5	Ground		

Reference for the USB Connectors

Two Universal Serial Bus (USB) ports are located on the motherboard in a double-stacked layout and can be accessed from the back panel.

USB Connector Diagram



USB Connector Signals

For USB connector signals, see [TABLE A-4](#).

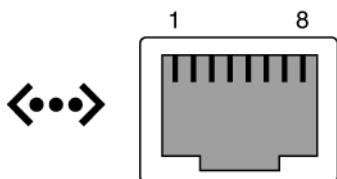
TABLE A-4 USB connector signals

Pin	Signal Description	Pin	Signal Description
A1	+5 V (fused)	B1	+5 V (fused)
A2	USB0/1-	B2	USB2/3-
A3	USB0/1+	B3	USB2/3+
A4	Ground	B4	Ground

Reference for the Gigabit Ethernet Connectors

Four RJ-45 Gigabit Ethernet connectors (NET0, NET1, NET2, NET3) are located on the system motherboard and can be accessed from the back panel. The Ethernet interfaces operate at 10 Mbit/sec, 100 Mbit/sec, and 1000 Mbit/sec.

Gigabit Ethernet Connector Diagram



Gigabit Ethernet Connector Signals

For Gigabit Ethernet connector signals, see [TABLE A-5](#).

TABLE A-5 Gigabit Ethernet connector signals

Pin	Signal Description	Pin	Signal Description
1	Transmit/Receive Data 0 +	5	Transmit/Receive Data 2 -
2	Transmit/Receive Data 0 -	6	Transmit/Receive Data 1 -
3	Transmit/Receive Data 1 +	7	Transmit/Receive Data 3 +
4	Transmit/Receive Data 2 +	8	Transmit/Receive Data 3 -

System Specifications

This appendix provides the following specifications for the Sun Fire V445 server:

- [“Reference for Physical Specifications” on page 156](#)
- [“Reference for Electrical Specifications” on page 157](#)
- [“Reference for Environmental Specifications” on page 158](#)
- [“Reference for Agency Compliance Specifications” on page 159](#)
- [“Reference for Clearance and Service Access Specifications” on page 159](#)

Reference for Physical Specifications

TABLE B-1 describes physical specifications for the system.

TABLE B-1 Physical specifications

Measurement	U.S.	Metric
Height	6.85 in	17.5 cm
Width	17.48 in	44.5 cm
Depth	25 in	64.4 cm
Weight:		
Minimum	70 lbs	31 kg
Maximum	82 lbs	37.2 kg
Power Cord	8.2 ft	2.5 m

Reference for Electrical Specifications

TABLE B-2 provides the electrical specifications for the system. All specifications pertain to a fully configured system operating at 50 Hz to 60 Hz.

TABLE B-2 Electrical Specifications

Parameter	Value
Input	
Nominal Frequencies	50 to 60 Hz
Nominal Voltage Range	100 to 240 VAC
Maximum Current AC RMS *	13.2 A @ 100 VAC 11 A @ 120 VAC 6.35 A @ 208 VAC 5.74 A @ 230 VAC
Output	
+12 VDC	0 to 45A
+3.3 VDC	0 to 3A
Maximum DC Output of 2 Power Supplies	1100 W @ 100 VAC to 240 VAC
Maximum AC Power Consumption	1320W for operation @ 100 VAC to 240 VAC (maximum configuration)
Maximum Heat Dissipation	4505 Btu/hr for operation @ 100 VAC to 240 VAC

* Refers to total input current required for four AC inlets when operating with all four power supplies or current required for a dual AC inlet when operating with the minimum of two power supplies.

Reference for Environmental Specifications

TABLE B-3 describes the operating and nonoperating environmental specifications for the system.

TABLE B-3 Environmental Specifications

Parameter	Value
Operating	
Temperature	5°C to 35°C (41°F to 195°F) noncondensing IEC 60068-2-1&2
Humidity	20% to 80% RH noncondensing; 27°C max wet bulb – IEC 60068-2-3&56
Altitude	Up to 3000 meters (10,000 feet) maximum ambient temperature is derated by 1°C per 500m above 500m– IEC 60068-2-13
Vibration (random)	0.0001 g ² /Hz, 5 to 150 Hz, -12db/octave slope 150 to 500 Hz
Shock	3.0 g peak, 11 milliseconds half-sine pulse – IEC 60068-2-27
Nonoperating	
Temperature	-40°C to 60°C (-40°F to 140°F) noncondensing – IEC 60068-2-1&2
Humidity	Up to 93% RH noncondensing; 38°C max wet bulb – IEC 60068-2-3&56
Altitude	0 to 12,000 meters (0 to 40,000 feet) – IEC 60068-2-13
Vibration	0.001 g ² /Hz, 5 to 150 Hz, -12db/octave slope 150 to 500 Hz
Shock	15.0 g peak, 11 milliseconds half-sine pulse; 1.0 inch roll-off front to back, 0.5 inch roll-off side to side – IEC 60068-2-27
Handling Drops	60 mm, 1 drop per corner, 4 corners – IEC 60068-2-31
Threshold Impact	0.85m/s, 3 impacts per caster, all 4 casters, 25 mm step-up – ETE 1010-01

Reference for Agency Compliance Specifications

For regulatory agency compliance specifications, see 819-3746, *Sun Fire V445 Server: Important Safety and Compliance Information*, published at <http://www.sun.com/documentation>.

Reference for Clearance and Service Access Specifications

TABLE B-4 describes minimum clearances needed for servicing the system.

TABLE B-4 Clearance and Service Access Specifications

Blockage	Required Clearance
Front of System	36 in (91.4 cm)
Back of System	36 in (91.4 cm)

Illustrated Parts Breakdown

This appendix contains a sequence of illustrations that show how the various pieces of the system fit together. Use the accompanying tables as a reference for identifying the parts and where they are described in this manual.

This illustrated parts breakdown is divided into the following sections:

- “Customer-Replacable Units” on page 162
- “Main Boards and Backplanes” on page 164
- “Miscellaneous Boards and Components” on page 166

Customer-Replacable Units

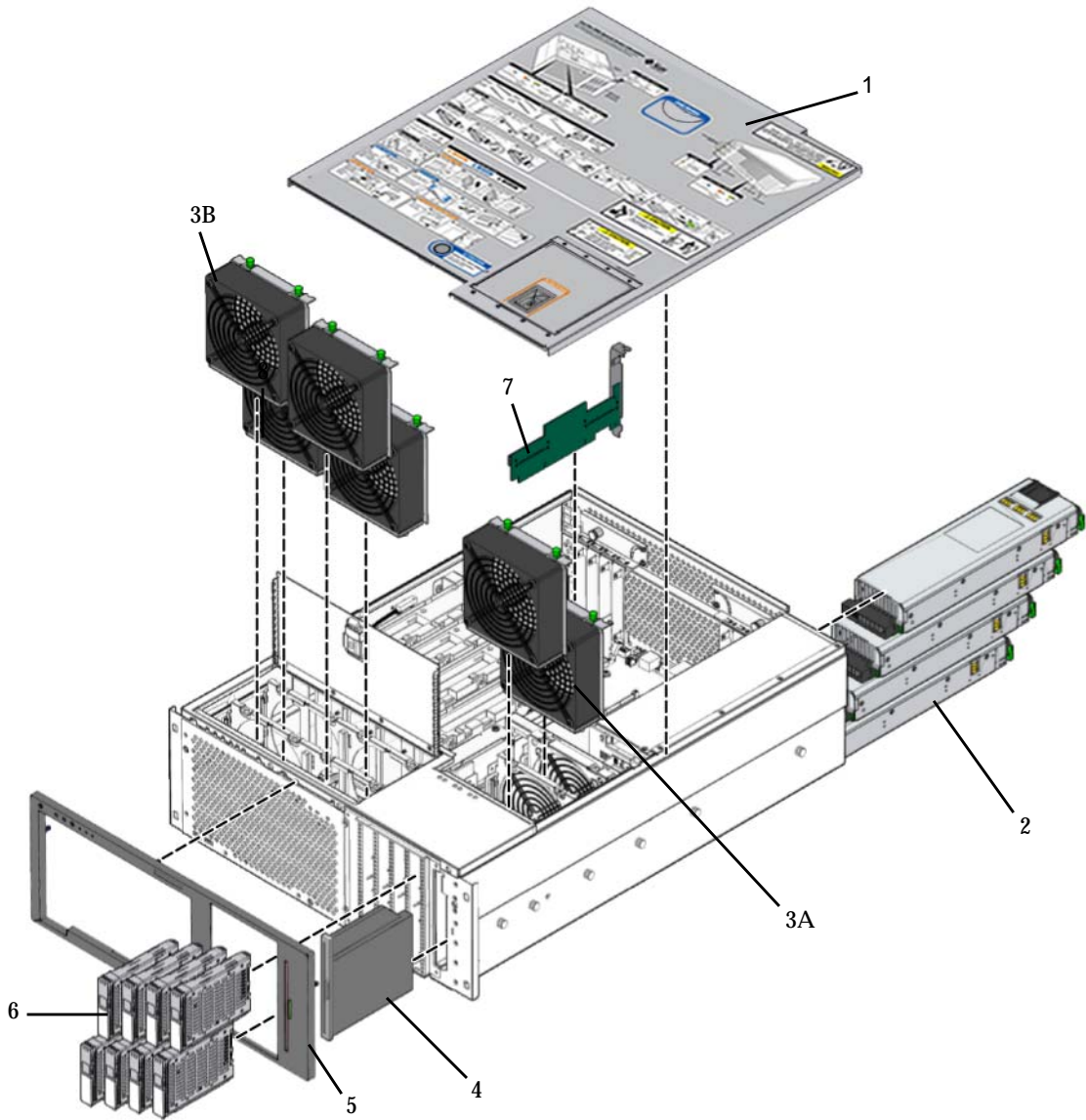


FIGURE C-1 Customer-Replacable Units

TABLE C-1 Customer Replacable Units (CRUs)

Reference number	Part name	Sections
1	Top cover	“Removing the Top Cover” on page 28 “Installing the Top Cover” on page 29
2	Power supplies	“About Hot-Pluggable and Hot-Swappable Components” on page 46 “Removing a Power Supply” on page 58 “Installing a Power Supply” on page 60 “Reference for Power Supply Status Indicators” on page 76
3A	Hard drive fan trays (FT4, FT5)	“About Hot-Pluggable and Hot-Swappable Components” on page 46 “About the Fan Trays” on page 46
3B	Motherboard fan trays (FT0, FT1, FT2, FT3)	“Removing a Fan Tray” on page 47 “Installing a Fan Tray” on page 49 “Reference for Fan Tray Status Indicators” on page 74
4	DVD drive	“Removing the Removable Media Drive” on page 71 “Installing the Removable Media Drive” on page 73
5	Front bezel	“Removing the Front Bezel” on page 70 “Installing the Front Bezel” on page 71
6	SAS hard drives	“About Hot-Pluggable and Hot-Swappable Components” on page 46 “Removing a Hard Drive” on page 51 “Installing a Hard Drive” on page 53 “Removing a Hard Drive Using a Hot-Plug Operation” on page 55 “Installing a Hard Drive Using the Hot-Plug Operation” on page 57 “Reference for Hard Drive Status Indicators” on page 75
7	PCI cards	“Removing a PCI Card” on page 62 “Installing a PCI Card” on page 66

Main Boards and Backplanes

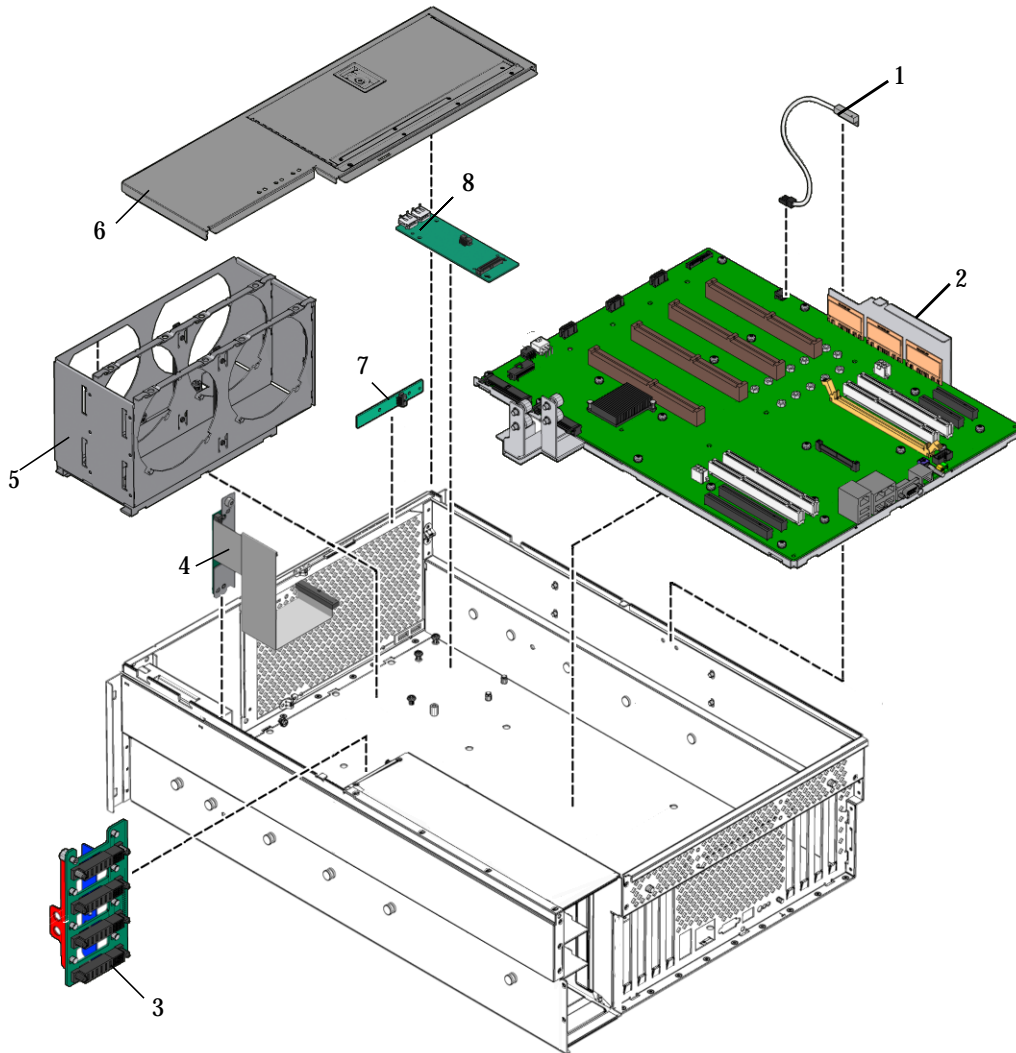


FIGURE C-2 Main Boards and Backplanes

TABLE C-2 Main Boards and Backplanes

Reference number	Part name	Sections
1	Top cover interlock switch	“Removing the Top Cover Interlock Switch” on page 145 “Installing the Top Cover Interlock Switch” on page 147
2	Motherboard	“Removing the Motherboard” on page 106 “Installing the Motherboard” on page 109
3	Power distribution board	“Removing the Power Distribution Board” on page 141 “Installing the Power Distribution Board” on page 143
4	DVD backplane	“Removing the DVD Backplane” on page 139 “Installing the DVD Backplane” on page 140
5	Motherboard fan cage	“Removing the Motherboard Fan Cage” on page 114 “Installing the Motherboard Fan Cage” on page 115
6	Top front cover	“Removing the Front Indicator Board” on page 121
7	Front indicator board	“Installing the Front Indicator Board” on page 123
8	Input/output (I/O) board	“Removing the Front I/O Board” on page 117 “Installing the Front I/O Board” on page 119

Miscellaneous Boards and Components

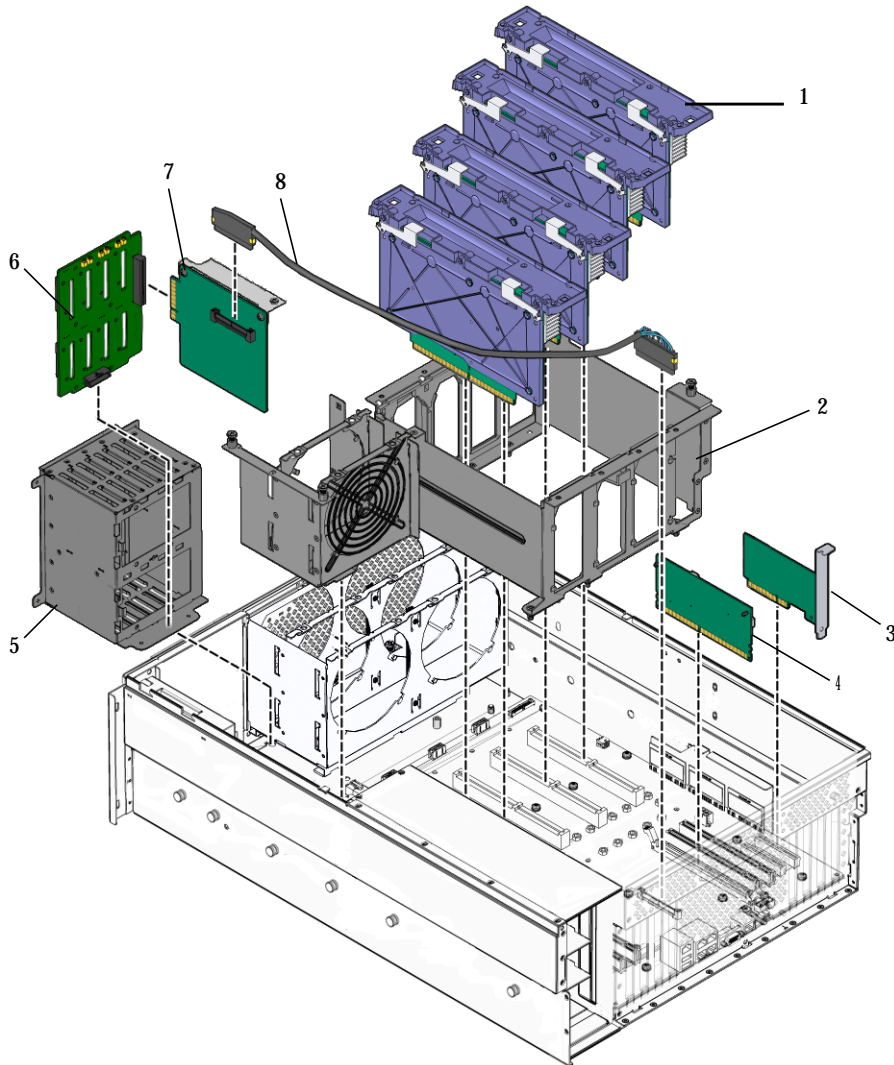


FIGURE C-3 Miscellaneous Boards and Components

TABLE C-3 Miscellaneous Boards and Components

Reference number	Part name	Sections
1	CPU/Memory module	“Removing a CPU/Memory Module” on page 83 “Installing a CPU/Memory Module” on page 86
	DIMM (not shown)	“About the DIMMs” on page 80 “Removing a DIMM” on page 89 “Installing a DIMM” on page 92
2	CPU/Memory module bracket	“Removing the CPU/Memory Module Bracket” on page 102 “Installing the CPU/Memory Module Bracket” on page 104
3	PCI card	“Removing a PCI Card” on page 62 “Installing a PCI Card” on page 66
4	System controller card	“Removing the System Controller Card” on page 93 “Installing the System Controller Card” on page 96
	IDPROM (not shown)	“Removing the IDPROM” on page 98 “Installing the IDPROM” on page 99
	System controller battery (not shown)	“Removing the System Controller Battery” on page 100 “Installing the System Controller Battery” on page 101
5	Disk cage	“Removing the Hard Drive Backplane” on page 134
6	Hard drive backplane	“Installing the Hard Drive Backplane” on page 137
7	Multilane data cable connector board	“Removing the Multilane Data Cable Connector Board” on page 126
		“Installing the Multilane Data Cable Connector Board” on page 128
8	Multilane data cable	“Removing the Multilane Data Cable” on page 130
		“Installing the Multilane Data Cable Connector Board” on page 128

Cable Routing and Board Connector Locations

This appendix describes cable connections, illustrates the connector locations on the system boards. It contains the following sections:

- “Cable Connections and Routing” on page 170
- “Motherboard Connectors” on page 171
- “Power Distribution Board Connectors” on page 172
- “Hard Drive Backplane Connectors” on page 173
- “Multilane Data Cable Connector Board Connector” on page 174
- “I/O Board Connectors” on page 175
- “Front Indicator Board Connectors” on page 175
- “Removable Media Cable/Backplane Connectors” on page 176

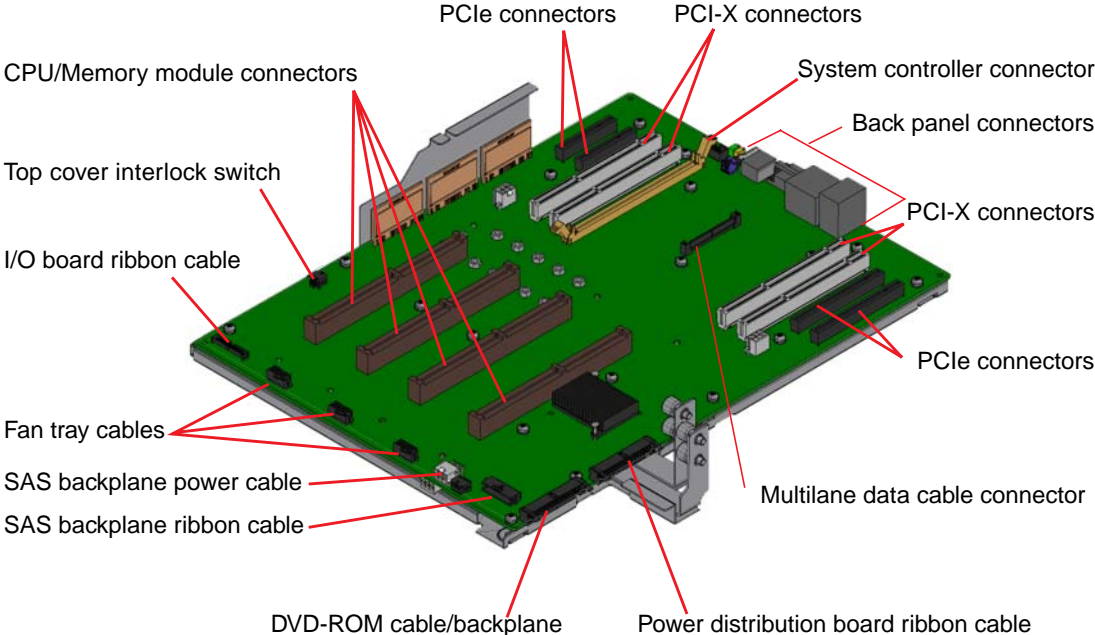
Cable Connections and Routing

Use the following table as a guide for connecting and routing system cables. Match cable ends with the corresponding board connectors.

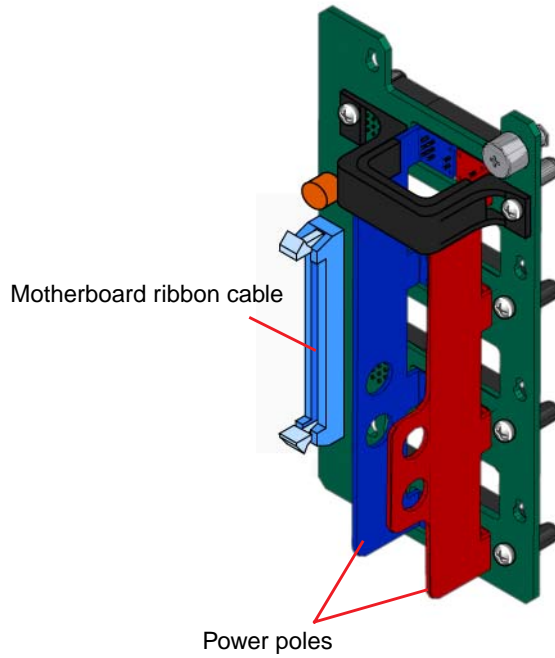
TABLE 0-1 Cable Connections and Routing

Cable Name and Part Number	Routed From	Routed To	Cable Management Notes
Power distribution board ribbon cable	Motherboard	Power distribution board	
DVD-ROM cable/backplane	Motherboard	DVD-ROM drive bay	Note orientation of DVD-ROM backplane.
SAS hard drive backplane ribbon cable	Motherboard	SAS backplane	Connect to backplane, then to motherboard.
SAS hard drive backplane power cable	Motherboard	SAS backplane	Connect to backplane, then to motherboard.
SAS hard drive fan tray cable	Motherboard	CPU/Memory module bracket	Route under SAS drive backplane cables. Note position and orientation of plugs on old cables. Ensure that new cable is positioned and oriented the same way on the CPU/Memory module bracket.
Motherboard fan tray cables (2)	Motherboard	Motherboard fan cage	Note position and orientation of plugs on old cable; ensure that new cable is positioned and oriented the same way on the fan cage.
I/O board ribbon cable	Motherboard	I/O board	
Front indicator panel cable	I/O board	Front indicator panel	
Top cover interlock switch	Motherboard	Chassis side panel	Secure connector behind its wire when removing or installing the motherboard.
SAS data cable (Standard SAS Configuration)	Motherboard	SAS data cable card	
SAS data cables (Alternate SAS Configuration)	SAS controller	SAS data cable card	Note connections. Secure under tab on rear of CPU/Memory module bracket.

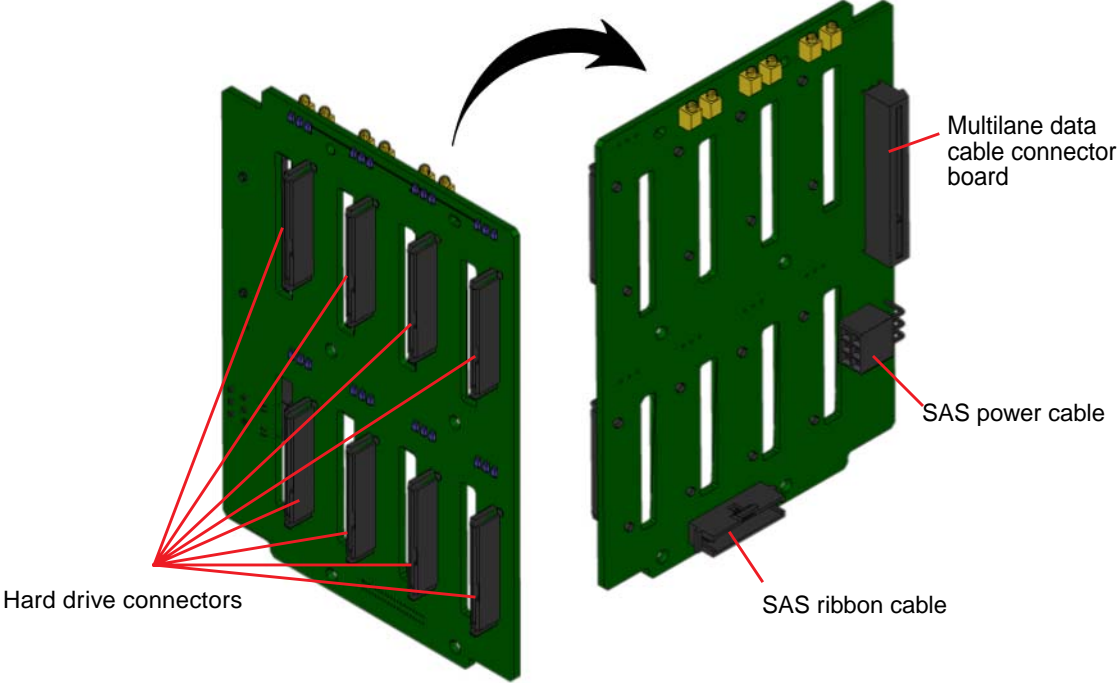
Motherboard Connectors



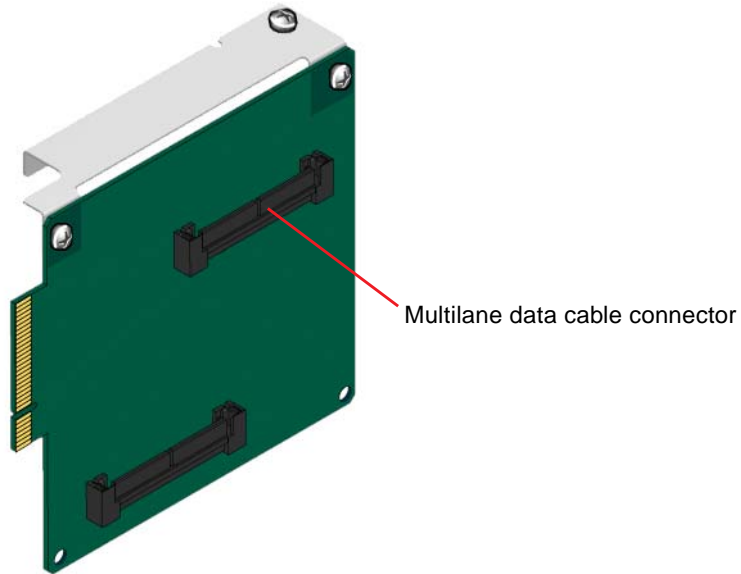
Power Distribution Board Connectors



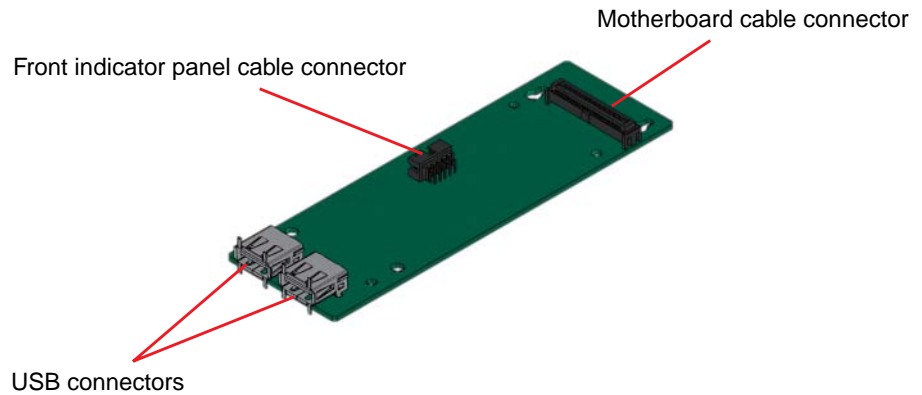
Hard Drive Backplane Connectors



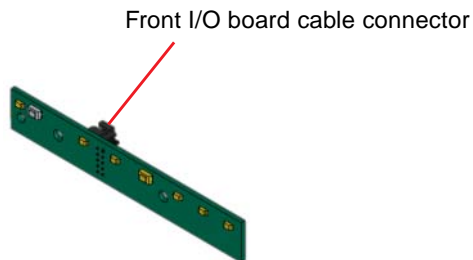
Multilane Data Cable Connector Board Connector



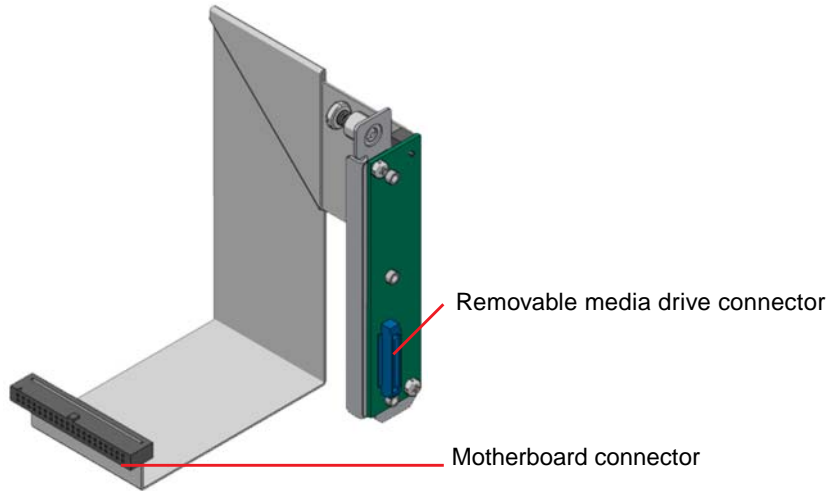
I/O Board Connectors



Front Indicator Board Connectors



Removable Media Cable/Backplane Connectors



Alternate Data Cable Connector Board/SAS Backplane Configuration

This appendix describes service procedures for the alternate Data Cable Connector Board/SAS Backplane configuration:

- [“Removing the Alternate Multilane Data Cable Connector Board” on page 178](#)
- [“Installing the Alternate Multilane Data Cable Connector Board” on page 180](#)
- [“Removing the Alternate Multilane Data Cables” on page 182](#)
- [“Installing the Alternate Multilane Data Cables” on page 183](#)

Removing the Alternate Multilane Data Cable Connector Board

Before You Begin

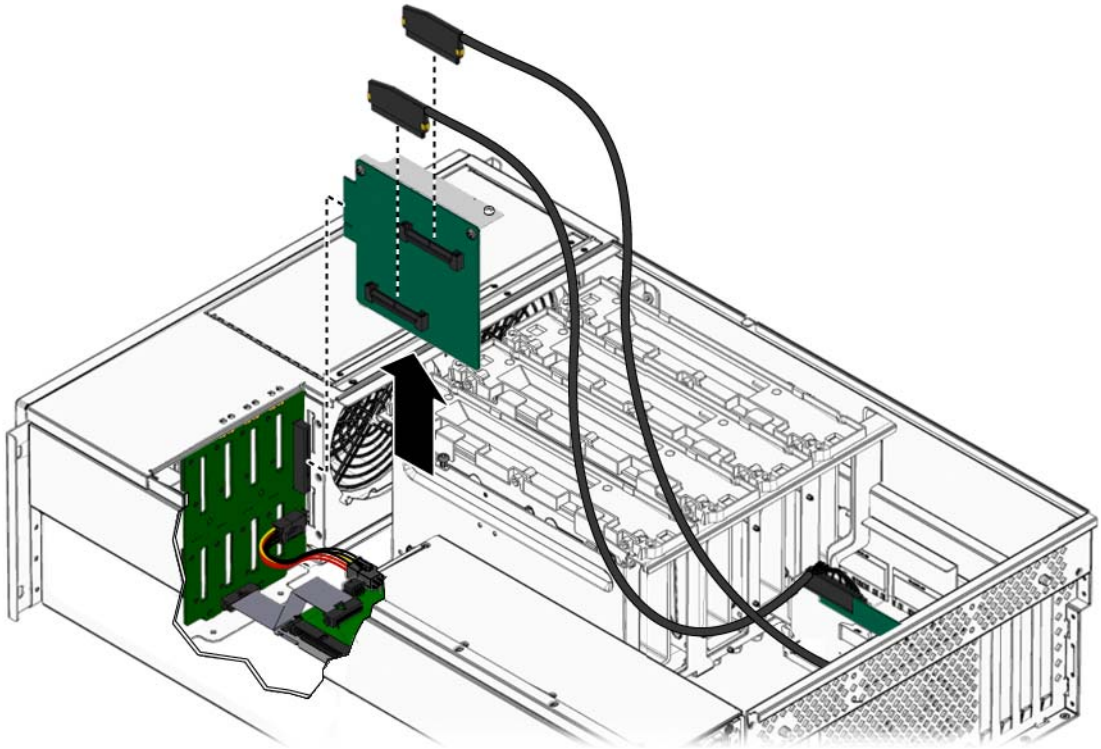
Complete these tasks:

- “Powering Off the System” on page 18
- “Sliding the Server Out of the Cabinet” on page 22
- “Removing the Top Cover” on page 28
- “Avoiding Electrostatic Discharge” on page 41

What to Do

1. **Remove the Phillips screw securing the connector board to the CPU/Memory module cage.**

2. Lift the connector board out of the chassis.



3. Disconnect the multilane data cables from the connector board.

Press the ejector buttons to release the cables.

4. Set the connector board aside on an antistatic mat.

What Next

Complete this task:

- “Installing the Alternate Multilane Data Cable Connector Board” on page 180

Installing the Alternate Multilane Data Cable Connector Board

Before You Begin

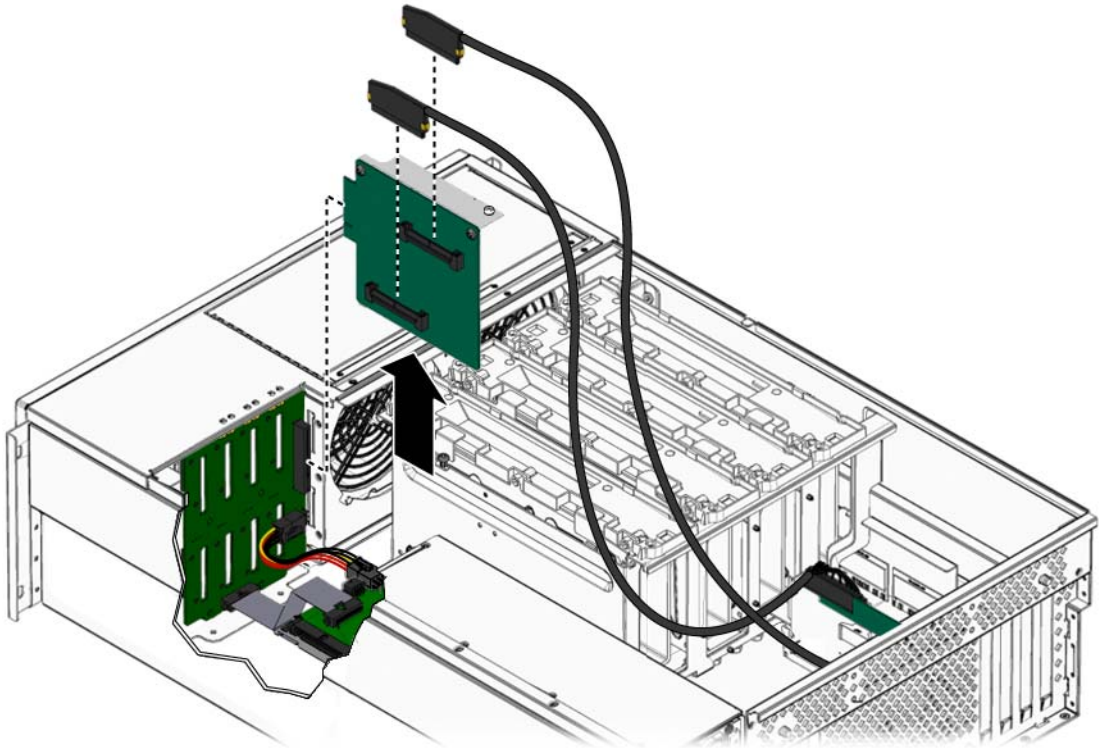
Complete this task:

- “Removing the Alternate Multilane Data Cable Connector Board” on page 178

What to Do

1. **Connect the multilane data cables to the connector board.**
2. Insert the connectors in until they snap into place.

3. Insert the connector board onto the SAS backplane.



4. Secure the connector board by installing the Phillips screw.

What Next

To reassemble the system, complete these tasks:

- “Installing the Top Cover” on page 29
- “Sliding the Server Into the Cabinet” on page 26
- “Powering On the System” on page 17

Removing the Alternate Multilane Data Cables

Before You Begin

Complete these steps:

- “Powering Off the System” on page 18
- “Sliding the Server Out of the Cabinet” on page 22
- “Removing the Top Cover” on page 28
- “Avoiding Electrostatic Discharge” on page 41
- “Removing the Alternate Multilane Data Cable Connector Board” on page 178

What to Do

1. **Note the cable positions and how they are plugged to the SAS controller.**
You must reconnect the cables into the correct connectors during reassembly.
2. **Gently remove the multilane data cables from their slot on the CPU/Memory module cage.**
3. **Disconnect the cables from the SAS controller.**
Press the ejector buttons to release the cables.

What Next

Complete this step:

- “Installing the Alternate Multilane Data Cables” on page 183

Installing the Alternate Multilane Data Cables

Before You Begin

Complete this step:

- “Removing the Alternate Multilane Data Cables” on page 182

What to Do

Complete these steps:

- 1. Connect the cables to their connectors on the SAS controller.**

Press the cable ends until they snap into place.

Note – You must connect the data cables into the correct connectors on the SAS controller and the multilane data cable connector board.

- 2. Route the cables into their slot on the CPU/Memory module cage.**

What Next

Complete these steps:

- “Installing the Alternate Multilane Data Cable Connector Board” on page 180
- “Installing the Top Cover” on page 29
- “Sliding the Server Into the Cabinet” on page 26
- “Powering On the System” on page 17

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