Sun Fire™ 880 Server Service Manual

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Regulatory Compliance Statements

Your Sun product is marked to indicate its compliance class:

- Federal Communications Commission (FCC) — USA
- Industry Canada Equipment Standard for Digital Equipment (ICES-003) — Canada
- Voluntary Control Council for Interference (VCCI) — Japan
- Bureau of Standards Metrology and Inspection (BSMI) — Taiwan

Please read the appropriate section that corresponds to the marking on your Sun product before attempting to install the product.

For important safety precautions to follow when installing or servicing this system, please see "Safety Precautions" on page 369.

FCC Class A Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Shielded Cables: Connections between the workstation and peripherals must be made using shielded cables to comply with FCC radio frequency emission limits. Networking connections can be made using unshielded twisted-pair (UTP) cables.

Modifications: Any modifications made to this device that are not approved by Sun Microsystems, Inc. may void the authority granted to the user by the FCC to operate this equipment.

FCC Class B Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Shielded Cables: Connections between the workstation and peripherals must be made using shielded cables in order to maintain compliance with FCC radio frequency emission limits. Networking connections can be made using unshielded twisted pair (UTP) cables.

Modifications: Any modifications made to this device that are not approved by Sun Microsystems, Inc. may void the authority granted to the user by the FCC to operate this equipment.

ICES-003 Class A Notice - Avis NMB-003, Classe A

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

ICES-003 Class B Notice - Avis NMB-003, Classe B

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

VCCI 基準について

クラス A VCCI 基準について

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BSMI Class A Notice

The following statement is applicable to products shipped to Taiwan and marked as Class A on the product compliance label.

警告使用者：
這是甲類的資訊產品，在居住的環境中使用
時，可能會造成射頻 干擾，在這種情況下，
使用者 會被要求採取某些適當的對策。

Declaration of Conformity

Compliance Model Number:	880
Product Family Name:	Sun Fire 880

EMC

European Union

This equipment complies with the following requirements of the EMC Directive 89/336/EEC:

EN55022:1998/CISPR22:1997			Class A
EN55024:1998	Required Limits (as applicable):		
		EN61000-4-2	4 kV (Direct), 8 kV (Air)
		EN61000-4-3	3 V/m
		EN61000-4-4	1.0 kV AC Power Lines, 0.5 kV Signal and DC Power Lines
		EN61000-4-5	1 kV AC Line-Line and Outdoor Signal Lines
			2 kV AC Line-Gnd, 0.5 kV DC Power Lines
		EN61000-4-6	3 V
		EN61000-4-8	1 A/m
		EN61000-4-11	Pass
EN61000-3-2:1995 + A1, A2, A14			Pass
EN61000-3-3:1995			Pass

Safety

This equipment complies with the following requirements of the Low Voltage Directive 73/23/EEC:

EC Type Examination Certificates:

EN60950:1992, 2nd Edition, Amendments 1, 2, 3, 4, 11	TÜV Rheinland Certificate No. S2071517.01
IEC 950:1991, 2nd Edition, Amendments 1, 2, 3, 4	CB Scheme Certificate No. US/5013/UL
Evaluated to all CB Countries	

Supplementary Information

This product was tested and complies with all the requirements for the CE Mark.

Burt Hemp May 5, 2001
Manager, Product Compliance

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Contents

Preface

The *Sun Fire 880 Server Service Manual* provides detailed procedures that describe the removal, installation, and replacement of serviceable parts and options in the Sun Fire™ 880 server. This service manual also includes information about diagnostics and maintenance of the system. This book is written for technicians, system administrators, qualified Sun™ service providers, and advanced computer system end users who have experience troubleshooting and replacing server hardware.

This manual presents information in a modular format designed to answer the type of questions that you might ask while servicing the Sun Fire 880 server. Typically, the modules cover specific tasks for a service-related procedure for a specific component.

Service providers who would like more general information about the system should refer to the appropriate chapter or section in the *Sun Fire 880 Server Owner's Guide.*

How This Book Is Organized

The chapters in this manual contain a series of related service tasks. Using the table of contents or the task list on the first page of each chapter, you can quickly find the procedure you need to perform a specific task. The procedures for the tasks are brief; however, they are interrelated and often refer to other modules in the book. For instance, the procedure "Replacing the Motherboard" is related to many tasks covered by other modules. You must perform these requisite tasks before or after replacing the motherboard.

This book is divided into eight chapters and appendixes.

- Chapter 1 describes the tasks that you need to perform before or after each service procedure.
- Chapter 2 explains tasks related to components on the motherboard side of the system.
- Chapter 3 describes tasks related to components on the input/output (I/O) board side of the system.
- Chapter 4 provides information about tasks related to various subassemblies in the system.
- Chapter 5 explains tasks related to storage devices.
- Chapter 6 describes tasks related to system backplanes and cables.
- Chapter 7 provides configuration information for various parts of the system.
- Chapter 8 details the diagnostic tools and troubleshooting procedures for the system.
- The appendixes provide information about field-replaceable units (FRUs), system LEDs, connector pinouts, system specifications, and safety precautions.

Using UNIX Commands

This document may not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices. See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris™ operating environment

Typographic Conventions

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

Shell Prompts

Shell	Prompt
C shell	*machine-name*`%`
C shell superuser	*machine-name*`#`
Bourne shell and Korn shell	`$`
Bourne shell and Korn shell superuser	`#`

Related Documentation

Application	Title
Installation	*Sun Fire 880 Server Rackmounting Guide* *Installation Instructions for Solaris* *Solaris (SPARC Platform Edition) Installation Guide* *Solaris (SPARC Platform Edition) Installation Release Notes* *Solaris Sun Hardware Platform Guide* *Solaris Installation Guide* *Solaris Advanced Installation Guide*
Owner's Guide	*Sun Fire 880 Server Owner's Guide*
Late-Breaking Information	*Sun Fire 880 Server Product Notes* *Solaris Release Notes* *Solaris Release Notes Supplement for Sun Hardware*
System Diagnostics	*SunVTS User's Guide* *SunVTS Test Reference Manual* *SunVTS Quick Reference Card*
System Management	*Sun Management Center Software User's Guide* *Sun Management Center Software Release Notes* *Sun Management Center Supplement for Workgroup Servers*
System Administration	*Solaris System Administrator AnswerBook* *Solaris Handbook for Sun Peripherals* *Platform Notes: The eri FastEthernet Device Driver* *Platform Notes: The Sun GigabitEthernet Device Driver* *Platform Notes: Using luxadm Software* *Sun Fire 880 Dynamic Reconfiguration User's Guide* *OpenBoot 4.x Command Reference Manual* *OpenBoot 4.x Quick Reference* *OpenBoot 4.x Supplement for PCI*
Remote System Monitoring and Control	*Sun Remote System Control (RSC) User's Guide*

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A broad selection of Sun System documentation is located at:

`http://www.sun.com/products-n-solutions/hardware/docs`

A complete set of Solaris documentation and many other titles are located at:

`http://docs.sun.com`

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Please include the part number (806-6597-11) of your document in the subject line of your email.

CHAPTER 1

Preparing to Service the System

This chapter tells you what you need to know about preparing for and completing service procedures.

Note – Except for removing and installing power supplies and disk drives, this system must be serviced by qualified service personnel.

Please be sure to keep the following guidelines in mind:

- Internal disk drives and certain qualified PCI cards are hot-pluggable. For more information about hot-plugging, see "About Hot-Pluggable and Hot-Swappable Components" on page 7.
- All redundant power supplies and fan trays feature a hot-swap capability. You can remove and replace a power supply or faulty fan tray without shutting down the operating system or turning off the system power. For additional details, see "About Hot-Pluggable and Hot-Swappable Components" on page 7.
- For the servicing of any other parts internal to the system, you must first power off the system. See "How to Power Off the System" on page 5.

The following tasks are covered in this chapter:

The following information is also included:

How to Power On the System

Before You Begin

Note – 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 these circumstances, see "How to Initiate a Reconfiguration Boot" on page 11.

What to Do

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

Caution – Before you power on the system, make sure that the front and side doors and all plastic outer panels are properly installed.

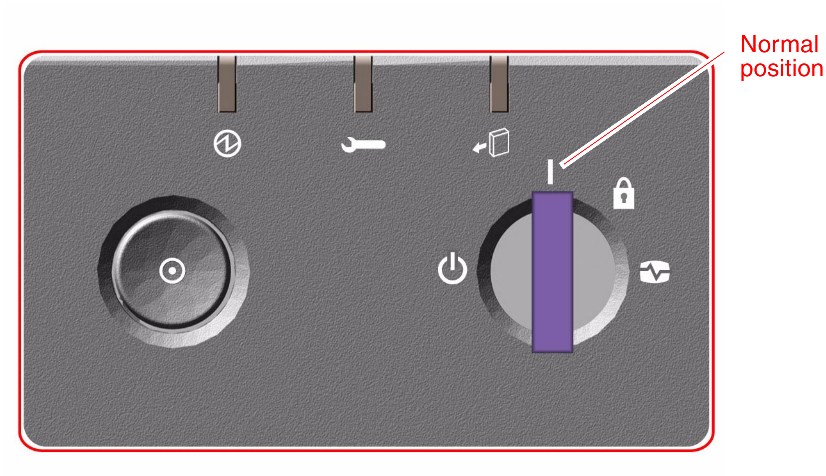
1. **Turn on power to any peripherals and external storage devices.**

   Read the documentation supplied with the device for specific instructions.

2. **Turn on power to the ASCII terminal or local graphics console (if present).**

3. **Insert the system key into the front panel keyswitch and turn it to the Normal or Diagnostics position.**

   See "About Power Button and Keyswitch Settings" on page 14 for information about each keyswitch setting.



4. **Press the Power button to the left of the keyswitch to power on the system.**

Note – The system may take anywhere from 30 seconds to two 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.

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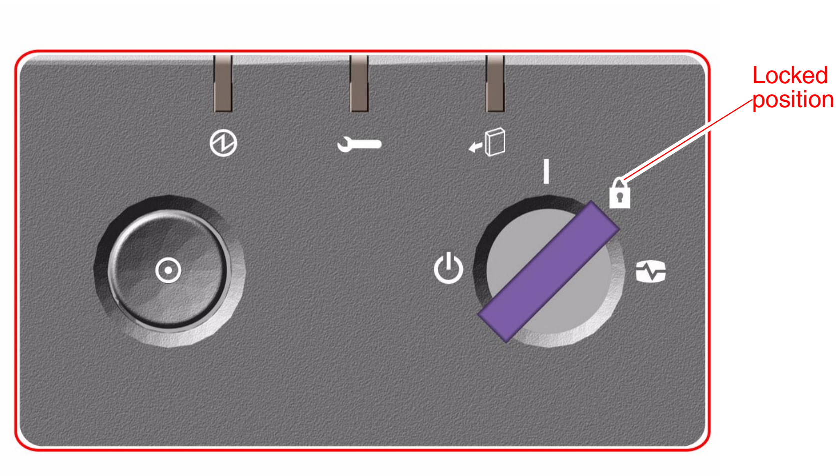
5. **Turn the keyswitch to the Locked position.**

   This prevents anyone from accidentally powering off the system.



6. **Remove the key from the keyswitch and keep it in a secure place.**

What Next

The system's front panel LED indicators provide power-on status information. For more information about the system LEDs, see "About Front Panel LEDs" on page 342.

If your system encounters a problem during system startup, and the keyswitch is in the Normal position, try restarting the system in the Diagnostics mode to determine the source of the problem. Turn the front panel keyswitch to the Diagnostics position and power cycle the system. See:

- "How to Power Off the System" on page 5
- "How to Power On the System" on page 2

How to Power Off the System

What to Do

1. **Notify users that the system will be powered down.**
2. **Back up the system files and data, if necessary.**
3. **Ensure that the front panel keyswitch is in the Normal or Diagnostics position.**
4. **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 five seconds causes an immediate hardware shutdown. Whenever possible, you should use the graceful shutdown method. Forcing an immediate hardware shutdown may cause disk drive corruption and loss of data. Use this method only as a last resort.

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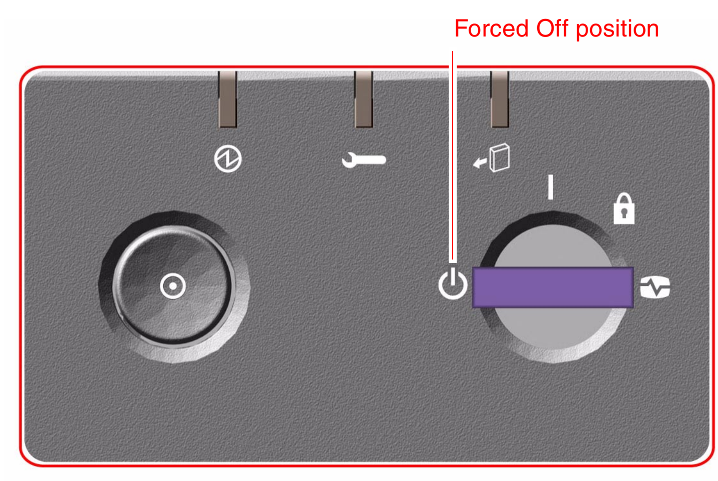
5. **Wait for the front panel Power/OK LED to turn off.**
6. **Turn the keyswitch to the Forced Off position.**



Caution – Be sure to turn the keyswitch to the Forced Off position before handling any internal components. Otherwise, it is possible for a user to restart the system remotely while you are working inside it. The Forced Off position is the only keyswitch position that prevents an RSC user from restarting the system.

7. **Remove the key from the keyswitch and keep it in a secure place.**

About Hot-Pluggable and Hot-Swappable Components

Sun Fire 880 systems feature a variety of hot-pluggable and hot-swappable components. *Hot-pluggable* components are components that you can install or remove while the system is running, without affecting the rest of the system's capabilities. However, in many cases, you must prepare the operating system prior to the hot-plug event by performing certain system administration tasks. Hot-pluggable components that require no such preparation are called *hot-swappable* components. These components can be removed or inserted at any time without preparing the operating system in advance. While all hot-swappable components are hot-pluggable, not every hot-pluggable component is hot-swappable.

Sun Fire 880 hot-pluggable components fall into three basic groups:

- Fan trays and power supplies
- Disk drives
- PCI cards

Each group is discussed in more detail in the sections that follow.

Note – PCI and disk hot-plug operations are not supported when the system `ok` prompt is displayed. You can only perform these hot-plug operations while the operating system is running.

Caution – The RSC card is *not* a hot-pluggable component. Before installing or removing an RSC card, you must power off the system and disconnect all AC power cords.

Fan Trays and Power Supplies

Sun Fire 880 fan trays and power supplies are hot-swappable—they can be removed or inserted at any time without requiring prior software preparations. Keep in mind that a power supply is not considered hot-swappable unless it is part of an N+1 redundant power configuration—a system configured with the optional third power supply. Do not remove a power supply from a working system if its removal would leave the system with fewer than two working power supplies.

Unlike other hot-pluggable devices, you can install or remove a power supply or fan tray while the system is operating at the `ok` prompt. However, in the case of the power supply, you must issue a `reset-all` command at the `ok` prompt in order for the change to be recognized the next time the operating system is booted.

Note – If you remove a power supply or fan tray while the operating system is running, wait for an acknowledgement message on the system console before installing a replacement part; otherwise, the environmental monitoring software will not recognize the new device and false error conditions will result.

Caution – When hot-swapping a redundant fan tray, do not put your hand into the empty fan tray bay. The fans in the populated bay are still spinning.

For additional information, see:

- "About Power Supplies" on page 235
- "About Fan Trays" on page 237

Disk Drives

Sun Fire 880 internal disk drives are hot-pluggable. However, certain software preparations are required. To perform Sun Fire 880 disk drive hot-plug operations, you use the Solaris `luxadm` utility. The `luxadm` utility is a command-line tool for managing intelligent storage arrays such as Sun StorEdge A5x00 series disk arrays or Sun Fire 880 internal storage arrays. For more information on `luxadm`, see the *Sun Fire 880 Server Owner's Guide*. For complete disk hot-plug procedures, refer to *Platform Notes: Using luxadm Software*, available on the *Solaris on Sun Hardware AnswerBook*. This AnswerBook documentation is provided on the Sun Computer Systems Supplement CD for your specific Solaris release.

Caution – When hot-plugging a disk drive, after disconnecting the drive from its backplane, allow 30 seconds or so for the drive to spin down completely before removing it from its drive bay.

PCI Cards

On Sun Fire 880 systems, certain qualified PCI cards are hot-pluggable, while the Remote System Control (RSC) card is *not* hot-pluggable.

Hot-plug operations for PCI cards involve Dynamic Reconfiguration (DR). DR is an operating environment feature that provides the ability to reconfigure system hardware while the system is running. DR lets you logically attach or detach hardware resources within an active operating environment. The main benefit of DR is that a service provider can add or replace hardware resources with little or no impact on normal system operations.

PCI card hot-plug procedures may involve software commands for preparing the system prior to removing a device, and for reconfiguring the operating environment after installing a new device. In addition, certain system requirements must be met in order for hot-plug operations to succeed.

For information about system requirements and limitations, and for detailed PCI card hot-plug procedures, refer to the *Sun Fire 880 Dynamic Reconfiguration User's Guide*, which is available on the *Solaris on Sun Hardware AnswerBook*. This AnswerBook documentation is provided on the Sun Computer Systems Supplement CD for your specific Solaris release.

Caution – You can hot-plug any standard PCI card that complies with PCI Hot-Plug Specification Revision 1.1, provided a suitable software driver exists for the Solaris operating environment, and the driver supports hot-plugging as described in the *Sun Fire 880 Dynamic Reconfiguration User's Guide*. The Sun Fire 880 system must be running the Solaris 8 7/01 operating environment or a subsequent release that supports Sun Fire 880 PCI hot-plug operations. Do not attempt to hot plug a PCI card until you are certain that its device drivers provide the proper support; otherwise, you may cause a system panic. For a list of Sun PCI cards and device drivers that support PCI hot-plug operations, see the *Sun Fire 880 Server Product Notes*.

Note – DR works in conjunction with (but does not require) multipathing software. You can use multipathing software to switch I/O operations from one I/O controller to another to prepare for DR operations. With a combination of DR and multipathing software, you can remove, replace, or deactivate a PCI controller card with little or no interruption to system operation. Note that this requires redundant hardware; that is, the system must contain an alternate I/O controller that is connected to the same device(s) as the card being removed or replaced. The alternate controller must reside on a different PCI card or be integrated into the Sun Fire 880 system motherboard or I/O board. For additional details, see the *Sun Fire 880 Server Owner's Guide*.

PCI Hot-Plug User Interfaces

There are two different methods for performing PCI hot-plug operations on Sun Fire 880 systems:

- Push-button method
- Command-line method

The push-button method relies on push buttons and status LEDs located near each PCI slot. You can initiate a hot-plug operation by pressing the push button for the corresponding slot. The command-line method lets you perform hot-plug operations via a remote login session, an RSC console, or a locally attached console. This method involves the Solaris `cfgadm(1)` command.

Both hot-plug methods make use of the status LEDs located near each PCI slot. These LEDs indicate where and when it is safe to insert or remove a board, and also show whether the operation has succeeded or failed. For additional details on hot-plug status LEDs, see "About PCI Slot LEDs" on page 346.

Note – Regardless of the method you use, it is often necessary to perform additional administrative steps to prepare for a hot-plug removal operation. Prior to performing a removal operation, you must ensure that the devices residing on the board are not currently in use. To identify and manually terminate usage of such devices, you can use standard Solaris operating environment commands such as `mount(1M)`, `umount(1M)`, `swap(1M)`, `ifconfig(1M)`, and `ps(1)`.

For detailed PCI hot-plug procedures, refer to the *Sun Fire 880 Dynamic Reconfiguration User's Guide*, available on the *Solaris on Sun Hardware AnswerBook*. This AnswerBook documentation is provided on the Sun Computer Systems Supplement CD for your specific Solaris release.

How to Initiate 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 device(s). 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's I^2C bus, including memory modules, CPU/Memory boards, 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, make sure that the front and side doors and all plastic outer panels are properly installed.

Note – You need a system console in order to issue software commands. See "About Setting Up a Console" on page 16.

What to Do

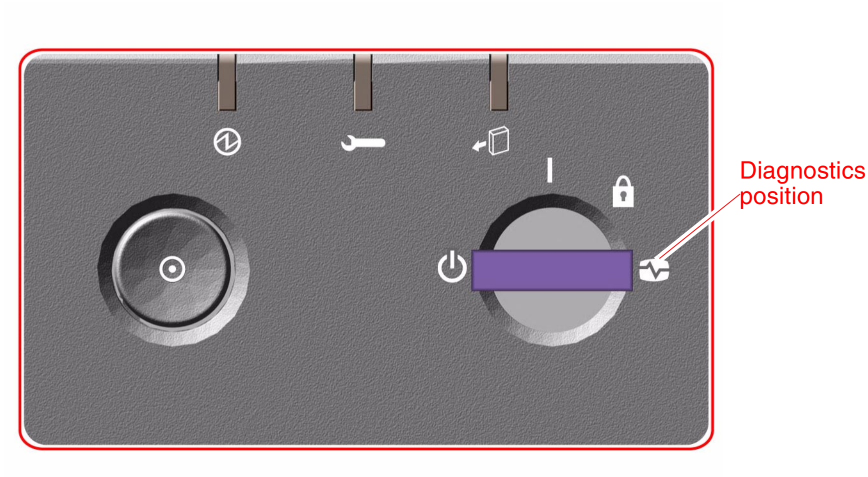
1. **Turn on power to any peripherals and external storage devices.**

   Read the documentation supplied with the device for specific instructions.

2. **Turn on power to the ASCII terminal or local graphics console (if present).**

3. **Insert the system key into the front panel keyswitch and turn it to the Diagnostics position.**

   Use the Diagnostics position to run POST and OpenBoot Diagnostics tests to verify that the system functions correctly with the new part(s) you installed. See "About Power Button and Keyswitch Settings" on page 14 for information about keyswitch settings.



4. **Press the Power button to the left of the keyswitch to power on the system.**

5. **When the diagnostics tests are completed, and the system banner is displayed on the system console, immediately abort the boot process to access the system `ok` prompt.**

   The system banner contains the Ethernet address and host ID. To abort the boot process, use one of the following methods:

   - Hold down the Stop key and press A on a Sun keyboard.
   - Press the Break key on the terminal keyboard.
   - Type `~#` in a `tip` window.
   - Issue an RSC `break` command

Note – The system may take anywhere from 30 seconds to two minutes before the system banner appears. 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.

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6. **At the** `ok` **prompt, type:**

```
ok env-on
Environmental monitor is ON
ok boot -r
```

The `env-on` command reenables the OpenBoot environmental monitor, which may have been disabled as a result of the abort key sequence. The `boot -r` command rebuilds the device tree for the system, incorporating any newly installed options so that the operating system will recognize them.

7. **Turn the keyswitch to the Locked position, remove the key, and keep it in a secure place.**

This prevents anyone from accidentally powering off the system.

What Next

The system's front panel LED indicators provide power-on status information. For more information about the system LEDs, see "About Front Panel LEDs" on page 342.

If your system encounters a problem during system startup, and the keyswitch is in the Normal position, try restarting the system in the Diagnostics mode to determine the source of the problem. Turn the front panel keyswitch to the Diagnostics position and power cycle the system. See:

- "How to Power Off the System" on page 5
- "How to Power On the System" on page 2

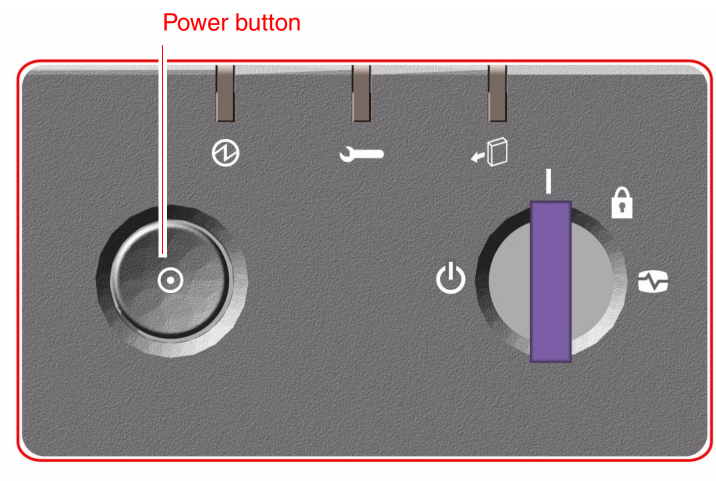
About Power Button and Keyswitch Settings

System Power Button

The system Power button is recessed to prevent accidentally turning the system on or off. The ability of the Power button to turn the system on or off is controlled by the security keyswitch.

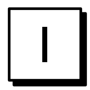
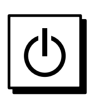
If the operating system is running, pressing and releasing the Power button initiates a graceful software system shutdown. Pressing and holding in the Power button for five seconds causes an immediate hardware shutdown.

Note – Whenever possible, you should use the graceful shutdown method. Forcing an immediate hardware shutdown may cause disk drive corruption and loss of data. Use this method only as a last resort.



Security Keyswitch

The four-position security keyswitch controls the power-on modes of the system and prevents unauthorized users from powering off the system or reprogramming system firmware. The following table describes the function of each keyswitch setting.

Position	**Icon**	**Description**
Normal		This setting enables the system Power button to power 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 the Power button in for five seconds causes an immediate hardware power off.
Locked		The Locked setting: • Disables the system Power button to prevent unauthorized users from powering the system on or off • Disables the keyboard Stop-a command, terminal Break key command, `~#` `tip` window command, and RSC `break` command, preventing users from suspending system operation to access the system `ok` prompt • Prevents unauthorized programming of the system flash PROMs The Locked position is the recommended setting for normal day-to-day operations.
Diagnostics		This setting forces the power-on self test(POST) and OpenBoot Diagnostics to run during system startup. The Power button functions the same as when the keyswitch is in the Normal position.
Forced Off		This setting forces the system to power off immediately and enter 5-volt standby mode. It also disables the system Power button. You may want to use this setting when AC power is interrupted and you do not want the system to restart automatically when power is restored. With the keyswitch in any other position, if the system was running prior to losing power, it restarts automatically once power is restored. The Forced Off setting also prevents an RSC console from restarting the system. However, the RSC card continues to operate using the system's 5-volt standby power.

About Setting Up a Console

To install your server or to diagnose problems, you need some way to enter system commands and view system output. There are four ways to do this.

1. Attach an ACSII character terminal to serial port A.

You can attach a simple terminal to serial port A. For instructions, see "How to Attach an Alphanumeric Terminal" on page 17.

2. Establish a `tip` connection from another Sun system.

For information about establishing a `tip` connection, see the *OpenBoot 4.x Command Reference Manual*. An online version of the manual is included with the *OpenBoot Collection AnswerBook* that ships with Solaris software.

3. Install a local graphics console on your server.

The server is often shipped without a mouse, keyboard, monitor, or frame buffer for the display of graphics. To install a local graphics console on a server, you must install a graphics frame buffer card in a PCI slot, and attach a monitor, mouse, and keyboard to the appropriate rear panel ports. For detailed instructions, see "How to Configure a Local Graphics Console" on page 19.

4. Set up a Remote System Control (RSC) console.

RSC is a remote server management tool that lets you monitor and control your server over modem lines or over a network. RSC provides remote system administration for geographically distributed or physically inaccessible systems. For additional details, see your *Sun Fire 880 Server Owner's Guide*.

Note – An RSC console cannot be used to perform the initial installation of the Solaris operating environment. The operating environment must be installed prior to setting up an RSC console.

How to Attach an Alphanumeric Terminal

Before You Begin

If your server is configured without a local graphics console, you need to attach an alphanumeric (ASCII) terminal to the server in order to install the operating environment and to run diagnostic tests.

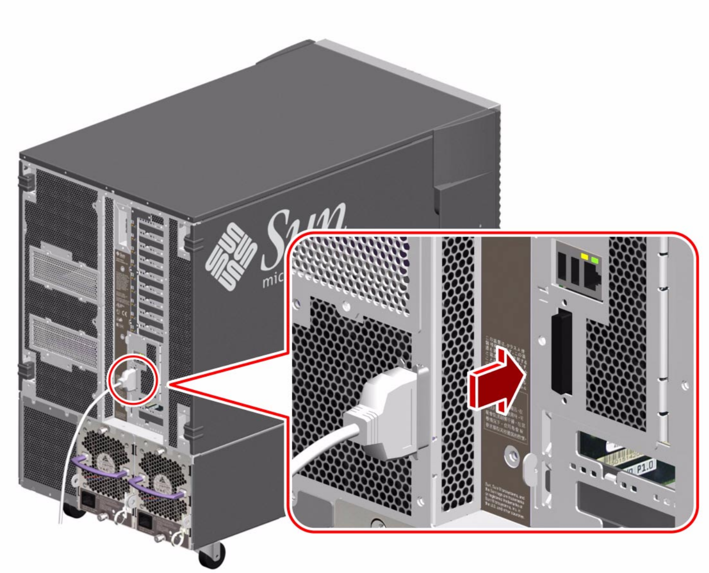
Alternatively, you can install a local graphics console, create a `tip` connection from another Sun system, or set up an RSC console. See:

- "About Setting Up a Console" on page 16
- "How to Configure a Local Graphics Console" on page 19

What to Do

1. **Connect a DB-25 null modem serial cable or a DB-25 serial cable and null modem adapter to the terminal's serial port.**

2. **Connect the opposite end of the cable to the system's serial port connector or to serial port A on the serial splitter cable.**



3. **Connect the terminal's power cable to an AC outlet.**

4. **Set the terminal to receive:**
   - At 9600 baud
   - An 8-bit signal with no parity and 1 stop bit

   See the documentation accompanying your terminal for more information.

What Next

You can now issue system commands and view system messages. Continue with your installation or diagnostic procedure as needed.

How to Configure a Local Graphics Console

Before You Begin

If your server is configured without a local alphanumeric terminal, you need to install a local graphics console in order to install the operating environment and to run diagnostic tests.

Alternatively, you can attach an alphanumeric (ASCII) terminal, create a `tip` connection from another Sun system, or set up an RSC console. See:

- "About Setting Up a Console" on page 16
- "How to Attach an Alphanumeric Terminal" on page 17

To install a local graphics console, you must have:

- A supported PCI-based graphics card
- A monitor (CRT) with appropriate resolution
- A Sun Type 6 USB keyboard
- A Sun Type 6 USB mouse and mouse pad

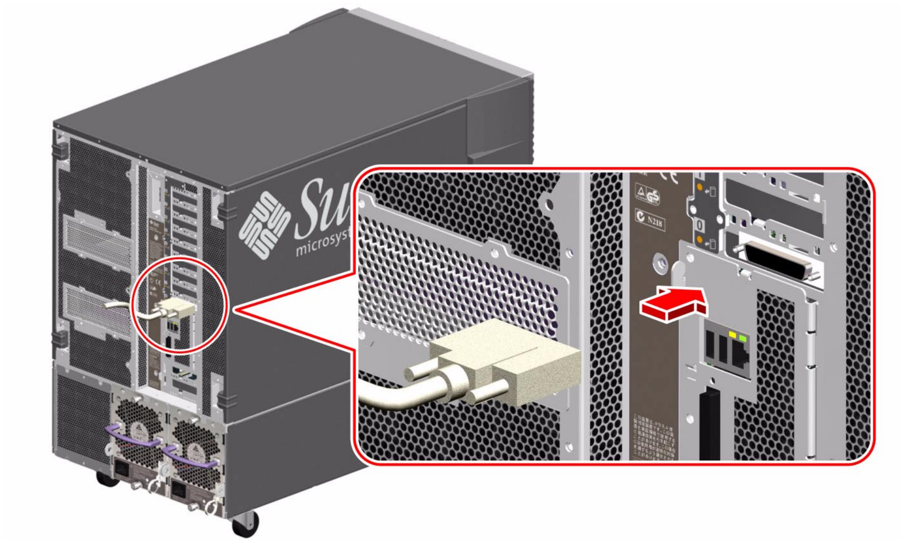
What to Do

1. **Install the graphics card into a vacant PCI slot.**

   See "How to Install a PCI Card" on page 92.

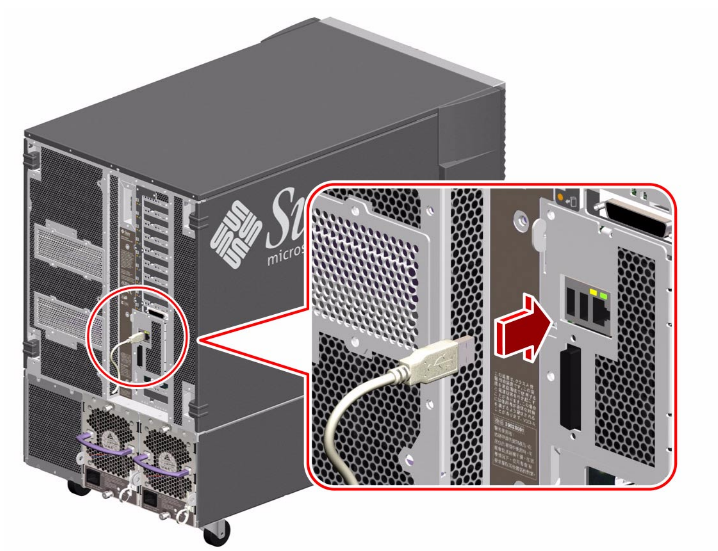
2. **Attach the monitor video cable to the graphic card's video port.**

   Tighten the thumbscrews to secure the connection.



3. **Connect the monitor's power cord to an appropriate AC power outlet.**

4. **Attach the keyboard cable to one of the system's USB ports.**



5. **Attach the mouse cable to the system's remaining USB port, or to a USB port on the keyboard, if applicable.**

What Next

You can now issue system commands and view system messages. Continue with your service or diagnostic procedure as needed.

How to Open and Remove a Side Door

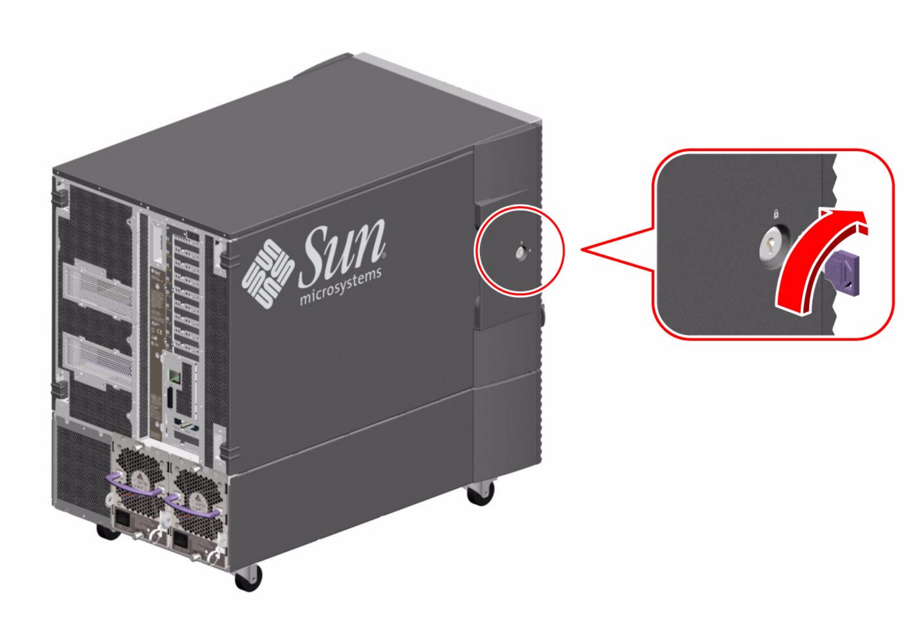
Before You Begin

If you are not performing a hot-plug procedure, complete the following task:

- “How to Power Off the System” on page 5

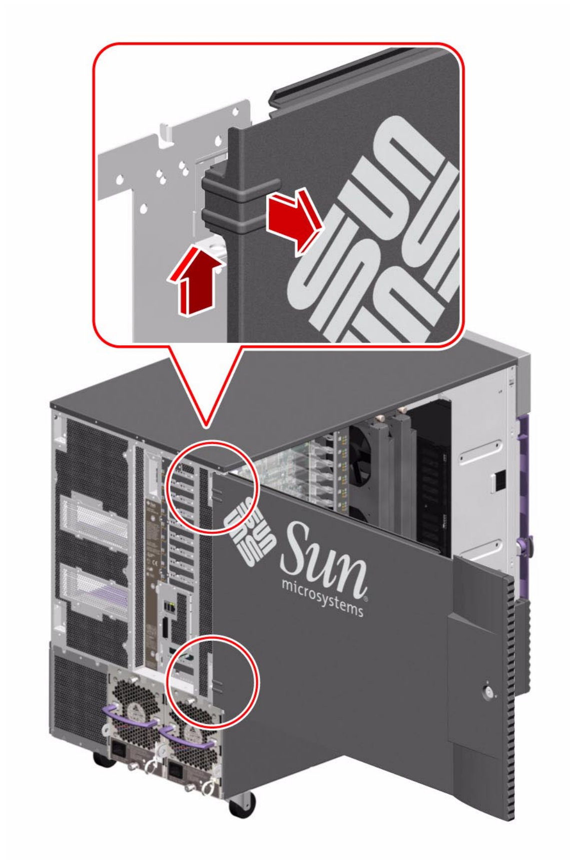
What to Do

1. **Unlock the side door using the system key.**



2. **Swing the side door open.**

3. **To remove the door from the chassis, open the door 90 degrees and pull it up until its mounting pins clear the brackets on the rear panel.**



What Next

To reassemble the system side door, complete the following task:

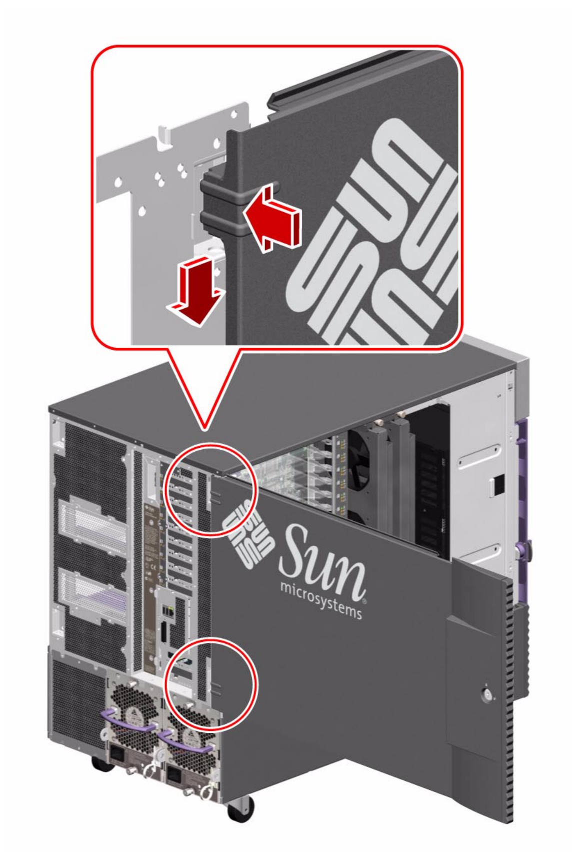
- "How to Close a Side Door" on page 24

How to Close a Side Door

What to Do

1. **If you removed the side door, remount it to the chassis.**

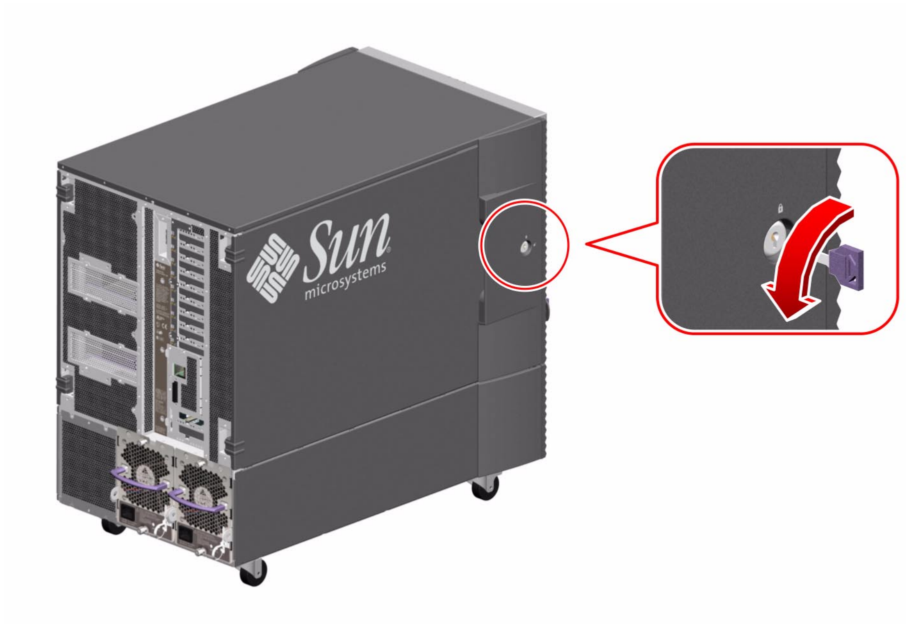
   Position the side door mounting pins over the corresponding holes in the chassis rear panel and lower the side door into place.



2. **Close the side door.**

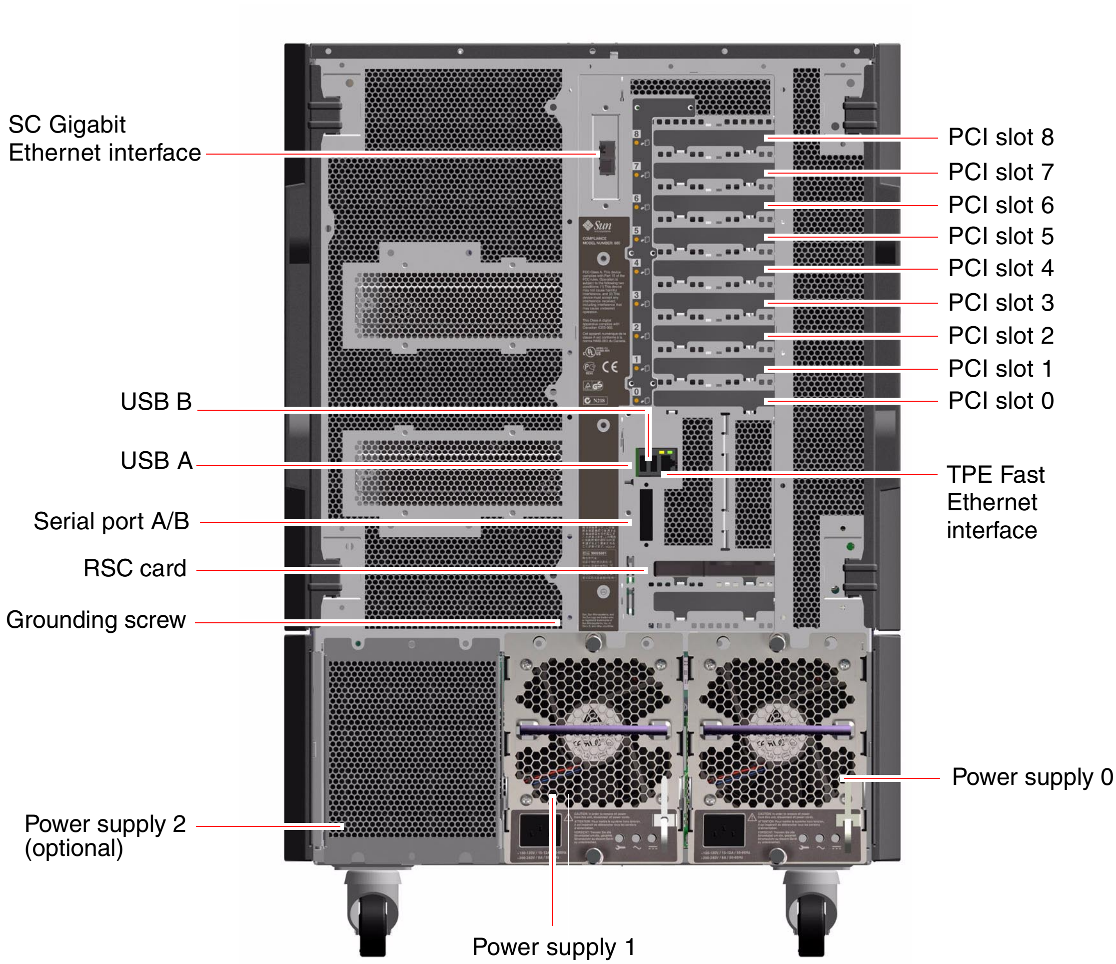
   Make sure that the door is firmly seated in its frame.

3. **Lock the side door with the system key.**



Locating Rear Panel Features

The following figure shows the system features that are accessible from the rear panel.



A grounding screw is located just above the center power supply. When installing a a Sun Fire 880 server into a rack, or connecting the server to an external storage array, be sure to connect an appropriate grounding strap between the server's grounding screw and the grounding screw on the rack enclosure or external storage array. A grounding strap prevents ground loops between systems and peripherals and helps guard against possible data loss.

How to Avoid 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 this task if you are working with a component that is not hot-pluggable:

- "How to Power Off the System" on page 5

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 disk 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. **Make sure that at least one AC power cord remains connected between a power supply and an AC power outlet.**

Note – The AC power cord provides a discharge path for static electricity, so you should leave it plugged in during installation and repair procedures. The only time you should unplug the power cords is when you service the power distribution board or Remote System Control (RSC) card. In each case, make sure that all power cords are disconnected.

---

2. **Use an antistatic mat or similar surface.**

   When performing any option installation or service procedure, place static-sensitive parts, such as boards, cards, and disk 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 one end of the strap to the system chassis sheet metal, and attach the other end to your wrist. Refer to the instructions that come with the strap.

4. **Detach both ends of the strap after you complete the installation or service procedure.**

Tools Required for Installation and Service

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

- Screwdriver, Phillips No. 1
- Screwdriver, Phillips No. 2
- Nut driver, 3/16ths inch
- Electrostatic discharge (ESD) mat, Sun part number 250-1088, or equivalent
- Grounding wrist or foot strap

The latter two items help protect the server against damage due to electrostatic discharge. For more information, see "How to Avoid Electrostatic Discharge" on page 27.

CHAPTER **2**

Servicing the Motherboard Side Components

This chapter describes how to remove and install the system motherboard and components on the motherboard side of the system. For a list of part numbers for field-replaceable units (FRUs) and optional equipment, see "Illustrated Parts Breakdown" on page 329.

The following tasks are covered in this chapter:

How to Remove a CPU/Memory Board

You must remove the CPU/Memory board to service the memory modules.

Caution – Either a CPU/Memory board or an air baffle must be installed in each CPU/Memory slot at all times. After removing a CPU/Memory board, you must install a replacement board or an air baffle immediately to avoid an automatic thermal shutdown. For more information, see "About CPU/Memory Boards" on page 224.

Before You Begin

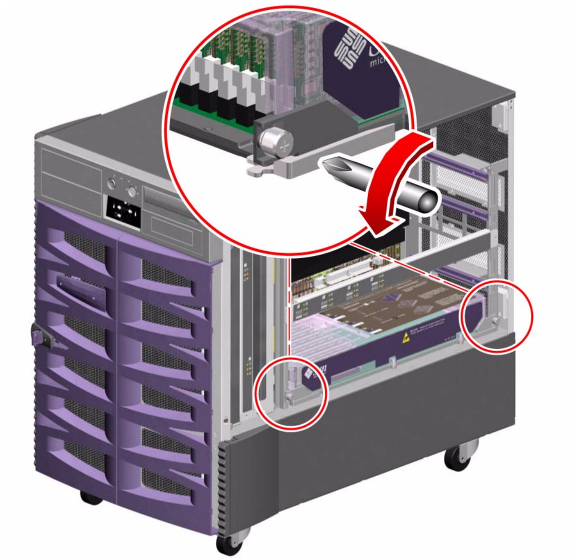
Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

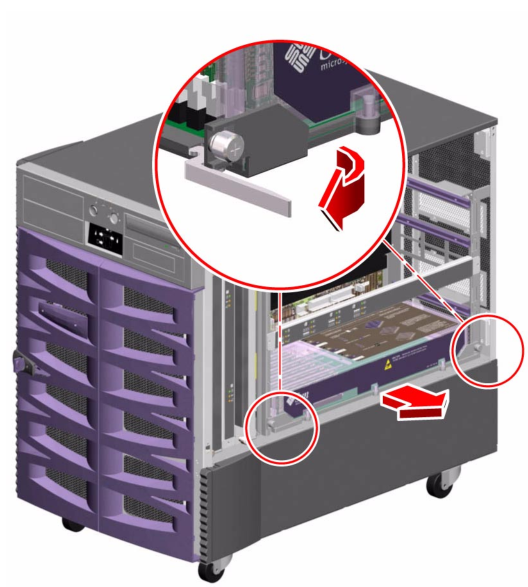
What to Do

1. **Identify the CPU/Memory board that you want to remove.**

2. Loosen the two captive screws securing the CPU/Memory board.



3. Rotate the CPU/Memory board ejection levers outward so that the CPU/Memory board connectors disengage from the motherboard.



4. Pull the CPU/Memory board from the chassis.

5. **Place the CPU/Memory board on an antistatic mat.**

6. **If you are not immediately replacing the CPU/Memory board, install a CPU air baffle into its slot next to the CPU fan trays.**

Caution – A CPU air baffle must be installed into an empty CPU/Memory board slot to ensure proper cooling of the system. Spare CPU air baffles are located under the CPU side chassis top.

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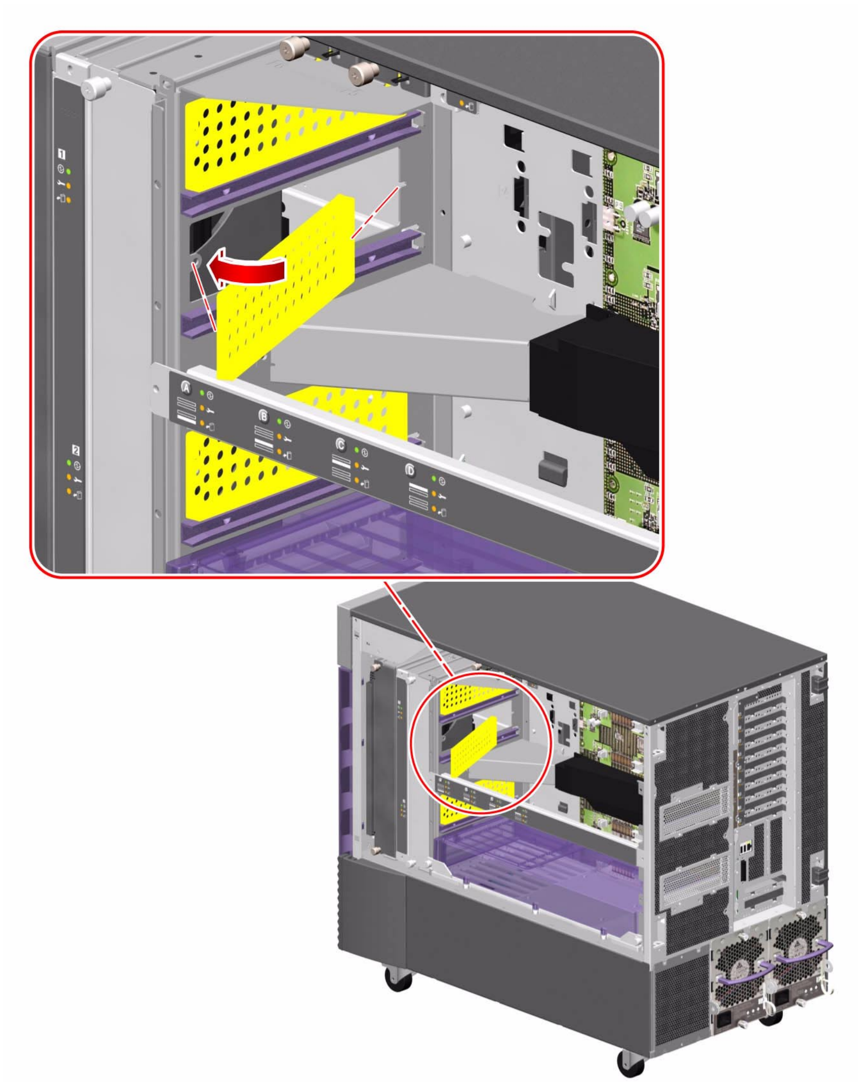
a. **Align the air baffle so that the tab on the end is under its slot in the chassis.**

b. **Rotate the air baffle into position.**

c. **Push in the plastic pin on the air baffle.**



7. **If you are not immediately replacing the CPU/Memory board, install a CPU/ Memory board dust cover on that slot's motherboard CPU/Memory board connectors.**

What Next

If you are installing a replacement CPU/Memory board, you must transfer all memory modules from the faulty board to the replacement board. Complete these tasks:

- "How to Remove a Memory Module" on page 42
- "How to Install a Memory Module" on page 46

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

If you are not replacing the part right away, you need to perform a reconfiguration boot. A reconfiguration boot is required in order for the operating system to recognize the configuration change. See:

- "How to Initiate a Reconfiguration Boot" on page 11

How to Install a CPU/Memory Board

Before You Begin

Caution – If a CPU/Memory board connector dust cover is installed on the motherboard CPU/Memory board connectors in the slot you are installing the CPU/Memory board, you must remove it. If you have not removed the dust cover from the motherboard, installing a CPU/Memory board in that slot may damage the motherboard and the CPU/Memory board.

Complete the following tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

If you are replacing a faulty CPU/Memory board with a new one, you must transfer the memory modules from the faulty CPU/Memory board to the new one. See the following sections for more information about transferring memory modules:

- "About Memory Modules" on page 226
- "How to Remove a Memory Module" on page 42
- "How to Install a Memory Module" on page 46

What to Do

1. **Locate the CPU/Memory board slot into which you want to install the CPU/Memory board.**

2. **If a CPU/Memory board connector dust cover is installed on the slot's motherboard CPU/Memory board connectors, remove it.**

Caution – If you have not removed the dust cover from the motherboard CPU/Memory board connectors, installing a CPU/Memory board in that slot may damage the motherboard and the CPU/Memory board.

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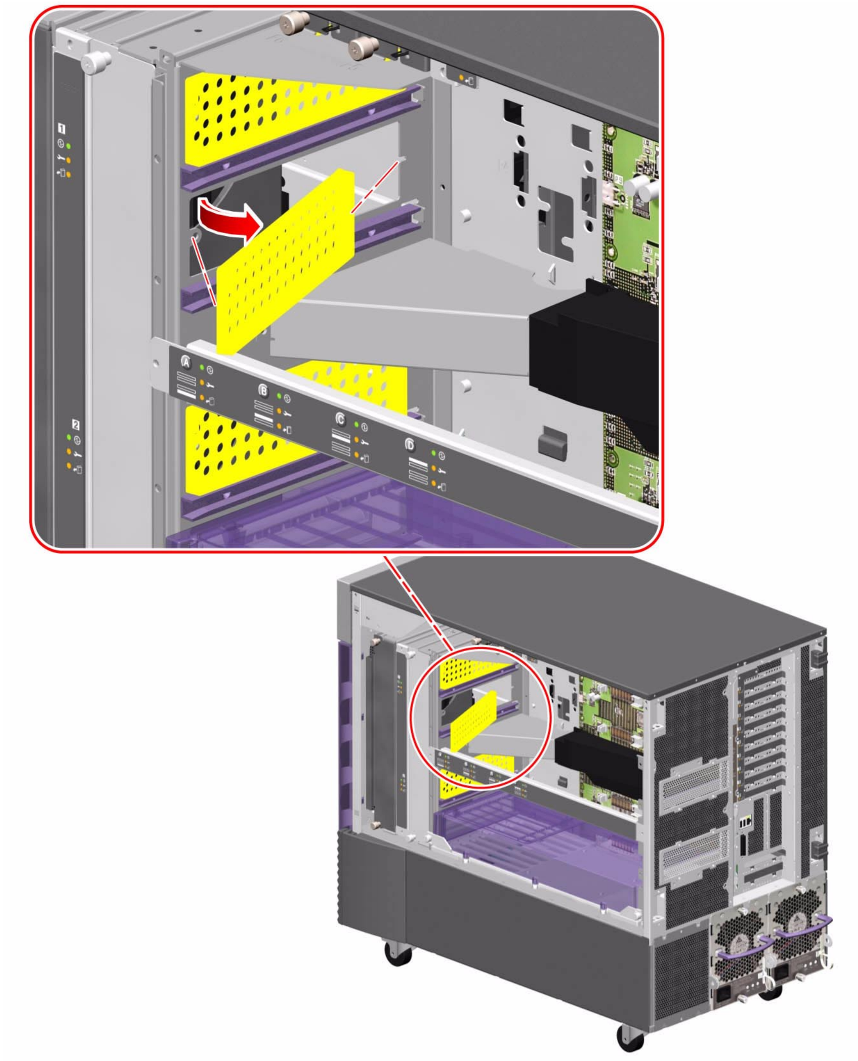
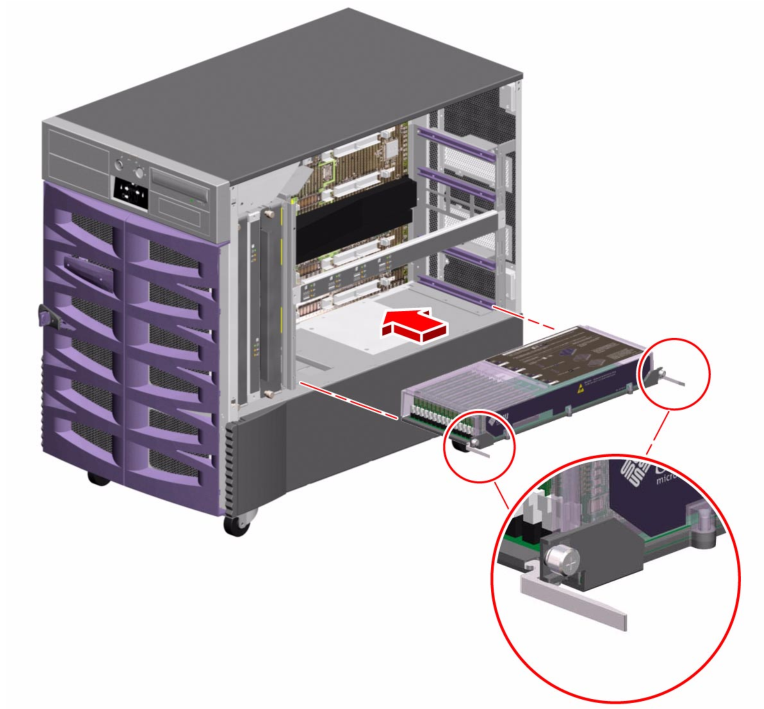
3. **If a CPU air baffle is installed in the CPU/Memory board's slot, remove the air baffle.**

   a. **Pull the plastic tab on the air baffle and rotate the baffle from its slot.**



   b. **Place the CPU air baffle into an empty CPU air baffle slot on the underside of the chassis top.**

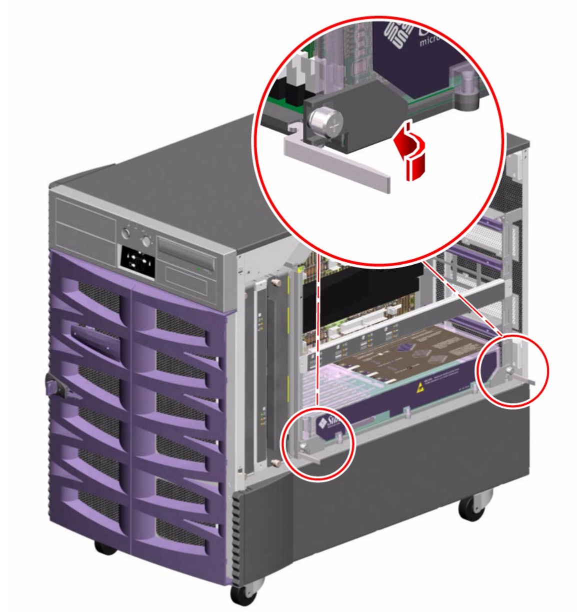
4. **Make sure that the ejection levers on the CPU/Memory board are rotated out 90 degrees.**



5. **Slide the CPU/Memory board into the guides in the chassis.**

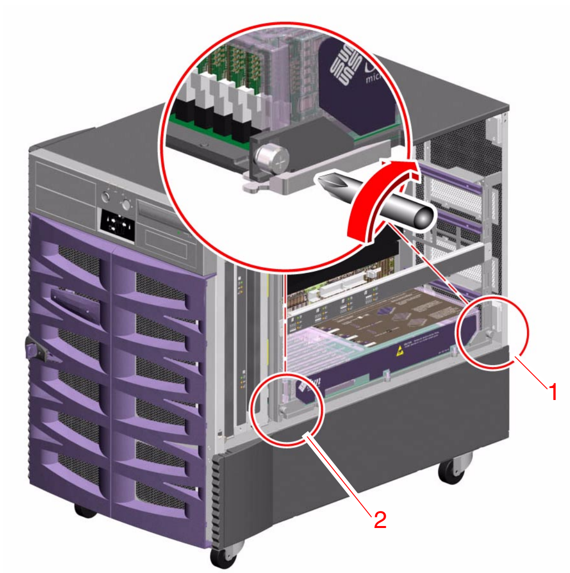
   Slide the board into the system until the connectors on the board begin to engage the sockets on the motherboard and the ejection levers begin to contact the bracket.

6. **Push in the two ejection levers simultaneously until the board is fully engaged in its slot.**



7. **Hand-tighten the two captive screws on the CPU/Memory board.**

8. **Using a No. 2 Phillips screwdriver, fully tighten the right-side captive screw and repeat for the left-side screw.**



What Next

To reassemble the system, complete this task:

- “How to Close a Side Door” on page 24

If you installed this part as a new option, you need to perform a reconfiguration boot. A reconfiguration boot is required in order for the operating system to recognize the new device. See:

- “How to Initiate a Reconfiguration Boot” on page 11

Note – Be sure to run POST and OpenBoot Diagnostics tests to verify that the system functions correctly with the part(s) you have just installed. For maximum test coverage, set the OpenBoot configuration variable `diag-level` to `max` prior to starting the diagnostic tests. See “Diagnostics and Troubleshooting” on page 249.

How to Remove a Memory Module

Before You Begin

Complete these tasks:

- Read the section, “About Memory Modules” on page 226
- “How to Power Off the System” on page 5
- “How to Open and Remove a Side Door” on page 22
- “How to Avoid Electrostatic Discharge” on page 27
- “How to Remove a CPU/Memory Board” on page 32

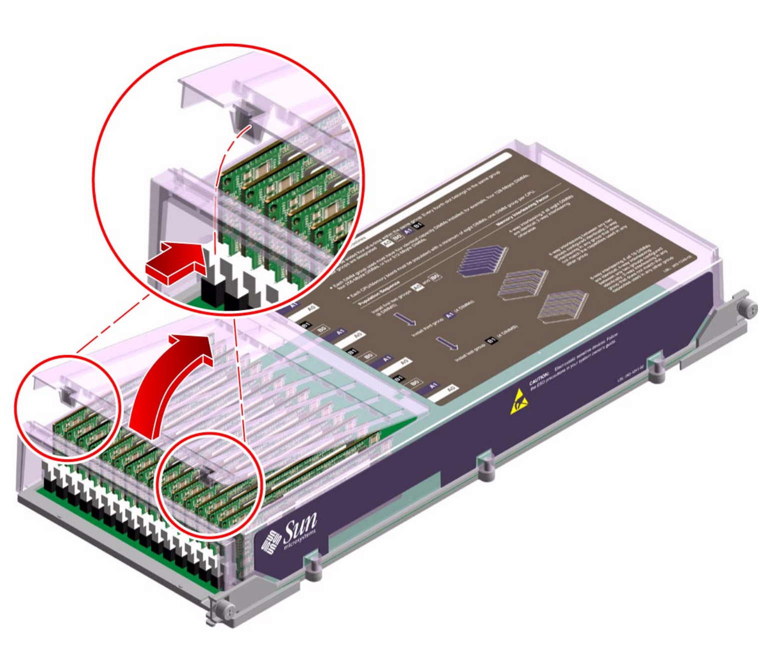
What to Do

Caution – Dual inline memory modules (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 any DIMM from its antistatic packaging until you are ready to install it. Handle the modules only by their edges. Do not touch the components or any metal parts, including the gold contacts on the bottom edge of the module. Always wear a grounding strap when you handle the modules.

---

1. **Remove the plastic cover on the CPU/Memory board.**

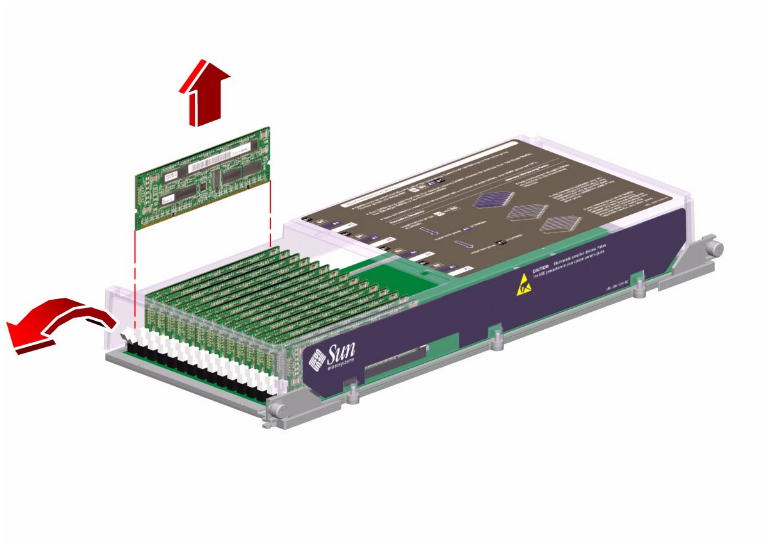
   Push the tabs inward until you can lift the cover free of the CPU/Memory board shroud.



2. **Identify the memory module that you want to remove.**

3. **Push down on the ejection levers at each end of the memory module until the memory module pops out of its socket.**

   Apply even pressure on both levers.

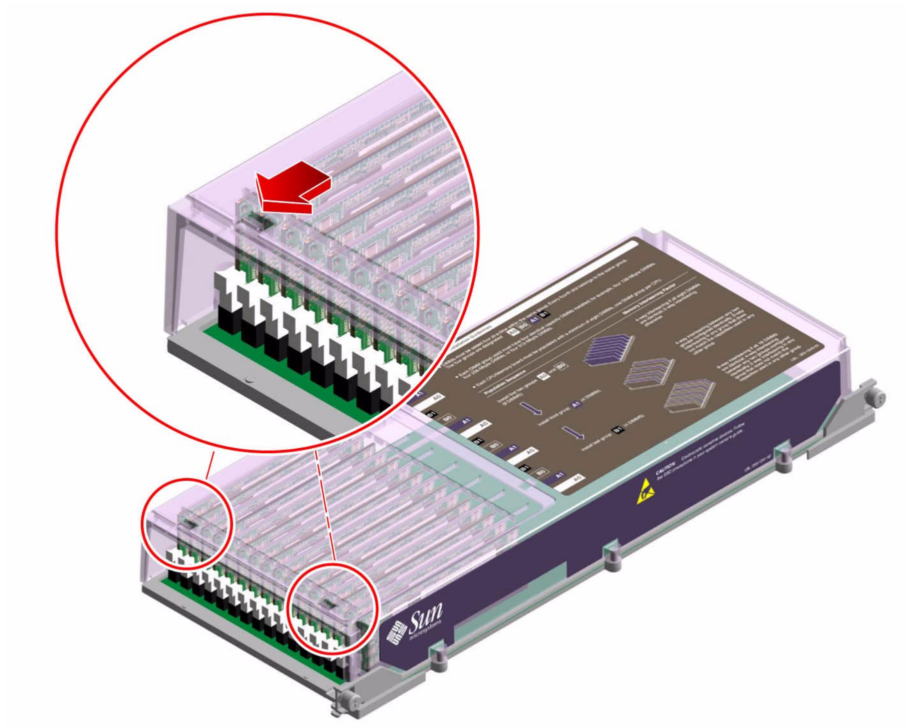


4. **Grasp the top corners of the memory module and pull it up and out of its socket.**

5. **Place the memory module on an antistatic mat.**

6. **If you are not installing replacement memory modules immediately, replace the plastic cover on the CPU memory module.**

   To fully engage the tabs on the cover, push both tabs at the same time until you hear a click.



What Next

To replace a memory module, complete this task:

- "How to Install a Memory Module" on page 46

To reassemble the system, complete these tasks:

- "How to Install a CPU/Memory Board" on page 37
- "How to Close a Side Door" on page 24

If you are not replacing the part right away, you need to perform a reconfiguration boot. A reconfiguration boot is required in order for the operating system to recognize the configuration change. See:

- "How to Initiate a Reconfiguration Boot" on page 11

How to Install a Memory Module

Before You Begin

Complete these tasks:

- Read the section, "About Memory Modules" on page 226
- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27
- "How to Remove a CPU/Memory Board" on page 32

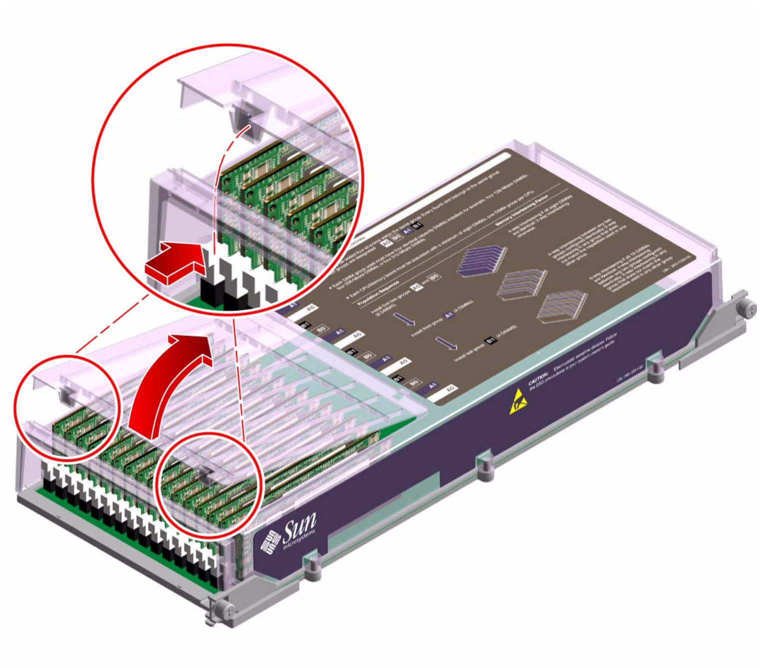
What to Do

Caution – Dual inline memory modules (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 any DIMM from its antistatic packaging until you are ready to install it. Handle the modules only by their edges. Do not touch the components or any metal parts, including the gold contacts on the bottom edge of the module. Always wear a grounding strap when you handle the modules.

---

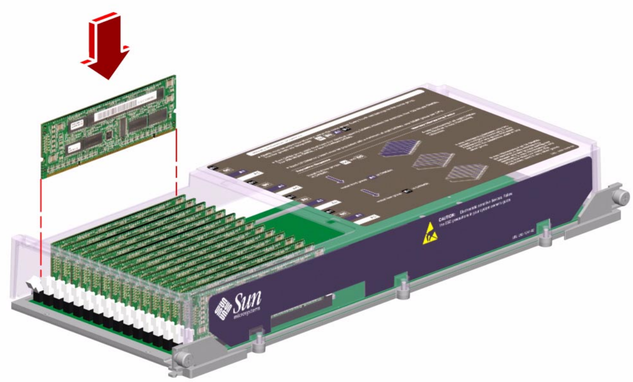
1. **Remove the plastic cover on the CPU/Memory board.**

   Push the tabs inward until you can lift the cover free of the CPU/Memory board shroud.



2. **Locate the slot into which you will install the memory module.**
3. **Rotate outward the memory module ejection levers for that slot.**

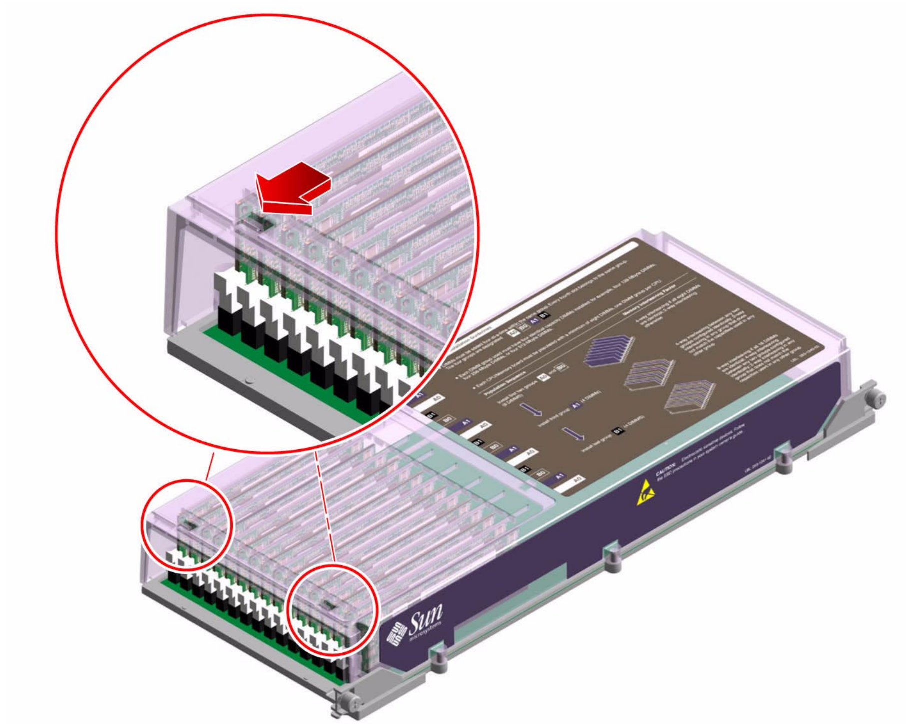
4. **Holding the bottom edge of the module parallel to its socket, carefully align the module so that each of its contacts is centered on a socket pin.**



5. **Push firmly and evenly on both ends of the memory module until its bottom edge is firmly seated in the socket. You will hear a click when the ejection levers are in the locked position.**

6. **Replace the plastic cover on the CPU/Memory board.**

   To fully engage the tabs on the cover, push both tabs at the same time until you hear a click.



What Next

To reassemble the system, complete these tasks:

- "How to Install a CPU/Memory Board" on page 37
- "How to Close a Side Door" on page 24

If you installed this part as a new option, you need to perform a reconfiguration boot. A reconfiguration boot is required in order for the operating system to recognize the new device. See:

- "How to Initiate a Reconfiguration Boot" on page 11

Note – Be sure to run POST and OpenBoot Diagnostics tests to verify that the system functions correctly with the part(s) you have just installed. For maximum test coverage, set the OpenBoot configuration variable `diag-level` to `max` prior to starting the diagnostic tests. See "Diagnostics and Troubleshooting" on page 249.

How to Remove a CPU Fan Tray

Caution – At least one CPU fan tray, one I/O fan tray, and one motherboard fan tray must be installed and operating to ensure proper system cooling; otherwise, the system will initiate an automatic thermal shutdown.

The primary CPU fan tray is in slot 1. To ensure proper cooling, each slot must contain either a CPU fan tray or a CPU fan tray filler panel. If a system configured with two CPU fan trays experiences a CPU fan tray failure and a CPU fan tray filler panel is not available, leave the failing fan tray in the system until you have a fan tray filler panel or a replacement CPU fan tray. For more information about CPU fan trays, see "About Fan Trays" on page 237.

All fan trays feature a hot-swap capability. You can remove and replace a faulty fan tray without shutting down the operating system or turning off the system power. For additional details, see "About Hot-Pluggable and Hot-Swappable Components" on page 7.

Before You Begin

If you are not performing a hot-swap procedure, complete the following task:

- "How to Power Off the System" on page 5

Complete these tasks:

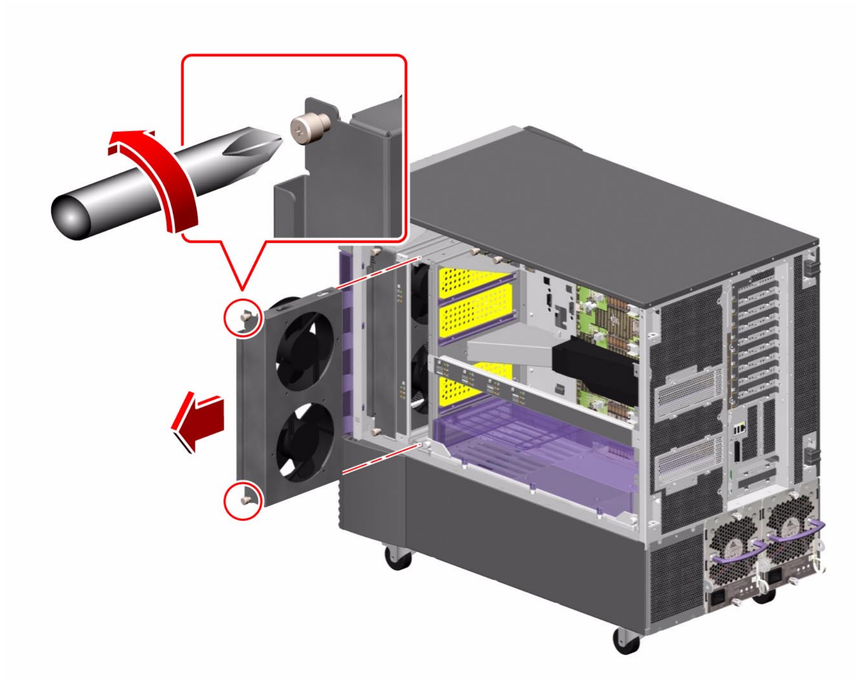
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Identify the CPU fan tray that you want to remove.**

   The primary CPU fan tray occupies CPU fan tray slot 1. For information about CPU fan tray LEDs, see "About Fan Tray LEDs" on page 349.

2. **Loosen the two captive screws holding the CPU fan tray in the chassis.**



3. **Slide the fan tray out from the system.**

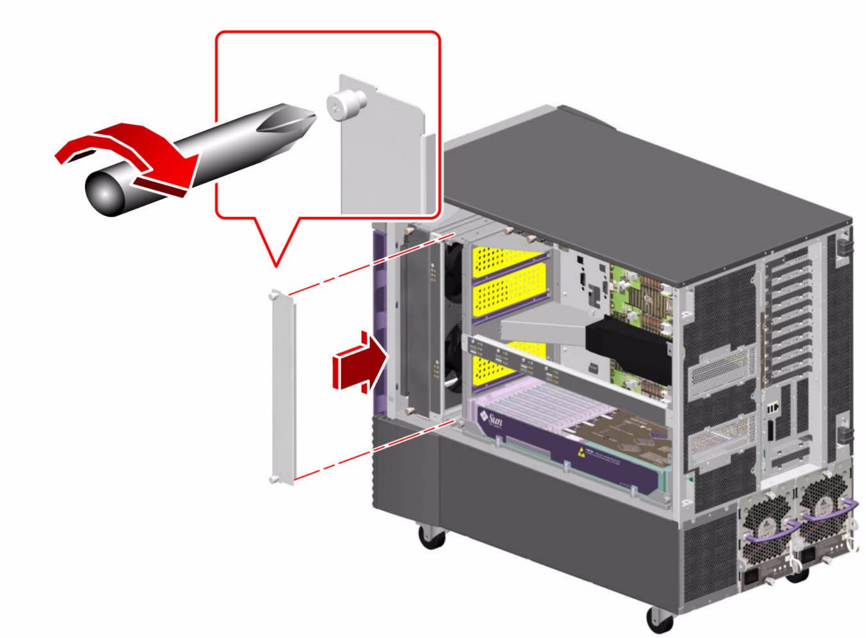
Caution – You must install either a new fan tray or a CPU fan tray filler panel into the empty slot to ensure proper cooling for the CPU/Memory boards.

Caution – If you are performing a hot-swap procedure, do not put your hand into the empty fan bay. The fans in the populated fan tray are still spinning.

---

4. **If you are not installing a replacement fan immediately, install a CPU fan tray filler panel.**

   Tighten the two captive Phillips screws that secure the filler panel to the chassis.



What Next

Note – During a hot-swap operation, after you remove a fan tray or power supply, wait for an acknowledgement message on the system console before installing a replacement part; otherwise, the environmental monitoring software will not recognize the new device and false error conditions will result. *If you are not replacing the fan tray, do not wait for the message. Install the fan tray filler panel immediately.*

To replace the CPU fan tray, complete this task:

- "How to Install a CPU Fan Tray" on page 53

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

How to Install a CPU Fan Tray

All fan trays feature a hot-swap capability. You can remove and replace a faulty fan tray without shutting down the operating system or turning off the system power. For additional details, see "About Hot-Pluggable and Hot-Swappable Components" on page 7.

Before You Begin

If you are not performing a hot-swap procedure, complete the following task:

- "How to Power Off the System" on page 5

Complete these tasks:

- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

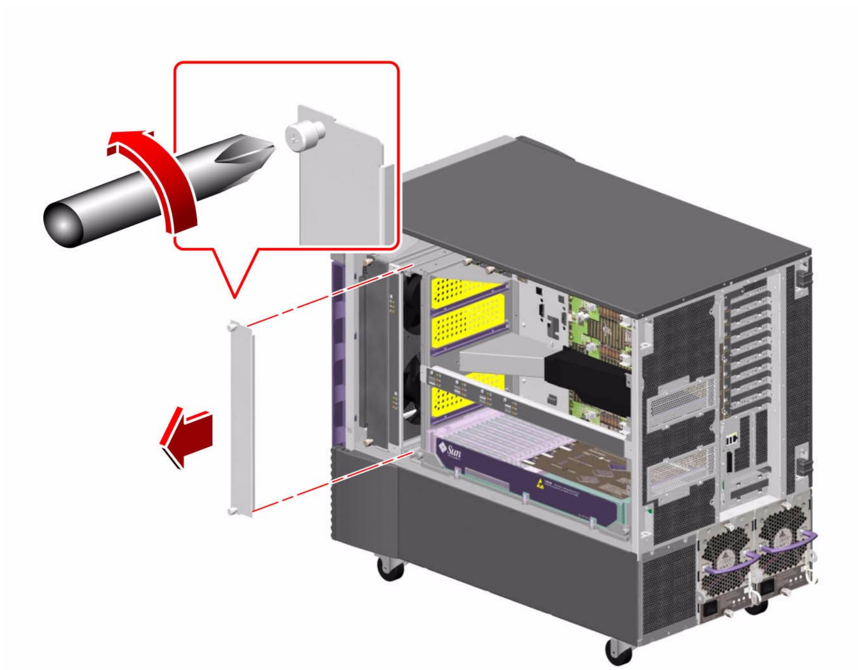
1. **Identify the slot into which you want to install the CPU fan tray.**

   The primary CPU fan tray occupies CPU fan tray slot 1. For information about CPU fan tray LEDs, see "About Fan Tray LEDs" on page 349.

2. **If there is a CPU fan tray filler panel in the slot, remove it.**

   Loosen the two captive screws on the fan tray filler panel and pull it out from the system.

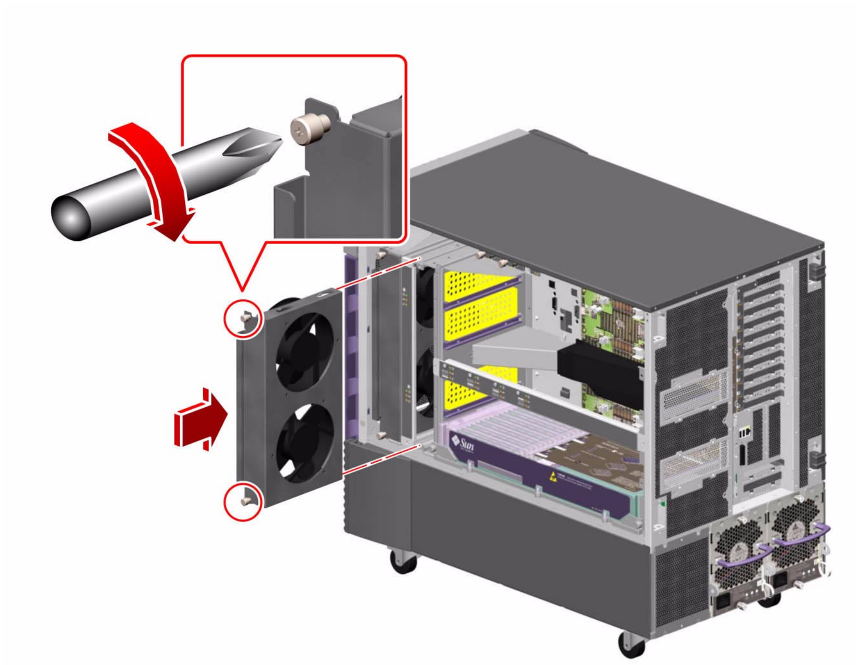
Caution – If you are performing a hot-swap procedure, do not put your hand into the empty fan bay. The fans in the populated fan tray are still spinning.



3. **Align the CPU fan tray with its slot in the chassis.**

   The arrow label on the fan tray indicates the top side of the fan tray.

4. **Slide the fan tray into the chassis until the connector on the fan tray is firmly seated in its socket.**



5. **Tighten the two captive screws on the fan tray.**

What Next

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

If you installed this part as a new option while the system was powered off, you need to perform a reconfiguration boot. A reconfiguration boot is required in order for the operating system to recognize the new device. See:

- "How to Initiate a Reconfiguration Boot" on page 11

How to Remove a Motherboard Fan Tray

Caution – At least one CPU fan tray, one I/O fan tray, and one motherboard fan tray must be installed and operating to ensure proper system cooling; otherwise, the system will initiate an automatic thermal shutdown.

Note – The motherboard fan tray is also referred to as the I/O bridge fan tray by the system's firmware and environmental software. For more information about motherboard fan trays, see "About Fan Trays" on page 237.

All fan trays feature a hot-swap capability. You can remove and replace a faulty fan tray without shutting down the operating system or turning off the system power. For additional details, see "About Hot-Pluggable and Hot-Swappable Components" on page 7.

Before You Begin

If you are not performing a hot-swap procedure, complete the following task:

- "How to Power Off the System" on page 5

Complete these tasks:

- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Identify the motherboard fan tray that you want to remove.**

   The primary motherboard fan tray occupies slot 5. The fan tray numbers are stamped into the chassis sheet metal at the base of each fan tray.

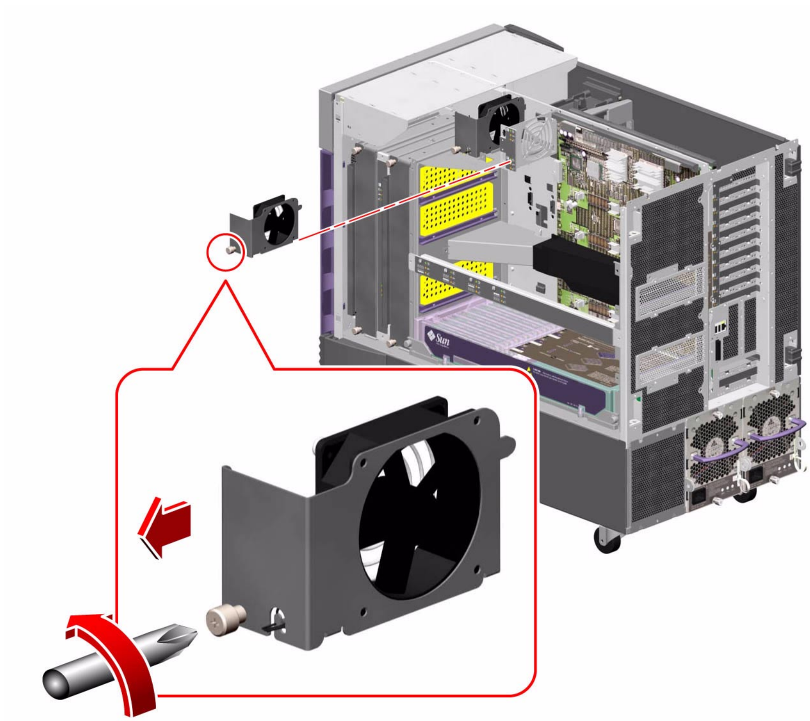
2. **Unplug the motherboard fan tray cable from the fan tray you are going to remove.**

   If you are removing a redundant fan tray, drape the cable away from the other fan.

Caution – If you are performing a hot-swap procedure, do not put your hand into the empty fan bay. The fan in the populated fan tray is still spinning.

---

3. **Loosen the captive screw on the fan tray on the fan tray you are going to remove.**



4. **If you are removing fan tray 5 and fan tray 6 is installed, disconnect the cable to fan tray 6 and drape it out of the way so that you can remove fan tray 5.**

Note – When both motherboard fan trays are not operational in a running Sun Fire 880 system, the environmental monitoring software generates warning messages that the fan trays are removed. If an operational fan tray is not installed quickly, the system may initiate a thermal shutdown. During motherboard fan tray hot-plug procedures, to avoid these messages and potential cooling issues resulting in a system thermal shutdown, reconnect the motherboard fan tray cables for functional fans as soon as possible.

---

5. **Slide the fan tray you are removing out of the system.**

6. **If you disconnected the cable to fan tray 6 to remove fan tray 5, reconnect the cable to fan tray 6.**

   If you disconnected the cable to fan tray 6 as part of a hot-plug procedure for fan tray 5 and you are immediately replacing fan tray 5, do not reconnect the cable to fan tray 6 until you install fan tray 5.

What Next

Note – During a hot-swap operation, after you remove a fan tray or power supply, wait for an acknowledgement message on the system console before installing a replacement part; otherwise, the environmental monitoring software will not recognize the new device and false error conditions will result.

To replace the motherboard fan tray, complete this task:

- "How to Install a Motherboard Fan Tray" on page 59

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

How to Install a Motherboard Fan Tray

Note – The motherboard fan tray is also referred to as the I/O bridge fan tray by the system's firmware and environmental software. For more information about motherboard fan trays, see "About Fan Trays" on page 237.

All fan trays feature a hot-swap capability. You can remove and replace a faulty fan tray without shutting down the operating system or turning off the system power. For additional details, see "About Hot-Pluggable and Hot-Swappable Components" on page 7.

Before You Begin

If you are not performing a hot-swap procedure, complete the following task:

- "How to Power Off the System" on page 5

Complete these tasks:

- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Locate the slot into which you want to install the motherboard fan tray.**

   a. **If you are installing fan tray 5 and fan tray 6 is installed, disconnect the cable to fan tray 6.**

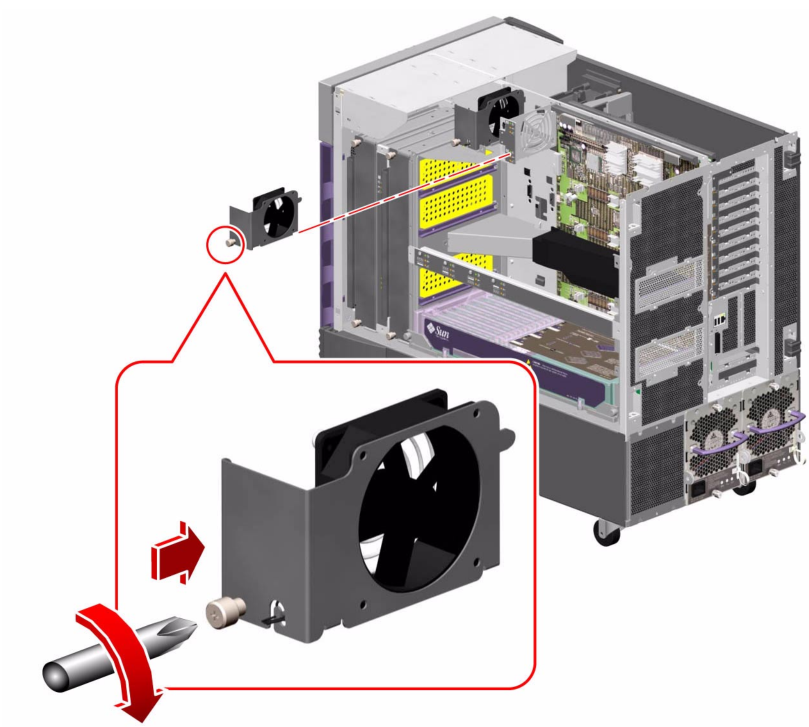
   The primary motherboard fan tray occupies slot 5. The fan tray numbers are stamped into the chassis sheet metal at the base of each fan tray.

Note – Ensure that the fan tray cable is not in the path of the fan tray that you will install.

Note – When both motherboard fan trays are not operational in a running Sun Fire 880 system, the environmental monitoring software generates warning messages that the fan trays are removed. If an operational fan tray is not installed quickly, the system may initiate a thermal shutdown. During motherboard fan tray hot-plug procedures, to avoid these messages and potential cooling issues resulting in a system thermal shutdown, reconnect the motherboard fan tray cables for functional fans as soon as possible.

---

2. **Align the fan tray to be installed with its plastic guide in the chassis.**



3. **Slide the fan tray into the chassis.**
4. **If you disconnected the cable to fan tray 6 to install fan tray 5, reconnect the cable to fan tray 6.**

Caution – If you are performing a hot-swap procedure, do not put your hand into the empty fan bay. The fan in the populated fan tray is still spinning.

---

5. **Tighten the captive screw on the fan tray.**

6. **Connect the motherboard fan tray cable to its connector.**

What Next

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

If you installed this part as a new option while the system was powered off, you need to perform a reconfiguration boot. A reconfiguration boot is required in order for the operating system to recognize the new device. See:

- "How to Initiate a Reconfiguration Boot" on page 11

How to Remove the CPU Fan Status Assembly

Before You Begin

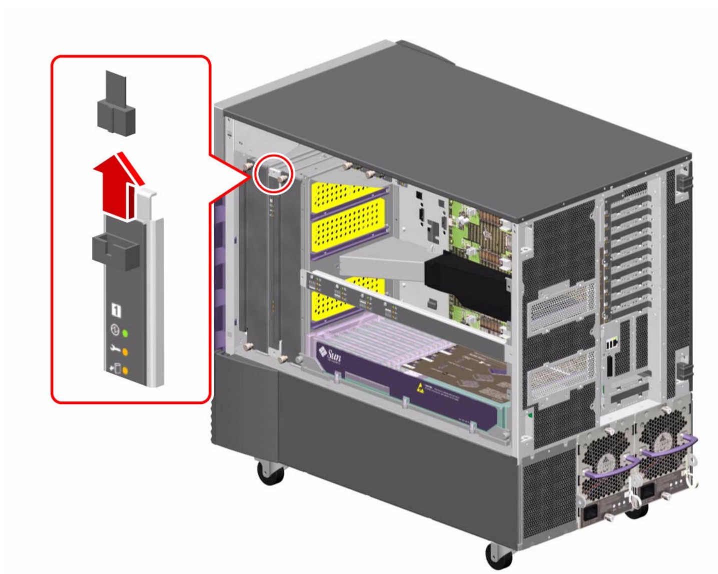
Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

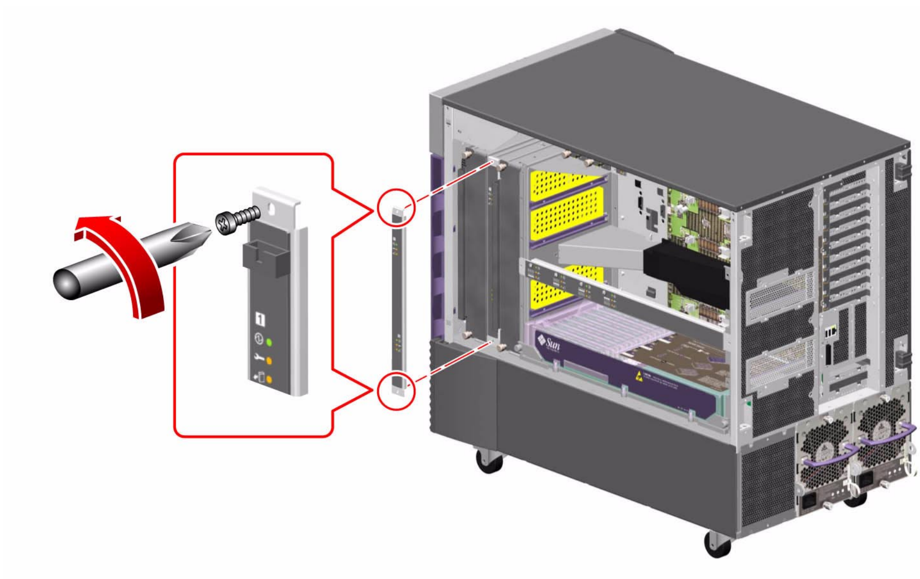
What to Do

1. **Disconnect the CPU fan status cable from the top of the assembly.**

   Press the tab on the cable connector.



2. **Remove the two Phillips screws securing the assembly to the chassis.**



3. **Carefully pull the fan status assembly out of the system and place it on an antistatic mat.**

What Next

To replace the CPU fan status assembly, complete this task:

- "How to Install the CPU Fan Status Assembly" on page 64

How to Install the CPU Fan Status Assembly

Before You Begin

Complete this task:

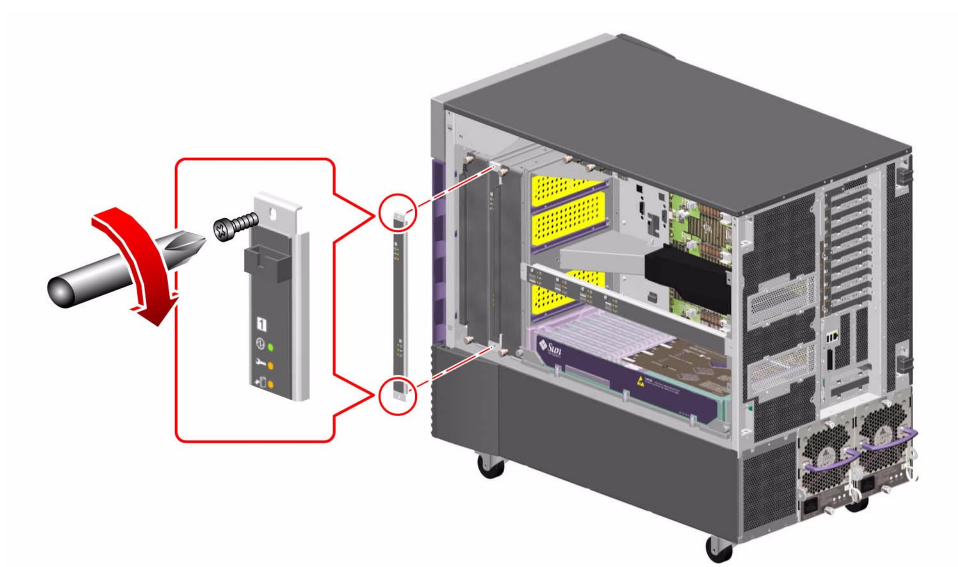
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

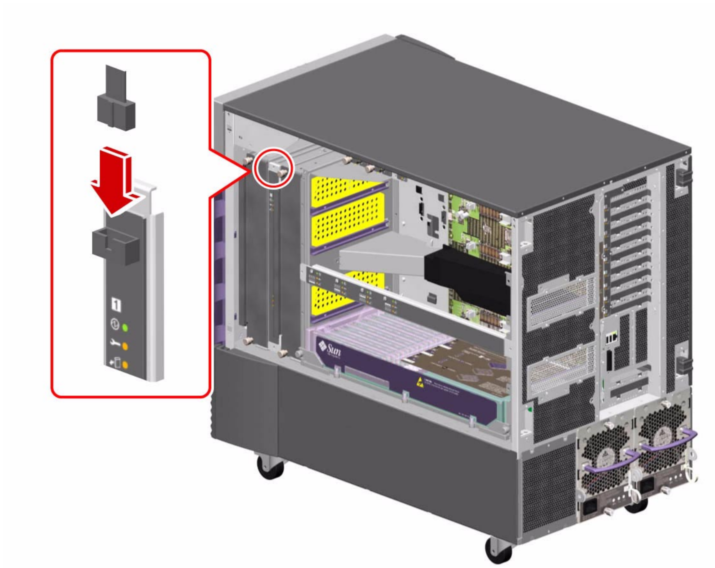
1. **Position the fan status assembly into place in the system.**

   The CPU fan status cable connector is on the top of the assembly. The sheet metal bracket is keyed on the bottom so that you can only install it in one way.

2. **Fasten the two Phillips screws that attach the assembly to the bracket.**



3. Connect the fan tray status cable to the assembly.



What Next

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

How to Remove the CPU/Memory Board Status Assembly

Before You Begin

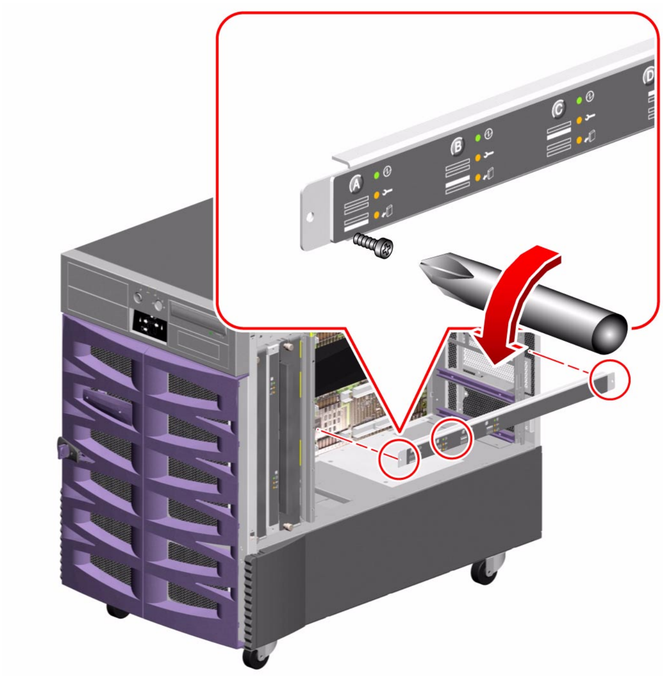
Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Remove the two Phillips screws securing the status assembly to the chassis.**

   Be sure to support the status assembly as you remove the screws so that the ribbon cable connected to the back of the assembly is not jarred.



2. **Disconnect the ribbon cable from the connector on the status assembly and remove the assembly from the system.**

3. **Place the status assembly on an antistatic mat.**

What Next

To replace the CPU/Memory board status assembly, complete this task:

- “How to Install the CPU/Memory Board Status Assembly” on page 68

How to Install the CPU/Memory Board Status Assembly

Before You Begin

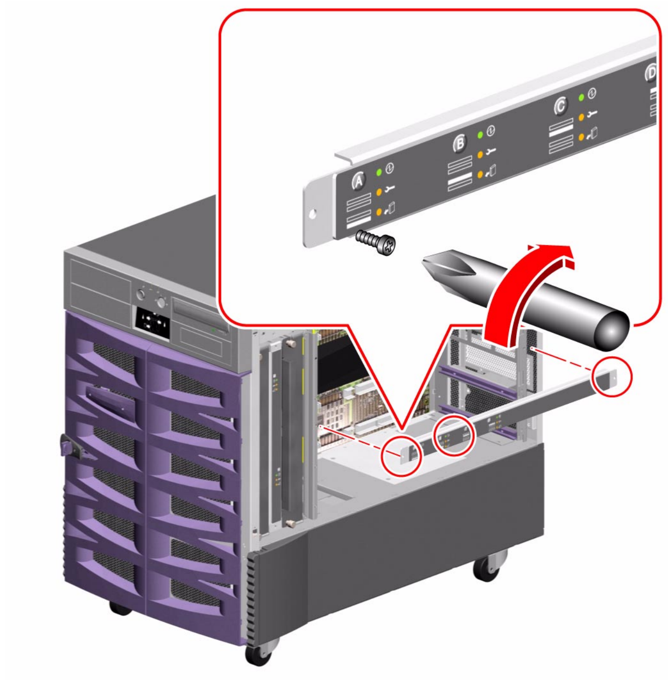
Complete this task:

- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Connect the CPU/Memory board status cable to the connector on the back of the status assembly.**

2. Place the status assembly into position and fasten the two Phillips screws that secure it to the chassis.



What Next

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

How to Remove the Motherboard Fan Status Flex Circuit

Before You Begin

Complete these tasks:

- “How to Power Off the System” on page 5
- “How to Open and Remove a Side Door” on page 22
- “How to Avoid Electrostatic Discharge” on page 27

What to Do

1. **Disconnect the ribbon cable from the back of the flex circuit.**
2. **Remove the two Phillips screws securing the flex circuit to the bracket.**
3. **Remove the flex circuit from the system.**
4. **Place the flex circuit on an antistatic mat.**

What Next

To replace the motherboard fan status flex circuit, complete this task:

- “How to Install the Motherboard Fan Status Flex Circuit” on page 71

How to Install the Motherboard Fan Status Flex Circuit

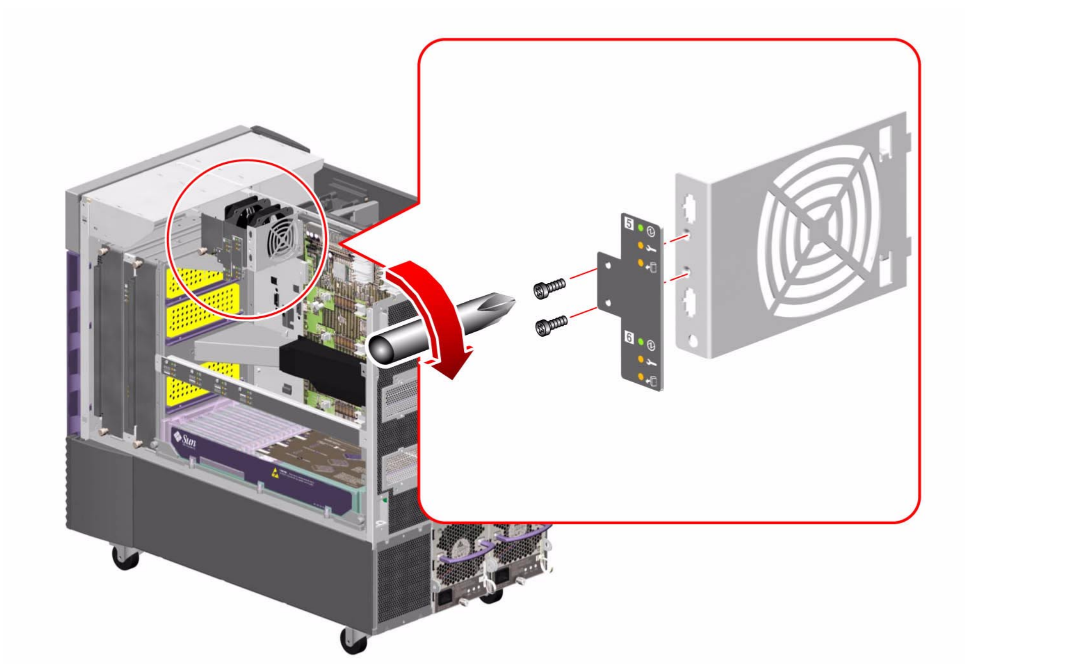
Before You Begin

Complete this task:

- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Position the flex circuit in the system and fasten the two Phillips screws that secure it to its bracket.**



2. **Connect the motherboard fan status cable to the connector on the back of the flex circuit.**

What Next

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

How to Remove the Motherboard

Before You Begin

Complete these tasks:

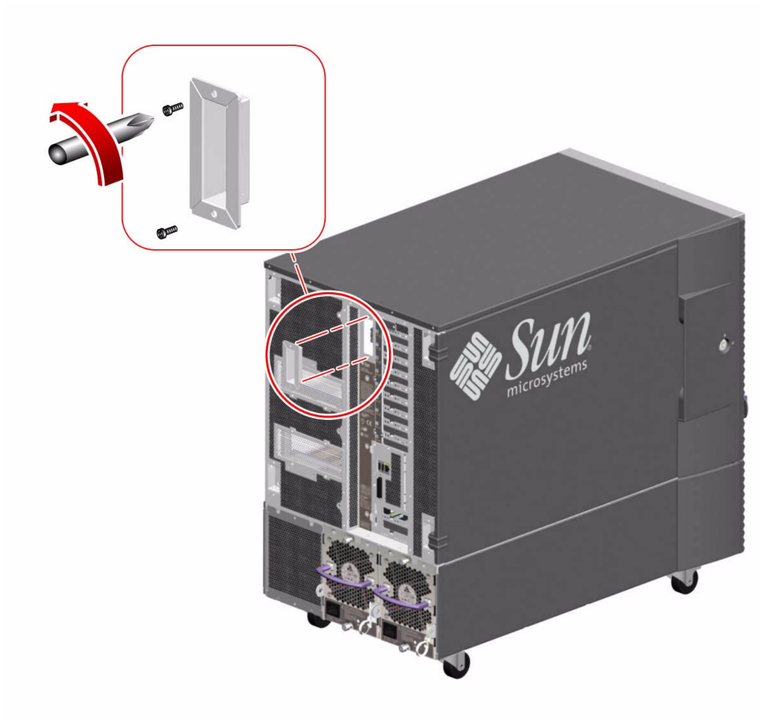
- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27
- "How to Remove a CPU/Memory Board" on page 32
- "How to Remove the CPU/Memory Board Status Assembly" on page 66

What to Do

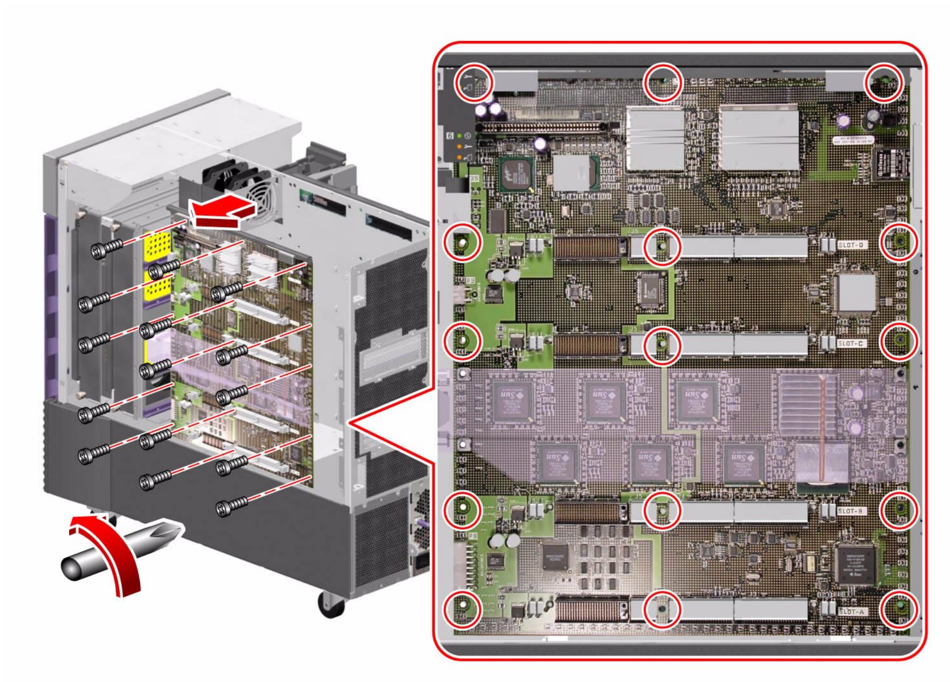
1. **Disconnect the CPU/Memory board status assembly cable (P35) from the motherboard at connector P35 (LED).**
2. **Disconnect the motherboard power cable (P8) from the motherboard at connector J4702 (Main Power).**
3. **Disconnect the motherboard power cable (P9) from the motherboard at connector J4701 (48 Volt Power).**
4. **Disconnect the base backplane FC-AL cable (A and B) from the motherboard at connectors A(FCALIN) and B(FCALOUT).**

5. **Remove the Gigabit Ethernet housing from the rear panel.**

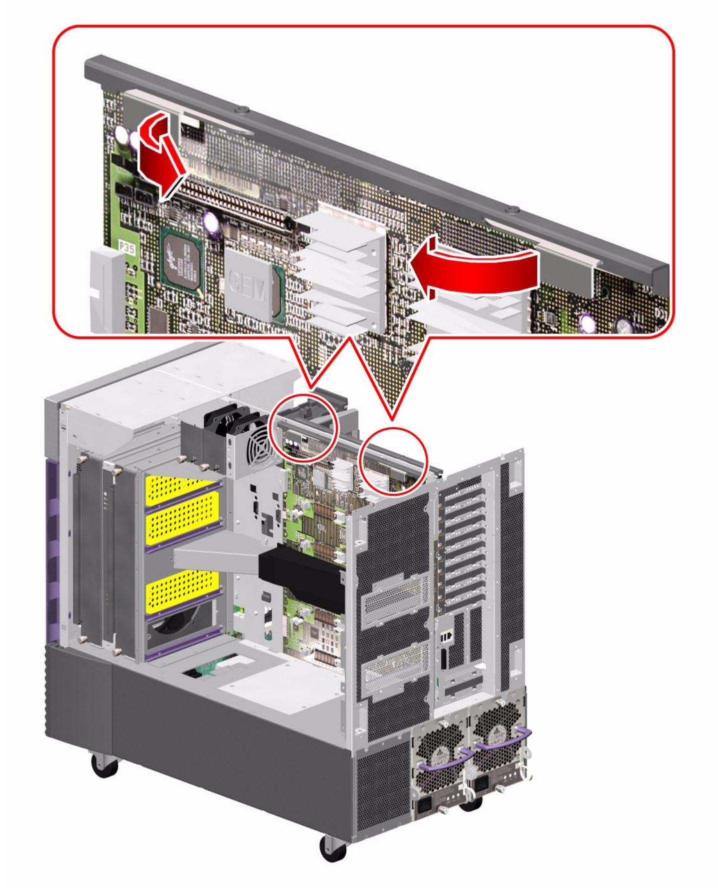
   Remove the two Phillips screws securing the housing to the chassis rear panel.



6. **Remove the 15 M4 Phillips screws securing the motherboard to the centerplane.**



7. If the system I/O board is installed, disengage the motherboard from the system by rotating the two ejection levers away from the motherboard.



8. Remove the motherboard from the system.

   a. Carefully pull the motherboard away from the centerplane so that the plastic motherboard air duct slides off the metal motherboard air guide.

   b. Angle the motherboard to avoid the motherboard fan status flex circuit as you pull the motherboard out from the system.

9. Place the motherboard on an antistatic mat.

10. Transfer the CPU/Memory board connector dust covers from the replacement motherboard to the faulty motherboard.

What Next

To replace the motherboard, complete this task:

- "How to Install the Motherboard" on page 78

How to Install the Motherboard

Before You Begin

Complete this task:

- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **If you are installing a new motherboard, remove the CPU/Memory board connector dust cover from every slot onto which you will install a CPU/Memory board.**

   Keep dust covers on any unused slots.

2. **Carefully position the motherboard in the chassis against the centerplane.**

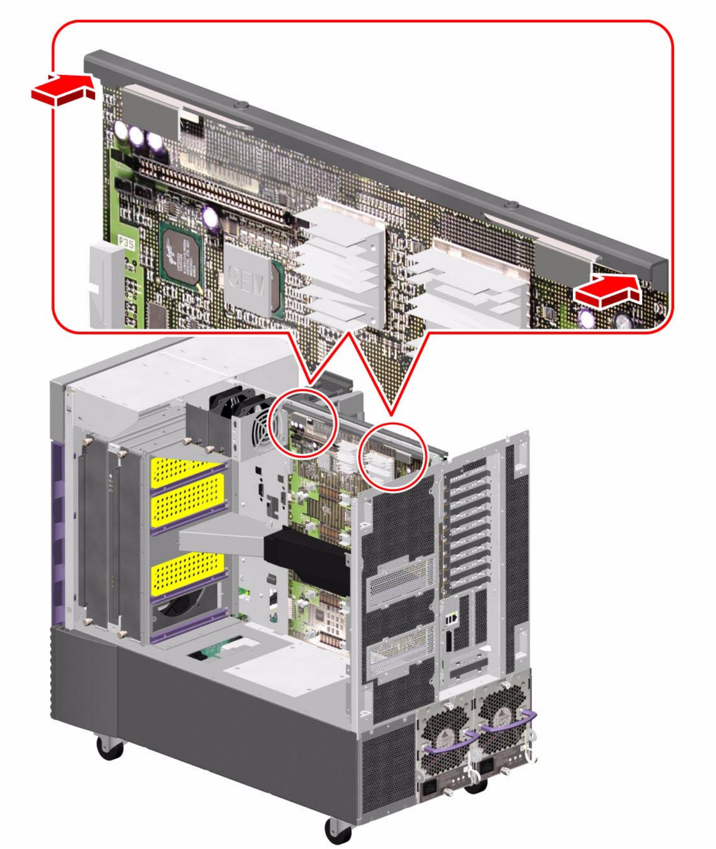
   a. **Angle the motherboard into the system so that you do not hit the motherboard fan status assembly.**

   b. **Carefully slide the plastic motherboard air duct over the metal motherboard air guide.**

   c. **Use the two guideposts that fit through two holes near the top of the motherboard to align the motherboard against the centerplane.**

3. **If the system I/O board is installed, seat the motherboard in the system by evenly and firmly pushing on the top outer ends of the motherboard stiffener and ejection assembly.**

Caution – Do not push on the ejection levers to seat the motherboard in the system.



4. Replace the 15 M4 Phillips screws that secure the motherboard in the chassis.

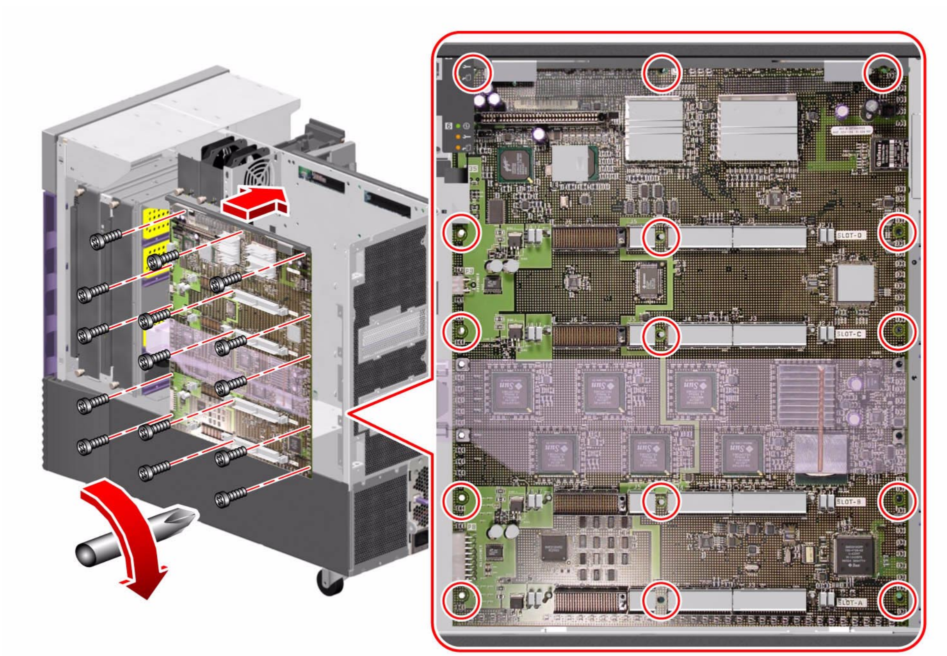
   a. Insert the top center screw and tighten it by two turns.

   b. Insert the screw directly beneath the top center screw and tighten it by two turns.

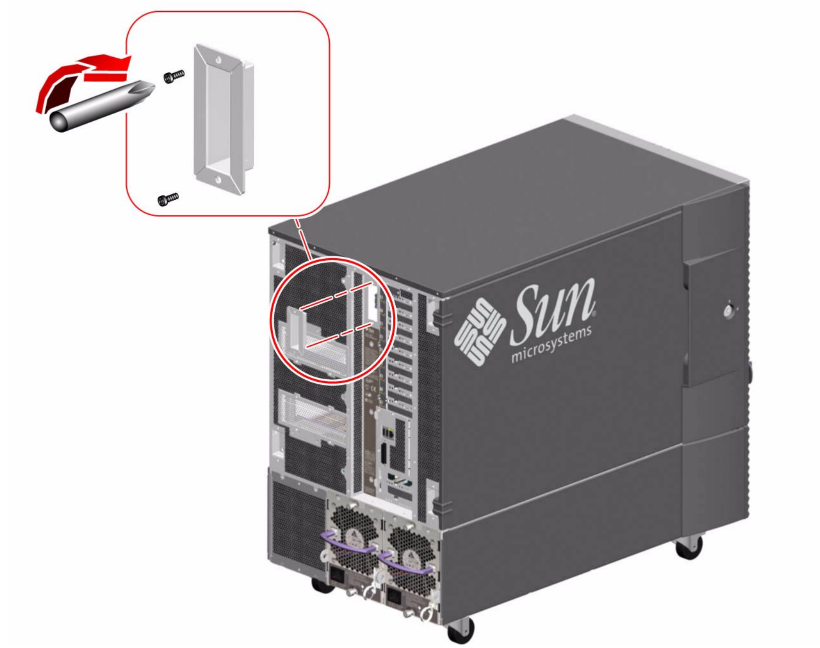
   c. Insert the top left and right screws and tighten them by two turns.

   d. Repeat this pattern for the remaining screws until they are all installed.

   e. Fully tighten the screws in the pattern described until the board is fully seated.



5. **Replace the two Phillips screws that secure the Gigabit Ethernet connector housing to the rear panel.**



6. **Connect the motherboard power cable (P8) to the motherboard at connector J4702 (Main Power).**

7. **Connect the motherboard power cable (P9) to the motherboard at connector J4701 (48 Volt Power).**

8. **Connect the base backplane FC-AL cable (A and B) to the motherboard at connectors A(FCALIN) and B(FCALOUT).**

9. **Connect the CPU/Memory board status assembly cable (P35) to the motherboard at connector P35.**

What Next

To reassemble the system, complete these tasks:

- "How to Install the CPU/Memory Board Status Assembly" on page 68
- "How to Install a CPU/Memory Board" on page 37
- "How to Close a Side Door" on page 24

Note – Be sure to run POST and OpenBoot Diagnostics tests to verify that the system functions correctly with the part(s) you have just installed. For maximum test coverage, set the OpenBoot configuration variable `diag-level` to `max` prior to starting the diagnostic tests. See "Diagnostics and Troubleshooting" on page 249.

CHAPTER 3

Servicing the Input/Output Board Side Components

This chapter describes how to remove and replace the system input/output (I/O) board and components on the I/O side of the system. For a list of part numbers for field-replaceable units (FRUs) and optional equipment, see “Illustrated Parts Breakdown” on page 329.

The following tasks are covered in this chapter:

How to Remove an I/O Fan Tray

Caution – At least one CPU fan tray, one I/O fan tray, and one motherboard fan tray must be installed and operating to ensure proper system cooling; otherwise, the system will initiate an automatic thermal shutdown.

All fan trays feature a hot-swap capability. You can remove and replace a faulty fan tray without shutting down the operating system or turning off the system power. For additional details, see “About Hot-Pluggable and Hot-Swappable Components” on page 7. For more information about I/O fan trays, see “About Fan Trays” on page 237.

Before You Begin

If you are not performing a hot-swap procedure, complete the following task:

- “How to Power Off the System” on page 5

Complete these tasks:

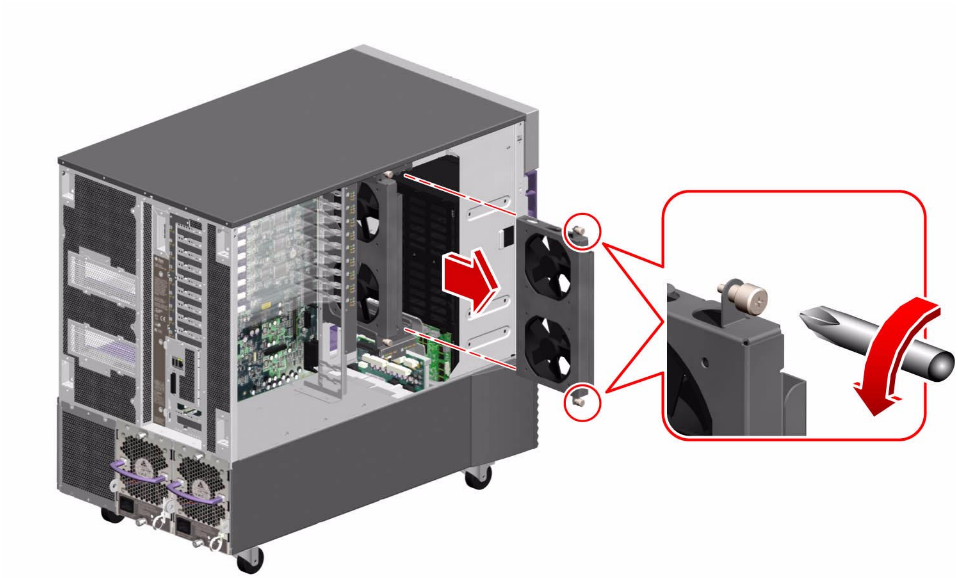
- “How to Open and Remove a Side Door” on page 22
- “How to Avoid Electrostatic Discharge” on page 27

What to Do

1. **Identify the fan tray that you want to remove.**

   The primary I/O fan tray is in slot 3. For information about I/O fan tray LEDs, see “About Fan Tray LEDs” on page 349.

2. **Loosen the two captive Phillips screws securing the fan tray to the brackets.**



3. **Slide the fan tray out from the brackets.**

Caution – If you are performing a hot-swap procedure, do not put your hand into the empty fan bay. The fans in the populated fan tray are spinning.

What Next

Note – During a hot-swap operation, after you remove a fan tray or power supply, wait for an acknowledgement message on the system console before installing a replacement part; otherwise, the environmental monitoring software will not recognize the new device and false error conditions will result.

To replace the I/O fan tray, complete this task:

- "How to Install an I/O Fan Tray" on page 86

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

How to Install an I/O Fan Tray

All fan trays feature a hot-swap capability. You can remove and replace a faulty fan tray without shutting down the operating system or turning off the system power. For additional details, see "About Hot-Pluggable and Hot-Swappable Components" on page 7. For more information about I/O fan trays, see "About Fan Trays" on page 237.

Before You Begin

If you are not performing a hot-swap procedure, complete the following task:

- "How to Power Off the System" on page 5

Complete these tasks:

- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Locate the I/O fan tray slot into which you want to install the fan tray.**

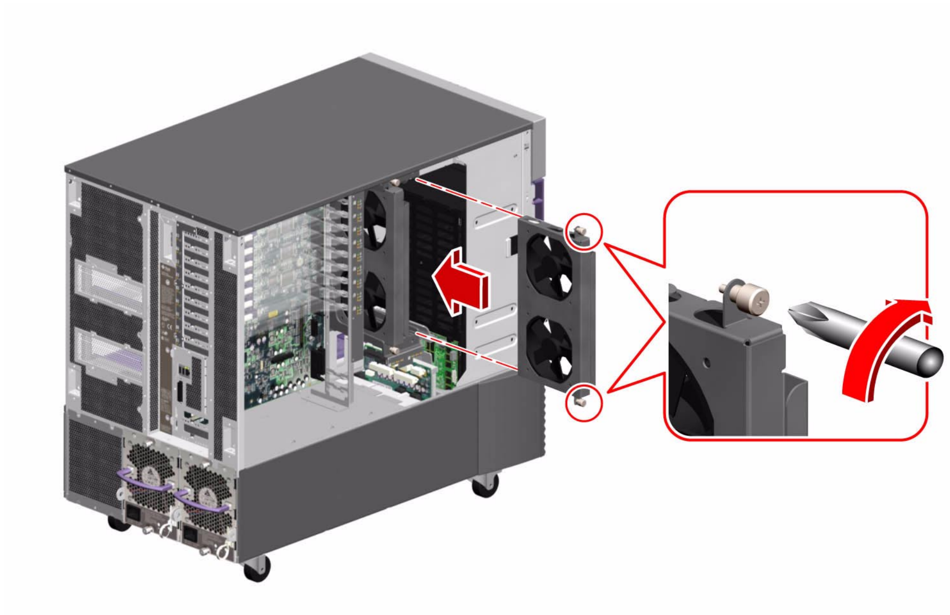
2. **Slide the fan tray into the brackets until the connector on the fan tray is fully seated into its socket.**

   The label on the I/O fan tray indicates the orientation of the fan tray.

Caution – If you are performing a hot-swap procedure, do not put your hand into the empty fan bay. The fans in the populated fan tray are spinning.

---

3. **Tighten the two captive Phillips screws that secure the fan tray to the brackets.**



What Next

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

If you installed this part as a new option while the system was powered off, you need to perform a reconfiguration boot. A reconfiguration boot is required in order for the operating system to recognize the new device. See:

- "How to Initiate a Reconfiguration Boot" on page 11

How to Remove a PCI Card

Before You Begin

Note – PCI cards are hot-pluggable provided the system is running a version of the Solaris operating environment that supports PCI card hot-plug operations. See the *Sun Fire 880 Server Product Notes* for important information about PCI card hot-plug support.

Note – If you are removing a PCI card as part of a hot-plug procedure, you must perform preliminary software commands to prepare the system before removing the card. In addition, certain other system requirements must be met in order for hot-plug operations to succeed. For more details about PCI card hot-plug procedures and system requirements, see "About Hot-Pluggable and Hot-Swappable Components" on page 7 and your *Sun Fire 880 Dynamic Reconfiguration User's Guide*.

Note – PCI and disk hot-plug operations are not supported when the system `ok` prompt is displayed. You can only perform these hot-plug operations while the operating system is running.

For information about PCI cards, see "About PCI Cards and Buses" on page 230.

If you are not performing a hot-plug procedure, complete the following task:

- "How to Power Off the System" on page 5

Complete these tasks:

- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

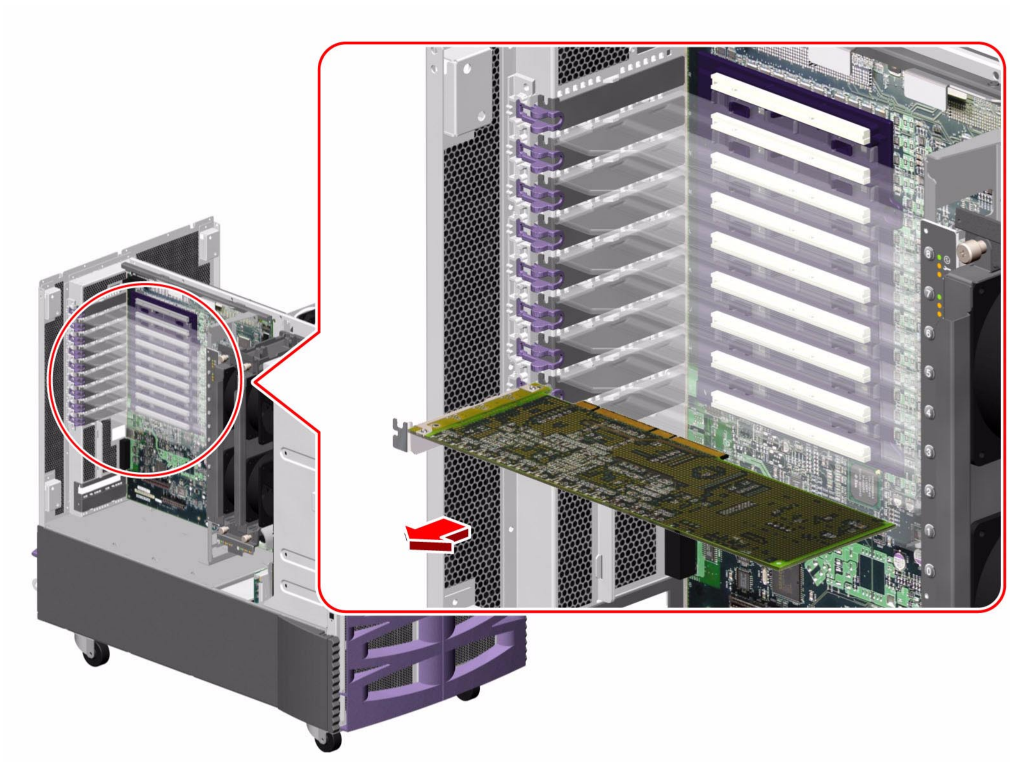
1. **Identify the PCI card that you want to remove.**

2. **Disconnect all external cables connected to the PCI card faceplate.**

3. **Disconnect all internal cables connected to the PCI card.**

4. **Pinch the PCI card retaining clip until it releases from the back of the card and rotate the clip outward.**

5. **Carefully pull the PCI card from the I/O board.**

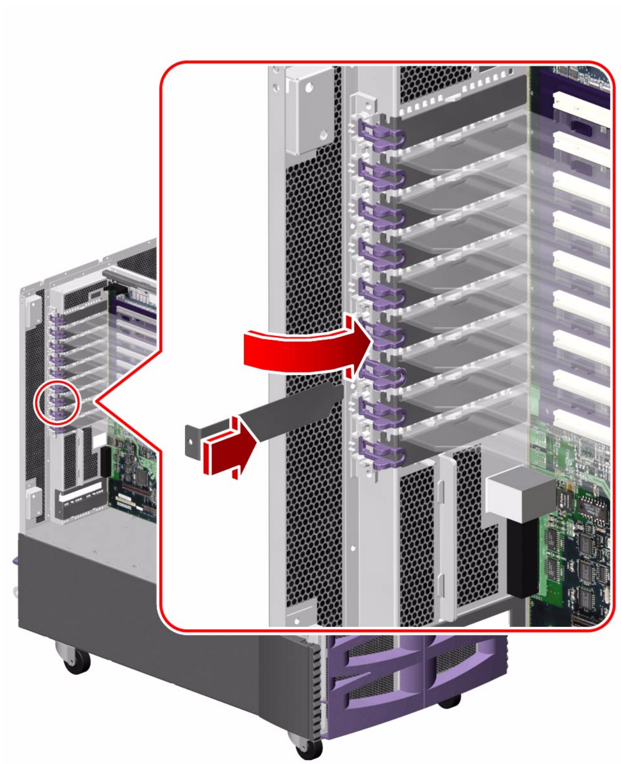


6. **Place the PCI card on an antistatic mat.**

7. **If you are not replacing the PCI card immediately, install a PCI filler panel into the system rear panel.**

   a. **Slide a PCI filler panel into the slot on the system rear panel.**

   b. **Rotate the PCI retaining clip over the back of the filler panel until it snaps into place.**



What Next

To replace the PCI card, complete this task:

- "How to Install a PCI Card" on page 92

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

If you removed this part while the system was powered off, and you are not replacing the part right away, you need to perform a reconfiguration boot. A reconfiguration boot is required in order for the operating system to recognize the configuration change. See:

- "How to Initiate a Reconfiguration Boot" on page 11

How to Install a PCI Card

Before You Begin

Note – PCI cards are hot-pluggable provided the system is running a version of the Solaris operating environment that supports PCI card hot-plug operations. See the *Sun Fire 880 Server Product Notes* for important information about PCI card hot-plug support.

Note – If you are installing a PCI card as part of a hot-plug procedure, you must perform preliminary software commands to prepare the system before installing the card. In addition, certain other system requirements must be met in order for hot-plug operations to succeed. For more details about PCI card hot-plug procedures and system requirements, see "About Hot-Pluggable and Hot-Swappable Components" on page 7 and your *Sun Fire 880 Dynamic Reconfiguration User's Guide*.

Note – PCI and disk hot-plug operations are not supported when the system `ok` prompt is displayed. You can only perform these hot-plug operations while the operating system is running.

If you are not performing a hot-plug procedure, complete the following task:

- "How to Power Off the System" on page 5

Complete these tasks:

- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

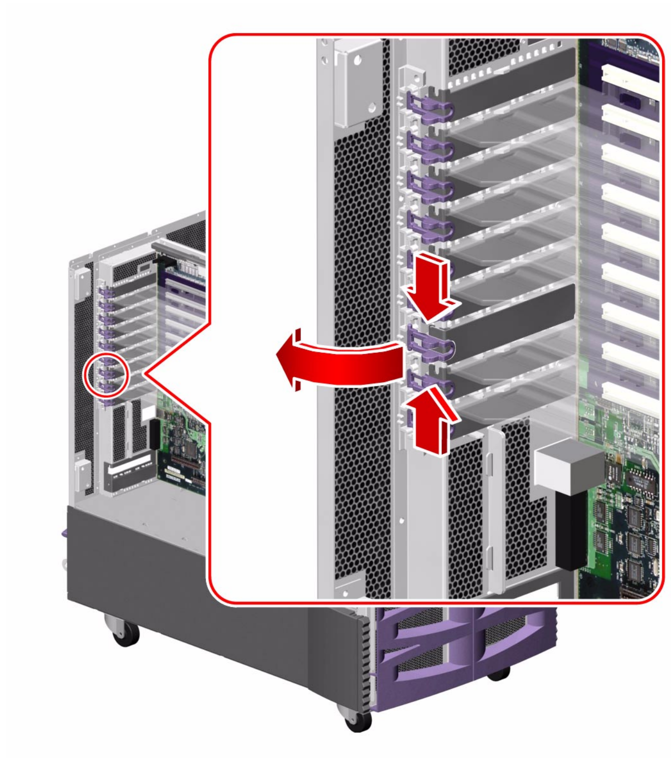
What to Do

1. **Identify the slot into which you want to install the PCI card.**

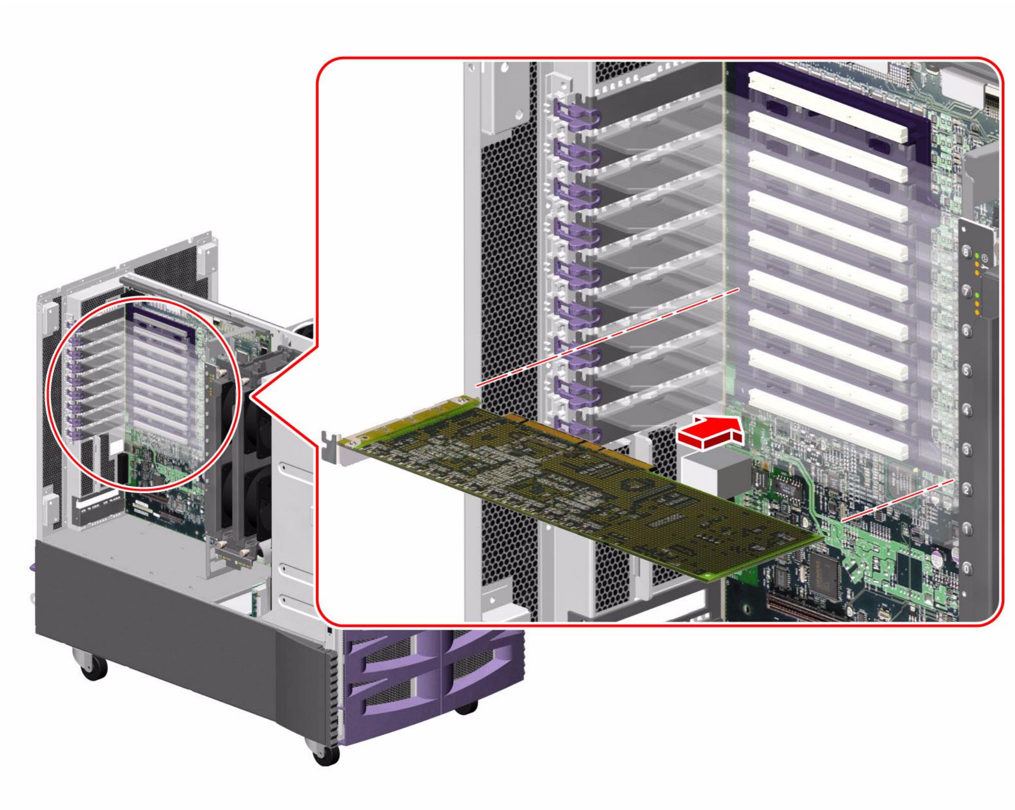
2. **Remove the PCI filler panel from the back of the system.**

   a. **Pinch the PCI card retaining clip until it releases from the top of the filler panel and rotate the clip outward.**

   b. **Slide the filler panel out from the rear panel.**



3. **Insert the PCI card into the appropriate slot on the I/O board.**



If you are installing a PCI long card:

a. **Insert the faceplate side of the PCI card into the appropriate opening on the rear panel. At the same time, insert the other end of the card into the corresponding groove on the PCI card bracket.**

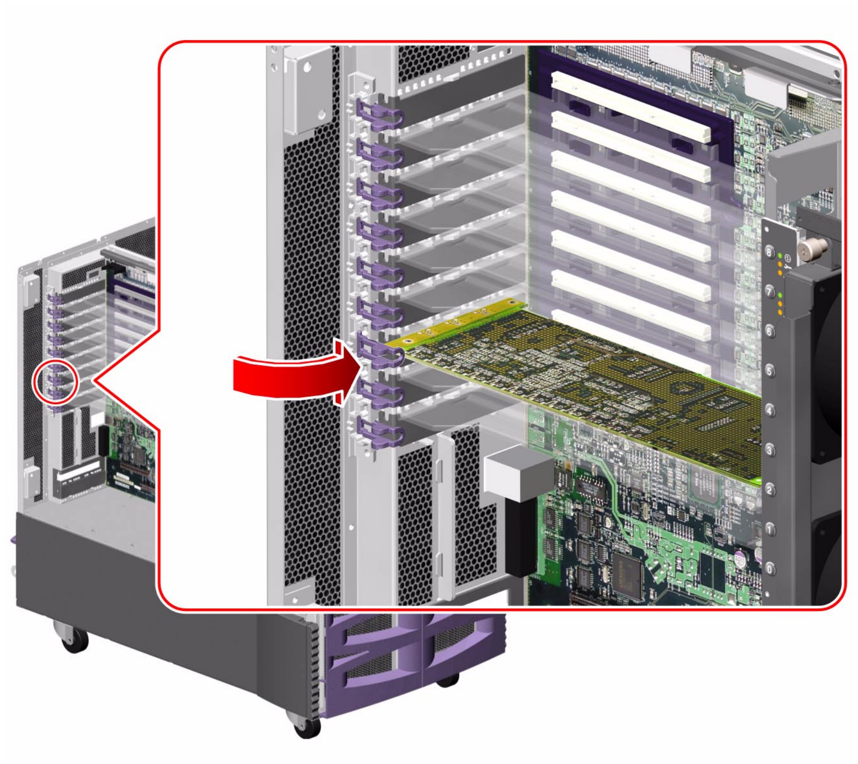
b. **Push the card into the slot on the I/O board until it is fully seated.**

If you are installing a PCI short card:

a. **Align the faceplate side of the PCI card with the appropriate opening on the rear panel.**

b. **Push the card into the slot on the I/O board until it is fully seated.**

4. **Rotate the PCI retaining clip over the back of the PCI card faceplate until it snaps into place.**



5. **If necessary, connect any internal cables to the PCI card's internal connectors.**
6. **If necessary, connect any external cables to the PCI card.**

What Next

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

Note – If you are installing a PCI card as part of a hot-plug procedure, you must issue software commands to reconfigure the operating environment after installing the new card. For more details about PCI card hot-plug procedures and system requirements, see "About Hot-Pluggable and Hot-Swappable Components" on page 7 and your *Sun Fire 880 Dynamic Reconfiguration User's Guide*.

If you installed this part as a new option while the system was powered off, you need to perform a reconfiguration boot. A reconfiguration boot is required in order for the operating system to recognize the new device. See:

- "How to Initiate a Reconfiguration Boot" on page 11

Note – Be sure to run POST and OpenBoot Diagnostics tests to verify that the system functions correctly with the part(s) you have just installed. For maximum test coverage, set the OpenBoot configuration variable `diag-level` to `max` prior to starting the diagnostic tests. See "Diagnostics and Troubleshooting" on page 249.

How to Remove the RSC Card

Note – *The RSC card is not a hot-pluggable component*. You must shut down the system and disconnect all the power cords from the system before performing this procedure.

Before You Begin

Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

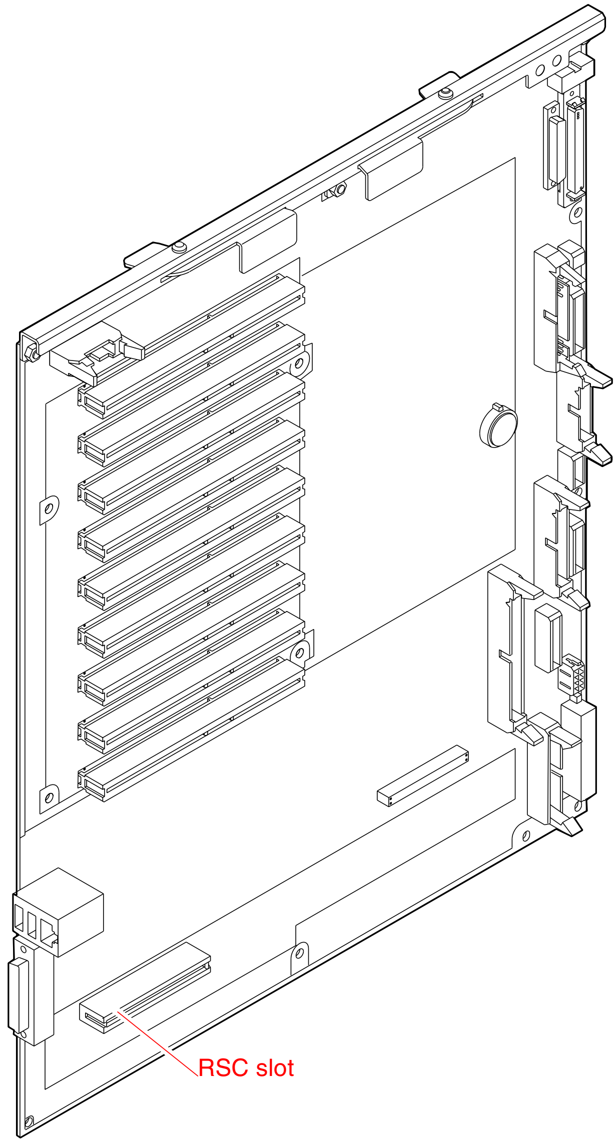
Caution – The system supplies hazardous voltage to the Remote System Control (RSC) card even when the system is powered off. To avoid personal injury or damage to the RSC card, you must disconnect the AC power cord(s) before servicing the RSC card.

---

1. **Disconnect the AC power cords from the power supplies.**

2. **Locate the RSC card.**

   The RSC card is installed in a slot on the system I/O board; it is labeled "RSC" on the rear panel.

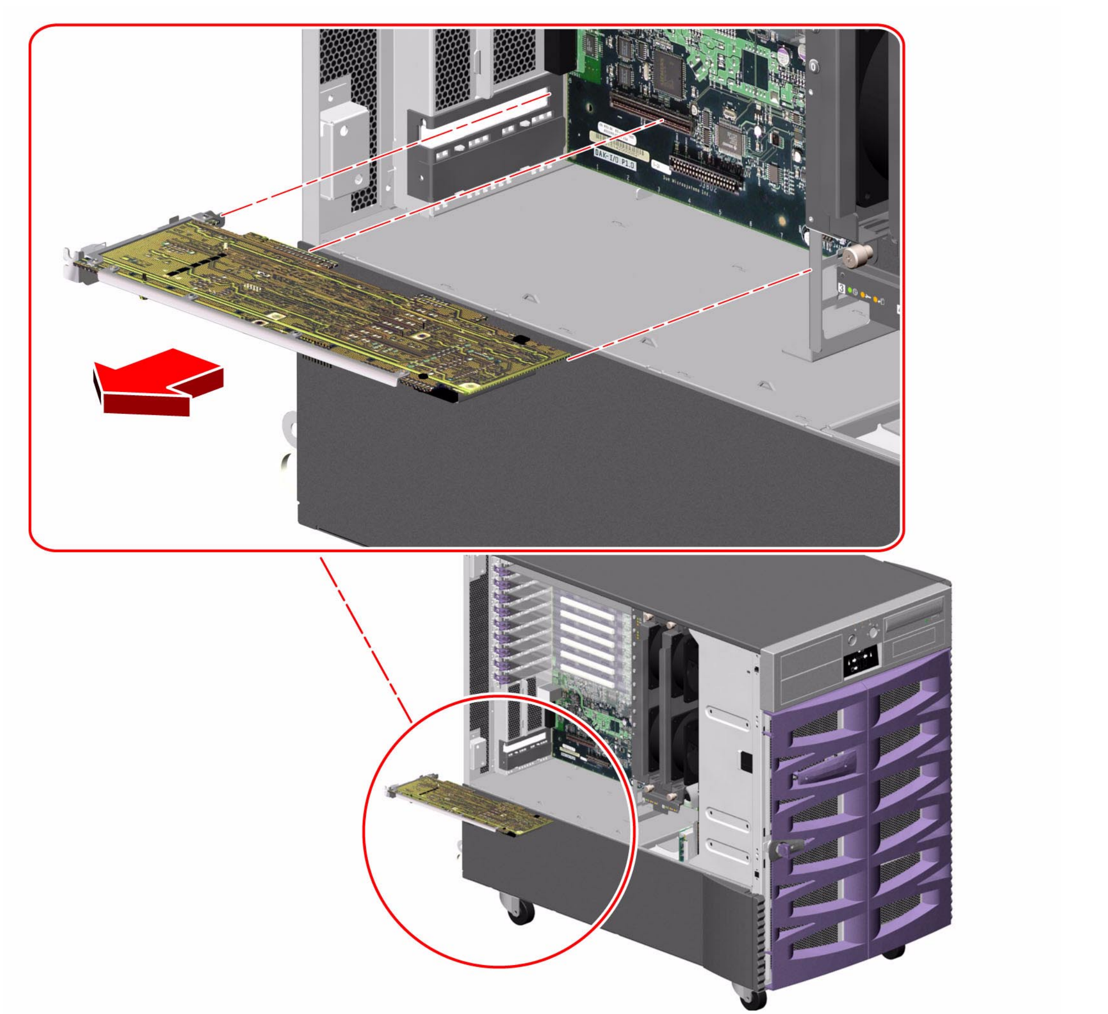


3. **Disconnect any external cable(s) attached to the faceplate of the RSC card.**

4. **Using a Phillips No. 1 screwdriver, remove the screw securing the card to the system rear panel.**

5. **Pull the RSC card from its slot.**

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



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

6. **Place the RSC card on an antistatic mat.**

Caution – If you removed the RSC card in order to remove and replace the system I/O board, reconnect the AC power cord to reestablish a ground path for electrostatic discharge.

What Next

To replace the RSC card, complete this task:

- "How to Install the RSC Card" on page 101

How to Install the RSC Card

Before You Begin

Complete this task:

- "How to Avoid Electrostatic Discharge" on page 27

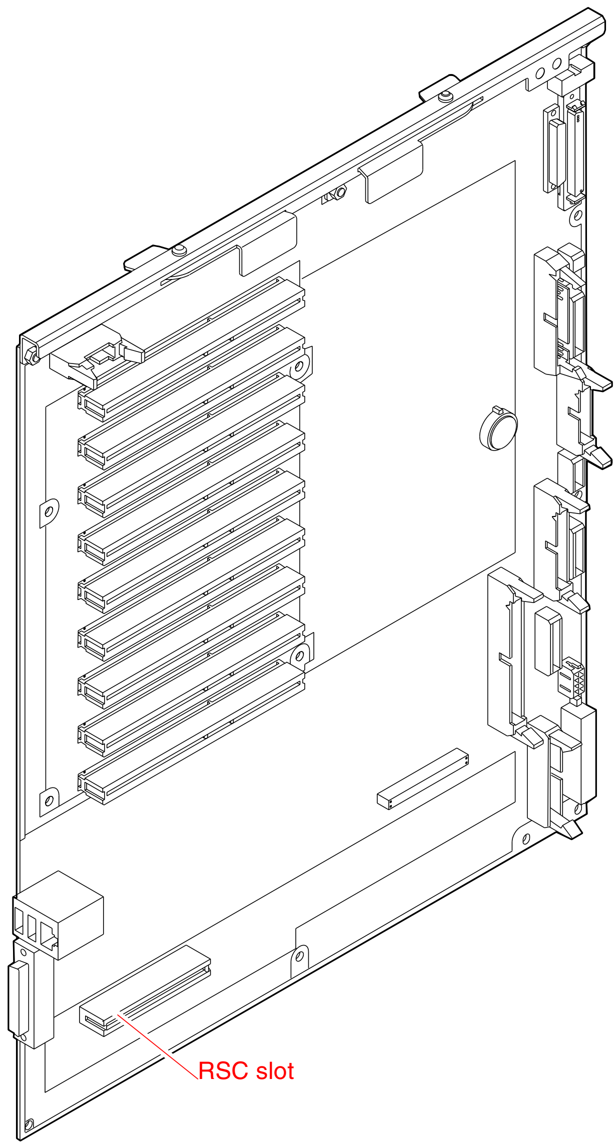
What to Do

Caution – The system supplies hazardous voltage to the Remote System Control (RSC) card even when the system is powered off. To avoid personal injury or damage to the RSC card, you must disconnect the AC power cord(s) before servicing the RSC card.

---

1. **Locate the slot for the RSC card, near the bottom of the system I/O board.**

Note – Make sure to install the RSC card into the RSC slot. Although the RSC card can physically fit in a PCI slot, it will not function if installed there.



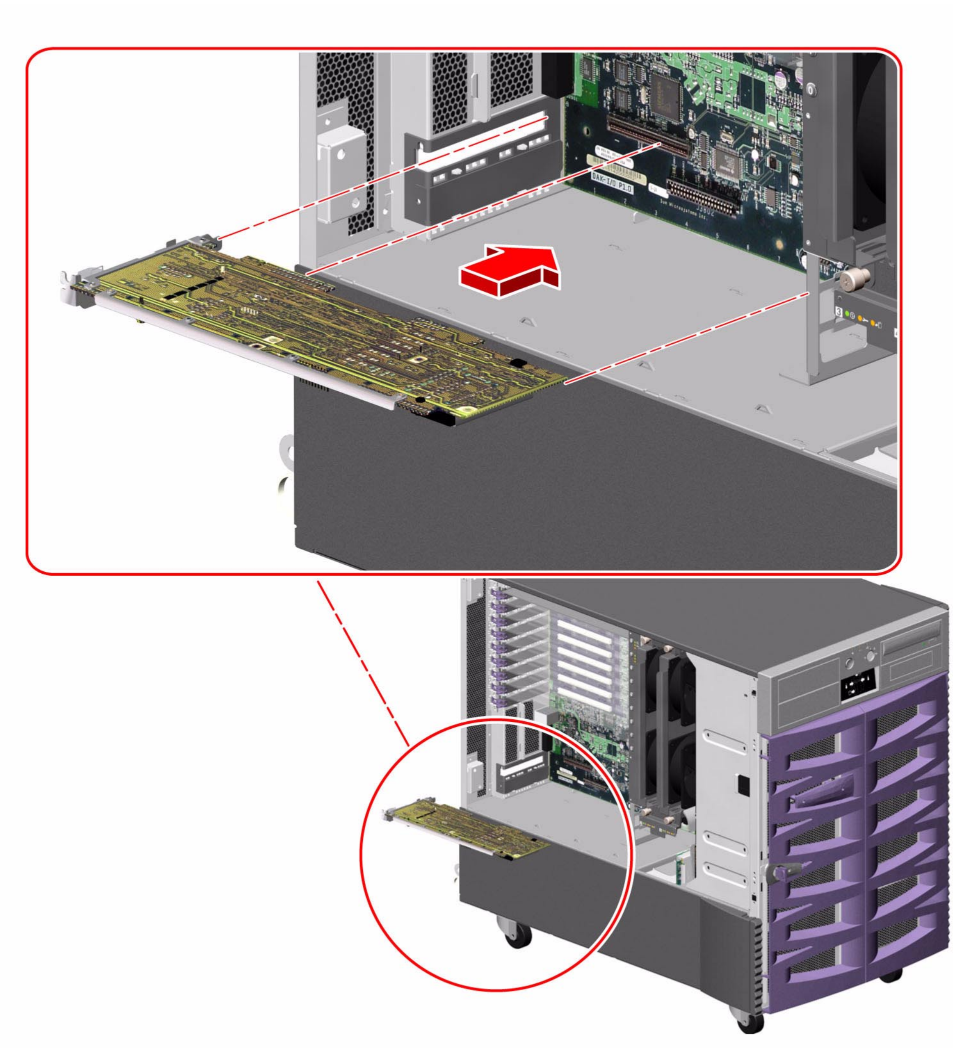
2. **Insert the RSC card into its slot on the system I/O board.**

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

b. **Insert the opposite end of the card into the appropriate card guide so that the RSC card is aligned evenly with the connectors on the I/O board.**

c. **Push the card into the connectors on the system I/O board.**

Apply even pressure along the edge of the card.



3. **Secure the RSC card faceplate to the rear panel with the Phillips screw.**

4. **Connect the Ethernet, serial, and/or modem cable to the appropriate connector on the RSC card faceplate.**
5. **Reconnect the AC power cords to the power supplies.**

What Next

Note – After replacing the RSC card, you must restore the RSC configuration settings by running the RSC server configuration script. In addition, the replacement card has a new Ethernet MAC address, which may necessitate configuration changes to other network devices. To determine the Ethernet MAC address for the new RSC card, use the RSC shell command `shownetwork`. For more information, see the *Remote System Control User's Guide* provided with the RSC software.

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

How to Remove the Sun StorEdge PCI Dual Fibre Channel Host Adapter Card

Before You Begin

Complete these tasks:

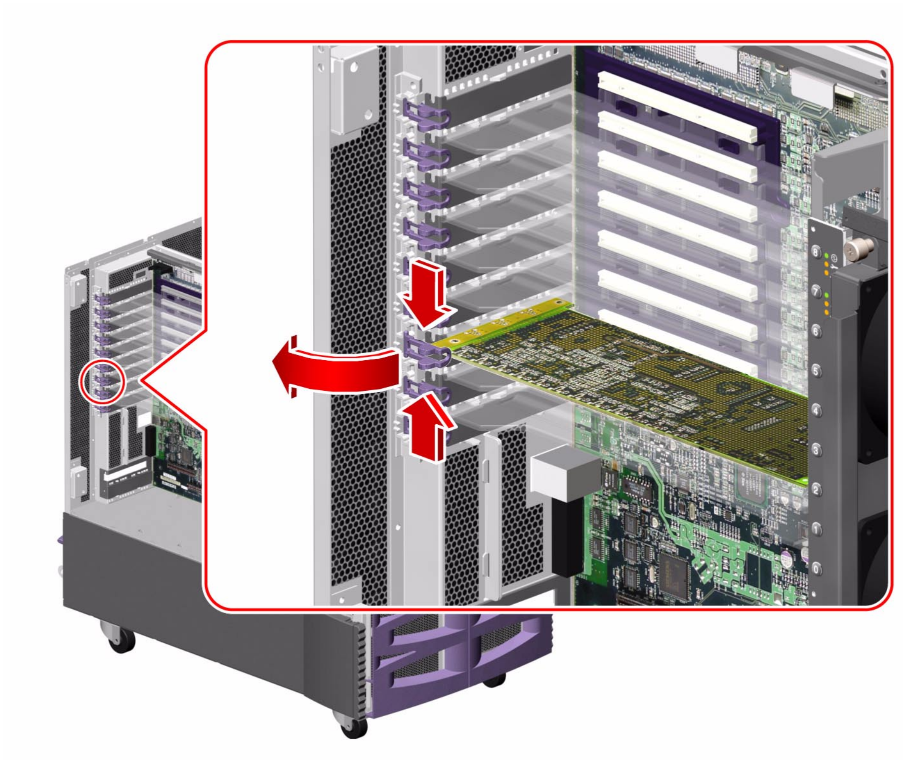
- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Locate the Sun StorEdge PCI Dual Fibre Channel Host Adapter card.**

2. **Disconnect any internal and external cable(s) attached to the card.**

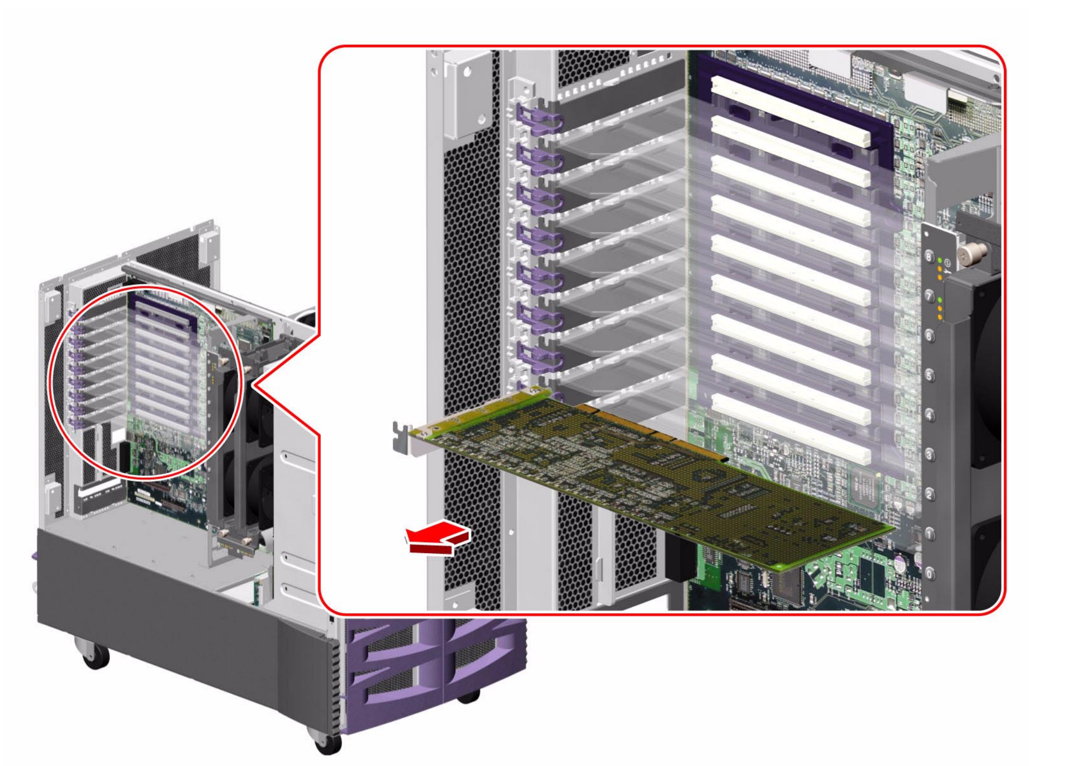
3. **Pinch the PCI card retaining clip until it releases from the back of the card and rotate the clip outward.**



4. **Carefully pull the Sun StorEdge PCI Dual Fibre Channel Host Adapter card from the I/O board.**

   Hold the card by the faceplate and its opposite edge, and pull up while carefully 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.

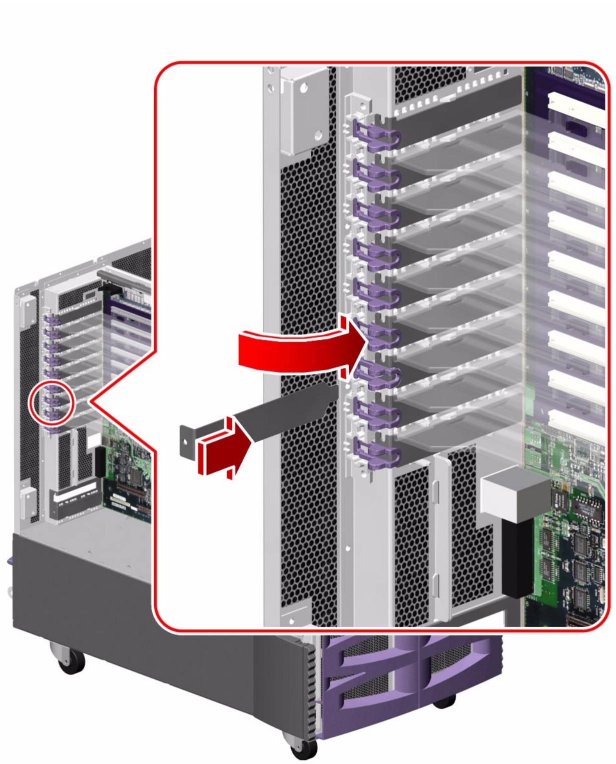


5. **Place the card on an antistatic mat.**

6. **If you are not immediately replacing the Sun StorEdge PCI Dual Fibre Channel Host Adapter card, install a PCI filler panel into the system rear panel.**

   a. **Slide a PCI filler panel into the slot on the system rear panel.**

b. **Rotate the PCI retaining clip over the back of the filler panel until it snaps into place.**



7. **If you are not immediately replacing the card, remove the Sun StorEdge PCI Dual Fibre Channel Host Adapter FC-AL cable from the system.**

   a. **Disconnect the FC-AL cable (D and C) from connectors D and C on the base FC-AL backplane.**

   b. **Remove the cable from the three tie-wraps on the chassis power bay.**

What Next

To replace the Sun StorEdge PCI Dual Fibre Channel Host Adapter card, complete this task:

- "How to Install the Sun StorEdge PCI Dual Fibre Channel Host Adapter Card" on page 110

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

If you are not immediately replacing the Sun StorEdge PCI Dual Fibre Channel Host Adapter card, you need to perform a reconfiguration boot to reflect the new system configuration. For further information, see:

- "How to Initiate a Reconfiguration Boot" on page 11

How to Install the Sun StorEdge PCI Dual Fibre Channel Host Adapter Card

For information about FC-AL host adapters, see your *Sun Fire 880 Server Owner's Guide*.

Note – Do not use the internal port of the Sun StorEdge PCI Dual Fibre Channel Host Adapter card to connect to the Loop A port of the FC-AL disk backplane. You must connect the card's internal port to Loop B only.

Note – If the internal port of your Sun StorEdge PCI Dual Fibre Channel Host Adapter card is connected to the Loop B port of an FC-AL disk backplane, *you must not use the card's external Port 1*. Connecting Port 1 to external devices under these circumstances is considered an unsupported configuration. In this case, use only Port 2 to connect to external devices.

Before You Begin

Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Locate the PCI slot for the Sun StorEdge PCI Dual Fibre Channel Host Adapter card.**

Note – For optimal performance, install the Sun StorEdge PCI Dual Fibre Channel Host Adapter card into a 66-MHz PCI slot (slot 7 or 8) on the I/O board. The Sun StorEdge PCI Dual Fibre Channel Host Adapter card will function in a 33- or 66-MHz PCI slot. For more information on PCI slots, see "About PCI Cards and Buses" on page 230.

---

2. **If a PCI filler panel is installed in the slot's rear panel opening, remove it.**

a. **Pinch the PCI card retaining clip until it releases from the top of the filler panel and rotate the clip outward.**

b. **Slide the filler panel out from the rear panel.**

3. **Connect the Sun StorEdge PCI Dual Fibre Channel Host Adapter FC-AL cable to the card.**

   a. **Connect the cable end labeled P3 to connector J3 on the card.**

   b. **Connect the cable end labeled P4 to connector J4 on the card.**

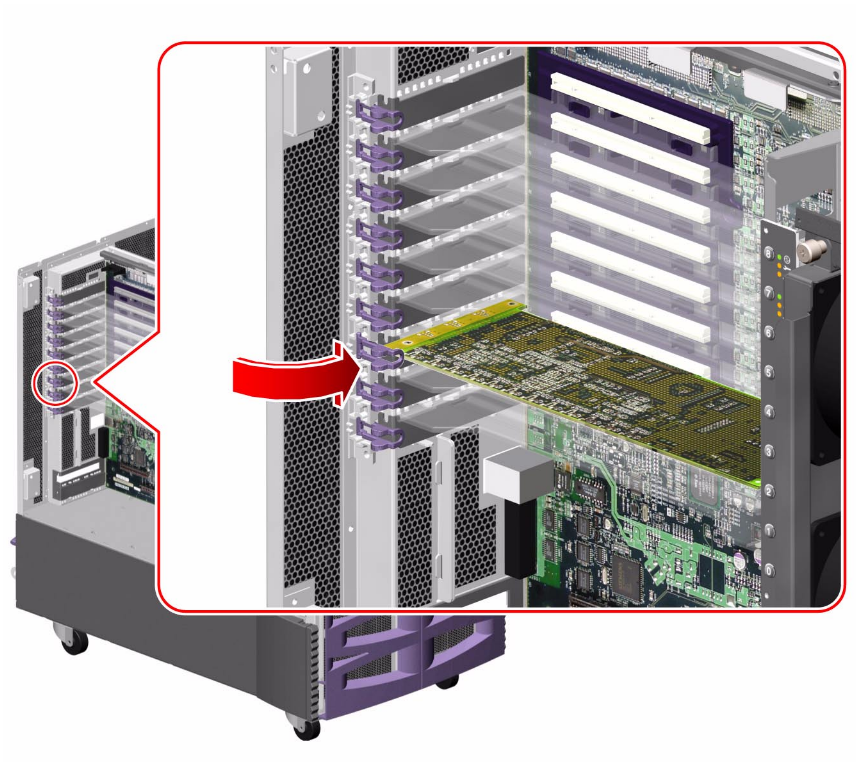
4. **Insert the Sun StorEdge PCI Dual Fibre Channel Host Adapter card into its slot on the system I/O board.**

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

   b. **Push the card into the connectors on the system I/O board.**

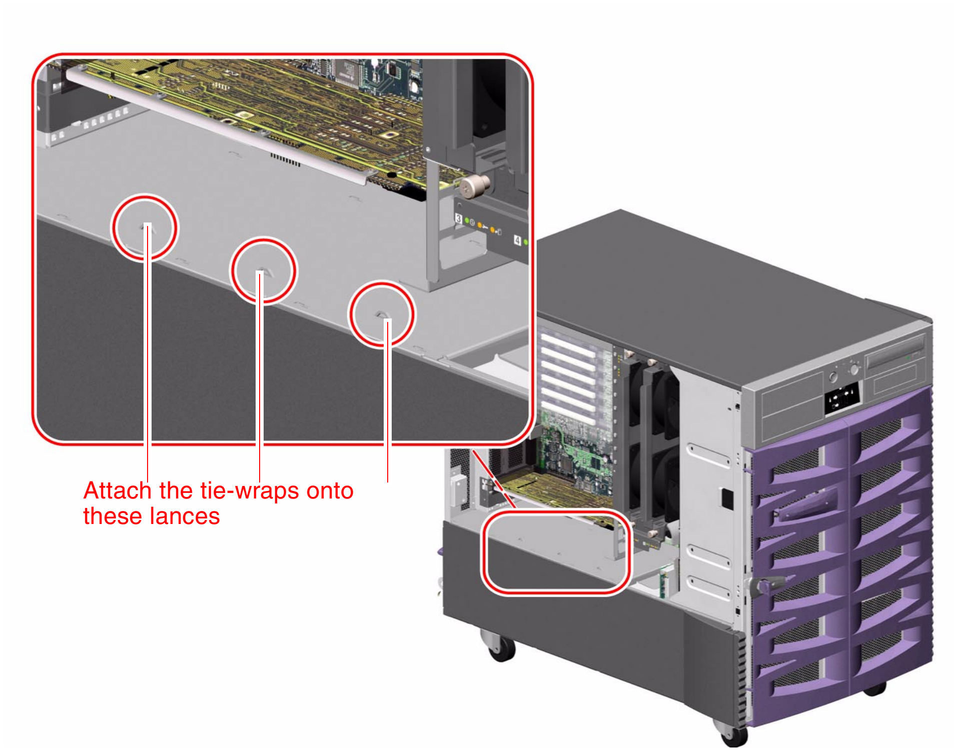
   Apply even pressure along the edge of the card.

5. **Rotate the PCI retaining clip over the back of the card faceplate until it snaps into place.**



6. **If you are installing the card for the first time, route and connect the Sun StorEdge PCI Dual Fibre Channel Host Adapter FC-AL cable in the system in the following manner:**

   a. **Attach the three tie-wraps provided with the Sun StorEdge PCI Dual Fibre Channel Host Adapter FC-AL cable onto the lances on the chassis power bay cover.**



   b. **Route the cable down to the chassis power bay cover and through the three tie-wraps.**

      Leave enough slack in the cable so that you can remove any other installed PCI cards during a PCI hot-plug procedure.

      For cable connector locations, see "Cable Connector Locations" on page 220.

   c. **Connect the cable end labeled D to connector D on the base FC-AL backplane.**

   d. **Connect the cable end labeled C to connector C on the base FC-AL backplane.**

What Next

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

If you installed this part as a new option, you need to perform a reconfiguration boot in order for the operating system to recognize the new device. See:

- "How to Initiate a Reconfiguration Boot" on page 11

Note – Be sure to run POST and OpenBoot Diagnostics tests to verify that the system functions correctly with the part(s) you have just installed. For maximum test coverage, set the OpenBoot configuration variable `diag-level` to `max` prior to starting the diagnostic tests. See "Diagnostics and Troubleshooting" on page 249.

How to Remove the PCI Internal LED Flex Circuit

Before You Begin

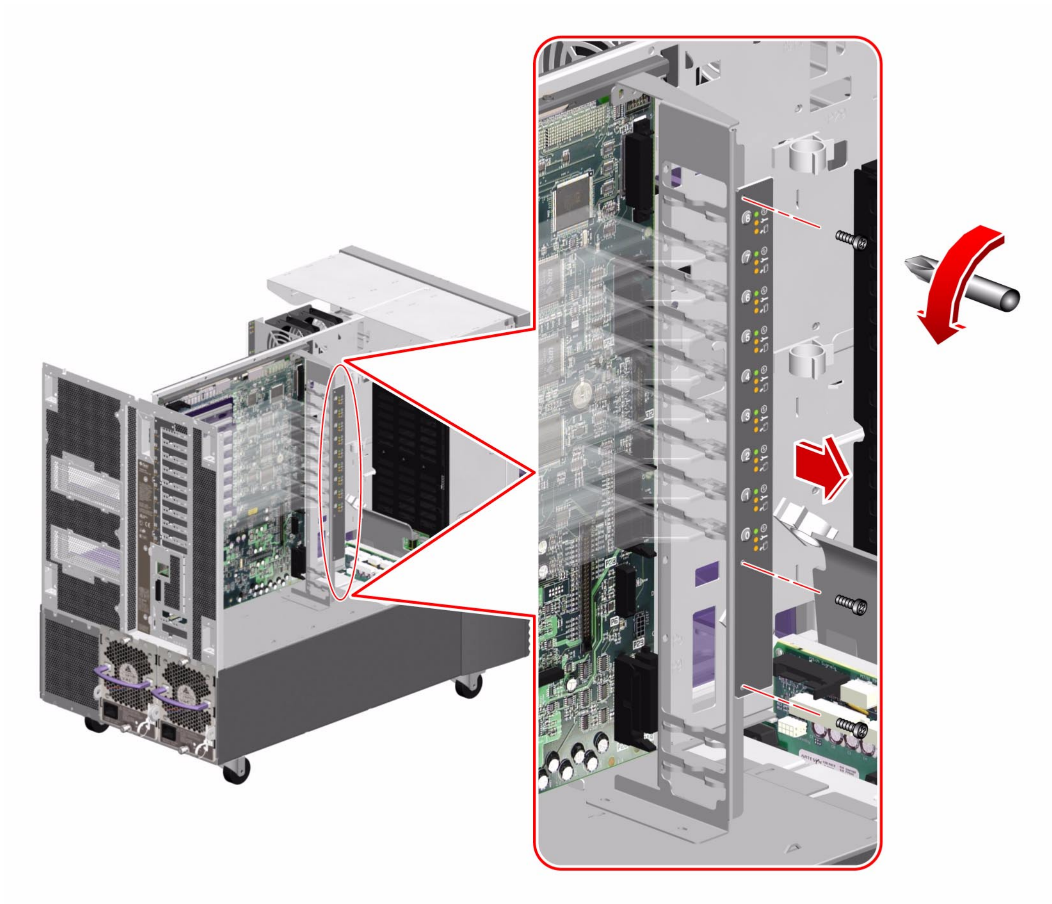
Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Disconnect the PCI internal status cable (P37) from the back of the PCI internal LED flex circuit.**

2. **Remove the three Phillips screws securing the flex circuit to the PCI card bracket and pull the flex circuit from the system.**



3. **Place the flex circuit on an antistatic mat.**

What Next

To replace the PCI internal LED flex circuit, complete this task:

- "How to Install the PCI Internal LED Flex Circuit" on page 117

How to Install the PCI Internal LED Flex Circuit

Before You Begin

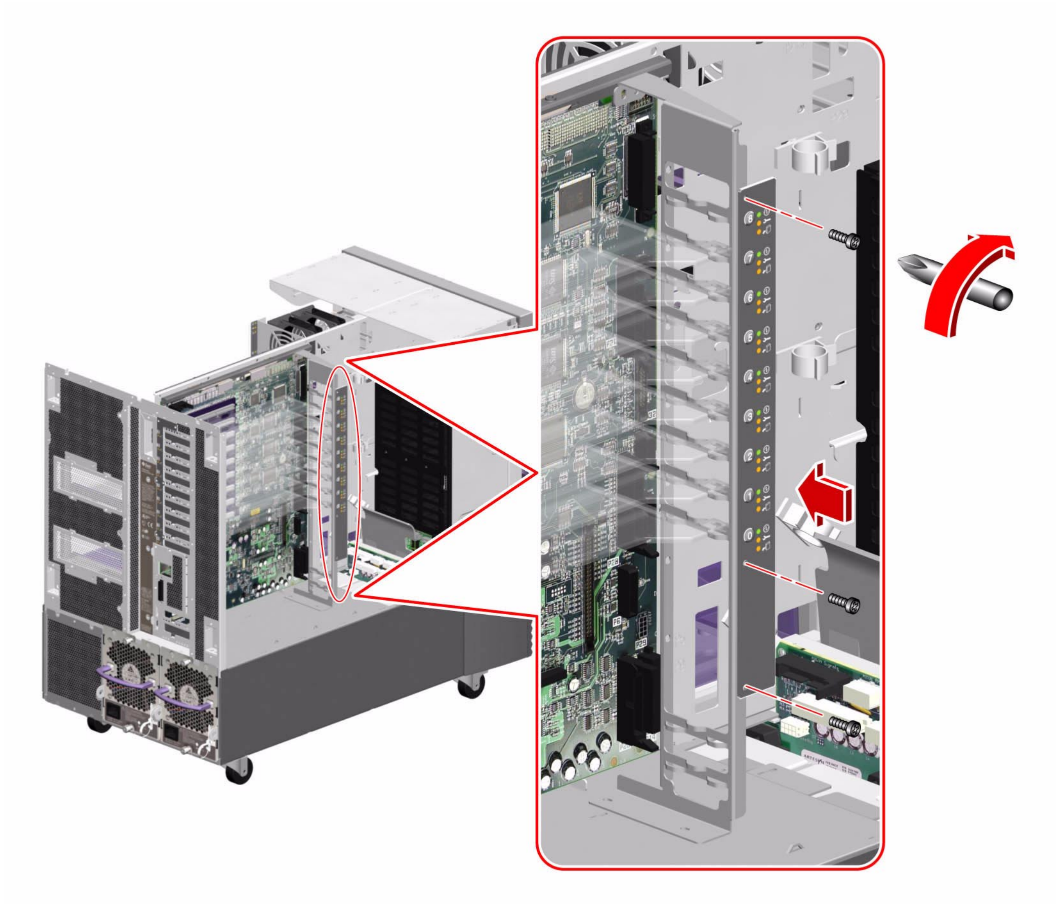
Complete this task:

- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Align the PCI internal LED flex circuit with the PCI card bracket.**

2. **Replace the three Phillips screws that secure the flex circuit to the bracket.**



3. **Connect the PCI internal status cable (P37) to the connector on the back of the flex circuit.**

What Next

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

How to Remove the PCI External LED Flex Circuit

Before You Begin

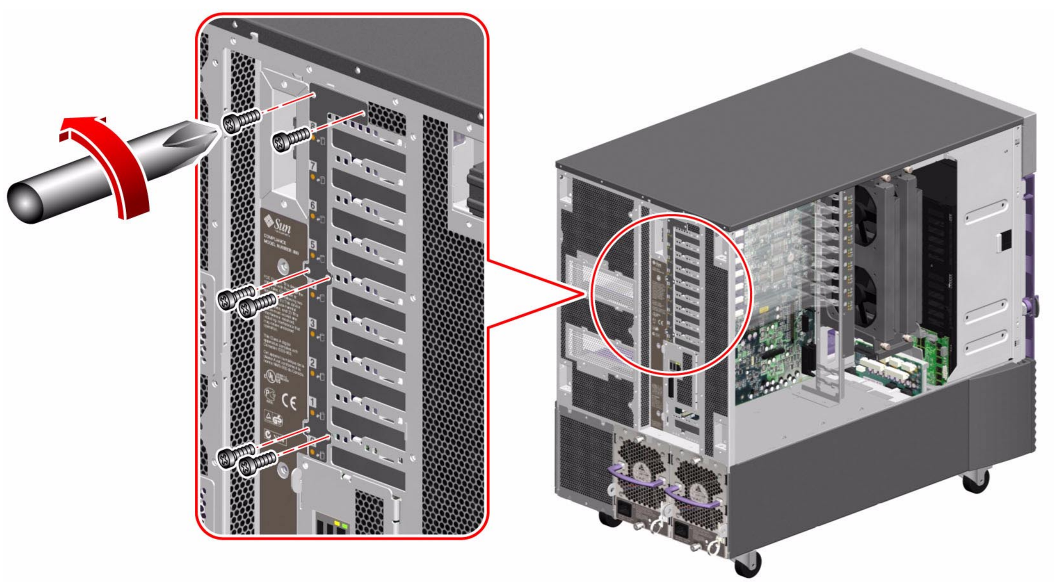
Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Disconnect the PCI external status cable (P24) from the back of the PCI external LED flex circuit.**

2. **Remove the six Phillips screws securing the flex circuit to the rear panel.**



3. **Remove the flex circuit from the rear panel.**

4. Place the flex circuit on an antistatic mat.

What Next

To replace the PCI external LED flex circuit, complete this task:

- "How to Install the PCI External LED Flex Circuit" on page 121

How to Install the PCI External LED Flex Circuit

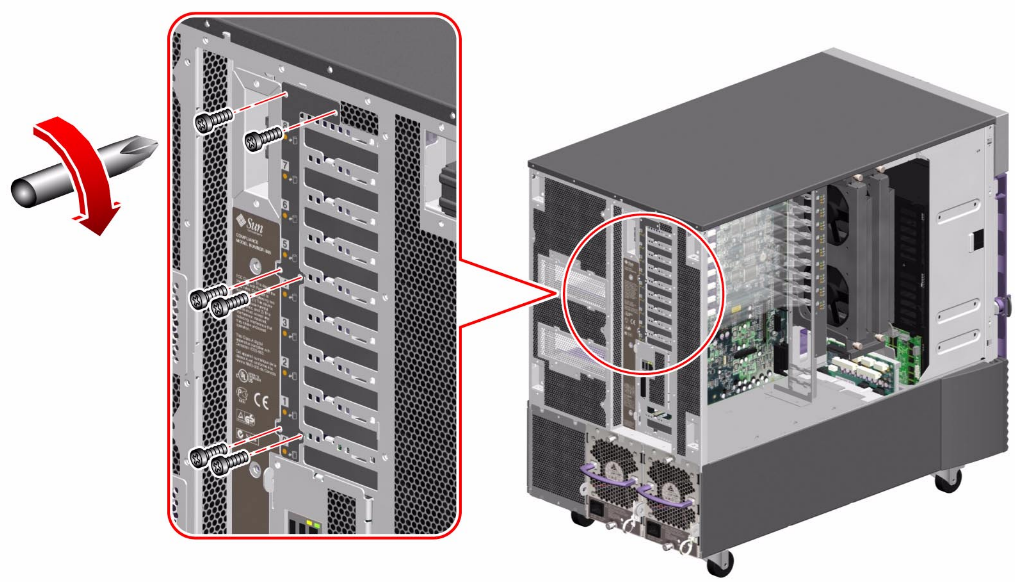
Before You Begin

Complete this task:

- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Position the PCI external LED flex circuit on the rear panel.**
2. **Replace the six Phillips screws that secure the flex circuit to the rear panel.**



3. **Connect the PCI external status cable (P24) to the connector on the back of the flex circuit.**

What Next

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

How to Remove the I/O Fan LED Flex Circuit

Before You Begin

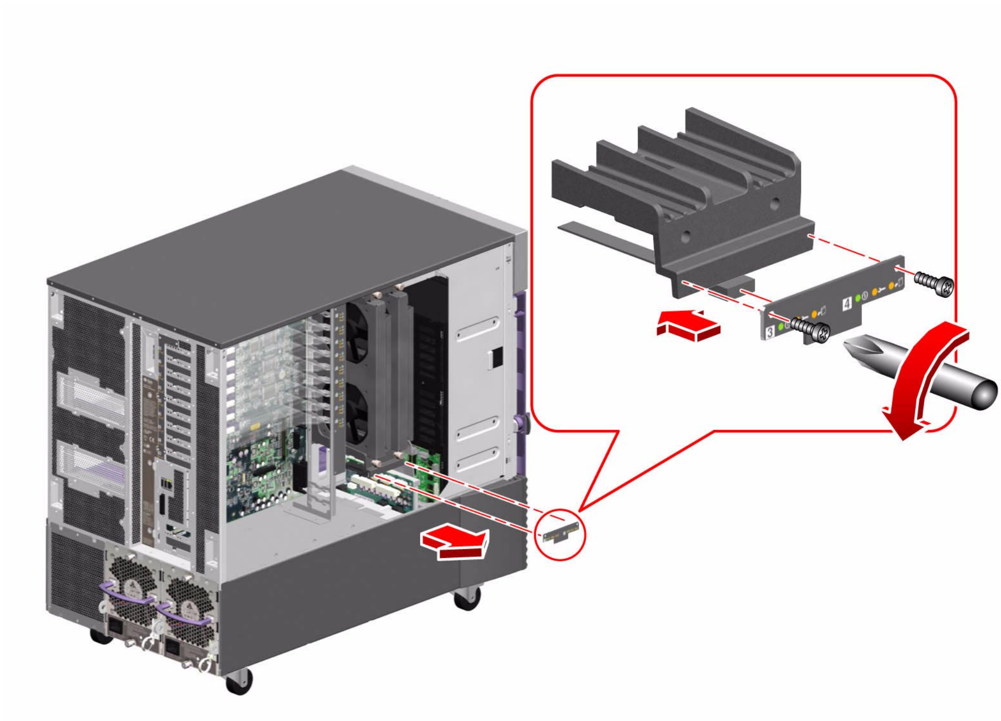
Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Disconnect the I/O fan status cable (P27) from the back of the I/O fan LED flex circuit.**

2. **Remove the two Phillips screws securing the flex circuit to the bottom I/O fan tray bracket.**



3. **Remove the flex circuit from the system.**
4. **Place it on an antistatic mat.**

What Next

To replace the I/O fan LED flex circuit, complete this task:

- "How to Install the I/O Fan LED Flex Circuit" on page 125

How to Install the I/O Fan LED Flex Circuit

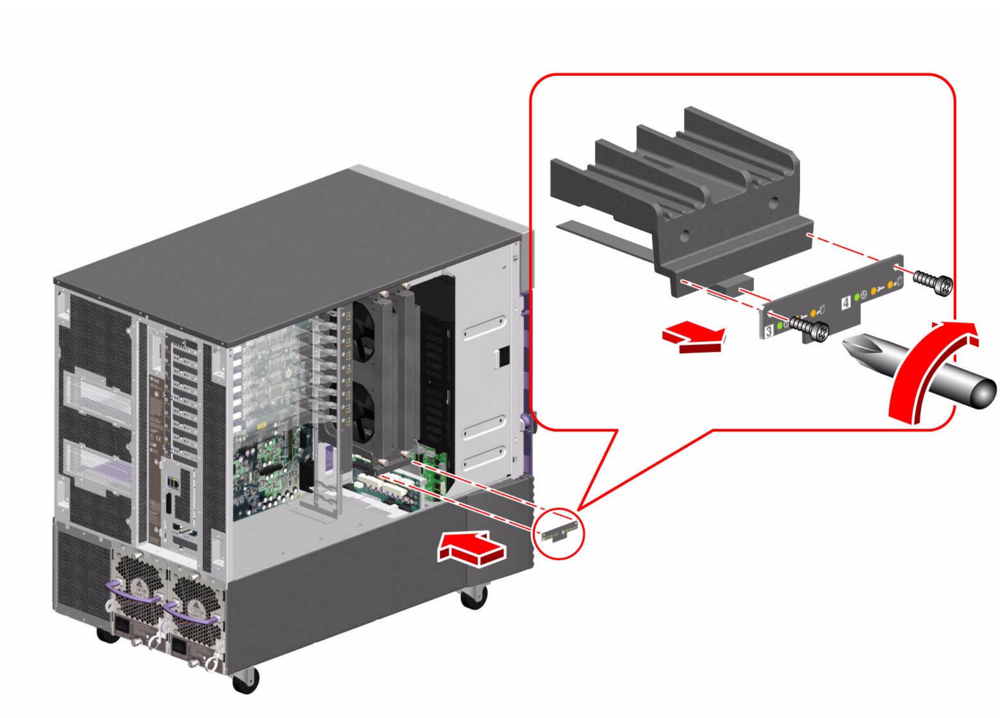
Before You Begin

Complete this task:

- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Position the I/O fan LED flex circuit on the bottom I/O fan tray bracket.**
2. **Replace the two Phillips screws that secure the flex circuit to the bracket.**



3. Connect the I/O fan status cable (P27) to the connector on the back of the flex circuit.

What Next

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

How to Remove the System SEEPROM

This section explains how to remove a functioning ID SEEPROM module so that you can install it on a new I/O board, thereby preserving the system’s host ID information. If you are replacing a defective ID SEEPROM module and want to retain the same host ID and Ethernet address, consult your authorized Sun sales representative or service provider for assistance with programming the new ID SEEPROM module with the existing host ID and Ethernet address.

Before You Begin

Complete these tasks:

- “How to Power Off the System” on page 5
- “How to Open and Remove a Side Door” on page 22
- “How to Avoid Electrostatic Discharge” on page 27

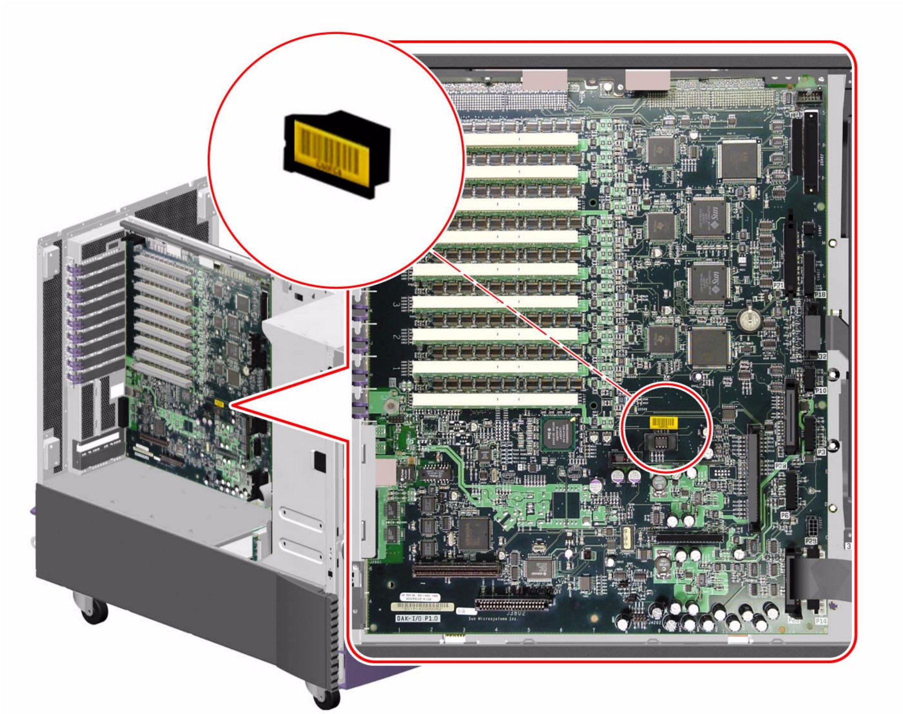
What to Do

Caution – The system supplies 5V standby voltage to the SEEPROM even when the system is powered off. To avoid damage to the SEEPROM, you must disconnect the AC power cord(s) before servicing the SEEPROM.

---

1. Disconnect the AC power cords from the power supplies.

2. **Locate the system SEEPROM on the I/O board.**



3. **Pull the SEEPROM from its socket.**
4. **Place the SEEPROM on an antistatic mat.**

What Next

To replace the system SEEPROM, complete this task:

- “How to Install the System SEEPROM” on page 129

How to Install the System SEEPROM

This section explains how to install a functioning ID SEEPROM module. If you are replacing a defective ID SEEPROM module and want to retain the same host ID and Ethernet address, consult your authorized Sun sales representative or service provider for assistance with programming the new ID SEEPROM module with the existing host ID and Ethernet address.

Before You Begin

Complete this task:

- "How to Avoid Electrostatic Discharge" on page 27

What to Do

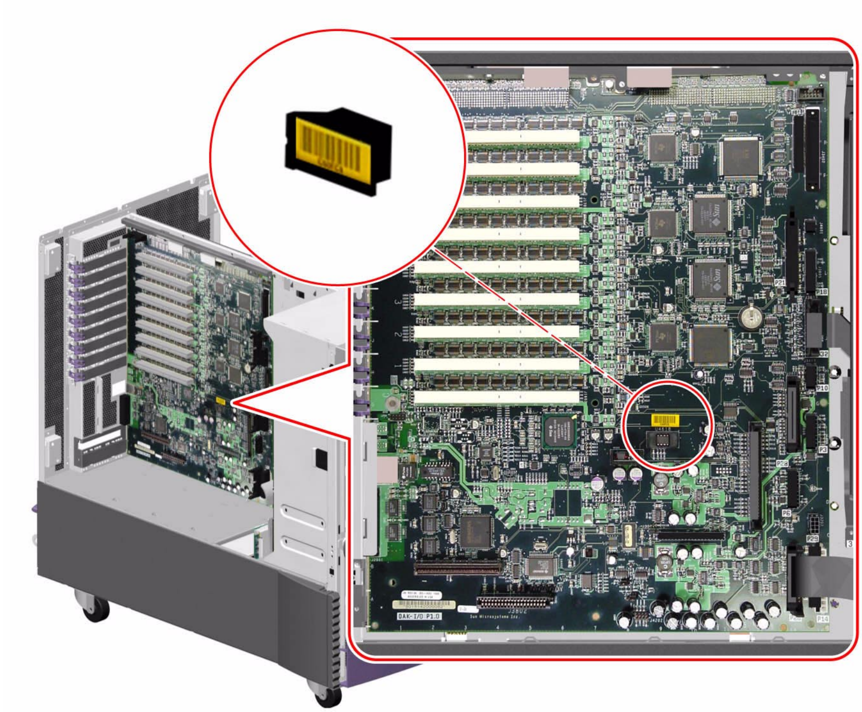
Caution – The system supplies 5V standby voltage to the SEEPROM even when the system is powered off. To avoid damage to the SEEPROM, you must disconnect the AC power cord(s) before servicing the SEEPROM.

---

1. **Disconnect the AC power cords from the power supplies.**

2. **Carefully seat the system SEEPROM in its socket on the I/O board.**

   The socket is keyed to ensure proper orientation of the SEEPROM module.



3. **Press evenly and firmly until the SEEPROM is fully seated in the socket.**

What Next

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

How to Remove the I/O Board

Before You Begin

You must remove the RSC card and all PCI cards from the I/O board. Note the slot number associated with each card so you can return each card to the appropriate slot when you reassemble the system.

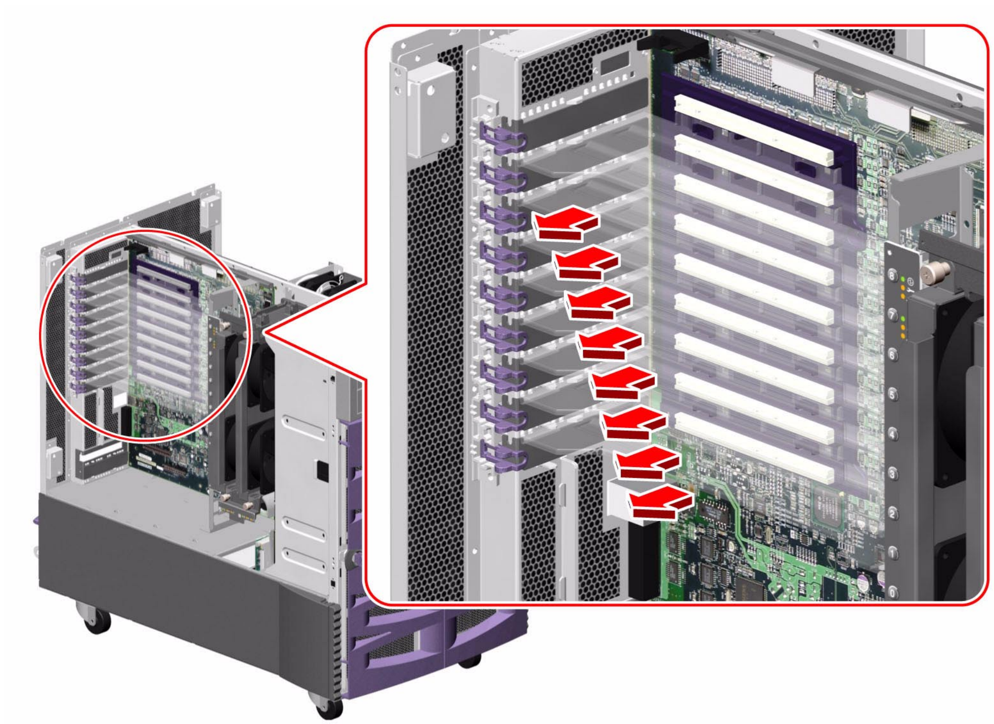
Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27
- "How to Remove a PCI Card" on page 88
- "How to Remove the RSC Card" on page 97
- "How to Remove an I/O Fan Tray" on page 84

What to Do

1. **Remove the eight PCI card dividers and set them aside.**

   Hold the divider by the front edge and pull it out from the divider base.



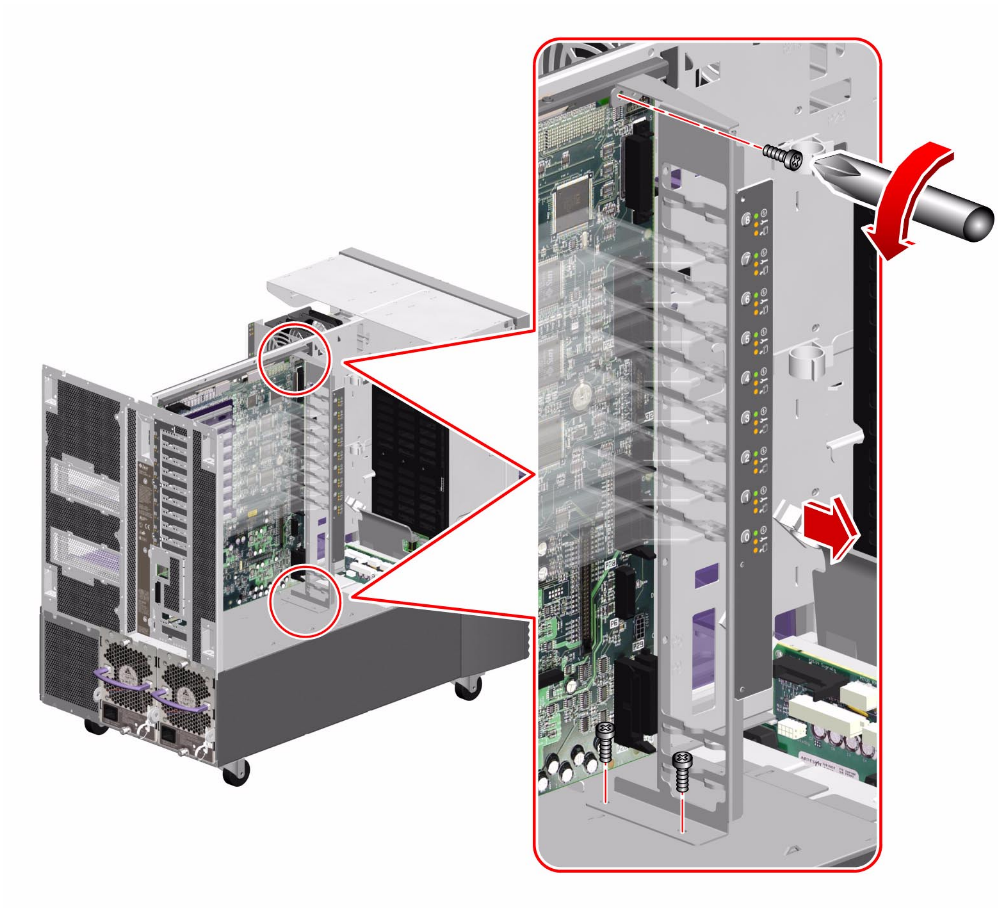
2. **Remove the PCI card bracket.**

   a. **Disconnect the PCI internal status cable (P36) from the I/O board at connector J3102.**

   Keep the cable connected to the flex circuit.

   For cable connector locations, see "Cable Connector Locations" on page 220.

b. **Remove the three Phillips screws securing the PCI card bracket to the chassis and the I/O board stiffener.**



c. **Pull the PCI card bracket from the system.**

d. **Place the bracket on an antistatic mat.**

3. **Disconnect the following cables from the I/O board:**

   For cable connector locations, see "Cable Connector Locations" on page 220.

   a. **Narrow SCSI cable (P1) from connector J3403(P1)**

   b. **Ultra Wide SCSI cable (P1) from connector J3402**

   c. **I^2C cable (P18) from connector J3805(P18)**

d. System status assembly cable (P32) from connector J3803(P32)

e. Fan power cable from connectors J3804(P6), J3807(P10) and J3806(P3)

f. Fan status cable (P28) from connector J3801(P28)

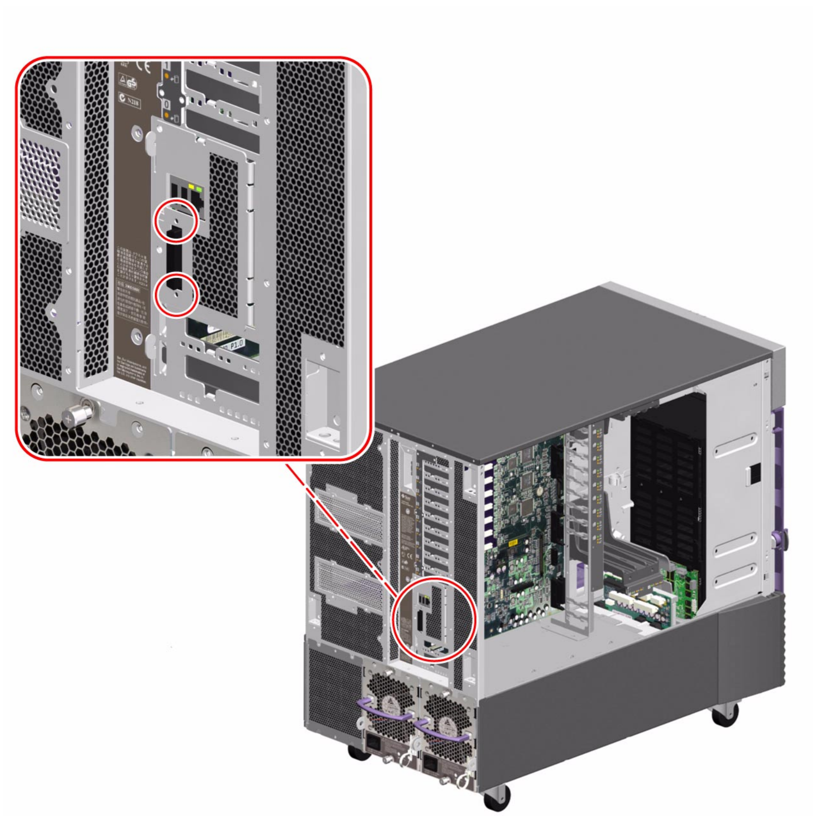
g. I/O signal cable (P26) from connector J3201(P26)

h. I/O board remote sense cable (P29) from connector J3202(P29)

i. I/O board power cable (P14) from connector J3203(P14)

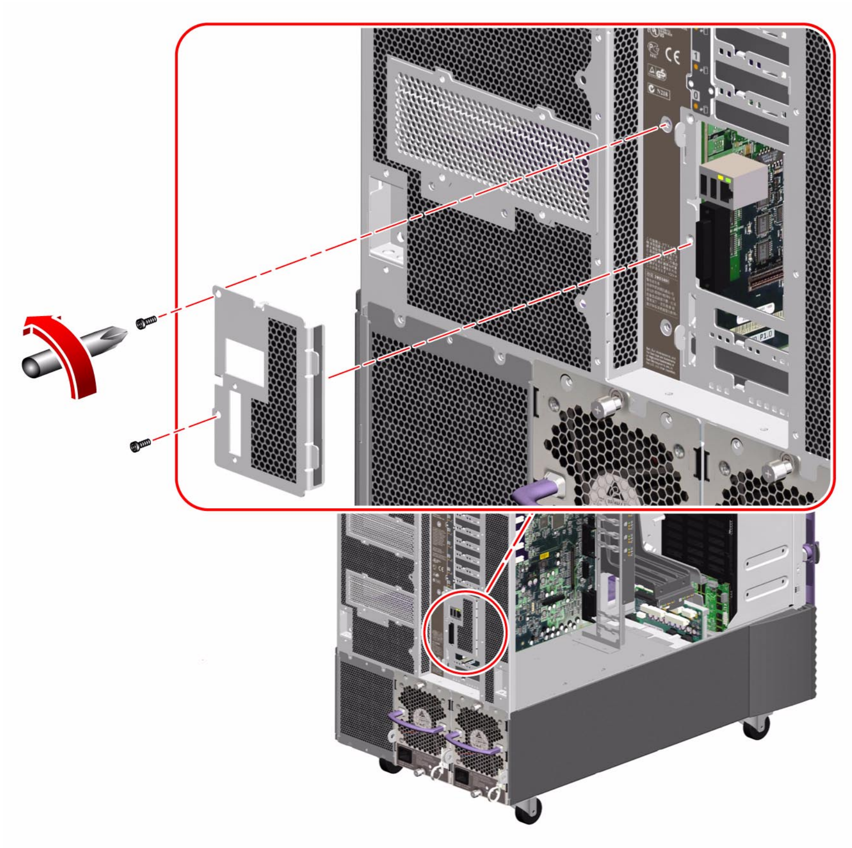
j. PCI external status cable (P23) from connector J3601

4. Remove the hex standoffs securing the serial port plate to the system rear panel.



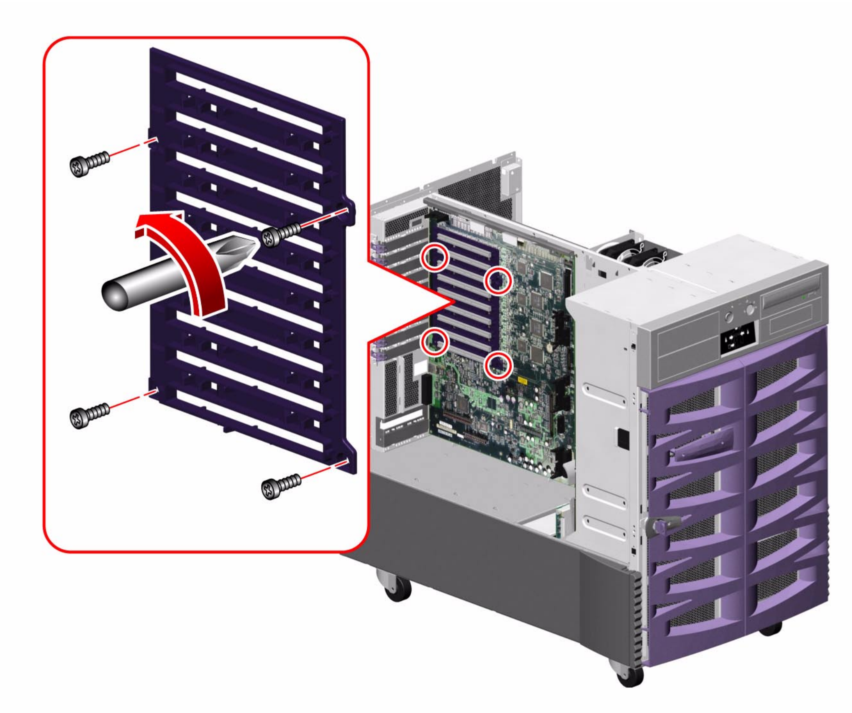
5. **Remove the back I/O plate from the rear panel.**

   Remove the two Phillips screws securing the plate in the system.



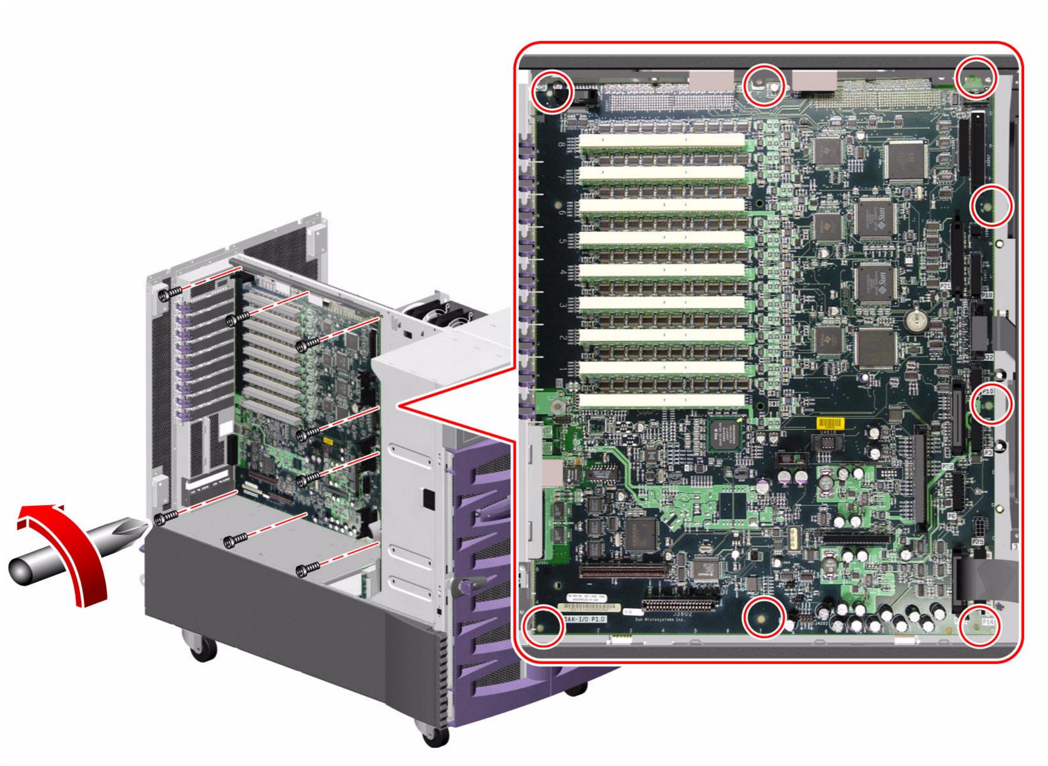
6. **Remove the PCI divider card base.**

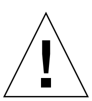
   a. **Remove the four Phillips screws securing the divider base to the centerplane.**



   b. **Pull the divider base from the system and set it aside.**

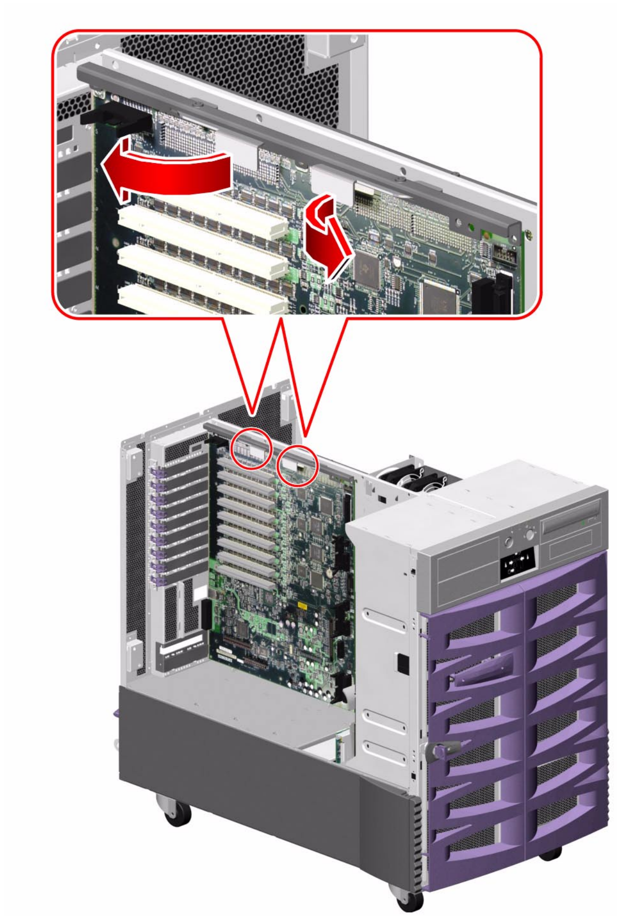
7. **Remove the remaining eight Phillips screws securing the I/O board to the system centerplane.**





Caution – If the motherboard is not installed, hold the I/O board steady while removing the last few screws to prevent it from falling out of the system.

8. **If the motherboard is installed, disengage the I/O board from the motherboard by rotating outward the two ejection levers on the top of the I/O board.**



9. **Remove the I/O board from the system.**

10. **Place the I/O board on an antistatic mat.**

11. **If you are replacing the I/O board with a new one, remove the system SEEPROM module from the old I/O board.**

    See "How to Remove the System SEEPROM" on page 127.

What Next

To replace the I/O board, complete this task:

- "How to Install the I/O Board" on page 140

How to Install the I/O Board

Before You Begin

Complete this task:

- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **If you are replacing the system I/O board, transfer the system SEEPROM module from the old I/O board to the new I/O board.**

   See "How to Install the System SEEPROM" on page 129.

Caution – Be sure that the I/O boards are on antistatic mats when you transfer the SEEPROM module.

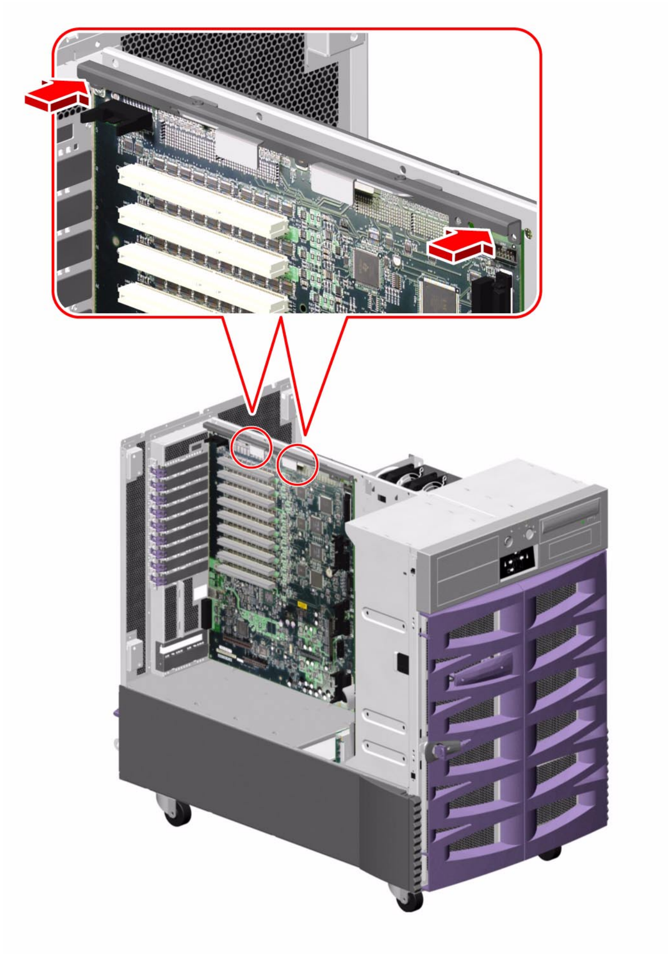
---

2. **Position the I/O board in the system against the centerplane.**

   Use the pins on the back of the I/O board to align it in the system.

3. **If the motherboard is in the system, connect the I/O board to the motherboard connectors by firmly pushing on the I/O board stiffener/ejection assembly.**

Caution – Do not push on the ejection levers to seat the I/O board in the system.



4. **Replace the eight Phillips screws that secure the I/O board to the centerplane.**

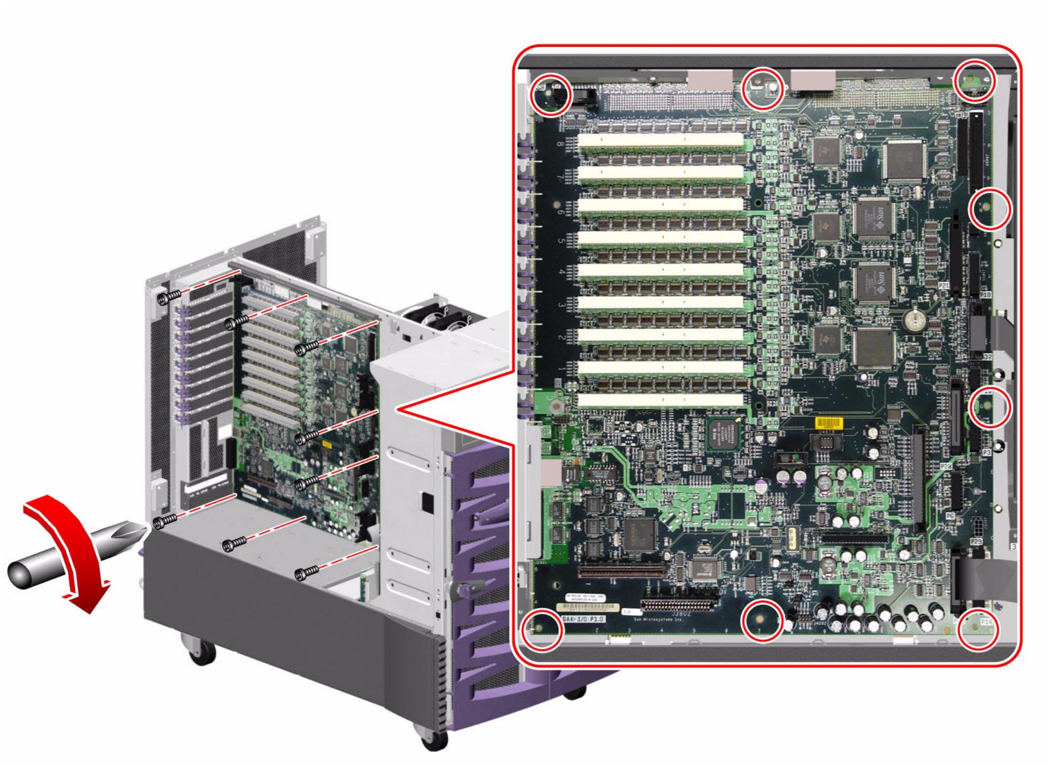
    a. **Insert the top center screw and tighten it by two turns.**

    b. **Insert the screw directly beneath the top center screw and tighten it by two turns.**

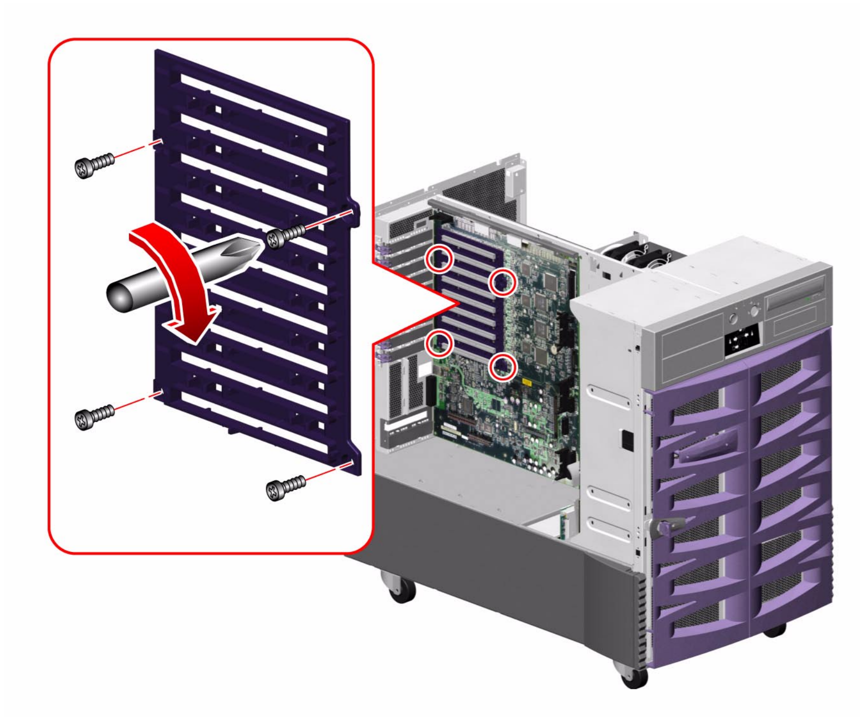
    c. **Insert the top left and right screws and tighten them by two turns.**

    d. **Insert the remaining screws and tighten them by two turns.**

    e. **Fully tighten the screws in the pattern described until the board is fully seated.**

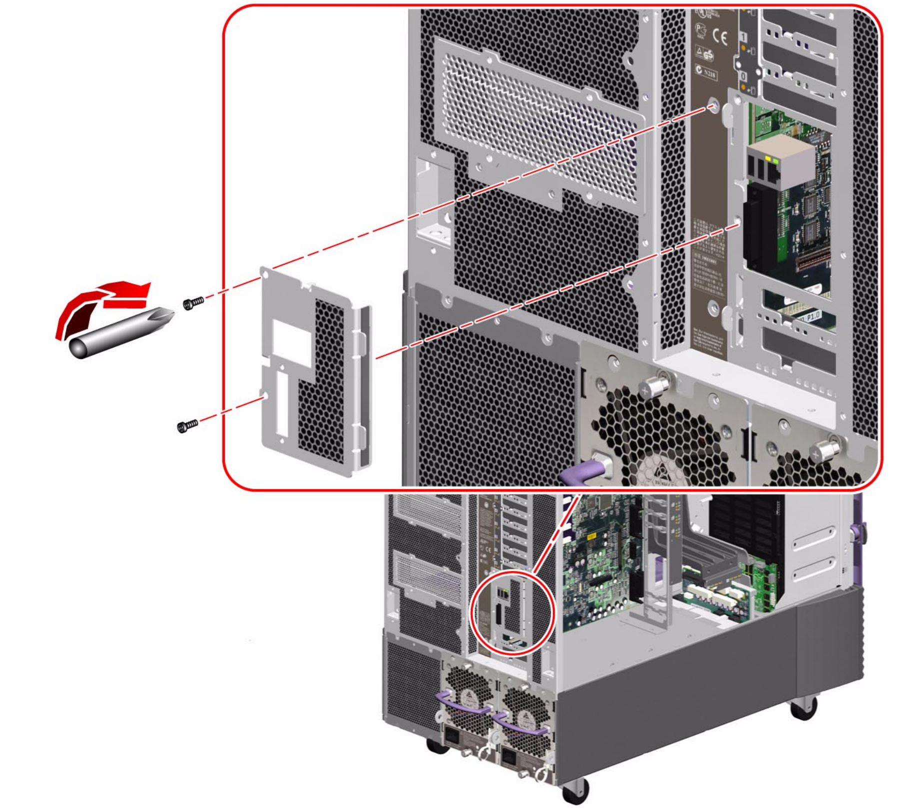


5. **Secure the PCI card divider base to the I/O board with four Phillips screws.**

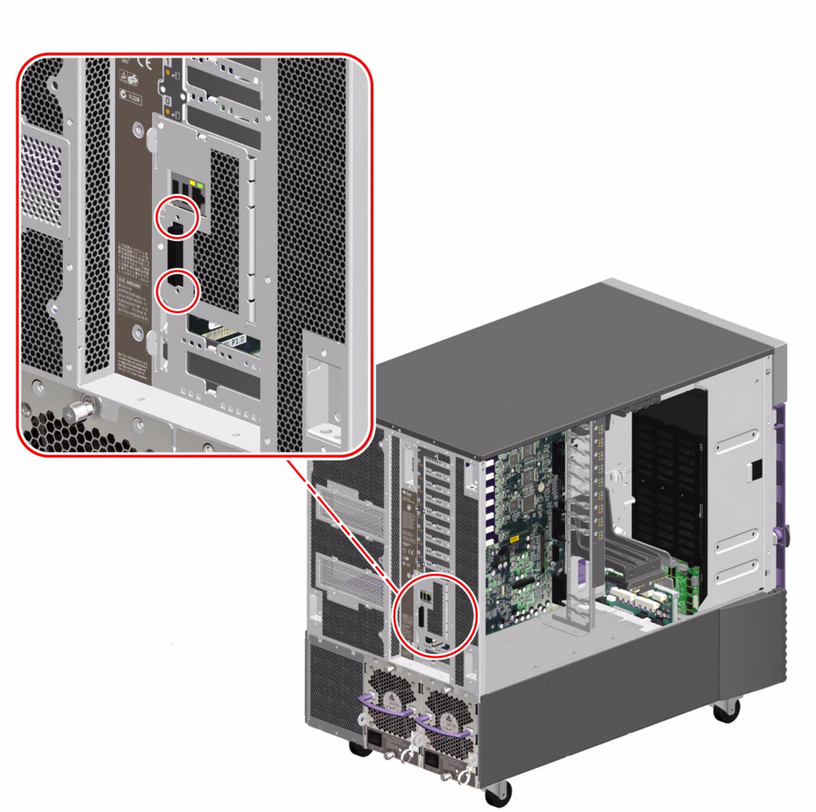


6. **Replace the back I/O plate on the system rear panel.**

   Replace the two Phillips screws that secure the plate to the rear panel.



7. **Replace the hex standoffs that secure the serial port plate to the system rear panel.**



8. **Reconnect the following cables to the I/O board:**

   For cable connector locations, see "Cable Connector Locations" on page 220.

   a. **I/O board power cable (P14) to connector J3203(P14)**

   b. **I/O board remote sense cable (P29) to connector J3202(P29)**

   c. **I/O signal cable (P26) to connector J3201(P26)**

   d. **Fan status cable (P28) to connector J3801(P28)**

   e. **Fan power cable to connectors J3804(P6), J3807(P10) and J3806(P3)**

   f. **System status assembly cable (P32) to connector J3803(P32)**

   g. **I^{2}C cable (P18) to connector J3805(P18)**

   h. **Ultra Wide SCSI cable (P1) to connector J3402**

i. **Narrow SCSI cable (P1) to connector J3403(P1)**

j. **PCI external status cable (P23) to connector J3601**

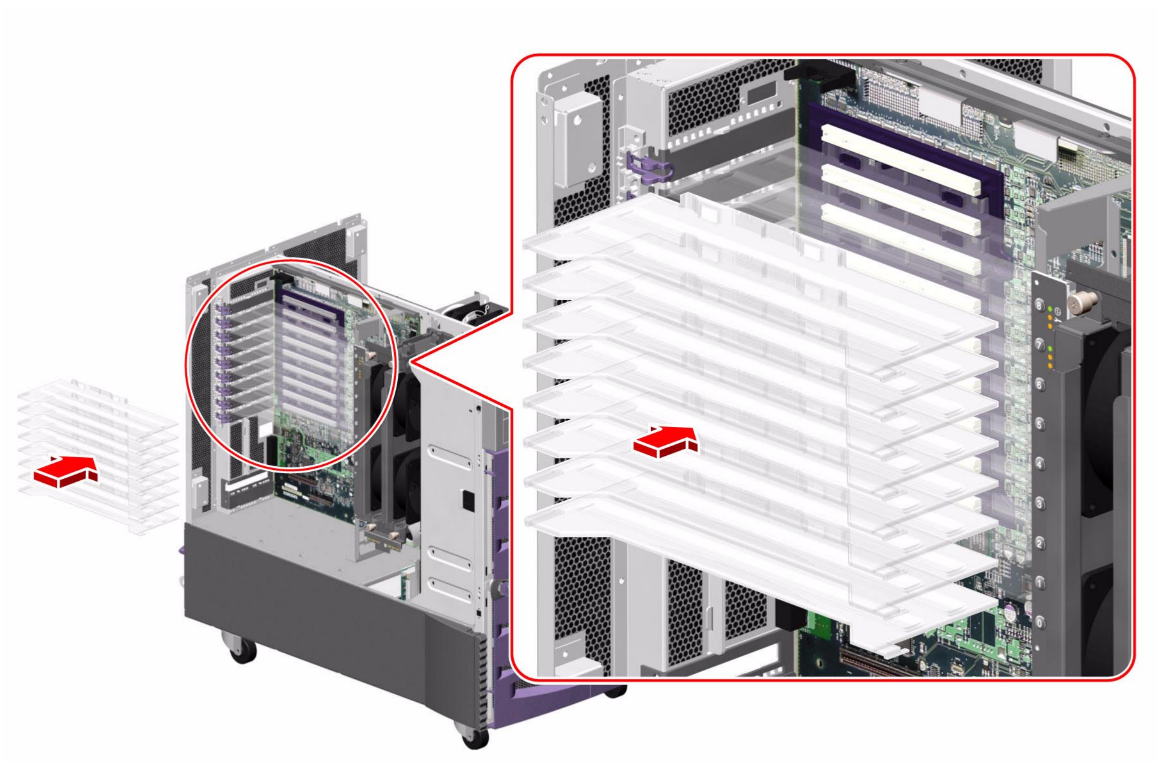
9. **Replace the PCI card bracket.**

   a. **Position the PCI card bracket in the system.**

   b. **Replace the four Phillips screws that secure the PCI card bracket to the chassis and the I/O board stiffener.**

   c. **Connect the PCI internal status cable (P36) to the I/O board at connector J3102(P36).**

10. **Replace the eight PCI card dividers from top to bottom.**



   a. **Carefully align the divider card with its tabs on the divider base.**

   Ensure that the back end of the divider is over the metal tab on the back of the system and that the plastic tab on the front of the divider is aligned with its slot on the PCI card bracket.

b. Push the card firmly into the tabs on the divider base.

What Next

To reassemble the system, complete these tasks:

- "How to Install an I/O Fan Tray" on page 86
- "How to Install the RSC Card" on page 101
- "How to Install a PCI Card" on page 92
- "How to Close a Side Door" on page 24

Note – Be sure to run POST and OpenBoot Diagnostics tests to verify that the system functions correctly with the part(s) you have just installed. For maximum test coverage, set the OpenBoot configuration variable `diag-level` to `max` prior to starting the diagnostic tests. See "Diagnostics and Troubleshooting" on page 249.

CHAPTER 4

Removing and Installing Miscellaneous Assemblies

This chapter describes how to remove and install miscellaneous assemblies in the system. For a list of part numbers for field-replaceable units (FRUs) and optional equipment, see "Illustrated Parts Breakdown" on page 329.

The following tasks are covered in this chapter:

How to Remove a Power Supply

Caution – A power supply must always occupy bays 0 and 1. If a power supply in bay 0 or 1 fails and the system is configured with a redundant power supply in bay 2, you must leave the failed power supply in its bay until you are able to install a functioning replacement power supply. A failed power supply in bay 0 or 1 still acts as an air baffle channeling airflow to cool the bottom row of disk drives in the disk cage. Replace the failed power supply as soon as possible to regain N+1 power redundancy.

Note – During a hot-swap operation, after you remove a fan tray or power supply, wait for an acknowledgement message on the system console before installing a replacement part; otherwise, the environmental monitoring software will not recognize the new device and false error conditions will result.

Before You Begin

It is not necessary to power off the system if you are removing a redundant power supply. For more information about power supplies, see:

- "About Power Supplies" on page 235
- "About Hot-Pluggable and Hot-Swappable Components" on page 7

Note – Unlike other hot-pluggable devices, you can install or remove a power supply or fan tray while the system is operating at the `ok` prompt. However, in the case of the power supply, you must issue a `reset-all` command at the `ok` prompt in order for the system to recognize the change the next time the operating system is booted.

If your system has only two power supplies or you are not performing a hot-plug procedure, complete this task:

- "How to Power Off the System" on page 5

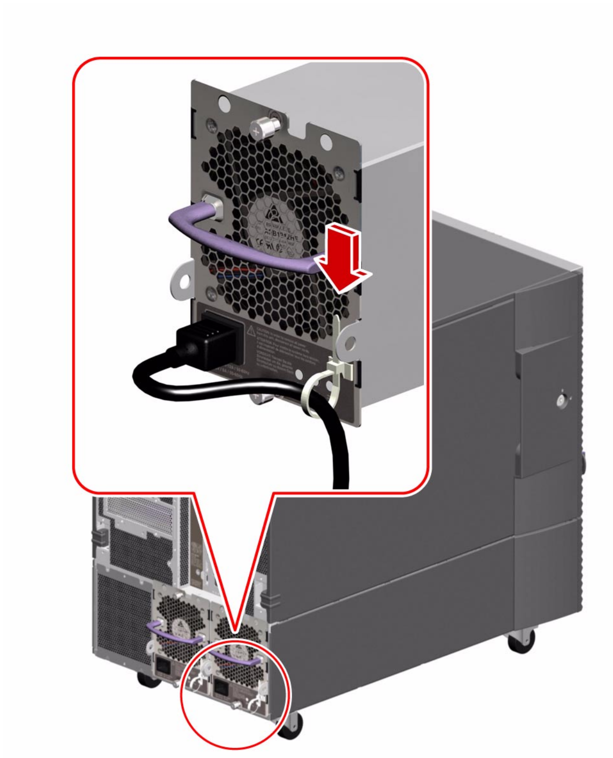
What to Do

1. **Identify the power supply that you want to remove.**

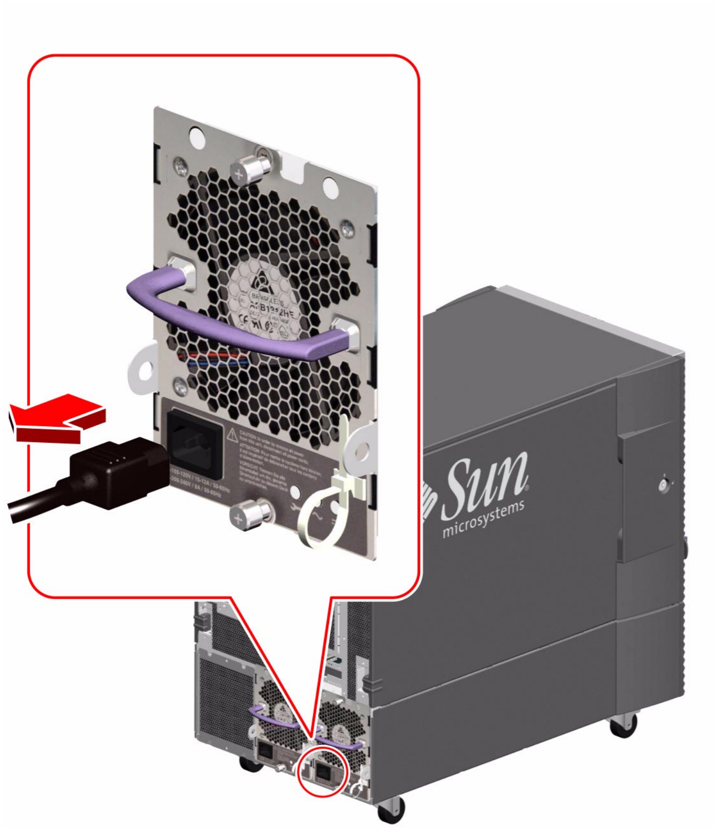
   For information about LEDs, see "About Power Supply LEDs" on page 348.

2. **Release the AC power cord from the strain-relief tie-wrap on the power supply.**

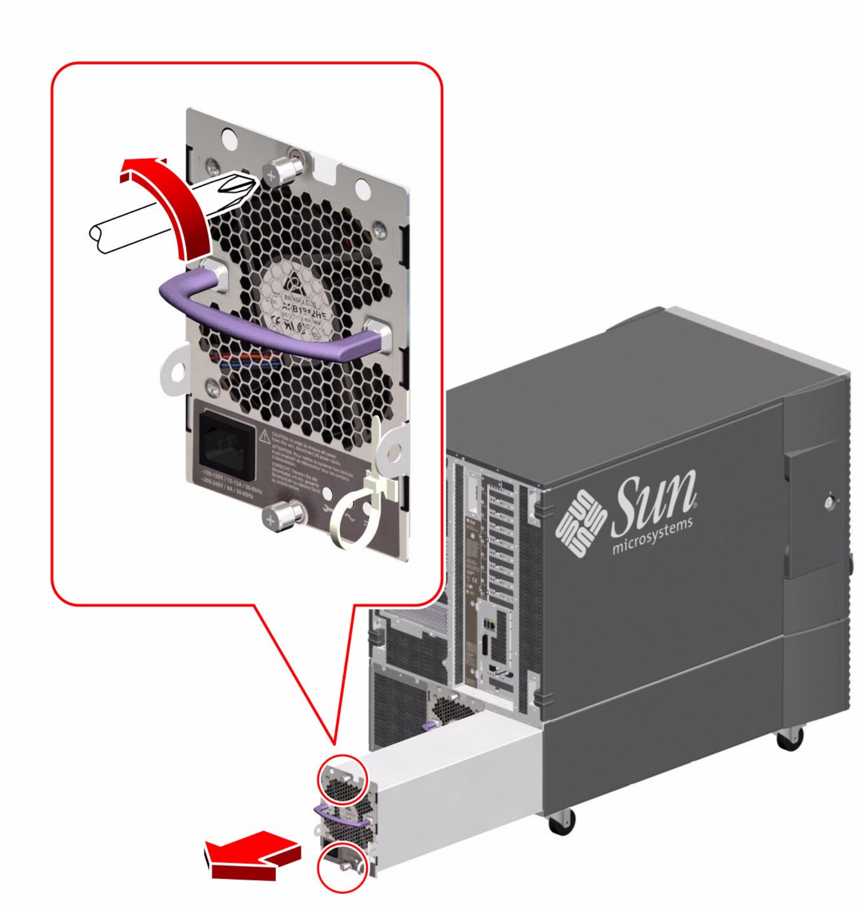
   Press the tab on the head of the tie-wrap to release it.



3. **Unplug the AC power cord from the power supply and the AC power outlet.**



4. **Loosen the two captive Phillips screws securing the power supply to the system rear panel.**



5. **Pull the power supply out from its bay.**

   Use one hand to pull the power supply out while using the other hand to support the power supply as it is removed from the system.

Note – When hot-swapping a power supply, do not disengage and reengage the supply in rapid succession. Rapid seating and unseating of power supplies will result in false error conditions. After removing a supply, wait for an acknowledgement message on the system console before installing a new supply; otherwise, the environmental monitoring software will not recognize the new device and false error conditions will result.

Caution – A power supply must always occupy bays 0 and 1. If a power supply in bay 0 or 1 fails and the system is configured with a redundant power supply in bay 2, you must leave the failed power supply in its bay until your are able to install a functioning replacement power supply. A failed power supply in bay 0 or 1 still acts as an air baffle channeling airflow to cool the bottom row of disk drives in the disk cage. Replace the failed power supply as soon as possible to regain N+1 power redundancy.

6. **If you removed a power supply from the left-side power bay (power supply 2) and are not immediately replacing it, install a power supply filler panel into the empty bay.**

   Insert the power supply filler panel into the empty bay and secure the filler panel to the rear panel with two Phillips screws.

What Next

To replace the power supply, complete this task:

- "How to Install a Power Supply" on page 155

How to Install a Power Supply

If you are installing a redundant power supply, it is not necessary to shut down and power off the system. For more information, see:

- “About Power Supplies” on page 235
- “About Hot-Pluggable and Hot-Swappable Components” on page 7

Note – Unlike other hot-pluggable devices, you can install or remove a power supply or fan tray while the system is operating at the `ok` prompt. However, in the case of the power supply, you must issue a `reset-all` command at the `ok` prompt in order for the system to recognize the change the next time the operating system is booted.

Note – After removing a power supply during a hot-plug operation, wait for an acknowledgement message on the system console before installing a new supply; otherwise, the environmental monitoring software will not recognize the new device and false error conditions will result.

What to Do

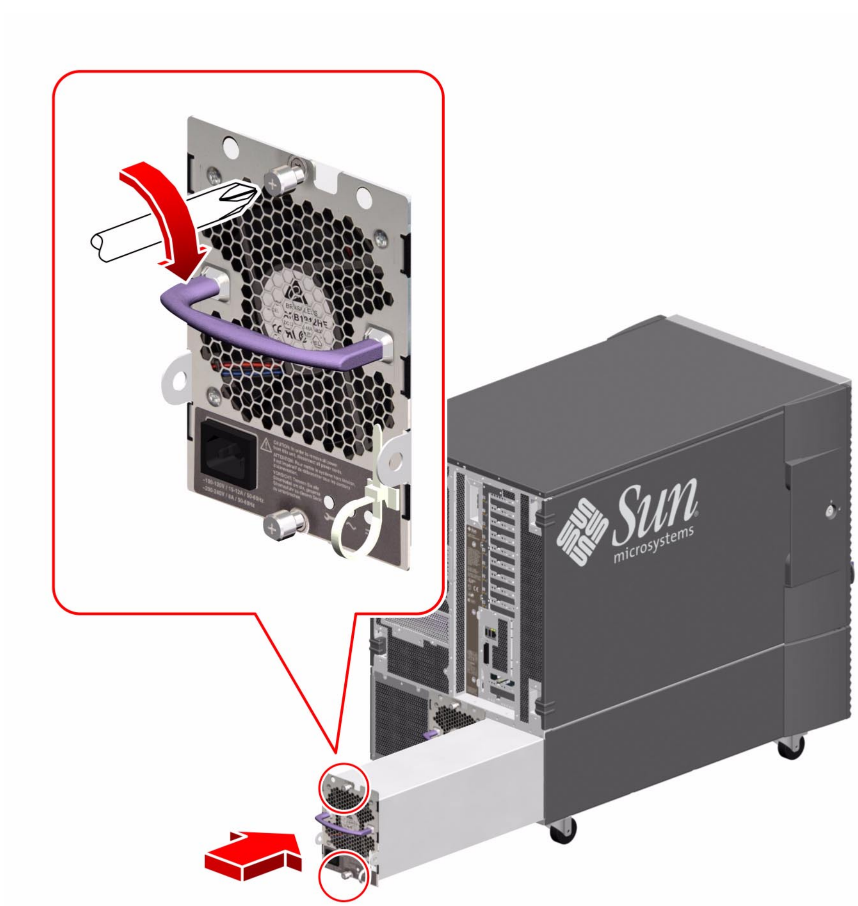
1. **Identify the bay into which you want to install the power supply.**

   For information on LEDs, see “About Power Supply LEDs” on page 348.

2. **If a power supply filler panel is in the bay, remove it.**

   Remove the two Phillips screws that secure the filler panel to the rear panel and pull the filler panel from the power bay.

3. **Slowly slide the power supply into its bay until the connectors on the power supply are fully engaged with the connectors on the power distribution board.**



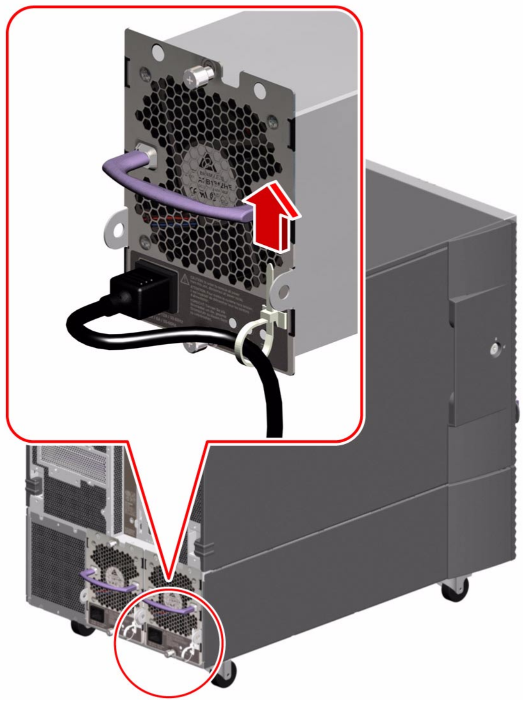
Caution – If you are hot-plugging a redundant supply, take care to avoid jarring or shocking the system. Also, do not engage and disengage the supply in rapid succession. Rapid seating and unseating of power supplies will result in false error conditions.

---

4. **Tighten the two captive screws that secure the power supply to the chassis.**

5. **Connect the AC power cord to both the power supply and a dedicated AC power outlet.**

   Insert the female end of the power cord through the strain-relief tie-wrap loop located to the right of the supply. Tighten the tie-wrap to secure the connection.



What Next

If you installed this part as a new option while the system was powered off, you need to perform a reconfiguration boot. A reconfiguration boot is required in order for the operating system to recognize the new device. See:

- "How to Initiate a Reconfiguration Boot" on page 11

How to Remove the System Status Assembly

Before You Begin

Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

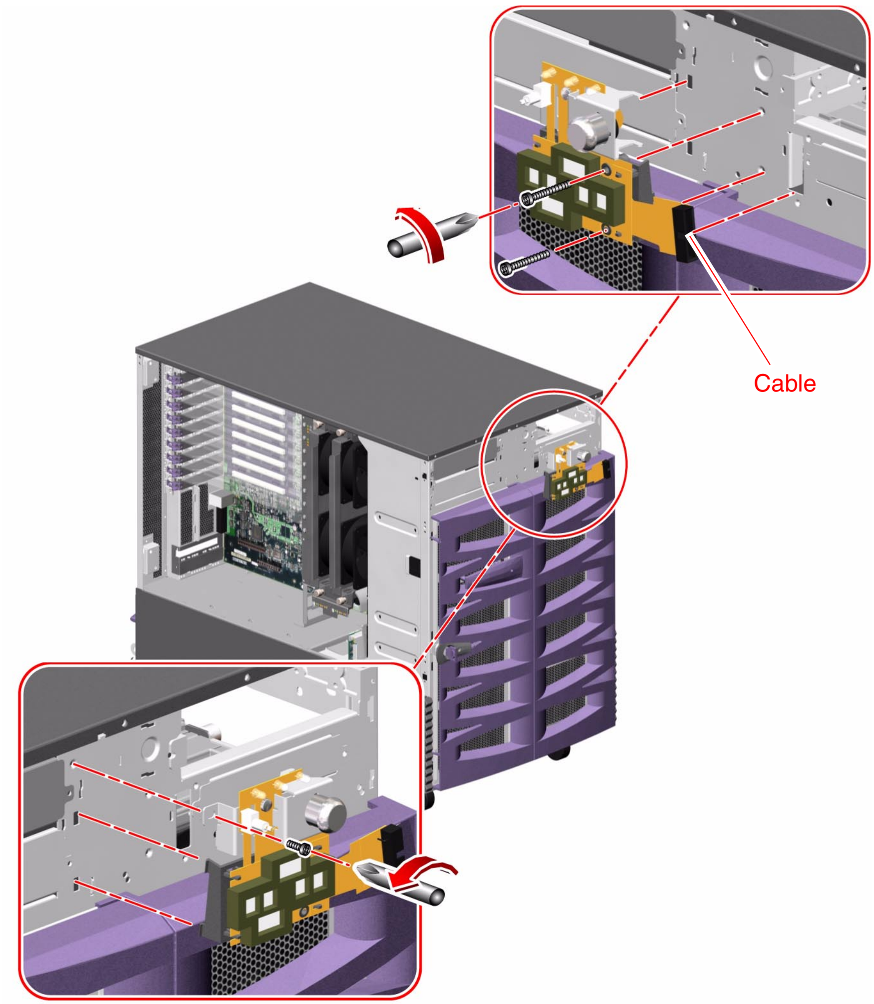
What to Do

1. **Remove the removable media assembly bezel from the system.**

   Remove the two Phillips screws securing the bezel to the front of the system.

2. **Remove the three Phillips screws securing the system status assembly to the front of the system.**

   Take care not to damage the flex circuit.



3. **Carefully remove the status assembly from the front of the system.**

   The status assembly is held in place by tabs on the left side and right top of the assembly.

4. **Disconnect the system status cable (P31) from the connector on the status assembly.**

5. **Place the status assembly on an antistatic mat.**

What Next

To replace the system status assembly, complete this task:

- "How to Install the System Status Assembly" on page 161

How to Install the System Status Assembly

Before You Begin

Complete this task:

- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Attach the system status cable (P31) to the connector on the side of the system status assembly.**
2. **Align the status assembly into position on the front of the system.**

   Insert the tabs on the left side of the status assembly into their cutouts first, as you align the metal tab on the right top side with its cutout.

3. **Replace the three Phillips screws that secure the status assembly to the front of the system.**
4. **Replace the removable media assembly bezel on the front of the system.**

   Replace the two Phillips screws that secure the bezel to the system front.

What Next

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

CHAPTER 5

Removing and Installing Storage Devices

This chapter describes how to remove and install storage devices. For a list of part numbers for field-replaceable units (FRUs) and optional equipment, see "Illustrated Parts Breakdown" on page 329.

The following tasks are covered in this chapter:

How to Remove a Disk Drive

Before You Begin

The system's disk drive hot-plug feature lets you remove a disk drive without shutting down the operating system or turning off the system power. For more information about disk drives, see the *Sun Fire 880 Server Owner's Guide*. For more information about hot-plugging, see:

- "About Hot-Pluggable and Hot-Swappable Components" on page 7

Note – PCI and disk hot-plug operations are not supported when the system `ok` prompt is displayed. You can only perform these hot-plug operations while the operating system is running.

Note – You need a system console in order to perform disk hot-plug operations. For additional details, see "About Setting Up a Console" on page 16.

Note – If you are removing multiple drives from a system to perform a service procedure that requires removing all the disks from the system, label each drive according to the slot from which it was removed from so that you can return the disk to its appropriate slot when you reassemble the system.

Complete this task:

- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Unlock and open the front door.**
2. **Identify the disk drive to be removed.**

   For information about disk status LEDs, see "About Disk Drive LEDs" on page 351.

3. **If you are performing a hot-plug operation, prepare the system for disk removal.**

   The hot-plug removal procedure involves software commands for preparing the system prior to removing the disk drive. See "About Hot-Pluggable and Hot-Swappable Components" on page 7.

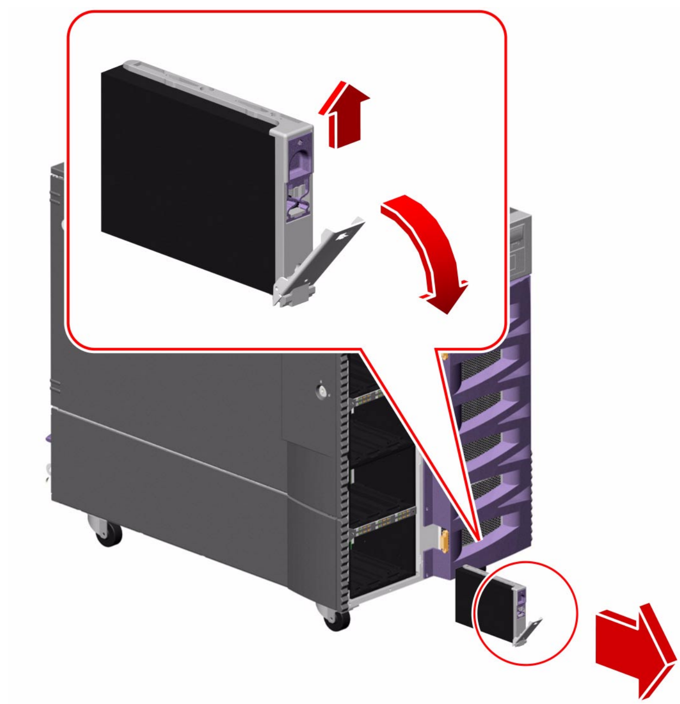
4. **If you are not performing a hot-plug operation, halt the operating system and power off the system.**

   See "How to Power Off the System" on page 5.

5. **Attach an antistatic wrist strap to a metal surface inside the system chassis.**

6. **Using your thumb and forefinger, push the drive latch upward to release the drive handle.**

   Swing the handle away from the drive until you feel the drive connector disengage from the backplane. Do not use excessive force.



Caution – If you are hot-plugging the disk drive, after disconnecting it from the backplane, allow 30 seconds or so for the drive to spin down completely before removing it from the system.

7. **Holding the drive by the handle, carefully slide it out of the drive bay.**

8. **Place the drive on an antistatic mat.**

9. **If you are performing a hot-plug operation, complete the software part of the removal procedure.**

   See “About Hot-Pluggable and Hot-Swappable Components” on page 7.

What Next

To reassemble the system, complete this task:

- “How to Install a Disk Drive” on page 167

How to Install a Disk Drive

Before You Begin

The system's disk drive hot-plug feature lets you remove a disk drive without shutting down the operating system or turning off the system power. For more information about disk drives, see the *Sun Fire 880 Server Owner's Guide*. For more information about hot-plugging, see:

- "About Hot-Pluggable and Hot-Swappable Components" on page 7

Note – PCI and disk hot-plug operations are not supported when the system `ok` prompt is displayed. You can only perform these hot-plug operations while the operating system is running.

Note – You need a system console in order to perform disk hot-plug operations. For additional details, see "About Setting Up a Console" on page 16.

Complete this task:

- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **If you are performing a hot-plug operation, prepare the system to receive the new disk drive.**

   The hot-plug installation procedure involves software commands for preparing the system prior to installing the disk drive. See "About Hot-Pluggable and Hot-Swappable Components" on page 7.

2. **If you are not performing a hot-plug operation, halt the operating system and power off the system.**

   See "How to Power Off the System" on page 5.

3. **Unlock and open the front door, if it is not open already.**

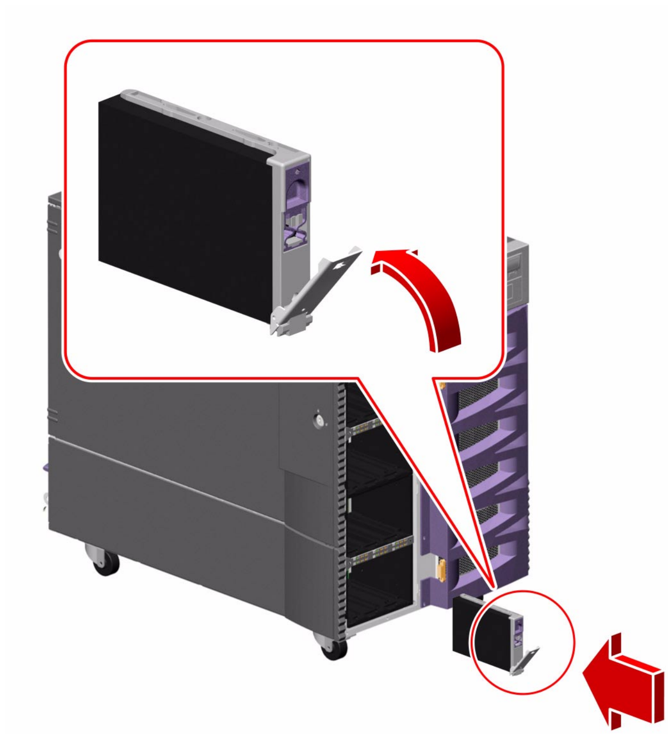
4. **Attach the antistatic wrist strap to a metal surface inside the system chassis.**

5. **Release the drive handle on the disk drive to be installed.**

   Use your thumb and forefinger to pinch the drive latch upward to open it.

6. **Align the disk drive with its drive bay.**

   Orient the drive so that the drive handle's hinge faces the bottom of the drive bay.



7. **Holding the drive by its handle, fit the drive into the guide rails at the top and bottom of the drive bay.**

8. **Slide the drive into the bay until it barely contacts the backplane.**

9. **Press carefully on the center of the drive and watch as the handle begins to close.**

   The drive handle begins to close as the drive engages its backplane connector.

10. **Press the handle toward the drive until the latch closes, securing the drive in place.**

11. **Close the front door and lock it, if necessary.**

12. **If you are performing a hot-plug installation, complete the software part of the installation procedure.**

    See “About Hot-Pluggable and Hot-Swappable Components” on page 7.

What Next

If you installed this part as a new option while the system was powered off, you need to perform a reconfiguration boot. A reconfiguration boot is required in order for the operating system to recognize the new device. See:

- “How to Initiate a Reconfiguration Boot” on page 11

How to Remove a DVD-ROM or Tape Drive

Before You Begin

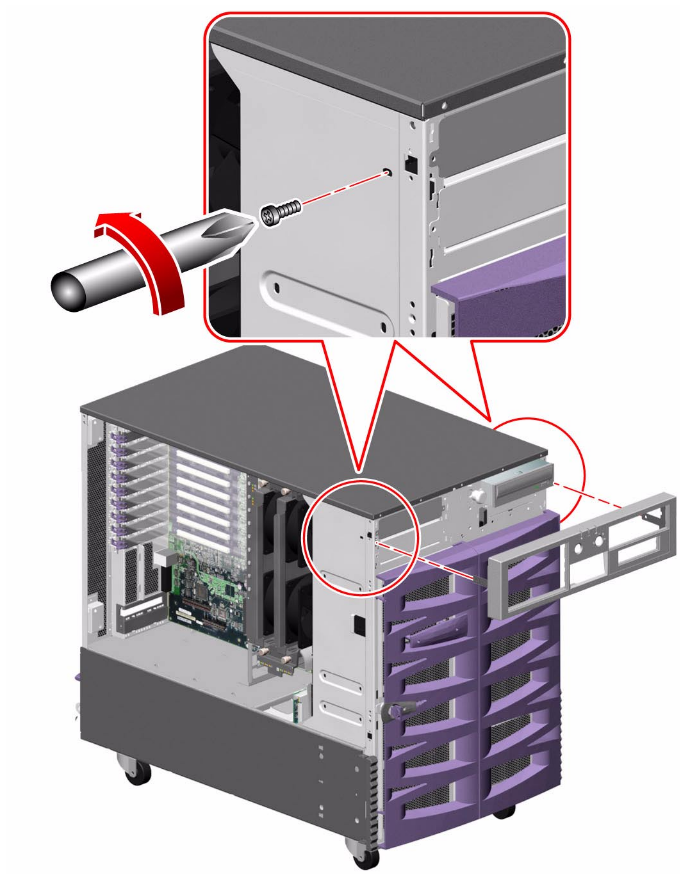
Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

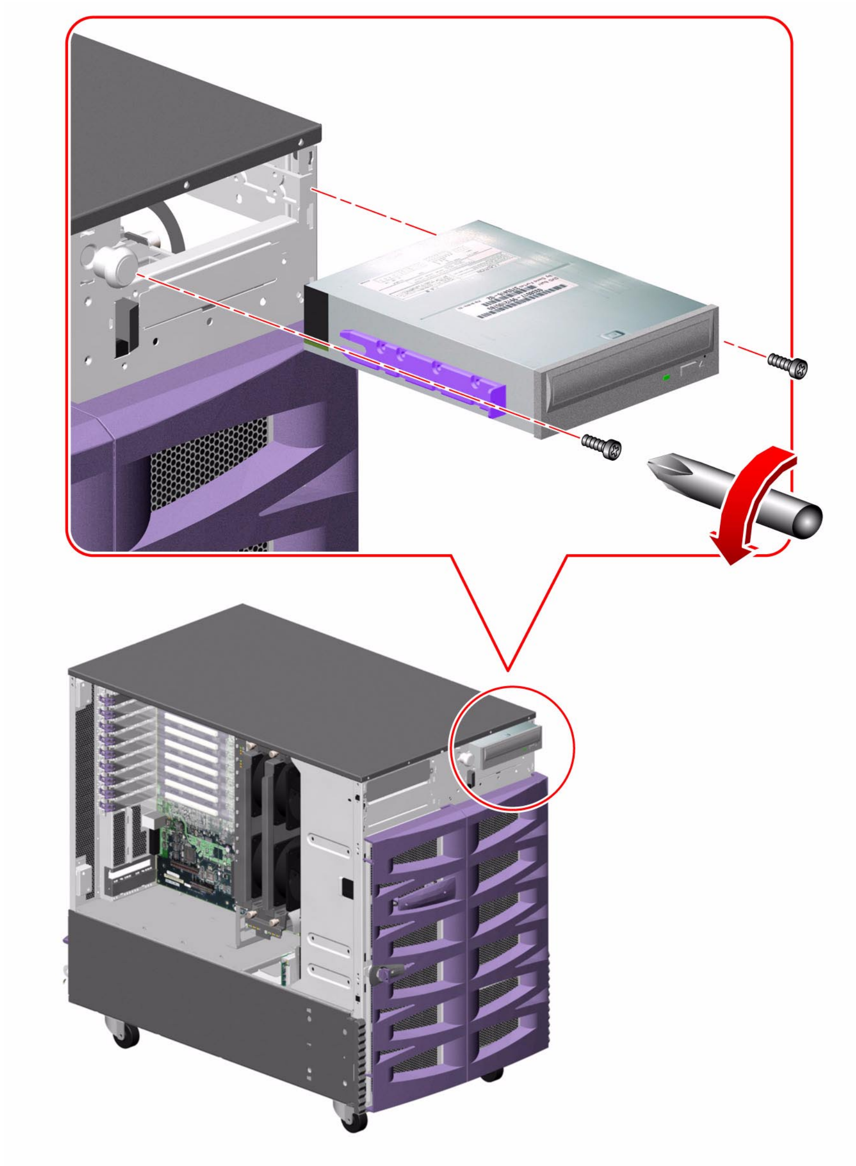
1. **Remove the removable media bezel from the front of the system.**

   Remove the two screws securing the bezel to the front of the system.



2. **Remove the cables connected to the back of the device.**

3. **Remove the two Phillips screws securing the device to the chassis.**



4. **Pull the device from the system.**

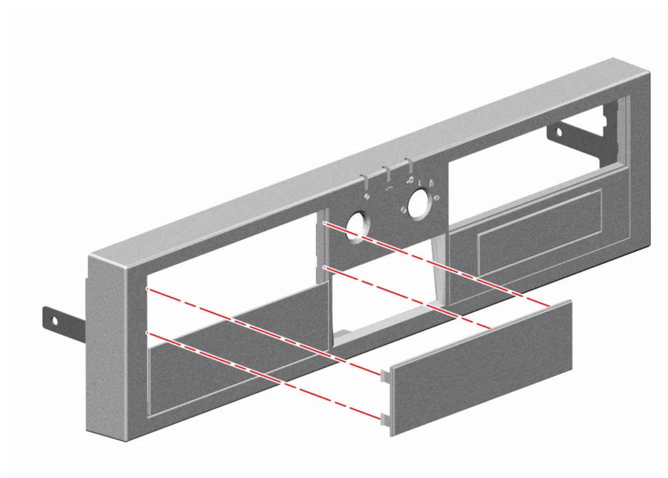
   The device slides out on guides located on its sides.

5. **If you are not immediately replacing the device, install a metal filler panel into the device's slot.**

6. **If you are not immediately replacing the device, replace the removable media bezel.**

   Replace the two screws that secure the bezel to the system chassis.

7. **If you have not replaced the device, install a plastic filler panel into the device's slot in the removable media bezel.**



What Next

To replace a DVD-ROM or Tape Drive, complete this task:

- "How to Install a DVD-ROM or Tape Drive" on page 174

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

If you are not replacing this part right away, you need to perform a reconfiguration boot in order for the operating system to recognize the configuration change. See:

- "How to Initiate a Reconfiguration Boot" on page 11

How to Install a DVD-ROM or Tape Drive

Before You Begin

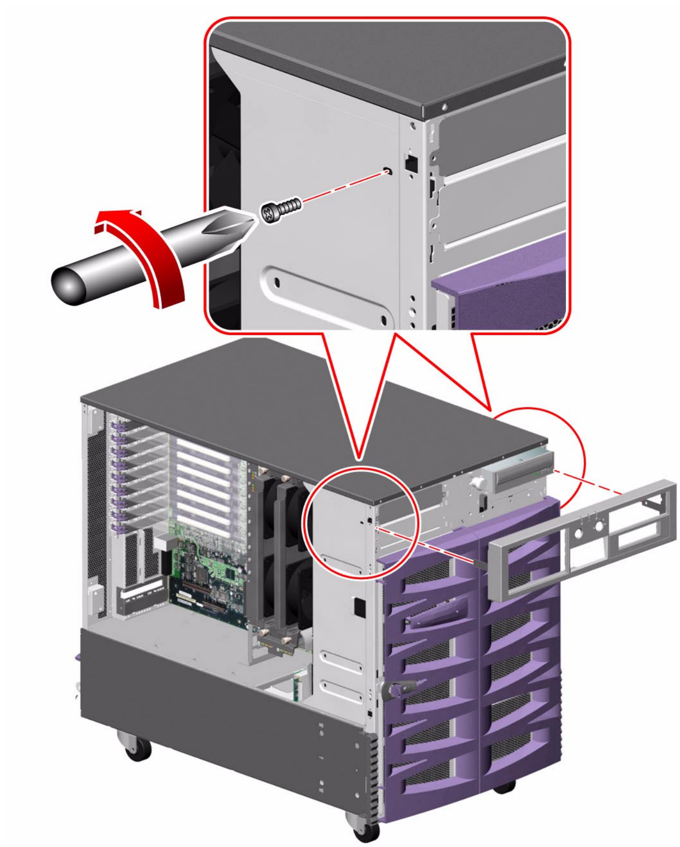
Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Remove the removable media bezel from the front of the system.**

   Remove the two screws securing the bezel to the front of the system.



2. **If there is a metal filler panel in the slot, remove it.**

   Using a flat head screwdriver, carefully pry the metal filler panel from the slot.

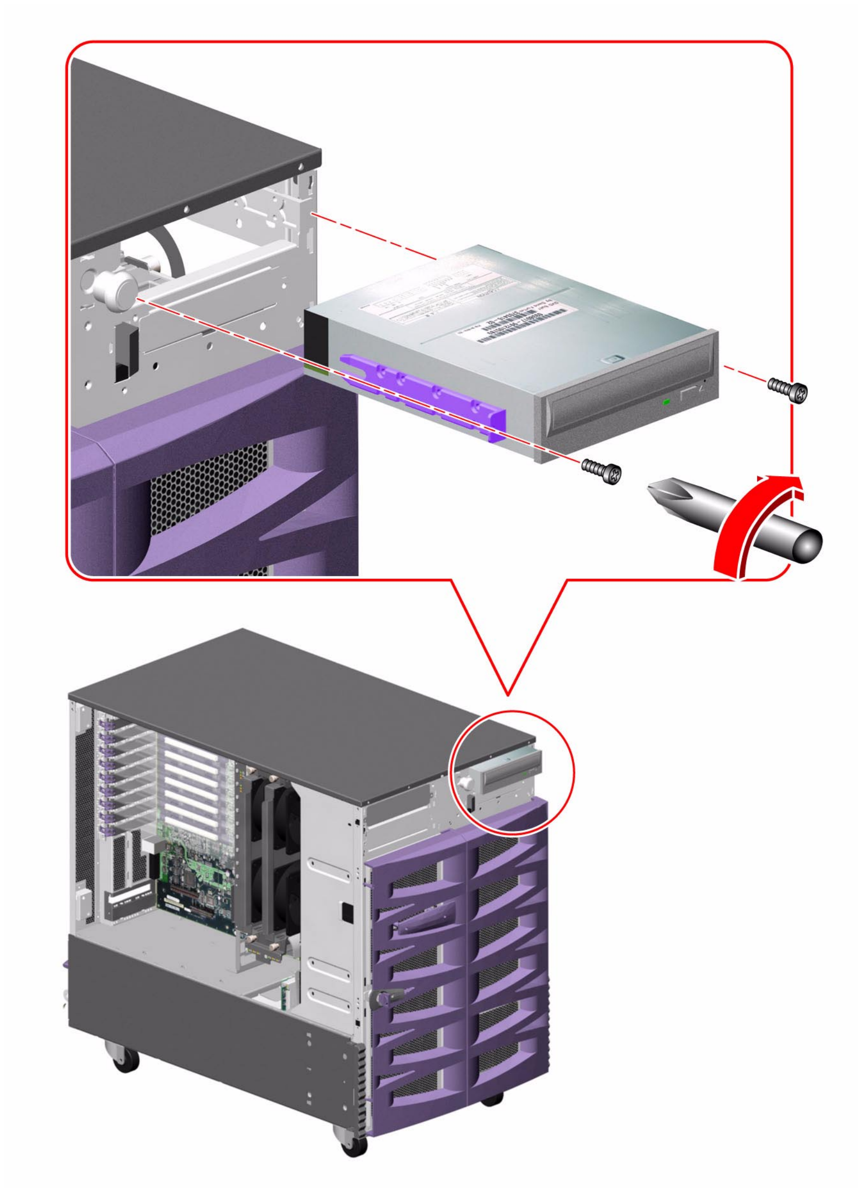
3. **If you are installing a full-height device in the left-side bay, remove the divider shelf from the bay.**

4. **Install the plastic guide rails onto the device.**

   If you are replacing a faulty device, transfer the guide rails to the new device. If you are installing a device for the first time, the guide rails and screws are shipped in the accessory kit that is shipped with your system.

5. **Align the device with the guides in the empty slot.**

6. **Slide the device into the slot.**
7. **Insert and tighten the two Phillips screws that secure the device to the system.**



8. **Connect the appropriate cables to the back of the device.**

Note – If you are installing a narrow SCSI (50-pin) device in one of the left-side bays, a wide-to-narrow (68-pin to 50-pin) SCSI adapter (Sun part number X913A) is required. This adapter is not supplied with the system or the device. You must order it separately.

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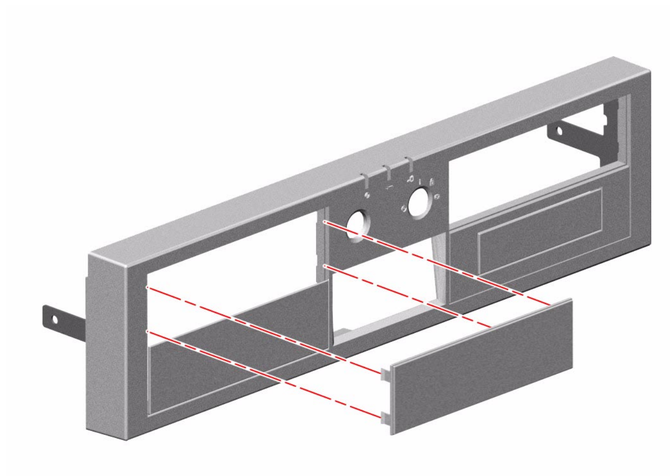
9. **If you are installing a device into an empty slot, remove that slot's plastic filler panel from the removable media bezel.**



10. **Replace the removable media bezel.**

    Replace the two screws that secure the bezel to the system chassis.

What Next

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

If you installed this part as a new option, you need to perform a reconfiguration boot in order for the operating system to recognize the new device. See:

- "How to Initiate a Reconfiguration Boot" on page 11

CHAPTER 6

Removing and Installing Backplanes and Cables

This chapter describes how to remove and install backplanes and cables in the system. For a list of part numbers for field-replaceable units (FRUs) and optional equipment, see “Illustrated Parts Breakdown” on page 329.

The following tasks are covered in this chapter:

The following information is also included:

How to Remove the Expansion FC-AL Backplane

Before You Begin

Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27
- "How to Remove a Disk Drive" on page 164; you must remove all the disk drives from the upper half of the disk cage.
- "How to Remove an I/O Fan Tray" on page 84; you must remove each fan tray.

What to Do

1. **Disconnect the base/expansion cable (P43 and P2) from the expansion backplane at connectors J0100 and J0801.**

   For cable connector locations, see "Cable Connector Locations" on page 220.

2. **Disconnect the two disk status flex circuit cables from the expansion backplane at connectors J01000 and J01001.**

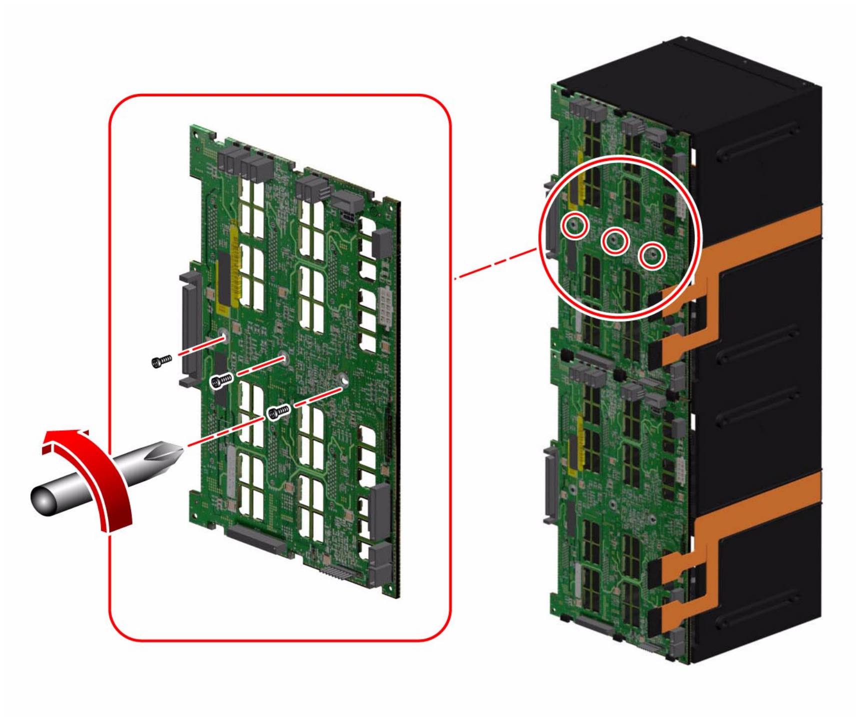
3. **Disconnect the I^2C cable (P20) from the expansion backplane at connector J0800.**

4. **Disconnect the FC-AL data cables (A and B) from the expansion backplane at connectors A(J0201) and B(J0200).**

5. **Disconnect the FC-AL data cables (D and C) from the expansion backplane at connectors D(J01101) and C(J01100).**

6. **Remove the three Phillips screws and nylon washers securing the expansion backplane to the disk cage.**

   Save the screws and washers to reinstall the replacement backplane.



7. **Remove the backplane from the system.**

8. **Place the expansion backplane on an antistatic mat.**

9. **If you are not immediately replacing the expansion backplane, install an FC-AL backplane filler panel, if you have one, on the disk cage.**

   a. **Align the filler panel screw holes with the holes on the disk cage.**

   b. **Fasten the three Phillips screws that secure the filler panel to the backplane**

10. **If you are not immediately replacing the expansion FC-AL backplane, disconnect the base/expansion cable (P42) from connector P42/J7(DISKS) on the power distribution board and from connector J0801 on the base backplane.**

11. **If you are not immediately replacing the expansion FC-AL backplane, disconnect the FC-AL data cable (F and E) from connectors F(J0501) and E(J0500) on the base backplane.**

What Next

To replace the expansion FC-AL backplane, complete this task:

- "How to Install the Expansion FC-AL Backplane" on page 183

To reassemble the system, complete this task:

- "How to Close a Side Door" on page 24

If you are not replacing this part right away, you need to perform a reconfiguration boot in order for the operating system to recognize the configuration change. See:

- "How to Initiate a Reconfiguration Boot" on page 11

How to Install the Expansion FC-AL Backplane

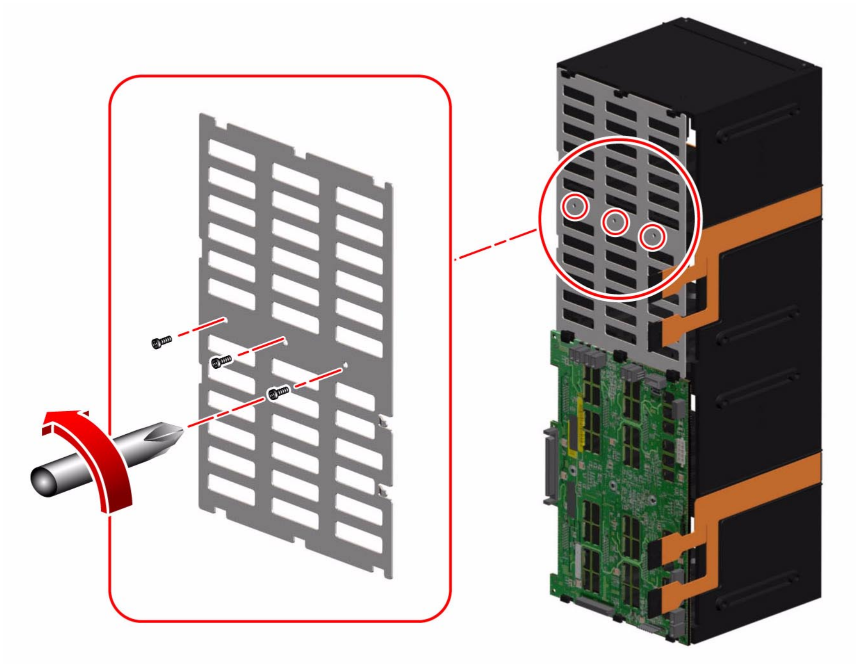
Before You Begin

Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27
- "How to Remove an I/O Fan Tray" on page 84; you must remove both I/O fan trays.

What to Do

1. **If an FC-AL backplane filler panel is installed, remove the three Phillips screws securing the filler panel to the backplane and remove it from the system.**

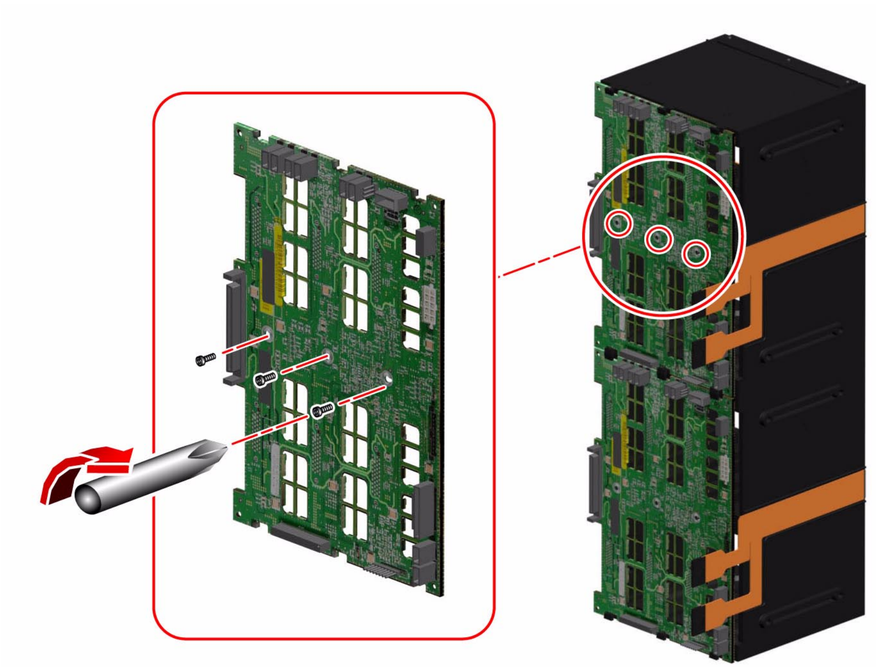


2. **Position the expansion backplane in the system against the disk cage.**

   Align the three screw holes on the backplane with the screw holes on the disk cage.

3. **Fasten the three screws and nylon washers that secure the backplane to the disk cage.**

   If you are installing the expansion backplane for the first time, the nylon washers are included with the backplane kit.



4. **Connect the expansion FC-AL backplane cables to the backplane.**

   For cable connector locations, see "Cable Connector Locations" on page 220.

   If you are installing an expansion backplane in the system for the first time, install the following cables:

   a. **FC-AL data cable (A and B) to connectors A(J0201) and B(J0200) on the expansion backplane and to connectors F(J0501) and E(J0500) on the base FC-AL backplane**

   b. **Base/expansion cable (P42) to the power distribution board at connector P42/J7(DISKS)**

Note – The expansion backplane cable is routed to both FC-AL backplanes. The cable end and connector that goes to the base backplane connector (J0801) will not reach the upper backplane. The two cable ends ganged together go to the upper backplane at connectors J0801 and J0100.

c. **Base/expansion cable (P1 - Base) to connector J0801 on the base backplane**

d. **Base/expansion cable (P2 and P43) to connector J0801 and J0100 on the expansion backplane**

e. **I^{2}C cable (P20) to connector J0800 on the expansion backplane**

The expansion backplane I^{2}C cable is part of a cable assembly that includes the base backplane I^{2}C cable that is already connected to the base backplane. The expansion backplane end of the cable is ganged with a group of cables running through the cable guides on the chassis centerplane and must be freed from the uppermost cable guide so that it can reach the expansion backplane.

If you are replacing the expansion FC-AL backplane, connect the following cables:

a. **FC-AL data cable (F and E) from connectors F(J0501) and E(J0500) on the base backplane to connectors A(J0201) and B(J0200) on the expansion backplane**

b. **Base/expansion cable (P2 and P43) to connectors J0801 and J0100 on the expansion backplane**

c. **I^{2}C cable (P20) to connector J0800 on the expansion backplane**

5. **Connect the Loop B FC-AL data cable (H and G) to connectors H(J01103) and G(J01102) on the base backplane and to connectors C(J01100) and D(J01101) on the expansion backplane.**

6. **Connect the two disk status flex circuit cables to the expansion backplane at connectors J01000 and J01001.**

What Next

To reassemble the system, complete these tasks:

- "How to Install a Disk Drive" on page 167
- "How to Install an I/O Fan Tray" on page 86
- "How to Close a Side Door" on page 24

If you installed this part as a new option, you need to perform a reconfiguration boot in order for the operating system to recognize the new device. See:

- "How to Initiate a Reconfiguration Boot" on page 11

Note – Be sure to run POST and OpenBoot Diagnostics tests to verify that the system functions correctly with the part(s) you have just installed. For maximum test coverage, set the OpenBoot configuration variable `diag-level` to `max` prior to starting the diagnostic tests. See "Diagnostics and Troubleshooting" on page 249.

How to Remove the Base FC-AL Backplane

Before You Begin

Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27
- "How to Remove a Disk Drive" on page 164; you must remove all the disk drives from the disk cage.
- "How to Remove an I/O Fan Tray" on page 84; you must remove both I/O fan trays.
- "How to Remove a CPU Fan Tray" on page 50
- "How to Remove the CPU Fan Status Assembly" on page 62
- "How to Remove the FC-AL Disk Cage" on page 193

What to Do

1. **If the expansion FC-AL backplane is installed, disconnect the following cables:**

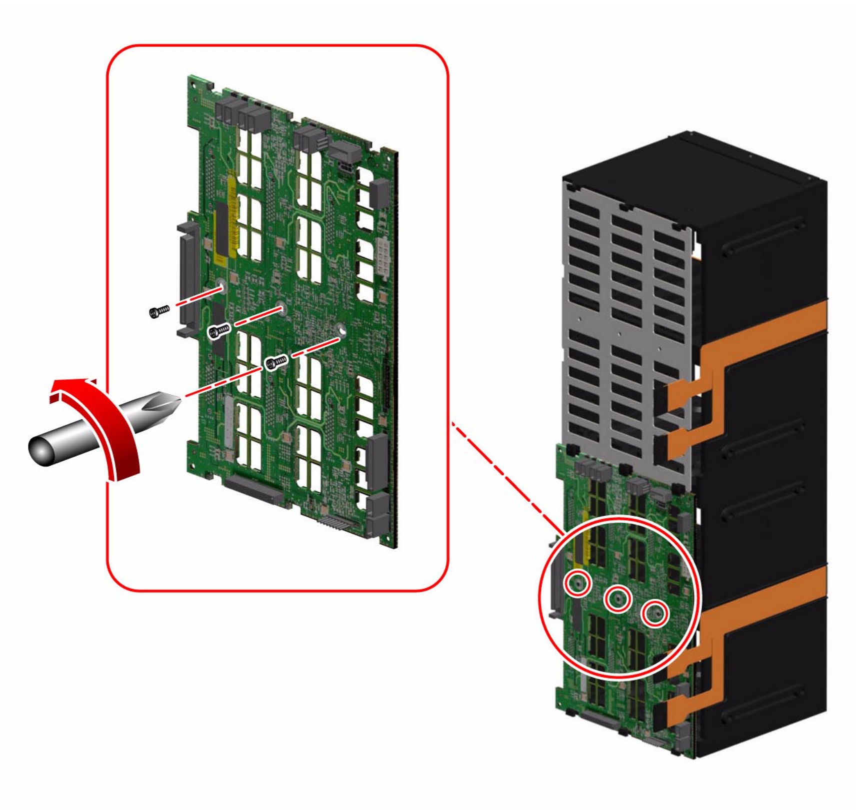
   For cable connector locations, see "Cable Connector Locations" on page 220.

   a. **FC-AL data cable (H and G) from the base backplane at connectors H(J01103) and G(J01102)**

   b. **FC-AL data cable (F and E) from the base backplane at connectors F(J01103) and E(J01102)**

2. **Disconnect the disk status flex circuit cables from the base backplane at connectors J01001 and J01000.**

3. **Remove the three Phillips screws and nylon washers securing the base backplane to the disk cage.**



4. **Remove the backplane from the system.**

5. **Place the backplane on an antistatic mat.**

What Next

To replace the base FC-AL backplane, complete this task:

- "How to Install the Base FC-AL Backplane" on page 190

How to Install the Base FC-AL Backplane

Before You Begin

Complete this task:

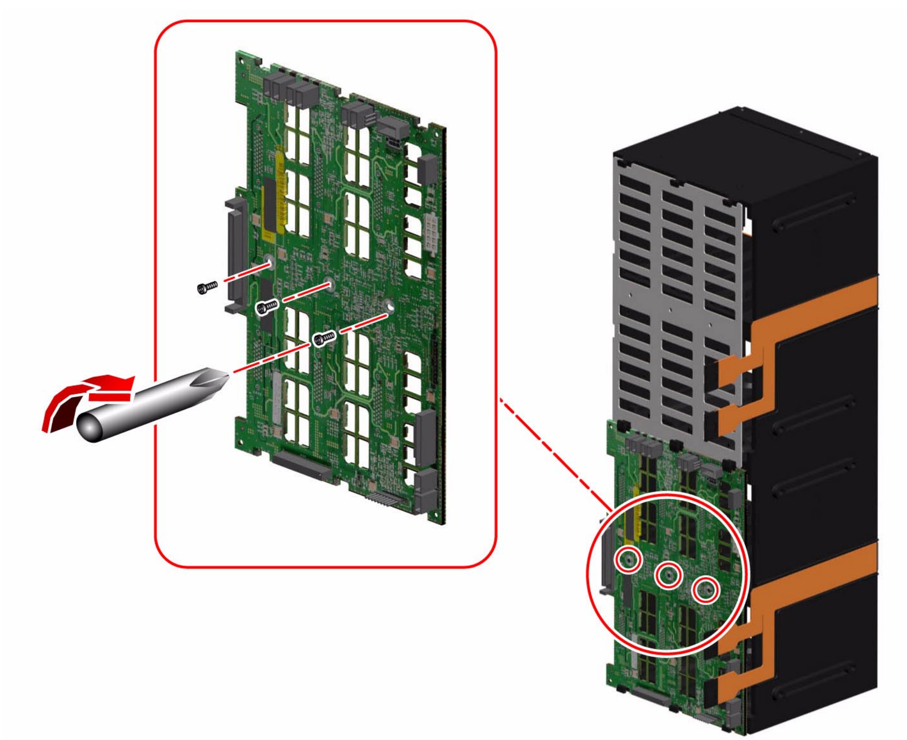
- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Position the base backplane against the disk cage.**

   Align the three screw holes on the backplane with the screw holes on the disk cage.

2. **Fasten the three screws and nylon washers that secure the backplane to the disk cage.**



3. **Connect the disk status flex circuit cables to the base backplane at connectors J01001 and J01000.**
4. **If the expansion FC-AL backplane is installed, connect the following cables:**

   For cable connector locations, see "Cable Connector Locations" on page 220.

   a. **FC-AL data cable (C and D) from connectors C(J01100) and D(J01101) on the expansion backplane to the base backplane at connectors H(J01103) and G(J01102)**

   a. **FC-AL data cable (A and B) from connectors A(J0201) and B(J0200) on the expansion backplane to the base backplane at connectors F(J0501) and E(J0500)**

What Next

To reassemble the system, complete these tasks:

- "How to Install the FC-AL Disk Cage" on page 198
- "How to Install the CPU Fan Status Assembly" on page 64
- "How to Install a CPU Fan Tray" on page 53
- "How to Install an I/O Fan Tray" on page 86
- "How to Install a Disk Drive" on page 167
- "How to Close a Side Door" on page 24

1. **After installing an expansion backplane, power on the system and bring the system up to the `ok` prompt.**
2. **Allow the system to remain at the `ok` prompt for at least 10 minutes to ensure that the two backplanes are loaded with the same version of firmware.**

   The system automatically synchronizes the firmware versions between the two backplanes.

3. **After the required waiting period, boot the system to single-user mode.**

```
ok boot -s
```

4. **To verify that the firmware synchronization process has successfully completed, type the following `luxadm` subcommand:**

```
# luxadm display enclosure_name
```

Where *enclosure_name* is the enclosure name assigned to the Sun Fire 880 internal storage array—by default, `FCloop`. If you need to verify the enclosure name first, use the `luxadm probe` subcommand.

The output of the `display` subcommand shows the status of each SSC100 in the system. The following is an excerpt of sample output for a dual-backplane system.

```
SSC100's - 0=Base Bkpln, 1=Base LoopB, 2=Exp Bkpln, 3=Exp LoopB
    SSC100 #0:    O.K.(9226/ 3A20)
    SSC100 #1:    O.K.(9226/ 3A20)
    SSC100 #2:    O.K.(9226/ 3A20)
    SSC100 #3:    O.K.(9226/ 3A20)
```

Verify that each SSC100 processor displays an "O.K." status and that each displays the same firmware version in parentheses. If so, the firmware synchronization process has successfully completed. Otherwise, wait another two minutes or so and repeat this step.

Note – For more information about the `luxadm` utility, see *Platform Notes: Using luxadm Software*, part of the Solaris on Sun Hardware AnswerBook2 Set on the Supplement CD.

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5. **Once the firmware synchronization process is complete, you can restore the system to multi-user mode.**

For example, type:

```
# init 3
```

Note – Be sure to run POST and OpenBoot Diagnostics tests to verify that the system functions correctly with the part(s) you have just installed. For maximum test coverage, set the OpenBoot configuration variable `diag-level` to `max` prior to starting the diagnostic tests. See "Diagnostics and Troubleshooting" on page 249.

How to Remove the FC-AL Disk Cage

Before You Begin

Complete these tasks:

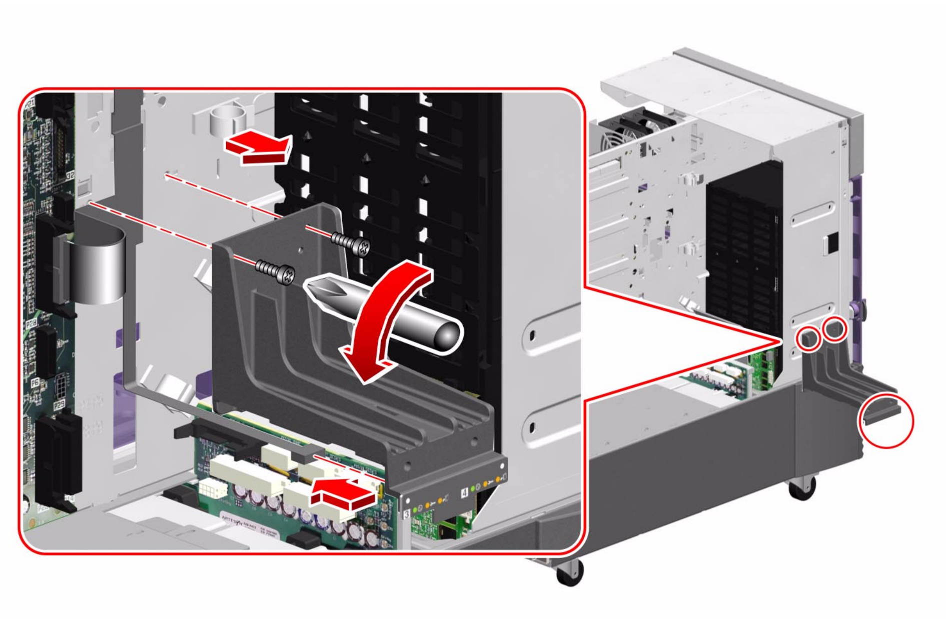
- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27
- "How to Remove a Disk Drive" on page 164; you must remove all the disk drives from the disk cage.
- "How to Remove an I/O Fan Tray" on page 84; you must remove both I/O fan trays.
- "How to Remove a CPU Fan Tray" on page 50
- "How to Remove the CPU Fan Status Assembly" on page 62

What to Do

1. **Remove the lower I/O fan tray bracket.**

   a. **Disconnect the fan status cable (P27) from the back of the I/O fan flex circuit.**

b. **Remove the two Phillips screws securing the lower I/O fan tray bracket to the centerplane.**



c. **Rotate the lower I/O fan tray bracket out from the system.**

d. **Place the bracket on an antistatic mat.**

2. **Disconnect the following cables from each backplane installed:**

   For cable connector locations, see “Cable Connector Locations” on page 220.

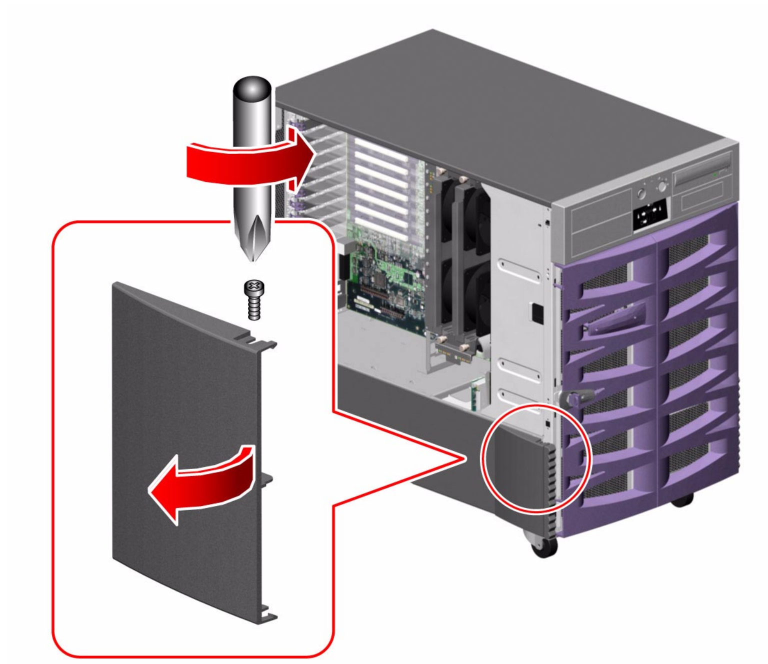
   a. **Base/expansion cable and/or base backplane power cable from the backplane at connectors J0100 and J0801**

   b. **I^2C cable from the backplane at connector J0800**

   c. **If a Sun StorEdge PCI Dual Fibre Channel Host Adapter card is connected to the base backplane, the FC-AL data cables from the base backplane at connectors C(J01100) and D(J01101)**

3. **Remove the I/O side fender from the system.**

   a. **Remove the Phillips screw from the top of the fender.**

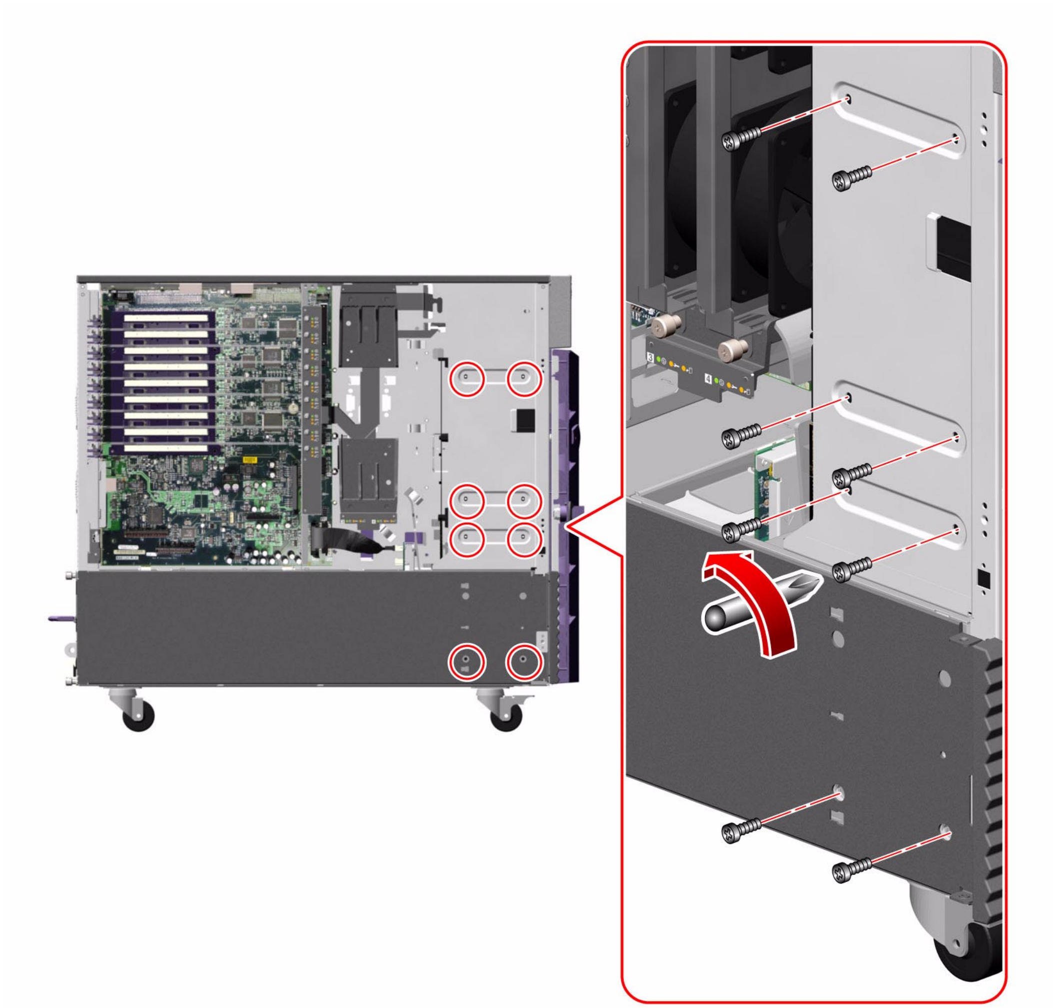


   b. **Holding the front of the fender, rotate it out and away from the chassis.**

   The fender is held in place by two tabs on the back of the fender that fit into the lower chassis.

4. **Remove the six CPU side screws securing the disk cage to the system**

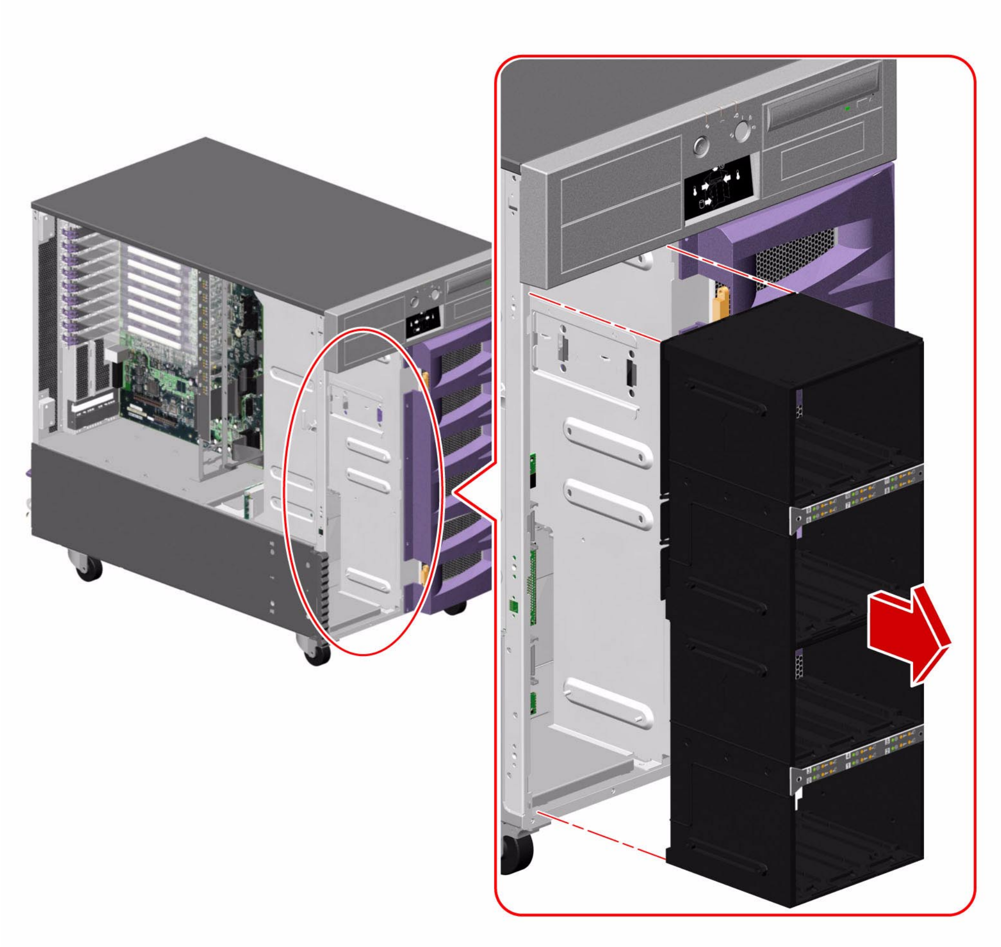
5. **Remove the eight I/O side screws securing the disk cage to the system.**



6. **Carefully pull the disk cage forward about 2 inches (5 cm), enough to give you clear access to the remaining cables on the base backplane.**

7. **Disconnect the base backplane FC-AL data cable (A and B) from the base backplane at connectors A(J0201) and B(J0200).**

8. **Slide the disk cage out fully from the system.**



9. **Place the disk cage on an antistatic mat.**

What Next

To replace the disk cage, complete this task:

- "How to Install the FC-AL Disk Cage" on page 198

How to Install the FC-AL Disk Cage

Before You Begin

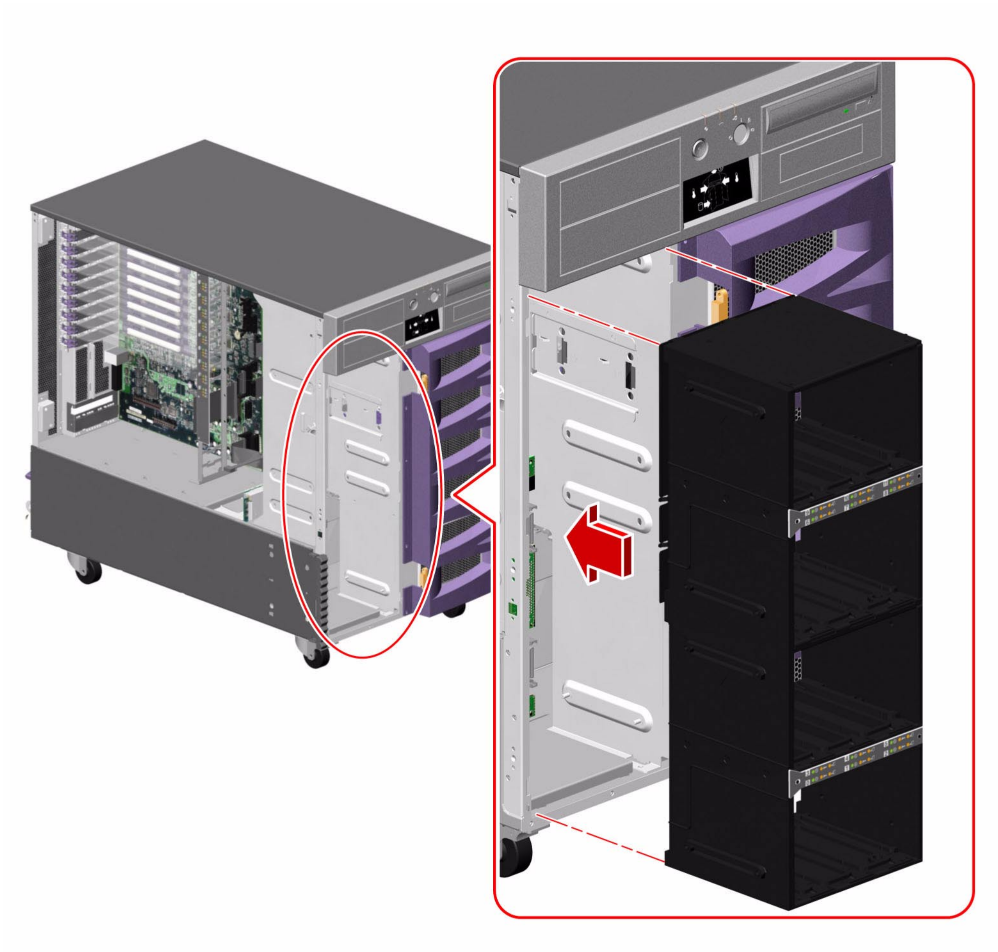
Complete this task:

- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Carefully align the disk cage with the disk cage bay.**

2. **Slide the disk cage into the system until it is about 2 inches (5 cm) from its final position in the disk cage bay.**

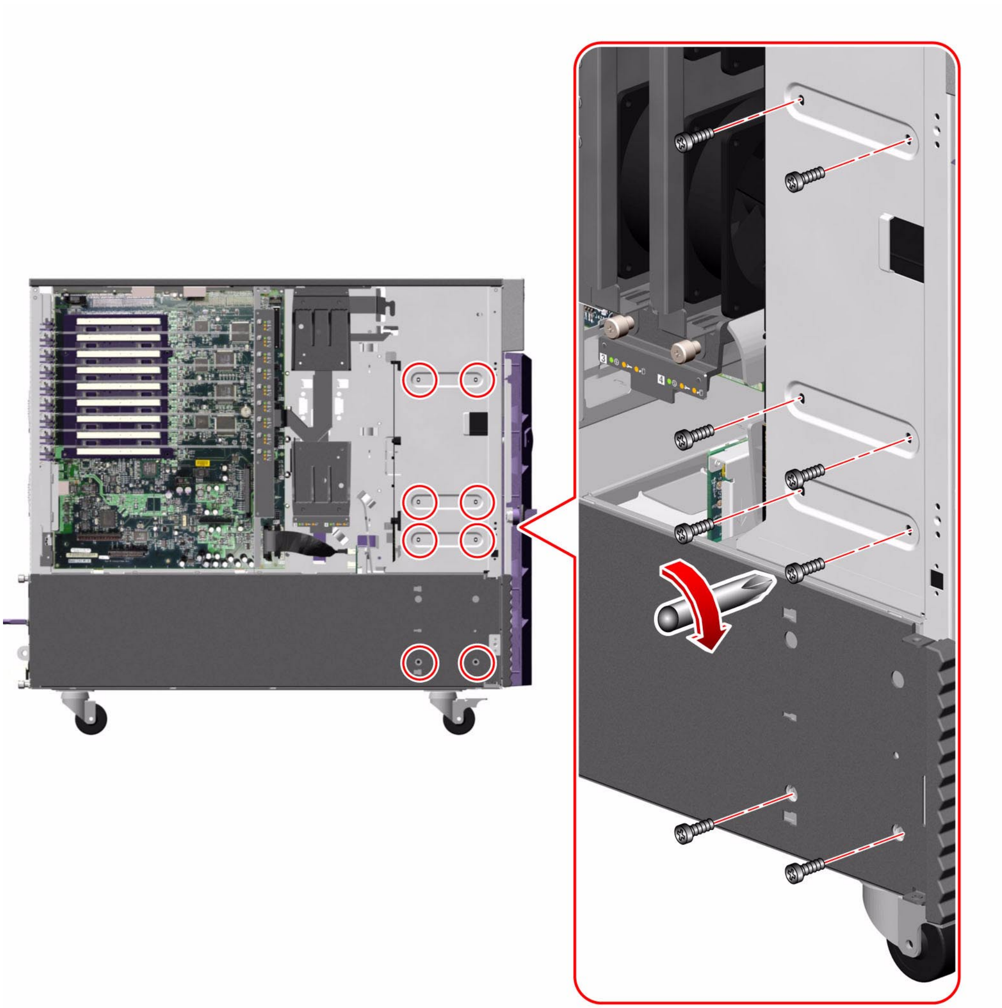


3. **Connect the base backplane FC-AL data cable (A and B) from the motherboard to the base backplane at connectors A(J0201) and B(J0200).**

4. **Slide the disk cage fully into the system.**

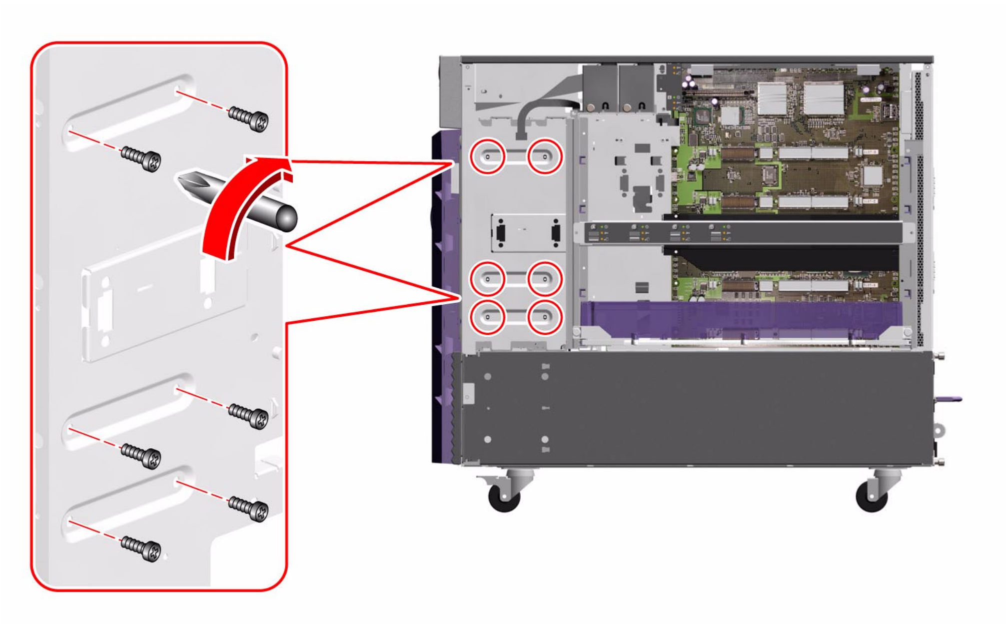
5. **On the I/O side of the system, loosely fasten the eight Phillips screws that secure the disk cage to the chassis.**

   Do not fully tighten the screws.

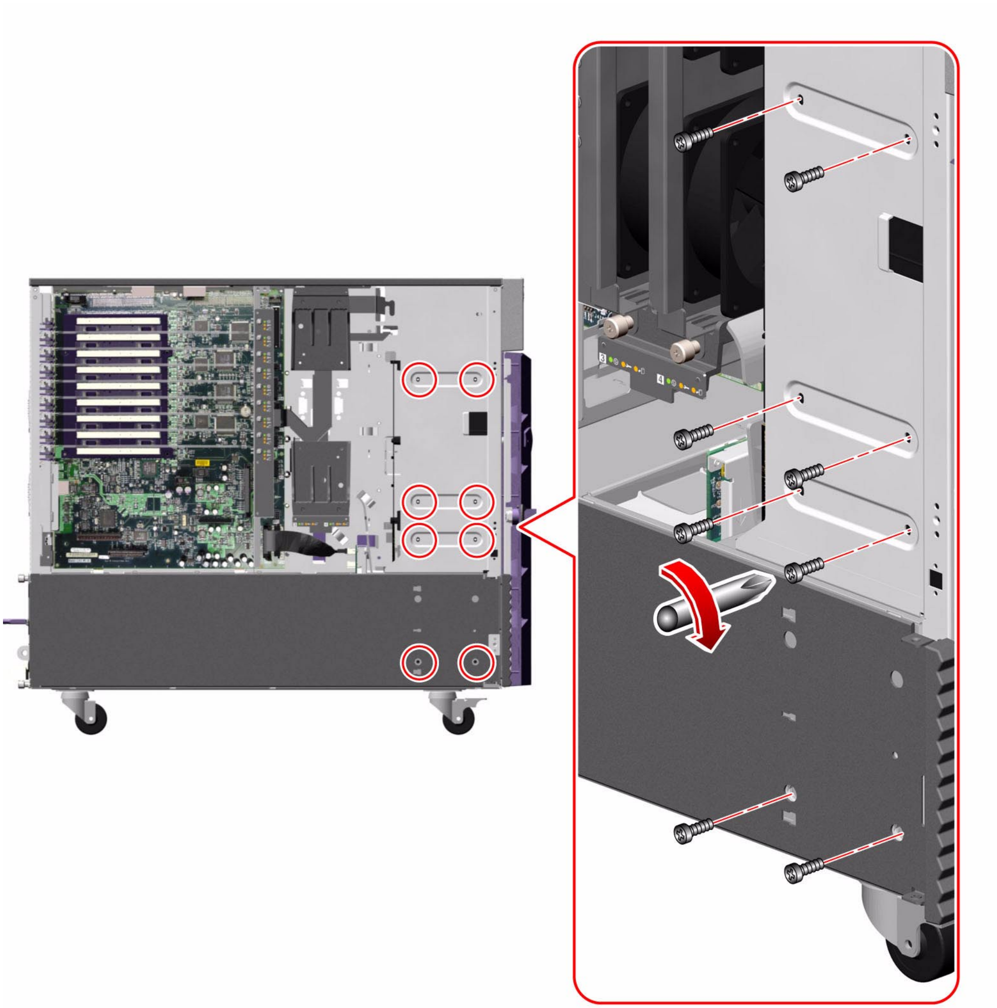


6. **On the CPU side of the system, loosely fasten the six Phillips screws that secure the disk cage to the chassis.**

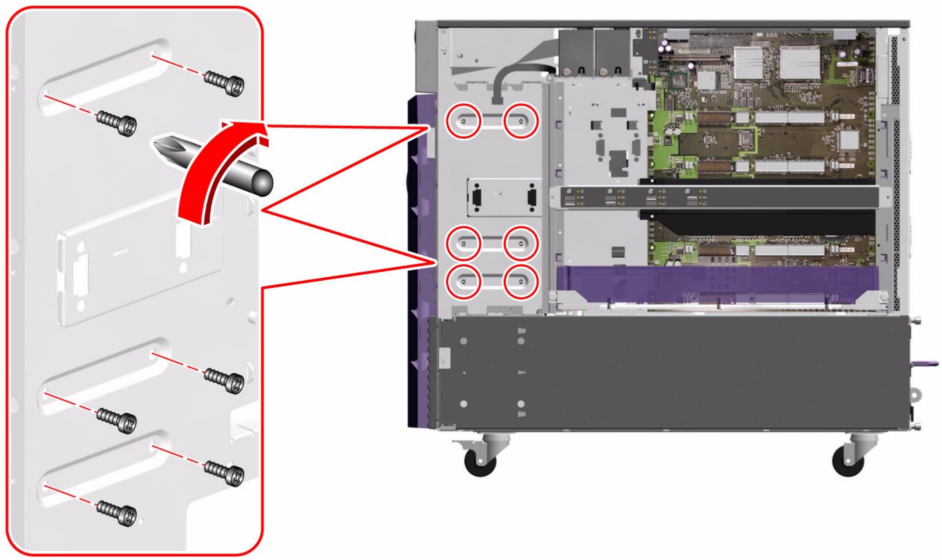
   Do not fully tighten the screws.



7. **On the I/O side of the system, fully tighten the eight Phillips screws that secure the disk cage to the chassis.**



8. **On the CPU side of the system, fully tighten the six Phillips screws that secure the disk cage to the chassis.**



9. **Connect the following cables to the base backplane:**

   For cable connector locations, see "Cable Connector Locations" on page 220.

   a. **Base backplane power cable (P16) to the base backplane at connector J0100**

      The cable is connected to the power distribution board at connector P15/J8.

   b. **I^2C cable (P19) to the base backplane at connector J0800**

   c. **If a Sun StorEdge PCI Dual Fibre Channel Host Adapter card is installed to control Loop B of the FC-AL disk backplane, connect the card's FC-AL data cable to the base backplane at connectors C(J01100) and D(J01101).**

10. **If the expansion FC-AL disk backplane is installed, connect the following cables:**

    a. **Base/expansion cable (P2 and P43) to the expansion backplane at connectors J0801 and J0100**

    b. **Base/expansion cable (P1) to the base backplane at connector J0801**

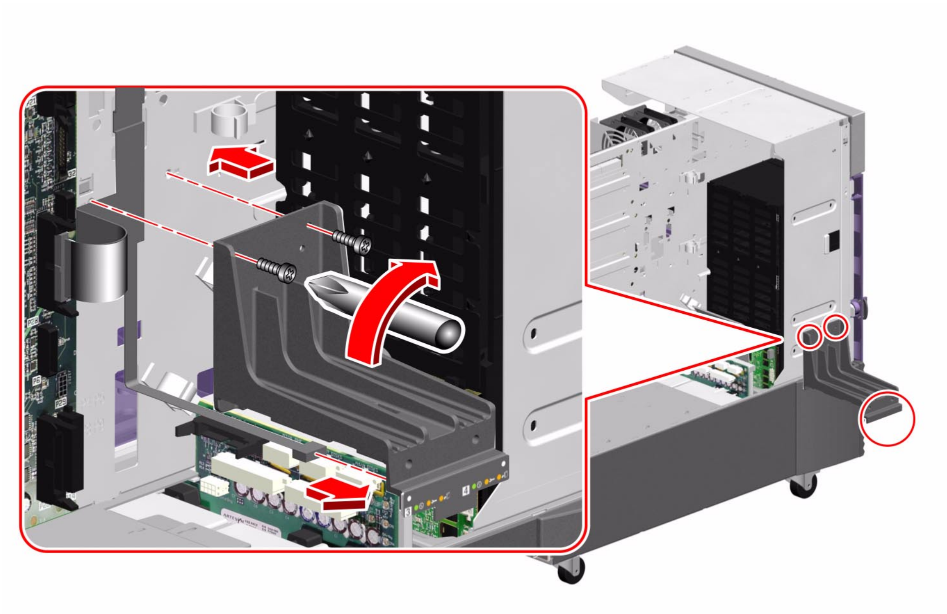
    c. **I^2C cable (P20) to the expansion backplane at connector J0800**

11. **Replace the lower I/O fan tray bracket.**

a. **Connect the fan status cable (P27) to the connector on the back of the I/O fan status flex circuit.**

b. **Place the lower I/O fan bracket in the system against the centerplane.**

Ensure that the ribbon cables behind the lower I/O fan bracket remain flat against the centerplane.

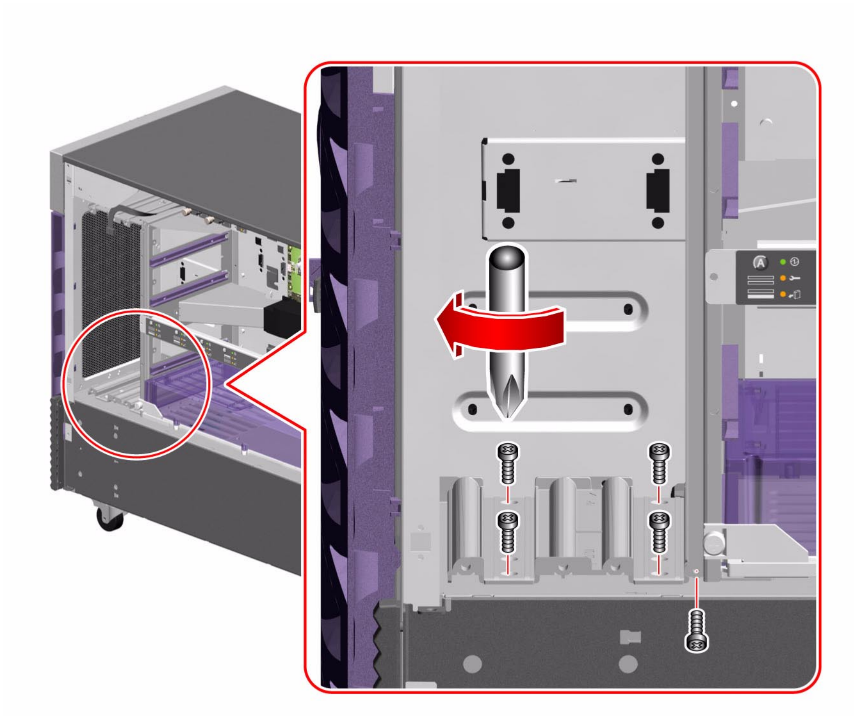


c. **Fasten the two Phillips screws that secure the lower I/O fan tray bracket to the centerplane.**

12. **Replace the lower CPU fan tray bracket.**

a. **Replace the four flat head Phillips screws that secure the bracket to the chassis.**

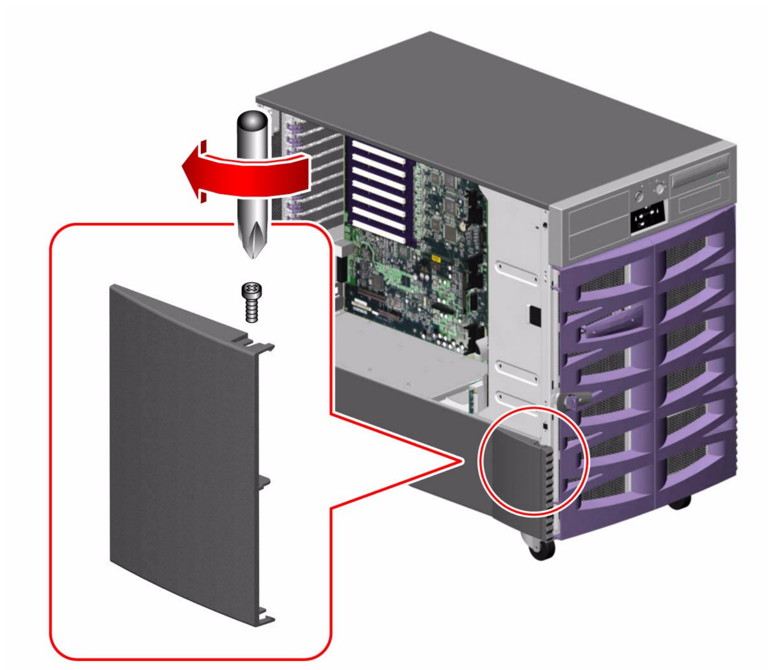
b. **Replace the Phillips screw that secures the front of the CPU fan tray bracket to the front CPU/Memory board bracket.**



13. **Replace the I/O side fender.**

    a. **Holding the front of the fender, align the tabs with the cutouts on the chassis and rotate the fender until it snaps into place.**

b. **Replace the Phillips screw on the top of the fender.**



What Next

To reassemble the system, complete these tasks:

- "How to Install the CPU Fan Status Assembly" on page 64
- "How to Install a CPU Fan Tray" on page 53
- "How to Install an I/O Fan Tray" on page 86
- "How to Close a Side Door" on page 24
- "How to Install a Disk Drive" on page 167

How to Remove the Power Distribution Board

Before You Begin

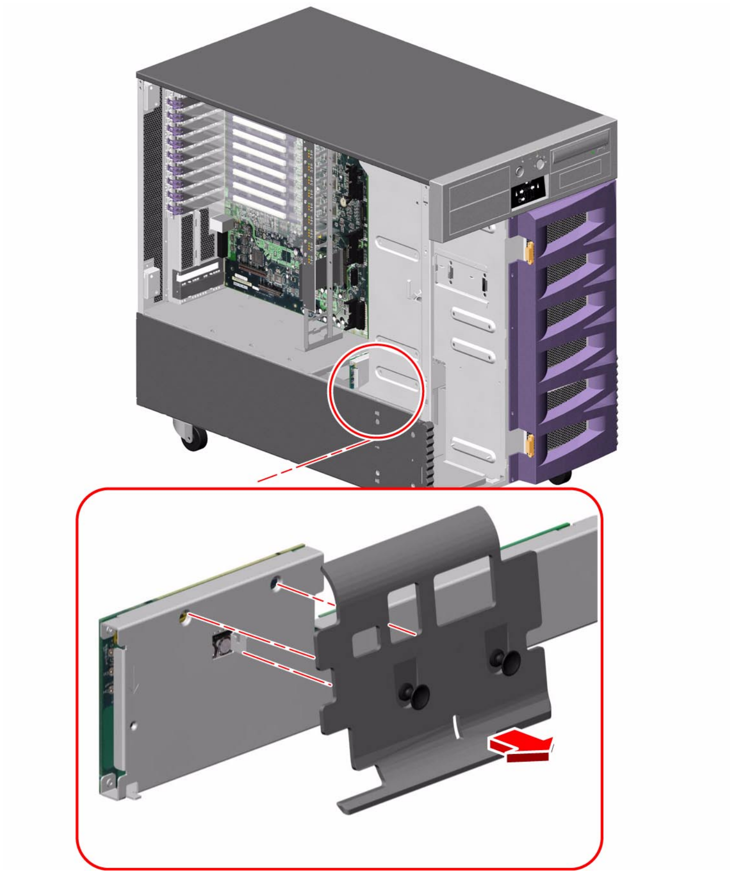
Complete these tasks:

- "How to Power Off the System" on page 5
- "How to Open and Remove a Side Door" on page 22
- "How to Avoid Electrostatic Discharge" on page 27
- "How to Remove a Power Supply" on page 150; you must remove all power supplies from the system.
- "How to Remove an I/O Fan Tray" on page 84; you must remove both I/O fan trays.
- "How to Remove a Disk Drive" on page 164; you must remove all disk drives from the system.
- "How to Remove a CPU Fan Tray" on page 50; you must remove both CPU fan trays.
- "How to Remove the CPU Fan Status Assembly" on page 62
- "How to Remove the FC-AL Disk Cage" on page 193

What to Do

1. **Remove the PCI air deflector from the power distribution board bracket.**

   Pull out the two plastic pins securing the PCI air deflector and remove it from the system.



2. **Disconnect the following cables from the power distribution board:**

   For cable connector locations, see "Cable Connector Locations" on page 220.

   a. **Base backplane power cable (P15) from the power distribution board at connector P15/J8(DISKS)**

   b. **If an expansion backplane is installed, disconnect the base/expansion cable (P42) from the power distribution board at connector P42/J7(DISKS)**

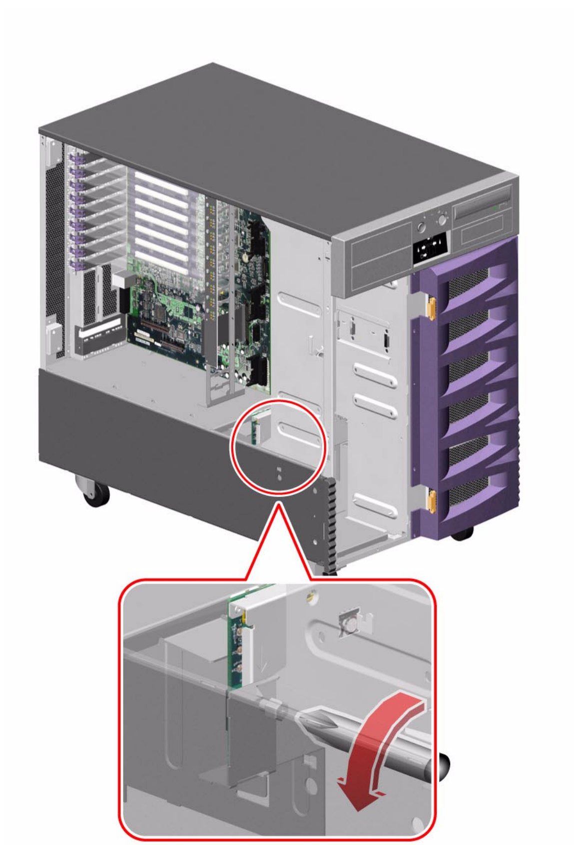
c. **RME power cable (P17) from the power distribution board at connector P17/ J6(RME)**

d. **I/O signal cable (P25) from the power distribution board at connector P25/ J9(Signals)**

e. **I/O board power cable (P13) from the power distribution board at connector P13/J5(I/O BOARD)**

3. **Loosen the captive Phillips screw securing the power distribution board to its bracket.**

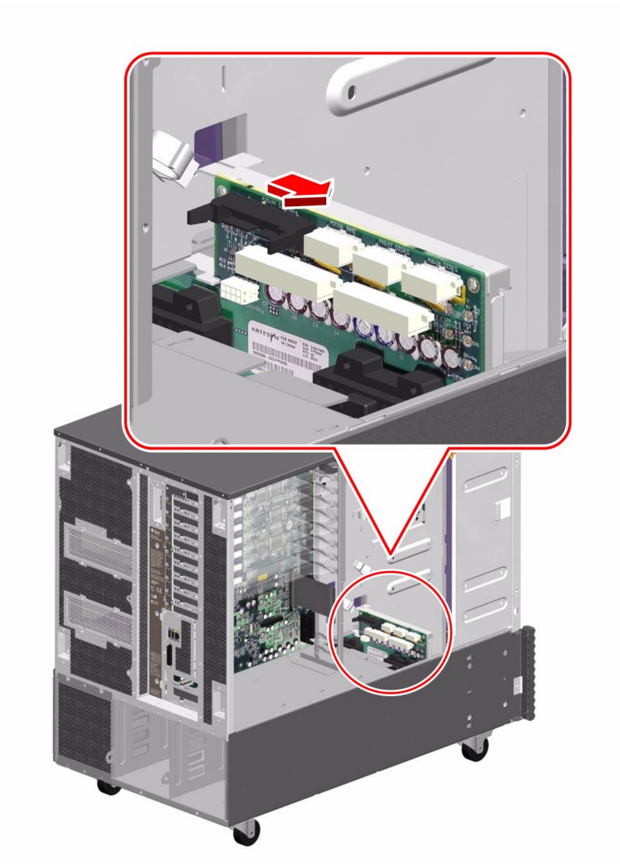
   Access the captive screw from the front of the system.



4. **Carefully pull the power distribution board out from the system until you can easily access the two cables still attached to the power distribution board.**

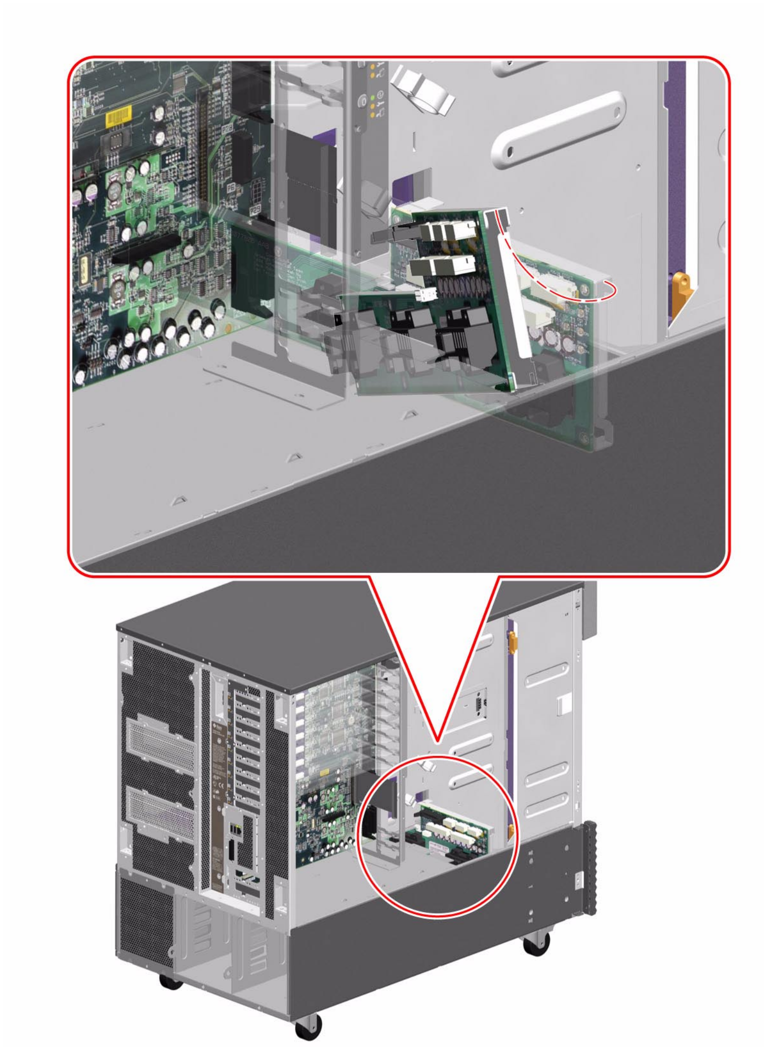
The power distribution board is held in place by two tabs that fit into cutouts on the chassis sidewall and by one tab on the centerplane.

Note – Be careful not to damage the I^2C cable and the motherboard power cables still attached to the power distribution board.



a. **Pull the power distribution board out until it clears the tab on the centerplane.**

b. Carefully rotate the board away from the power distribution board bracket.



c. Pull the power distribution board out from the system enough so that you can disconnect the two cables still attached to the board.

5. Disconnect the following cables from the power distribution board:

a. Motherboard power cable (P7) from the power distribution board at connector P7/J4(MOTHERBOARD)

b. I/O board remote sense cable (P38) from the power distribution board at connector P38/J10(Sense/5vstby)

6. **Remove the power distribution board from the system.**

7. **Place the board on an antistatic mat.**

What Next

To replace the power distribution board, complete this task:

- "How to Install the Power Distribution Board" on page 213

How to Install the Power Distribution Board

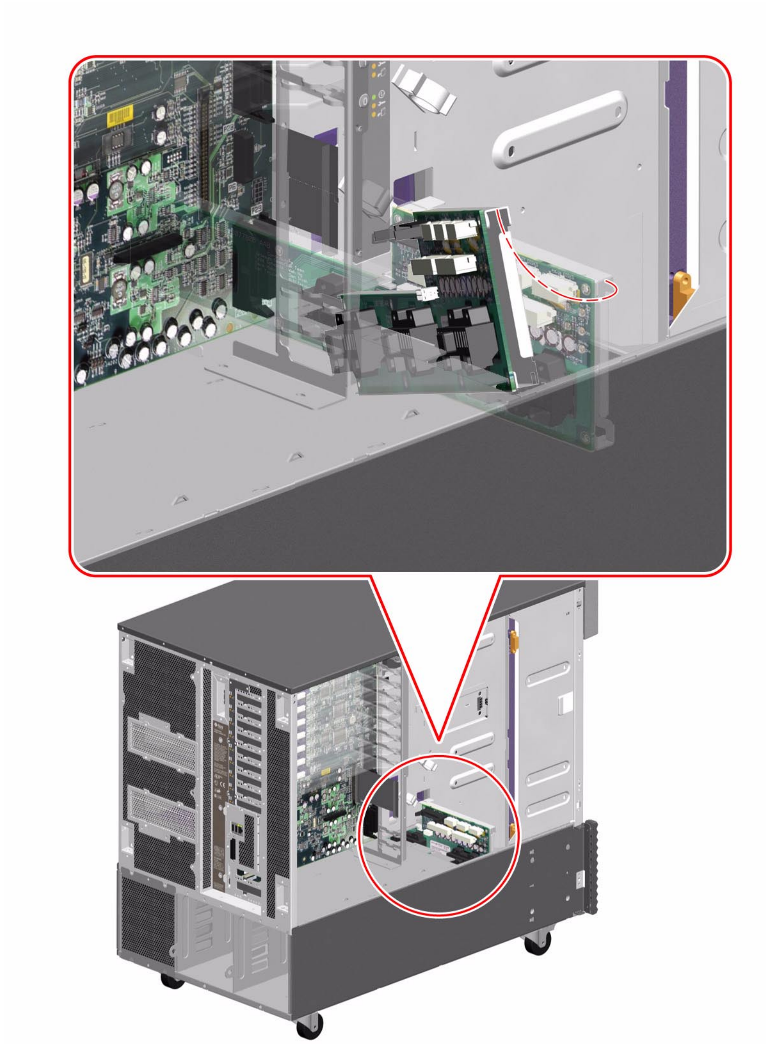
Before You Begin

Complete this task:

- "How to Avoid Electrostatic Discharge" on page 27

What to Do

1. **Angle the power distribution board into its position in the chassis far enough to still easily access connectors P7/J4(MOTHERBOARD) and P38/J10(Sense/5Vstby) on the power distribution board.**



2. **Connect the following cables to the power distribution board:**

   For cable connector locations, see "Cable Connector Locations" on page 220.

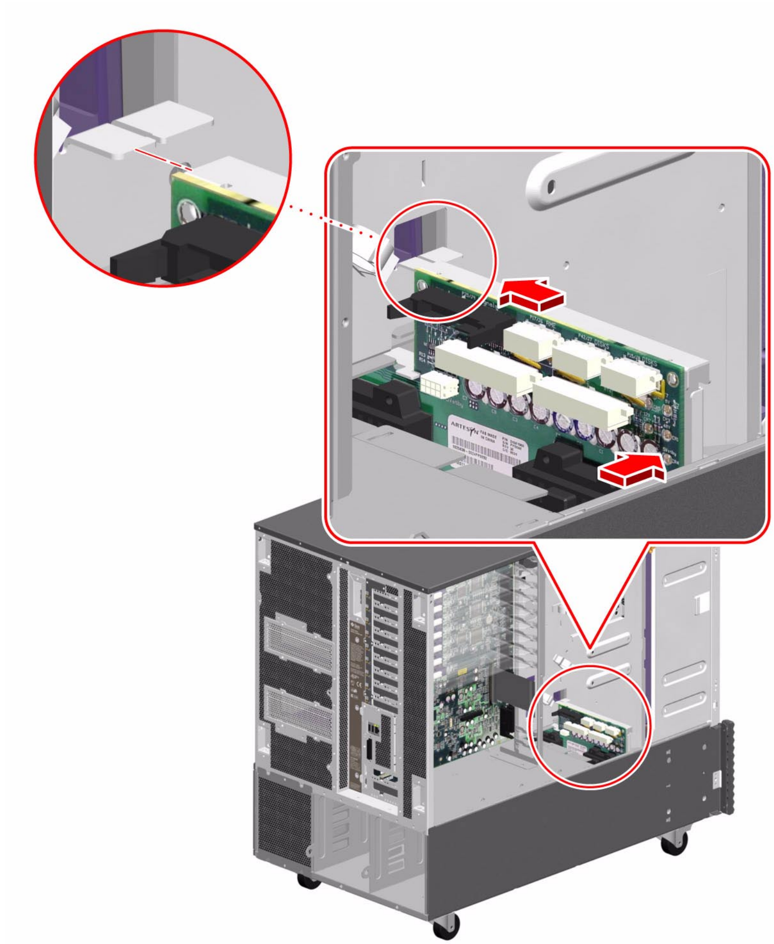
   a. **Motherboard power cable (P7) to the power distribution board at connector P7/J4(MOTHERBOARD)**

   b. **I/O board remote sense cable (P38) to the power distribution board at connector P38/J10(Sense/5Vstby)**

3. **Carefully finish positioning the power distribution board in the chassis against its bracket.**

   a. **Align the board by placing the bracket side of the board against the power distribution board bracket so that the hole on the top of the board aligns with the tab on the centerplane.**

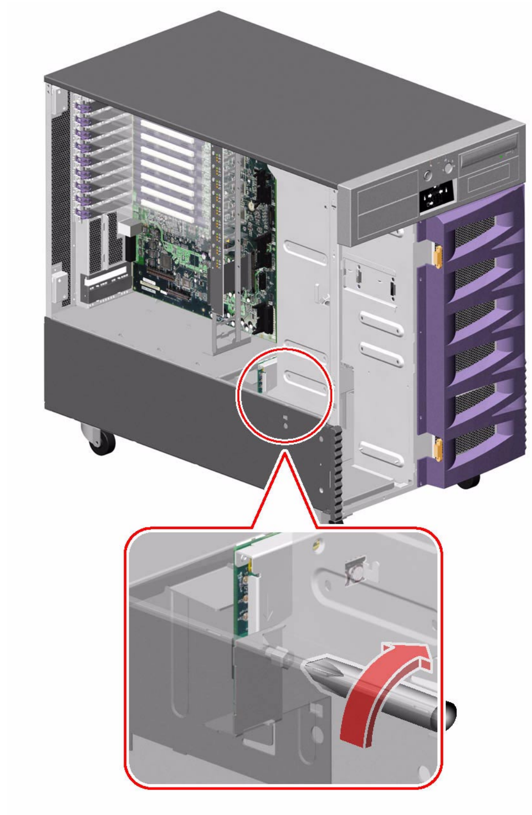
      This ensures that the tabs on the end of the power distribution board are aligned with their cutouts in the sidewall of the chassis.



b. **Slide the board fully into the chassis until the tabs on the end of the power distribution board are in their cutouts on the chassis sidewall and the tab on the centerplane is in the hole on the top of the power distribution board.**

4. **Tighten the captive Phillips screw that secures the backplane to the backplane bracket.**

   Access the captive screw from the front of the system.



5. **Connect the following cables to the power distribution board:**

   a. **I/O board power cable (P13) to the power distribution board at connector P13/J5(I/O BOARD)**

   b. **I/O signal cable (P25) to the power distribution board at connector P25/J9(Signals)**

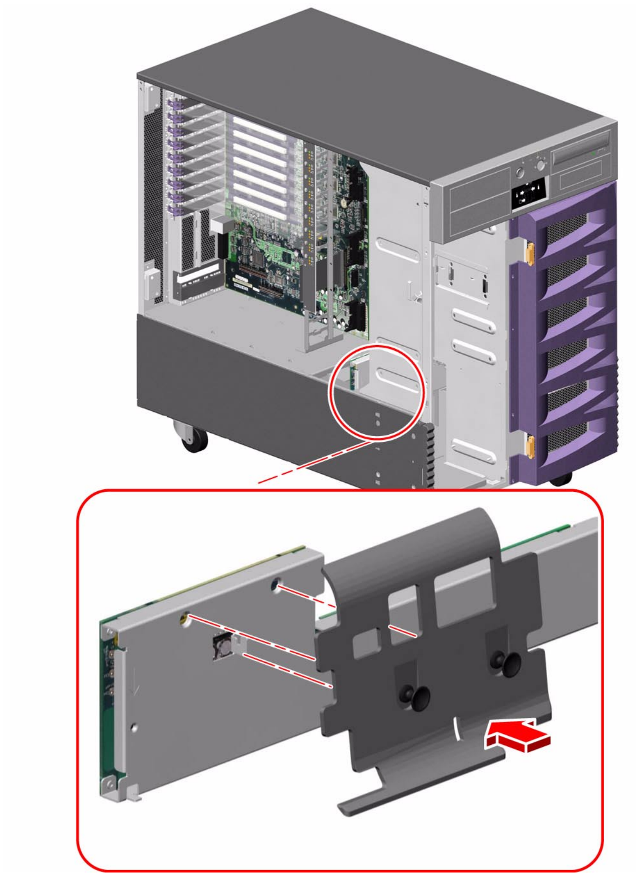
   c. **RME power cable (P17) to the power distribution board at connector P17/J6(RME)**

   d. **If an expansion backplane is installed, connect the base/expansion cable (P42) to the power distribution board at connector P42/J7(DISKS)**

   e. **Base backplane power cable (P15) to the power distribution board at connector P15/J8(DISKS)**

6. **Attach the PCI air deflector to the power distribution board bracket.**

   a. **Align the cutout on the air deflector with the tab on the bracket.**



   b. **Push in the two plastic pins that secure the PCI air deflector to the bracket.**

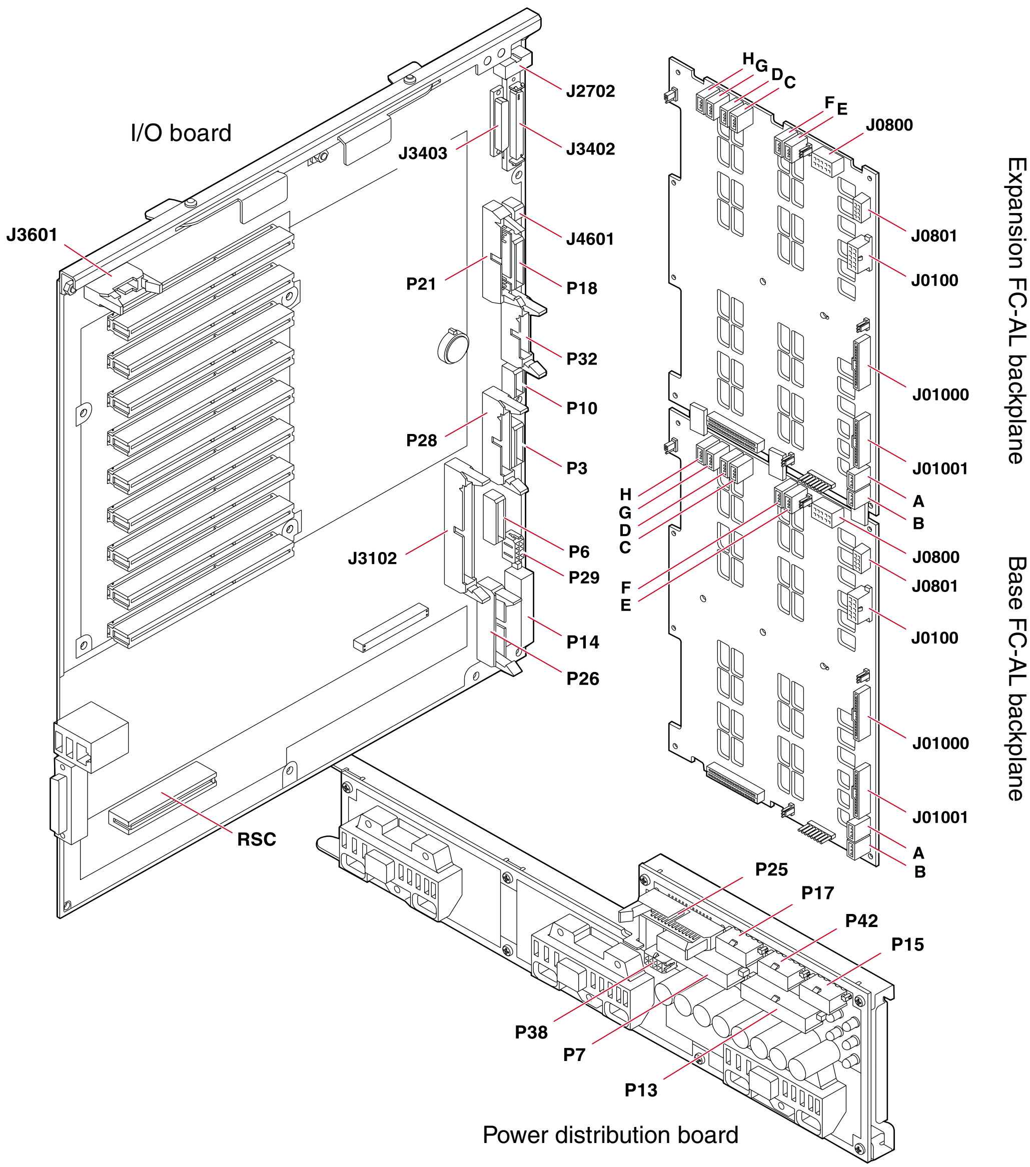
What Next

To reassemble the system, complete these tasks:

- "How to Install the FC-AL Disk Cage" on page 198
- "How to Install the CPU Fan Status Assembly" on page 64
- "How to Install a CPU Fan Tray" on page 53
- "How to Install an I/O Fan Tray" on page 86
- "How to Install a Power Supply" on page 155
- "How to Close a Side Door" on page 24
- "How to Install a Disk Drive" on page 167

Note – Be sure to run POST and OpenBoot Diagnostics tests to verify that the system functions correctly with the part(s) you have just installed. For maximum test coverage, set the OpenBoot configuration variable `diag-level` to `max` prior to starting the diagnostic tests. See "Diagnostics and Troubleshooting" on page 249.

Cable Connector Locations



Cable Routing

Cable Name	Part Number	Cable end	Connect to
I/O board power cable	530-2818	P14 P13	I/O board at P14(J3203) PDB at P13/J5(I/O BOARD)
I^2C cable	530-2840	P18 P19 P20	I/O board at P18(J3805) Base backplane at J0800 Expansion backplane at J0800
Base backplane power cable	530-2841	P15 P16	PDB at P15/J8(DISKS) Base backplane at J0100
Base/expansion cable	530-2863	P42 P1(Base) P43(Expansion) P2(Expansion)	PDB at P42/J7(DISKS) Base backplane at J0801 Expansion backplane at J0100 Expansion backplane at J0801
I/O board remote sense cable	530-2745	P29 P38	I/O board at P29(J3202) PDB at P38/J10(Sense/5Vstby)
I/O signal cable	530-2746	P26 P25	I/O board at P26(J3201) PDB at P25/J9(Signals)
Motherboard power cable	530-2816	P7 P8 P9	PDB at MOTHERBOARD(P7/J4) Motherboard at P8(J4702) Motherboard at P9(48VPOWER)
FC-AL data cable (short cable)	530-2621	F, E A, B	Base backplane at F, E Expansion backplane at A, B
FC-AL data cable (medium cable)	530-2622	H, G C, D	Base backplane at H, G Expansion backplane at C, D
FC-AL data cable (long cable)	530-2623	A, B A, B	Motherboard at A, B Base backplane at A, B
Loop B PCI FC-AL data cable	530-3056	D C P3 P4	Base backplane at D Base backplane at C PCI card at J3 PCI card at J4
Fan power cable	530-2747	P10 P6 P3 P4, P5 P1, P2 P11 P12	I/O board at P10(J3807) I/O board at P6(J3804) I/O board at P3(J3806) Centerplane cutouts P4, P5(I/O fans) Centerplane cutouts P1, P2(CPU fans) Top cutout on motherboard fan status bracket Bottom cutout on motherboard fan status bracket
PCI internal status cable	530-2835	P36 P37	I/O board at P36(J3102) PCI internal LED flex circuit

Cable Name	Part Number	Cable end	Connect to
PCI external status cable	530-2836	P23 P24	I/O board at P23(J3601) PCI external LED flex circuit
System status assembly cable	530-2839	P32 P31	I/O board at P32(J3803) System status assembly
CPU/Memory board status cable	530-2837	P35 P34	Motherboard at P35 CPU/Memory board status assembly
Fan status cable	530-2838	P28 P27 P30 P29	I/O board at P28(J3801) I/O fan status flex circuit Motherboard fan status flex circuit CPU fan status flex circuit
RME power cable	530-2548	P17 P3 P2 P4 P5	PDB at P17/J6(RME) Lower 5.25-inch RME device Upper 5.25-inch RME device DVD-ROM 3.25-inch RME device
RME wide SCSI cable	530-2569	P1 P2 P3	I/O board at J3402 Lower 5.25-inch RME device Upper 5.25-inch RME device
RME narrow SCSI cable	530-2748	P1 P2	I/O board at J3403 DVD-ROM

CHAPTER 7

Hardware Configuration

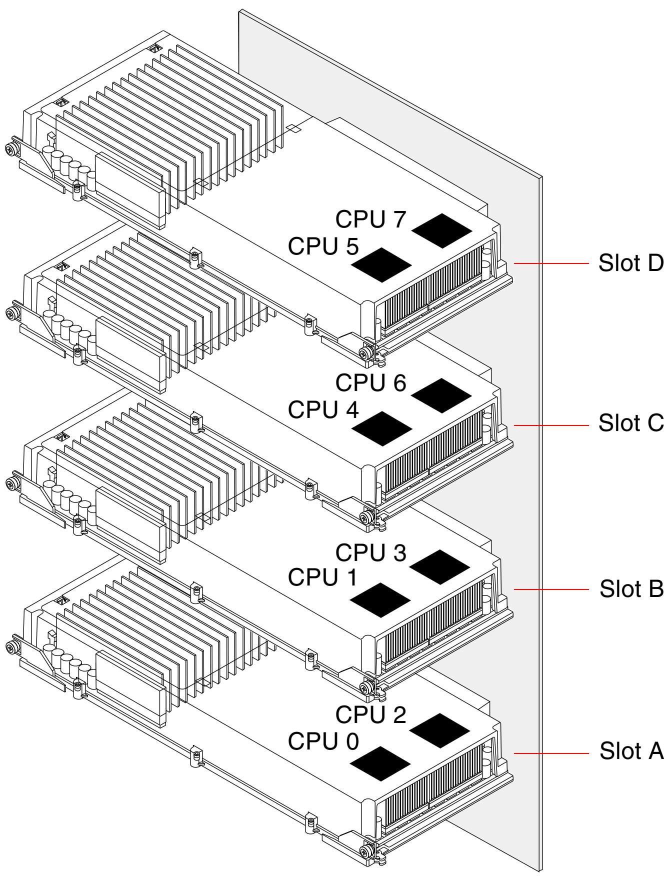
This chapter provides hardware configuration information for the Sun Fire 880 server. The following topics are covered in this chapter:

Note – For configuration information about the internal mass storage subsystem and network interfaces, see the *Sun Fire 880 Server Owner's Guide*.

About CPU/Memory Boards

The system motherboard provides slots for up to four CPU/Memory boards. Each CPU/Memory board in the system must be of the same speed. Each CPU/Memory board incorporates two UltraSPARC III microprocessors, with 8 Mbytes of static random access memory (SRAM) external cache memory per processor, and slots for up to 16 memory modules. The external cache memory cannot be upgraded; it is fixed at 8 Mbytes, which is the maximum amount that the UltraSPARC III architecture supports.

The following illustration shows the four CPU/Memory board slots on the system motherboard. The slots are labeled A through D from bottom to top. The CPUs in the system are numbered from 0 to 7, depending on the slot where each CPU resides. For example, a CPU/Memory board installed in slot D always contains CPUs 5 and 7, even if there are no other CPU/Memory boards installed in the system.



The UltraSPARC III microprocessor is a high-performance, highly integrated superscalar processor implementing the SPARC V9 64-bit Reduced Instruction Set Computing (RISC) architecture. The UltraSPARC III processor supports both 2D and 3D graphics, as well as image processing, video compression and decompression, and video effects through the sophisticated Visual Instruction Set (VIS) extension. VIS provides high levels of multimedia performance, including real-time video compression and decompression and two streams of MPEG-2 decompression at full broadcast quality with no additional hardware support.

The Sun Fire 880 server employs a shared-memory multiprocessor architecture with all processors sharing the same physical address space. The system processors, main memory, and I/O subsystem communicate via a high-speed system interconnect bus, operating at a clock rate of 150 MHz. In a system configured with multiple CPU/Memory boards, all main memory is accessible from any processor over the system bus. The main memory is shared logically by all processors and I/O devices in the system.

For information about memory modules and memory configuration guidelines, see “About Memory Modules” on page 226.

Sun Fire 880 systems using the 900 MHz CPU/Memory Board require the Solaris 8 02/02 operating environment or a compatible Solaris version, or the Solaris 8 10/01 operating environment with patches.

Note – The Solaris™ 8 7/01 operating environment is not supported for Sun Fire 880 systems with 900 MHz CPU/Memory Boards.

Note – After installing a CPU/Memory board, you must perform a reconfiguration boot in order for the operating system to recognize the new device. See “How to Initiate a Reconfiguration Boot” on page 11.

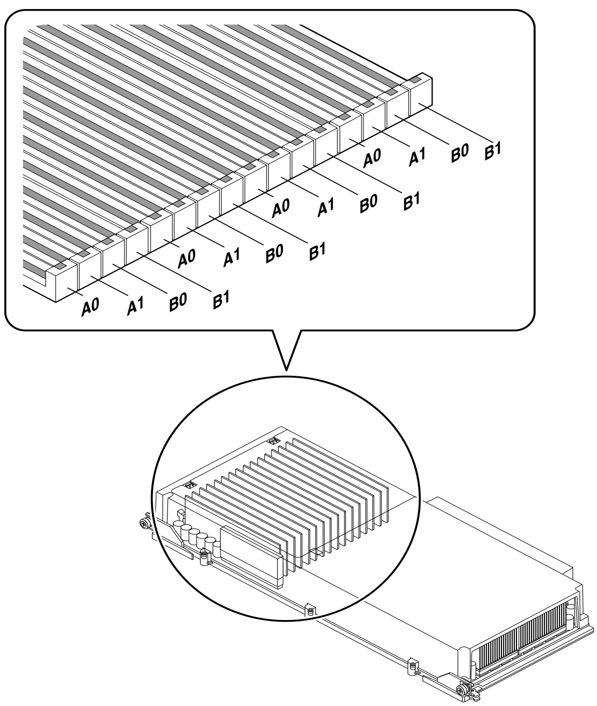
Caution – Either a CPU/Memory board or an air baffle must be installed in each CPU/Memory slot at all times. After removing a CPU/Memory board, you must install a replacement board or an air baffle immediately to avoid an automatic thermal shutdown. For more information, see the *Sun Fire 880 Server Owner’s Guide*.

About Memory Modules

The Sun Fire 880 server uses 3.3-volt, high-capacity next generation dual inline memory modules (DIMMs). The DIMMs are built with synchronous dynamic random access memory (SDRAM) chips that operate at a 75-MHz clock frequency. The system supports DIMMs with 128-, 256-, and 512-Mbyte capacities, with future support for higher capacities as they become available.

Each CPU/Memory board contains slots for 16 DIMMs. Total system memory ranges from a minimum of 1 Gbyte (one CPU/Memory board with eight 128-Mbyte DIMMs) to a maximum of 32 Gbytes (four boards fully populated with 512-Mbyte DIMMs).

Within each CPU/Memory board, the 16 DIMM slots are organized into groups of four. The system reads from, or writes to, all four DIMMs in a group simultaneously. DIMMs, therefore, must be added in sets of four. The figure below shows the DIMM slots and DIMM groups on a Sun Fire 880 CPU/Memory board. Every fourth slot belongs to the same DIMM group. The four groups are designated A0, A1, B0, and B1.



You must physically remove a CPU/Memory board from the system before you can install or remove DIMMs. The DIMMs must be added four-at-a-time within the same DIMM group, and each group used must have four identical DIMMs installed—that is, all four DIMMs in the group must be from the same manufacturing vendor and must have the same capacity (for example, four 128-Mbyte DIMMs, four 256-Mbyte DIMMs, or four 512-Mbyte DIMMs).

Note – Each CPU/Memory board must be populated with a minimum of eight DIMMs, installed in groups A0 and B0.

Memory Interleaving

You can maximize the system's memory bandwidth by taking advantage of its memory interleaving capabilities. Sun Fire 880 systems support two-way, four-way, and eight-way memory interleaving. In most cases, higher interleaving factors result in greater system performance. However, actual performance results may vary depending on the system application.

The system's interleaving capabilities are summarized as follows:

- Memory interleaving is limited to memory within the same CPU/Memory board. Memory interleaving between CPU/Memory boards is not supported.
- Eight-way interleaving occurs automatically when all 16 DIMM slots in a CPU/Memory board are filled with identical capacity DIMMs (16 identical DIMMs).
- Four-way interleaving occurs automatically between any two DIMM groups that are configured identically (eight identical capacity DIMMs).
- Two-way interleaving occurs automatically in any DIMM group where the DIMM capacities do not match the capacities used in any other group.

Independent Memory Subsystems

Each Sun Fire 880 CPU/Memory board contains two independent memory subsystems (one per UltraSPARC III CPU). Memory controller logic incorporated into the UltraSPARC III CPU allows each CPU to control its own memory subsystem. One CPU controls DIMM groups A0 and A1, while the other CPU controls DIMM groups B0 and B1.

The Sun Fire 880 system uses a shared memory architecture. During normal system operations, the total system memory is shared by all CPUs in the system. However, in the event of a CPU failure, the two DIMM groups associated with the failed CPU become unavailable to all other CPUs in the system.

The following table shows the association between the CPUs and their corresponding DIMM groups.

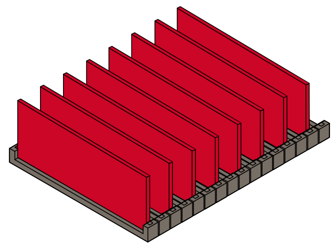
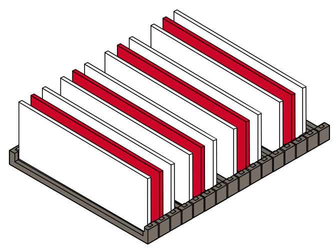
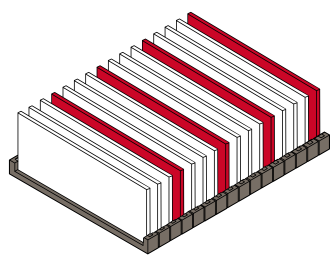
CPU Number	CPU/Memory Slot	Associated DIMM Groups
CPU 0	Slot A	A0, A1
CPU 2	Slot A	B0, B1
CPU 1	Slot B	A0, A1
CPU 3	Slot B	B0, B1
CPU 4	Slot C	A0, A1
CPU 6	Slot C	B0, B1
CPU 5	Slot D	A0, A1
CPU 7	Slot D	B0, B1

Configuration Rules

- DIMMs must be added four-at-a-time within the same group of DIMM slots; every fourth slot belongs to the same DIMM group.
- Each group used must have four identical DIMMs installed—that is, all four DIMMs must be from the same manufacturing vendor and must have the same capacity (for example, four 128-Mbyte DIMMs, four 256-Mbyte DIMMs, or four 512-Mbyte DIMMs).
- Each CPU/Memory board must be populated with a minimum of eight DIMMs, installed in groups A0 and B0.

Caution – DIMMs are made of electronic components that are extremely sensitive to static electricity. Static from your clothes or work environment can destroy the modules. Do not remove a DIMM from its antistatic packaging until you are ready to install it on the system board. Handle the modules only by their edges. Do not touch the components or any metal parts. Always wear an antistatic grounding strap when you handle the modules. For more information, see "How to Avoid Electrostatic Discharge" on page 27.

The following table summarizes the guidelines for installing DIMMs in a CPU/ Memory board.

Population Sequence		Memory Interleaving Factor
Install first eight DIMMs into groups A0 and B0 (so that every other slot is occupied).		Four-way interleaving if all eight DIMMs are identical; two-way interleaving otherwise
Install next four DIMMs into group A1.		Four-way interleaving between any two groups configured identically; two-way interleaving in any group that does not match the capacities used in any other group
Fill last four available slots (group B1).		Eight-way interleaving if all 16 DIMMs are identical; four-way interleaving between any two groups configured identically; two-way interleaving in any group that does not match the capacities used in any other group

About PCI Cards and Buses

All system communication with storage peripherals and network interface devices is mediated by two Peripheral Component Interconnect (PCI) bridge chips, located on the system's motherboard. Each bridge chip manages communication between the system's main interconnect bus and two PCI buses, giving the system a total of four separate PCI buses. The four PCI buses support up to nine PCI interface cards and four motherboard devices.

The following table describes the PCI bus characteristics and maps each bus to its associated bridge chip, motherboard devices, and PCI slots. All slots comply with PCI Local Bus Specification Revision 2.1.

PCI Bridge	PCI Bus	Clock Rate (MHz)/ Bandwidth (bits)/ Voltage (V)	Motherboard Devices	PCI Slots
0	PCI A	66 MHz/ 64 bits/ 3.3V	Gigabit Ethernet controller FC-AL controller	None
0	PCI B	33 MHz/ 64 bits/ 5V	SCSI controller (interface to the internal DVD drive and optional tape drive)	Slots 0, 1, 2, 3
1	PCI C	33 or 66 MHz/ 64 bits/ 3.3V	None	Slots 7 and 8
1	PCI D	33 MHz/ 64 bits/ 5V	RIO ASIC (Ethernet, USB, and EBus interfaces)	Slots 4, 5, 6

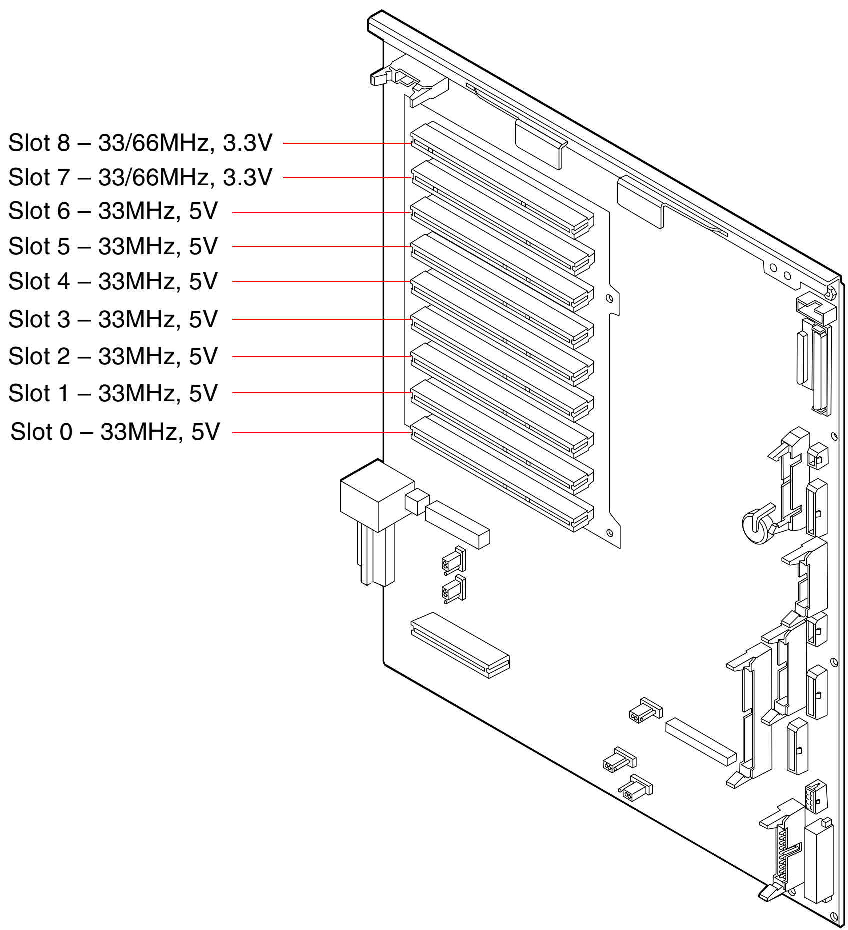
The system's PCI hot-plug feature lets you remove and install PCI cards while the system is running. You can hot-plug any standard PCI card, provided that its Solaris device drivers support PCI hot-plug operations, and the system is running the Solaris 8 7/01 operating environment or a subsequent release that supports this feature. In addition, the PCI card must comply with the PCI Hot-Plug Specification Revision 1.1.

PCI hot-plug procedures may involve software commands for preparing the system prior to removing a card and for reconfiguring the operating environment after installing a PCI card. For more information about PCI hot-plug procedures, see "About Hot-Pluggable and Hot-Swappable Components" on page 7.

Note – Do not attempt to hot-plug a PCI card until you are certain that its device drivers support PCI hot-plug operations; otherwise, you may cause a system panic. For a list of Sun PCI cards and device drivers that support PCI hot-plug operations, see the *Sun Fire 880 Server Product Notes*.

Status LEDs provide power, fault, and hot-plug status indications for each PCI slot. A contact push button is also provided for each slot, which allows you to initiate the hot-plug procedure at the server. For information about the status indicator LEDs, see “About PCI Slot LEDs” on page 346.

The following figure shows the PCI slots on the I/O board.

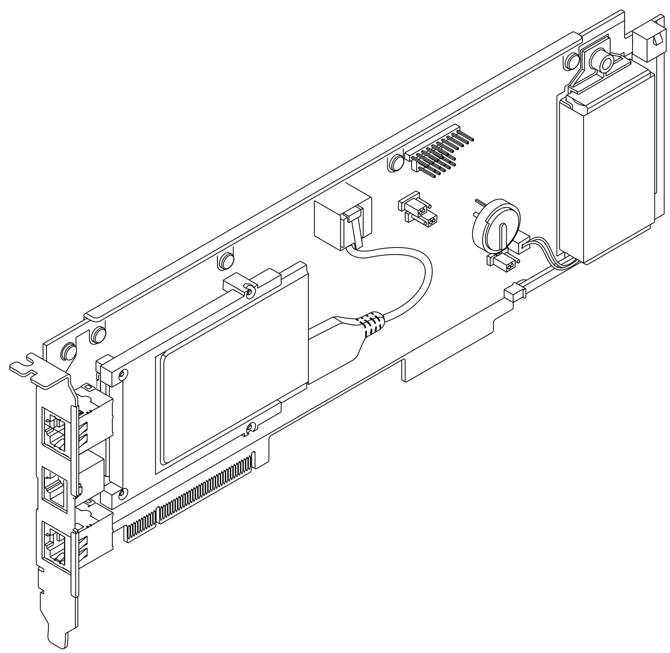


Configuration Rules

- All slots accept short or long PCI cards.
- 5V PCI cards must be installed into 5V slots. 3.3V PCI cards must be installed into 3.3V slots. All slots accept universal (3.3V/5V) PCI cards.
- All slots accept either 32- or 64-bit PCI cards.
- All slots comply with PCI Local Bus Specification Revision 2.1.
- Each slot can supply up to 25 watts of power. The total power used for all nine slots must not exceed 135 watts.
- Compact PCI (cPCI) cards and SBus cards are not supported.
- Slots 7 and 8 can operate at either 33 or 66 MHz; however, both slots always operate at the same speed. When the system is booted, if neither slot contains a 33-MHz PCI card, both slots operate at 66 MHz. If you then add a PCI card to either slot via a hot-plug operation, the card must be a 66-MHz card; a 33-MHz card will fail to operate under these conditions.
- If either slot 7 or 8 contains a 33-MHz PCI card when the system is booted, both slots operate at 33 MHz. In this case, either slot can accept a 33-MHz or 66-MHz card via a hot-plug operation; however, 66-MHz cards will operate at 33 MHz.
- For best performance, install high-throughput cards into slots 7 and 8.
- You can improve overall system availability by installing redundant network or storage interfaces on separate PCI buses and PCI bridges. For additional information, see the *Sun Fire 880 Server Owner's Guide*.

About the Remote System Control Card

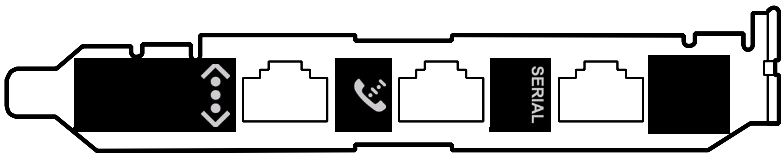
The Remote System Control (RSC) card enables access, monitoring, and control of the Sun Fire 880 server from a remote location. It is a fully independent processor card with its own resident firmware, power-on self-test (POST) diagnostics, and real-time operating system. The card features modem, serial, and Ethernet interfaces that provide simultaneous access to the Sun Fire 880 server for multiple RSC users. RSC users are provided secure access to the system's Solaris and OpenBoot console functions and have full control over power-on self-test (POST) and OpenBoot Diagnostics.



The RSC card runs independently of the host server, and operates off of 5-volt standby power from the system's power supplies. It also includes a battery that provides approximately 30 minutes of back-up power in the event of a power failure. The card features on-board devices that interface with the system's environmental monitoring subsystem and can automatically alert administrators to system problems. Together these features allow the RSC card and RSC software to serve as a "lights-out" management tool that continues to function even when the server operating system goes offline, the system is powered off, or a power outage occurs.

The RSC card plugs in to a dedicated slot on the system I/O board and provides the following ports through an opening in the system rear panel:

- 10-Mbps Ethernet port via an RJ-45 twisted-pair Ethernet (TPE) connector
- 56-Kbps modem port via an RJ-11 connector
- EIA-232D serial port via an RJ-45 connector



All three RSC connection ports can be used simultaneously. The modem supports regular asynchronous serial protocol, and can also support the Point-to-Point Protocol (PPP). When running PPP, a standard internet TCP/IP 10-Mbps protocol stack is available over the modem interface.

Note – You must install the Solaris operating environment and the Sun Remote System Control software prior to setting up an RSC console. For more information, see the *Sun Fire 880 Server Owner's Guide*.

Once you install the operating environment and the RSC software, you can then configure the system to use RSC as the system console. For detailed instructions, see the *Sun Fire 880 Server Owner's Guide*.

Configuration Rules

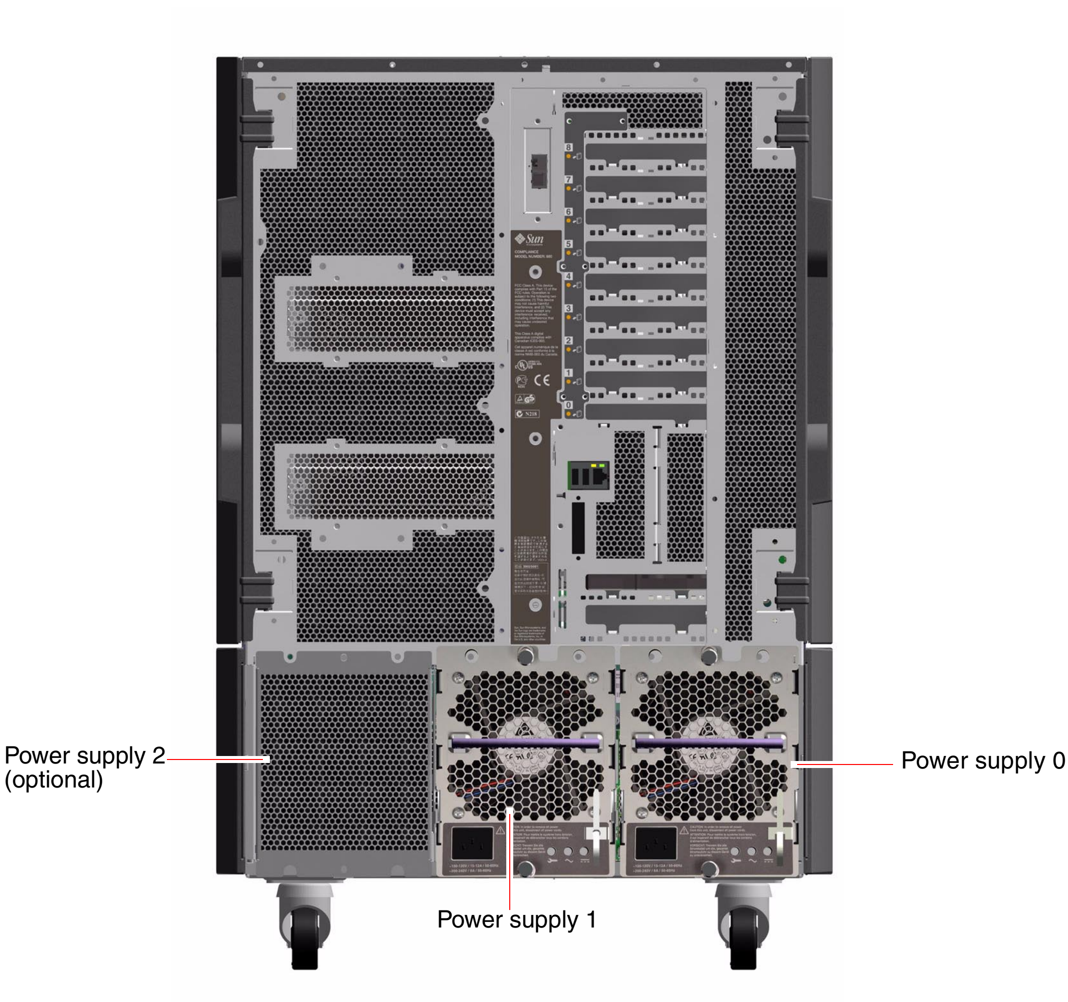
The RSC card is installed in a dedicated slot at the base of the system I/O board. Never move the RSC card to another system slot, as it is *not* a PCI-compatible card.

Note – The RSC card is *not* a hot-pluggable component. Before installing or removing an RSC card, you must power off the system and disconnect all system power cords.

About Power Supplies

A central power distribution board delivers DC power to all internal system components. The system's power supplies plug in to connectors on this board, and all of the supplies installed share equally in satisfying the power demands of the system.

Sun Fire 880 power supplies are modular units, designed for fast, easy installation or removal, even while the system is fully operational. Power supplies are installed in bays at the rear of the system, as shown in the following figure.



The system can accommodate a maximum of three power supplies, each with its own 20-amp AC power cord. Each power supply is auto-ranging, providing up to 1120 watts of DC power at 120/240 VAC line input. The basic system configuration comes with two power supplies installed, which together provide sufficient power for a maximally configured system. You can add an optional third power supply to provide N+1 power redundancy, allowing the system to continue operating should any one of the power supplies fail.

Each power supply provides a total of five DC output voltages (3.3V, 5.0V, 12V, 48V, and 5.0V standby). Output current is shared equally between each of the supplies via active current sharing circuitry.

Power supplies in a redundant configuration feature a hot-swap capability. You can remove and replace a faulty power supply without shutting down the operating system or turning off the system power. For additional details, see "About Hot-Pluggable and Hot-Swappable Components" on page 7.

Each power supply has three status LEDs to provide power and fault status information. For additional details, see "About Power Supply LEDs" on page 348.

Configuration Rules

- In order to gain more system power redundancy and reliablity, you should connect each power supply to a dedicated AC circuit. Consult your local electrical codes for any additional requirements.
- The minimum system configuration requires two power supplies. Systems configured with only one power supply are not supported.
- A system configured with two power supplies may shut down abruptly if either power supply fails. Installation of an optional third power supply enables the system to remain fully operational should any one of the power supplies fail.
- Power supply bays 0 and 1 must always contain power supplies. If a power supply in either bay fails and the system can continue to operate, you must leave the failed power supply in its bay until you are able to install a functioning replacement power supply. A failed power supply in bay 0 or 1 still acts as an air baffle, channeling airflow to cool the bottom row of disk drives in the disk cage. The failed power supply should be replaced as soon as possible to regain N+1 power redundancy.

Caution – If any power supply fails, leave the supply in its bay until you are ready to install a replacement.

For information about installing power supplies, see "How to Install a Power Supply" on page 155.

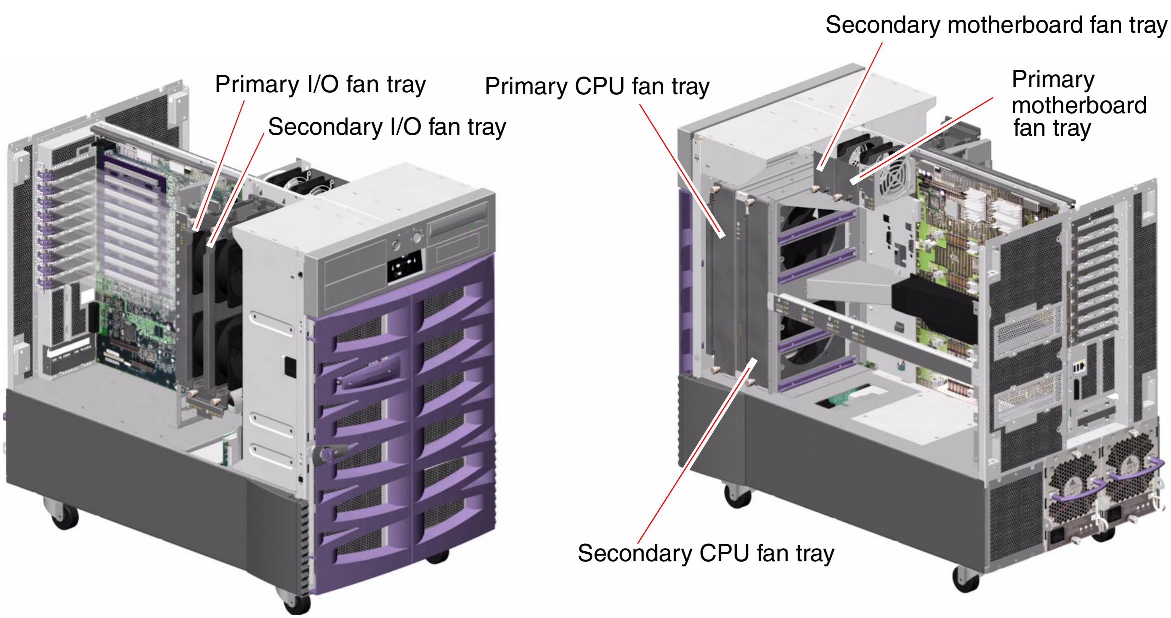
About Fan Trays

The basic system is equipped with three fan trays: a CPU fan tray, an I/O fan tray, and a motherboard fan tray. The CPU and I/O fan trays contain two fans apiece, while the motherboard fan tray contains a single fan. All systems are equipped with this primary set of fan trays. Systems configured with the redundant cooling option include a secondary set of the same fan trays.

Note – The motherboard fan tray is also known as the I/O bridge fan tray since its primary purpose is to cool the I/O bridge chips on the system motherboard.

The following table describes the system's fan trays.

Fan(s)	Bay Number.	Description
Primary CPU fan tray	1	One fan tray with two 6-inch fans
Secondary CPU fan tray	2	One fan tray with two 6-inch fans
Primary I/O fan tray	3	One fan tray with two 4-inch fans
Secondary I/O fan tray	4	One fan tray with two 4-inch fans
Primary motherboard fan tray	5	One 3-inch fan
Secondary motherboard fan tray	6	One 3-inch fan



In systems configured with the redundant cooling option, only the primary fan trays are running during normal system operation. If a primary fan tray fails, the environmental monitoring subsystem detects the failure and automatically activates the secondary fan tray.

All fan trays feature a hot-swap capability. You can remove and replace a faulty fan tray without shutting down the operating system or turning off the system power. For additional details, see "About Hot-Pluggable and Hot-Swappable Components" on page 7.

For each fan in the system, the environmental monitoring subsystem monitors or controls the following:

- Fan present (monitored)
- Fan speed in revolutions per minute (RPM) (monitored) – Used to detect early fan degradation
- Fan power input (controlled) – Used to increase or decrease the airflow and cooling capacity
- Fan fault LEDs (controlled)

Only the primary CPU fans have variable speed control. The secondary CPU fans, the primary and secondary motherboard fans, and the primary and secondary I/O fans can only be turned fully on or fully off. Fan speed is controlled by the environmental monitoring subsystem in response to temperature conditions inside the system. For additional details, see the *Sun Fire 880 Server Owner's Guide*.

Status indicator LEDs provide power, fault, and hot-plug indications for each fan tray. For information about the status indicator LEDs, see "About Fan Tray LEDs" on page 349.

Configuration Rules

- The minimum system configuration requires a complete set of three working fan trays — an I/O fan tray, a CPU fan tray, and a motherboard fan tray.
- If the system does not include a secondary CPU fan tray, a CPU fan tray filler panel must be installed in its place.

Caution – A complete set of three working fan trays must be present in the system at all times. After removing a fan tray, if the system is left with fewer than three working fan trays, you must install a replacement fan tray immediately to avoid an automatic thermal shutdown. For more information, see the *Sun Fire 880 Server Owner's Guide*.

About Removable Media Devices

The Sun Fire 880 system provides front-panel access to three mounting bays for 5.25-inch half-height (1.6-inch) SCSI devices. One of the bays houses a SCSI DVD-ROM drive, which comes standard in all system configurations. You can use the other two bays for wide (68-pin) or narrow (50-pin) SCSI tape drives, such as 8-mm tape, 4-mm DDS-2 or DDS-3 tape, or quarter-inch cassette tape drives. Narrow SCSI devices require a 68-pin to 50-pin SCSI adapter (Sun part number X913A) which must be ordered separately. You can easily convert these same two bays into a single full-height bay by removing a metal shelf divider.

The SCSI bus that supports the removable media devices is Fast/Wide-capable (20 Mbytes per second) and can support single-ended, wide or narrow SCSI devices.

Target addresses (also known as SCSI IDs) for the SCSI bus are available in the ranges of 0 through 5 and 8 through 15.

The following target addresses are reserved for internal devices.

Address	Device	Comment
5	Tape drive	If no tape drive is installed in the system, you can use this address for an external device. If you later install an internal tape drive, you must use 5 as its address and assign a different address to the external device.
6	DVD-ROM	This address is reserved exclusively for the DVD-ROM drive. It cannot be used for any other device.
7	SCSI host adapter	This address is reserved exclusively for the SCSI host adapter on the system's motherboard. It cannot be used for any other device.

Configuration Rules

You cannot assign target addresses 6 or 7 to any SCSI removable media device; they are reserved for the system's DVD-ROM drive and SCSI host adapter.

About Serial Ports

The system provides two serial communication ports through a single, shared DB-25 connector located on the rear panel. The primary port is capable of both synchronous and asynchronous communication, while the secondary port is asynchronous only. In synchronous mode, the primary port operates at any rate from 50 Kbaud to 256 Kbaud when the clock is generated internally. When the clock is generated from an external source, the synchronous port operates at rates up to 384 Kbaud. In asynchronous mode, either port supports baud rates of 50, 75, 110, 200, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 76800, 115200, 153600, 230400, 307200, and 460800.

The primary port is accessible by connecting a standard serial cable to the rear panel serial port connector. To access the secondary port, you must attach a serial port splitter cable (Sun part number X985A) to the rear panel serial port connector. The connector labeled "A" on the splitter cable provides the primary port; the connector labeled "B" provides the secondary port.

You can configure both serial ports to comply with the Electronics Industries Association EIA-423 or EIA-232D standards using jumpers located on the system's I/O board. The jumpers are factory-set for the EIA-423 standard, which is the default standard for North American users. Compliance with the EIA-232D standard is required for digital telecommunication in nations of the European Community. For more information about configuring the serial port jumpers, see "About Serial Port Jumpers" on page 243.

See "Reference for the Serial Port A and B Connectors" on page 356 for the connector diagram, rear panel icon, and pin assignments.

About USB Ports

The system's rear panel provides two Universal Serial Bus (USB) ports for connection to USB peripheral devices such as:

- Sun Type 6 USB keyboard
- Sun USB three-button mouse
- Modems
- Printers
- Scanners
- Digital cameras

For USB port locations, see "Locating Rear Panel Features" on page 26.

Note – For Sun Fire 880 servers, you must order the keyboard and mouse as options. If the version of your Sun Type 6 keyboard does not have an integrated USB hub, the keyboard and mouse will consume both USB ports on the system rear panel. If you need to connect additional USB devices, you must add a USB hub.

The USB ports are compliant with the Open Host Controller Interface (Open HCI) specification for USB Revision 1.0. Both ports support isochronous and asynchronous modes and enable data transmission at speeds of 1.5 Mbps and 12 Mbps. Note that the USB data transmission speed is significantly faster than that of the standard serial ports, which operate at a maximum rate of 460 Kbaud.

The USB ports are accessible by connecting a USB cable to either rear panel USB connector. The connectors at each end of a USB cable are different, so you cannot connect them incorrectly. One connector plugs in to the system or USB hub; the other plugs in to the peripheral device. Up to 126 USB devices can be connected to the bus simultaneously, through the use of USB hubs.

Note – The Universal Serial Bus provides power for smaller USB devices such as modems. Larger USB devices, such as scanners, require their own power source.

Both USB ports support hot-plugging. You can connect and disconnect the USB cable and peripheral devices while the system is running, without affecting system operations.

Note – You can only perform USB hot-plug operations while the operating system is running. USB hot-plug operations are not supported when the system `ok` prompt is displayed.

About Hardware Jumpers

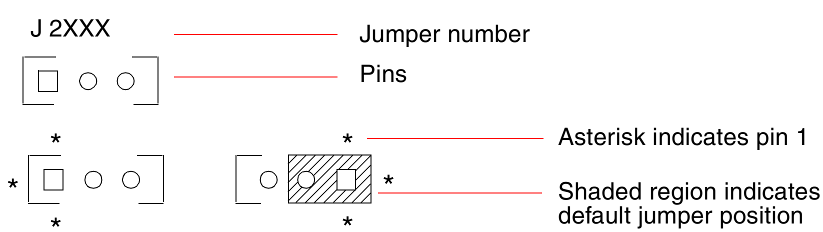
The hardware jumpers in the Sun Fire 880 server have the following functions:

- J2902 and J2903 on the system I/O board are used to configure the serial ports for either EIA-423 or EIA-232D operation. For information about the EIA-423 and EIA-232D jumper settings, see "About Serial Port Jumpers" on page 243.
- J3002, J3003, and J3004 are used to affect the operation of the OpenBoot flash PROM located on the system I/O board. See "About Flash PROM Jumpers" on page 244.
- J01701, J01003, and J0803 are used to affect the operation of the flash PROM located on the FC-AL disk backplane. See "About Flash PROM Jumpers" on page 244.
- J0403 is used to affect the operation of the FRU SEEPROM located on the RSC card. See "About Flash PROM Jumpers" on page 244.

Note – All internal jumper modifications must be performed only by qualified service personnel.

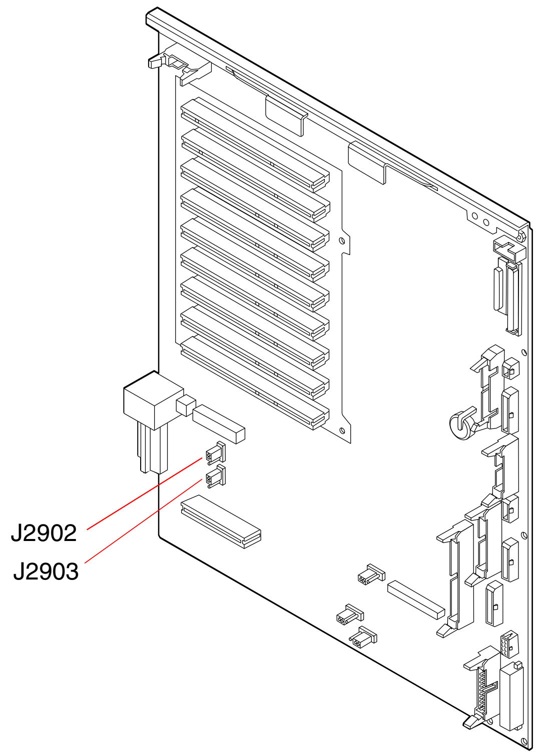
Note – Do not change the configuration of J0501 and J0502 on the RSC card from the default settings; otherwise, the RSC card will not boot.

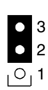
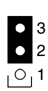
All jumpers are marked with identification numbers. For example, the serial port jumpers on the system I/O board are marked J2902 and J2903. Jumper pins are located immediately adjacent to the identification number. The default jumper positions are indicated with shaded regions. Pin 1 is marked with asterisks (*) in any of the positions shown below.



About Serial Port Jumpers

The serial port jumpers (J2902 and J2903) on the system I/O board configure the system's two serial ports for either EIA-423 or EIA-232D signal levels. EIA-423 levels are the default standard for North American users. EIA-232D levels are required for digital telecommunication in nations of the European Community.



Jumper		Shunt on Pins 1 + 2 Selects	Shunt on Pins 2 + 3 Selects	Default Setting
J2902		EIA-232D	EIA-423	2 + 3
J2903		EIA-232D	EIA-423	2 + 3

About Flash PROM Jumpers

The Sun Fire 880 system uses flash PROMs to enable the reprogramming of specific firmware code blocks held in nonvolatile system memory, and to enable remote reprogramming of that code by an authorized system administrator over a local area network. Firmware updates, when required, are available for download from the SunSolve[SM] Online web site at the following URL:

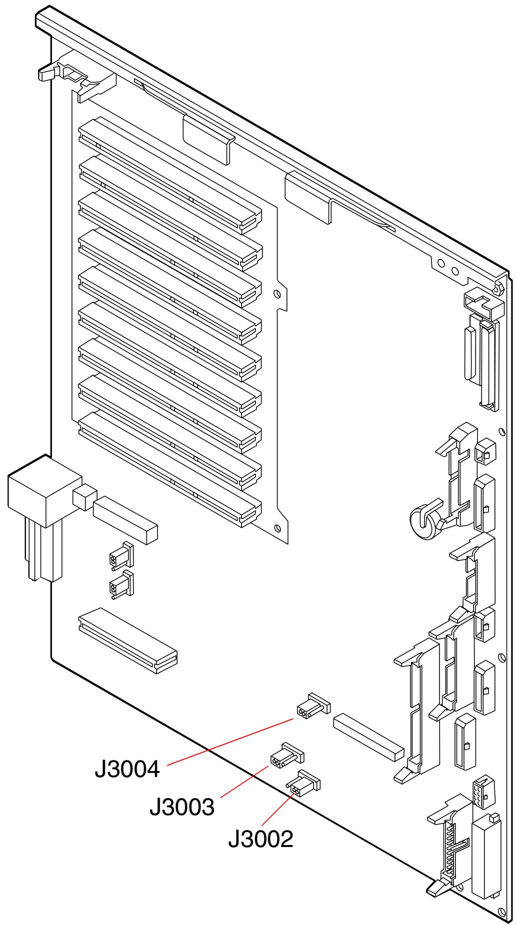
`http://sunsolve.sun.com`

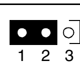
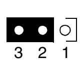
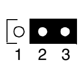
Instructions for performing a firmware update procedure are provided with the downloaded firmware image.

Several jumpers located on the system I/O board, FC-AL disk backplane, and RSC card affect flash PROM operation. The jumper locations and settings are provided in the sections that follow. For an explanation of how each jumper affects the flash PROM update procedure, see the instructions supplied with the firmware image.

System I/O Board

The locations and functions of the flash PROM jumpers on the system I/O board are shown below.

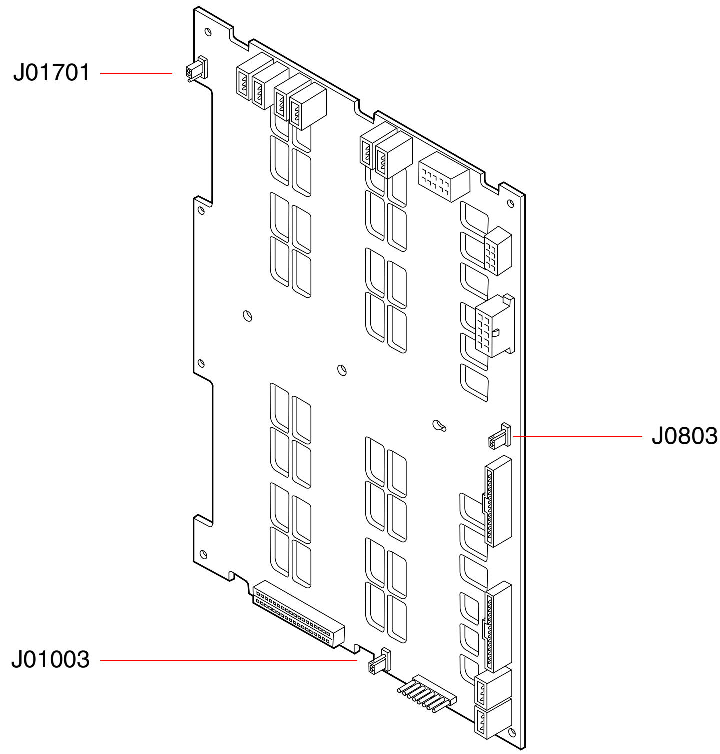


Jumper		Shunt on Pins 1 + 2 Selects	Shunt on Pins 2 + 3 Selects	Default Setting
J3004	 1 2 3	OpenBoot flash PROM	For factory use only	1 + 2
J3003	 3 2 1	Write-protect	Write-enable	2 + 3
J3002	 1 2 3	High half booting	Normal booting	2 + 3

Note – Jumper J3003 is factory-set so that the flash PROM is write-enabled. You use the keyswitch located on the front panel to write-protect the flash PROM. When the switch is set to the Locked position, the flash PROM is write-protected. When the switch is set to the Normal position or to the Diagnostics position, the flash PROM is write-enabled.

FC-AL Disk Backplane

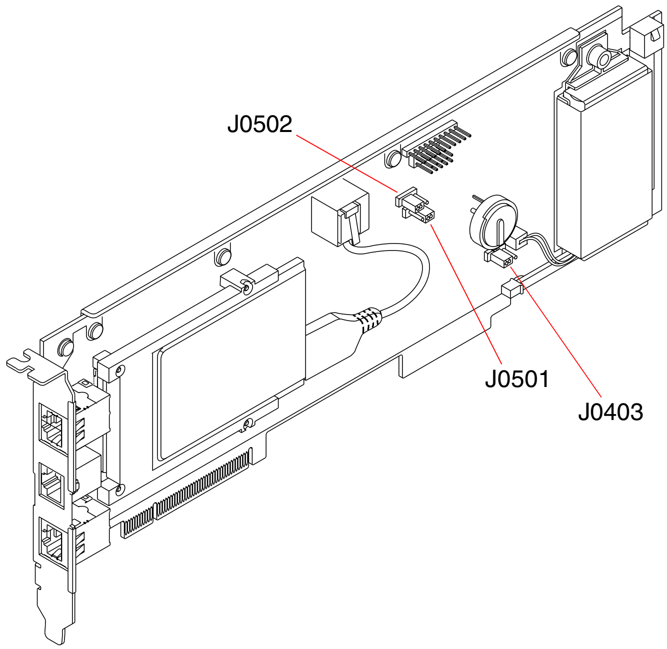
The locations and functions of the flash PROM jumpers on the Fibre Channel-Arbitrated Loop (FC-AL) disk backplane are shown below.



Jumper	Shunt on Pins 1 + 2 Selects	Shunt on Pins 2 + 3 Selects	Default Setting
J01701	High half booting, Loop B	Normal booting, Loop B	2 + 3
J0803	High half booting, Loop A	Normal booting, Loop A	2 + 3
J01003	Flash PROM	For factory use only	1 + 2

RSC Card

The locations and functions of the flash PROM jumpers on the Remote System Control (RSC) card are shown below.



Jumper	Shunt on Pins 1 + 2 Selects	Shunt on Pins 2 + 3 Selects	Default Setting
J0502 3 2 1	Not used	Disable mirror	2 + 3
J0501 3 2 1	Normal booting	Not used	1 + 2
J0403 1 2 3	FRU PROM write-enable	FRU PROM write-protect	1 + 2

Note – Do not change the configuration of J0501 and J0502 from the default settings; otherwise, the RSC card will not boot.

CHAPTER **8**

Diagnostics and Troubleshooting

This chapter covers the diagnostic tools that are available for the system and provides instructions on how to use these tools. It also provides information about error indications and software commands to help you determine which component you need to replace.

The following tasks are covered in this chapter:

- "How to Use POST Diagnostics" on page 256
- "How to Use OpenBoot Diagnostics" on page 276
- "How to Check Whether SunVTS Software Is Installed" on page 283
- "How to Use SunVTS Software" on page 284

The following information is also included:

- "About Diagnostic Tools" on page 250
- "About POST Diagnostics" on page 252
- "About OpenBoot Diagnostics" on page 264
- "About SunVTS Software" on page 282
- "About Sun Management Center Software" on page 287
- "About Sun Remote System Control" on page 288
- "About Troubleshooting Your System" on page 290
- "About Diagnosing Specific Problems" on page 311

Note – The procedures in this chapter assume that you are familiar with the OpenBoot firmware and that you know how to enter the OpenBoot environment. For more information about the OpenBoot firmware, see the *OpenBoot 4.x Command Reference Manual*. An online version of the manual is included with the *OpenBoot Collection AnswerBook* that ships with Solaris software.

About Diagnostic Tools

The system provides both firmware-based and software-based diagnostic tools to help you identify and isolate hardware problems. These tools include:

- Power-on self-test (POST) diagnostics
- OpenBoot Diagnostics
- Sun Validation Test Suite (SunVTS™) software
- Sun Management Center software
- Remote System Control (RSC) software

POST diagnostics verify the core functionality of the system, including the motherboard, CPU/Memory board, DIMMs, and PCI slots. You can run POST even if the system is unable to boot. For more information about POST, see "About POST Diagnostics" on page 252 and "How to Use POST Diagnostics" on page 256.

OpenBoot Diagnostics tests focus on system I/O and peripheral devices. Like POST, you can run OpenBoot Diagnostics even if the system is unable to boot. For more information about OpenBoot Diagnostics, see "About OpenBoot Diagnostics" on page 264 and "How to Use OpenBoot Diagnostics" on page 276.

SunVTS system exerciser is a graphics-oriented UNIX application that handles the continuous exercising of system resources and internal and external peripheral equipment. For more information about SunVTS, see "About SunVTS Software" on page 282.

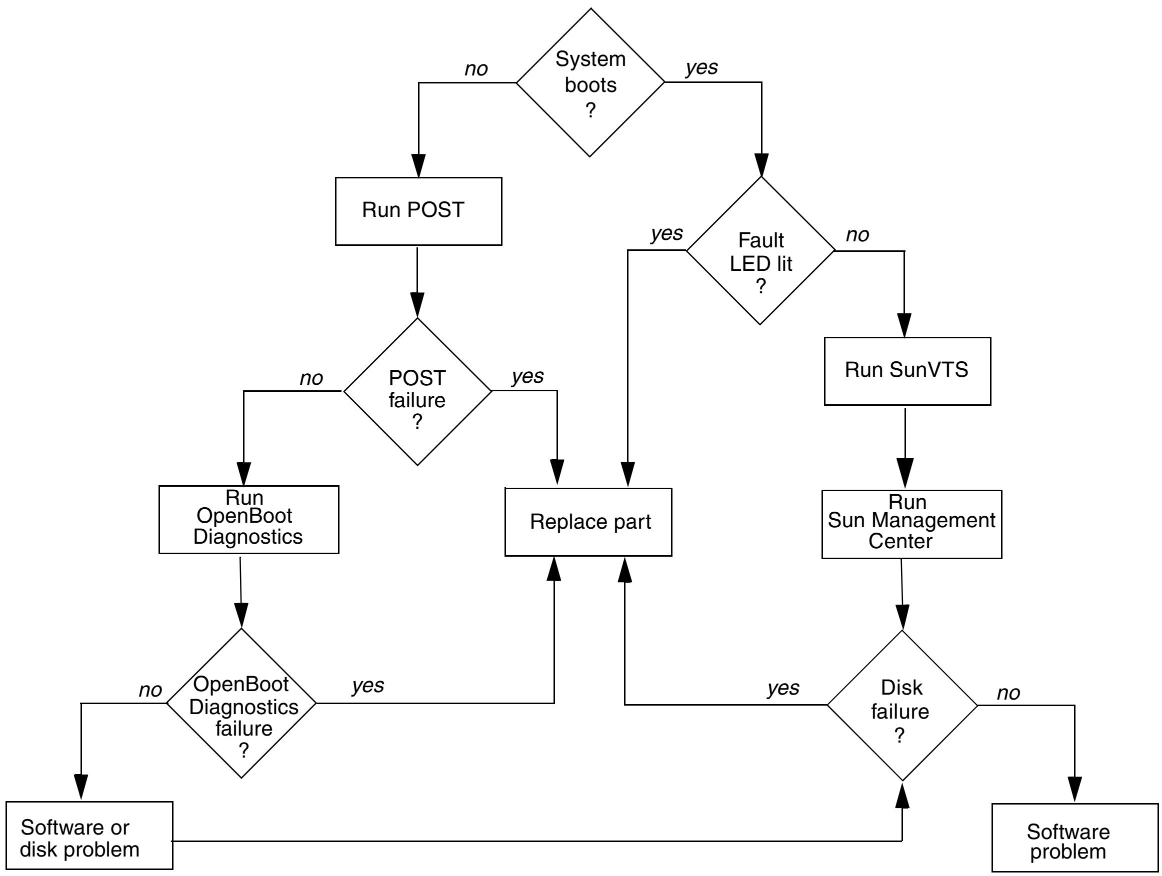
Sun Management Center (formerly Sun Enterprise SyMON) software enables you to monitor the system hardware status and operating system performance of your server. For more information about Sun Management Center software, see "About Sun Management Center Software" on page 287.

Remote System Control (RSC) software is a server management tool that provides remote system administration for geographically distributed or physically inaccessible systems. For more information about RSC, see "About Sun Remote System Control" on page 288.

Which method or tool you use to diagnose system problems depends on the nature of those problems:

- If your system is not able to boot its operating system software, you need to run POST and OpenBoot Diagnostics tests.
- If your system is "healthy" enough to start up and load its operating system software, you can use Sun Management Center software and SunVTS software to diagnose system problems.
- If your system is at a remote location, use RSC to diagnose problems remotely.

The following chart shows which tools you can use to diagnose hardware and software problems.



About POST Diagnostics

The POST diagnostic code resides in the OpenBoot PROM on the system I/O board. When you power on the system, POST runs automatically under certain conditions. For information about running POST, see “How to Use POST Diagnostics” on page 256.

POST tests the following system components:

- CPU/Memory board
- PCI slots (POST tests for shorts only)
- DIMMs
- Motherboard

OpenBoot diagnostic configuration variables, stored in the system non-volatile random access memory (NVRAM), enable you to control certain aspects of POST testing. For information about the configuration variables, see “OpenBoot Configuration Variables for POST” on page 253.

POST reports its test results through detailed diagnostic and error messages. See “Viewing POST Error Messages” on page 261 for information about diagnostic and error messages.

By default, POST displays diagnostic and error messages through a `tip` connection or a local ASCII terminal attached to the system’s serial port A (`ttya`). You can also redirect POST output to display remotely on a Remote System Control (RSC) console. If you redirect POST output to an RSC console, POST results will not display locally. See “Observing POST in Progress” on page 258 for information about redirecting POST output to an RSC console.

The RSC card runs its own POST diagnostics separately from the main POST diagnostics. RSC POST tests the basic functions of the RSC card. To view detailed diagnostic and error messages from RSC POST, you must attach an ASCII terminal directly to the RSC serial port before running RSC POST. For more information about RSC POST, see the *Sun Remote System Control (RSC) User’s Guide*.

OpenBoot Configuration Variables for POST

The following table lists and describes the OpenBoot configuration variables that enable you to control the operation of POST.

Note – Both POST and OpenBoot Diagnostics use the settings of the configuration variables `diag-level`, `diag-switch?`, and `diag-trigger`. Changing the values of these variables will affect both POST and OpenBoot Diagnostics operation. See "OpenBoot Configuration Variables for OpenBoot Diagnostics" on page 265 for a complete listing and description of the configuration variables that control OpenBoot Diagnostics testing.

Variable	Setting	Description	Default
`diag-level`		Determines the level of testing executed.	`min`
	`off`	May perform initialization, but no testing.	
	`min`	Performs limited testing.	
	`max`	Runs extensive tests.	
	`menus`	Forces POST to enter interactive mode, providing access to advanced debugging features (for manufacturing use only).	
`diag-switch?`		Toggles the system between diagnostic mode and nondiagnostic mode.	`false`
	`true`	Sets the system in diagnostic mode.	
	`false`	Sets the system in nondiagnostic mode.	
`diag-trigger`		Specifies the type of reset events that will cause POST tests to run.	`power-reset`
	`power-reset`	Runs POST tests only on power-on resets, including RSC-initiated power-on resets.	
	`error-reset`	Runs POST tests only on power-on resets and resets triggered by hardware errors, including operating system panics, and watchdog reset events.	
	`soft-reset`	Runs POST tests on all reset events.	
	`none`	POST is not run.	

To display the current and default values of all OpenBoot configuration variables, use the `printenv` command without specifying a variable. The following is sample output from the `printenv` command.

```
ok printenv
Variable Name          Value                            Default Value

test-args              null
diag-passes            1                                1
pci8a-probe-list       1,2                              1,2
pci8b-probe-list       1,2,3,4,5                        1,2,3,4,5
pci9a-probe-list       1,2                              1,2
pci9b-probe-list       1,2,3,4                          1,2,3,4
local-mac-address?     false                            false
fcode-debug?           false                            false
silent-mode?           false                            false
scsi-initiator-id      7                                7
oem-logo                                                No default
oem-logo?              false                            false
oem-banner                                              No default
oem-banner?            false                            false
ansi-terminal?         true                             true
screen-#columns        80                               80
screen-#rows           34                               34
ttyb-rts-dtr-off       false                            false
ttyb-ignore-cd         true                             true
ttya-rts-dtr-off       false                            false
ttya-ignore-cd         true                             true
ttyb-mode              9600,8,n,1,-                     9600,8,n,1,-
ttya-mode              9600,8,n,1,-                     9600,8,n,1,-
output-device          screen                           screen
input-device           keyboard                         keyboard
auto-boot-on-error?    false                            false
load-base              16384                            16384
auto-boot?             false                            true
boot-command           boot                             boot
diag-file
diag-device            net                              net
boot-file
boot-device            /pci@8,600000/SUNW,qlc@2 ...     disk net
use-nvramrc?           false                            false
nvramrc
security-mode          none                             No default
security-password                                       No default
security-#badlogins    0                                No default
diag-out-console       false                            false
diag-trigger           power-reset                      power-reset
diag-script            normal                           normal
diag-level             min                              min
diag-switch?           true                             false
ok
```

To display the current and default values of a specific OpenBoot configuration variable, specify the `printenv` command and the variable name at the `ok` prompt.

```
ok printenv diag-switch?
diag-switch? =        true
ok
```

To set or change the value of an OpenBoot configuration variable, use the `setenv` command.

```
ok setenv diag-level max
diag-level =          max
```

How to Use POST Diagnostics

When you power on the system, POST runs automatically under either of the following conditions:

- The front panel keyswitch is set to the Diagnostics position and the OpenBoot configuration variable `diag-level` is set to its default value (or to any valid setting other than `none`).
- The OpenBoot configuration variable `diag-switch?` is set to `true` and both `diag-level` and `diag-trigger` are set to their default values (or to any valid setting other than `none`).

Note – The default value for `diag-switch?` is `false`. Therefore, if all OpenBoot configuration variables are set to their default values, POST does not run unless the keyswitch is set to the Diagnostics position. For maximum test coverage, set `diag-level` variable to `max` prior to starting POST diagnostics.

You can also configure POST to run automatically after specific types of reset events by setting the values of the OpenBoot configuration variables `diag-switch?` and `diag-trigger`, as shown in the following table. Note that `diag-level` must be set to any valid value other than none. For more information, see "OpenBoot Configuration Variables for POST" on page 253.

Reset Event	POST Runs Automatically If...

Any power-on reset, including RSC-initiated power-on resets	The front panel keyswitch is set to the Diagnostics position
	`OR`
	`diag-switch?` is set to `true` and `diag-trigger` is set to any setting other than `none`

Any automatic reset triggered by a hardware error, including all operating system panics, and watchdog reset events	`diag-switch?` is set to `true` and `diag-trigger` is set to `error-reset` or `soft-reset`
Any user-initiated reset event	`diag-switch?` is set to `true` and `diag-trigger` is set to `soft-reset`

Before You Begin

You can view POST status and error messages on a local ASCII terminal or through a `tip` connection. You can also view messages remotely on an RSC console. To view POST diagnostic messages remotely on an RSC console, you need to configure the RSC software before starting POST. For information about using the RSC software, see the *Sun Remote System Control (RSC) User's Guide*. For information about setting up an alphanumeric terminal or establishing a `tip` connection, see "About Setting Up a Console" on page 16.

Note – By default, POST diagnostics output displays locally on an attached terminal or through a `tip` connection. However, if diagnostics output is redirected to an RSC console, the output will not display locally until it is directed back to the local terminal or `tip` connection. For information about directing POST output to an RSC console or to a local terminal or `tip` connection, see the *Sun Remote System Control (RSC) User's Guide* and "Observing POST in Progress" on page 258.

What to Do

1. **Turn the keyswitch to the Diagnostics position.**

   For information about the keyswitch position, see "About Power Button and Keyswitch Settings" on page 14.

2. **Press the Power button.**

   The system runs the POST diagnostics.

   POST displays status and error messages locally on an attached terminal, through a `tip` connection, or on an RSC console (if POST output has been redirected to the RSC console). For more information, see "Observing POST in Progress" on page 258.

   Upon completion of POST, the system will run OpenBoot Diagnostics. For more information about OpenBoot Diagnostics, see "About OpenBoot Diagnostics" on page 264.

Observing POST in Progress

As POST runs, it displays diagnostic status messages locally on an attached terminal, through a `tip` connection, or on an RSC console (if POST output has been redirected to the RSC console). By default, POST output displays locally on an attached terminal or through a `tip` connection. To redirect output to an RSC console:

1. **Type the following commands at the `ok` prompt:**

```
ok diag-console rsc
ok setenv input-device rsc-console
ok setenv output-device rsc-console
```

2. **To cause the changes to take effect, power cycle the system, or type:**

```
ok reset-all
```

If you redirect POST output to an RSC console, the POST results will not display locally on an attached terminal or through a `tip` connection. To redirect POST output to the terminal or `tip` connection, issue the `diag-console` command as shown in the following example:

```
ok> diag-console ttya
ok> reset-all
```

See the *Sun Remote System Control (RSC) User's Guide* for more information.

When POST starts, it selects a master CPU to control test execution and error handling. If the master CPU fails, the CPU takes itself offline, and POST selects a new master if another CPU exists in the system.

The level of POST testing depends on the setting of the variable `diag-level`. See "OpenBoot Configuration Variables for POST" on page 253 for more information.

The following is partial sample output of POST testing for four online CPUs – CPU1, CPU3, CPU5, and CPU7. The CPUs CPU0, CPU2, CPU4, and CPU6 are offline. In the sample output, CPU1 is the master CPU, and the OpenBoot Diagnostics configuration variable `diag-level` is set to `max`. The CPU being tested is indicated by `1>`, `3>`, `5>`, or `7>` at the beginning of each status line.

```
@(#)OBP 4.0.45 2001/02/08 14:32 Sun Fire 880
Online: CPU0 CPU1 CPU2 CPU3 CPU4 CPU5 CPU6 CPU7*
Executing Power On SelfTest w/%o0 = 0000.0000.0003.1001

Calling POST w/%o0 0000.0000.0003.1001
1>@(#) Sun Fire 880 POST 1.2.45 2001/02/21 01:10
1>
1>Jump from OBP->POST.
1>System frequency is 150 MHz, CPU frequency 750
1>
1>Start selftest...
1>Offline CPU 0.
1>Offline CPU 2.
1>Reset Module with CPUs 2 0, both have been offlined.
1>Offline CPU 4.
1>Offline CPU 6.
1>Reset Module with CPUs 6 4, both have been offlined.
1>Init CPU
1>Scrub and Setup Ecache
1>  Size = 00000000.00800000...
1>Setup and Enable DMMU
1>Init Scan and I2C Devices
1>Creating Scan Database
1>INFO: Initializing MDR Chips...
1>INFO: Initializing DAR DTL bits ...
1>INFO: Initializing DCS DTL bits ...
1>INFO: Initializing All I2C Controllers and seg5_hp_en
1>Running scan ring integrity test
1>INFO: Ring 3 on BBC# 0 NOT Present or Shut OFF
1>INFO: Ring 5 on BBC# 0 NOT Present or Shut OFF
1>INFO: Ring 3 on BBC# 1 NOT Present or Shut OFF
1>INFO: Ring 5 on BBC# 1 NOT Present or Shut OFF
1>INFO: Disabling DAR-Err Circuitry ...
1>INFO: Setting Trip Temp of CPU 1 and 3 to 110C
1>INFO: Setting Trip Temp of CPU 5 and 7 to 110C
1>WED FEB  21 6:14:00 GMT 1
1>INFO: Disabling Cheetah-Err Circuitry ...
1>Setup DMMU Miss Handler
1>Probe and Setup Memory
1>INFO: 256MB Bank 0
1>INFO:No memory detected in Bank 1
1>INFO:No memory detected in Bank 2
1>INFO:No memory detected in Bank 3
```

```
1>Data Bitwalk on Master
1>  Test Bank 0.
1>Address Bitwalk on Master
1>INFO: Addr walk mem test on CPU 1 Bank 0: 00000010.00000000 to
00000010.10000000.
1>Set Mailbox
1>Move Memory Stack
1>  New memory location 00000010.00110000.
1>Post Data Region Scrub
1>Setup Final DMMU Entries
1>Post Image Region Scrub
1>Copy POST to Memory
1>Verifying checksum on copied image.
1>The Memory's CHECKSUM value is e92b.
1>The Memory's Content Size value is a91a0.
1>Success...  Checksum on Memory Validated.
3>Init CPU
5>Init CPU
7>Init CPU
3>Scrub and Setup Ecache
3>  Size = 00000000.00800000...
5>Scrub and Setup Ecache
5>  Size = 00000000.00800000...
7>Scrub and Setup Ecache
7>  Size = 00000000.00800000...
3>Setup and Enable DMMU
7>Setup and Enable DMMU
5>Setup and Enable DMMU
3>Setup DMMU Miss Handler
3>Probe and Setup Memory
3>WARNING:DIMM Failure detected in Bank 2
3>  DIMM 0 J7900 side 2 =   0MB.
3>  DIMM 1 J7901 side 2 =   0MB.
3>  DIMM 2 J8001 side 2 =   0MB.
3>  DIMM 3 J8000 side 2 =  64MB.
3>INFO: 256MB Bank 0
3>INFO:No memory detected in Bank 1
3>INFO:No memory detected in Bank 3
```

The remaining POST output would show the results of CPU and memory testing of CPU3, CPU5, and CPU7.

Viewing POST Error Messages

If POST detects an error, it displays an error message indicating the failing part. If POST detects an error that prevents the system from booting, POST halts execution and returns control to OpenBoot. The last message displayed by POST prior to the `ok` prompt indicates the part you need to replace.

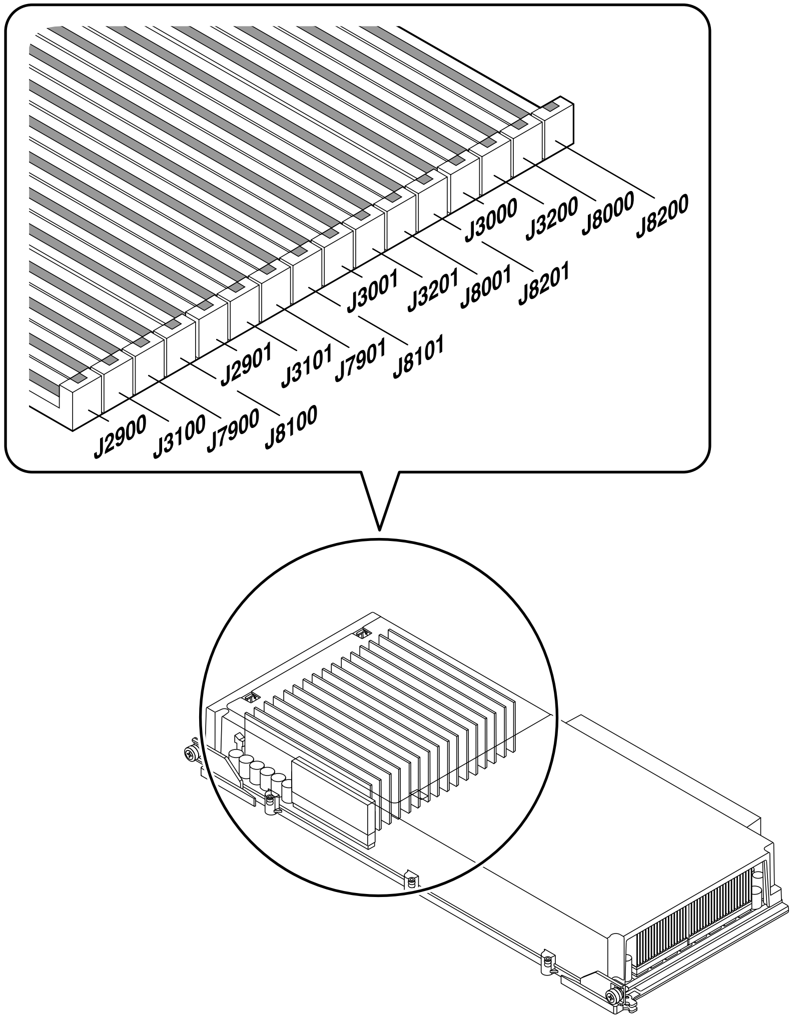
The following is a sample error message for a failed test at DIMM J7900.

```
1>Data Bitwalk on Slave 3
1>                 Test Bank 0.
3>Bank 0 DIMM 0
3>ERROR: TEST = Bank 0 DIMM 0
3>H/W under test = CPU3 Bank 0 Dimm 0, J7900 side 1
3>MSG =
       *** Test Failed!! ***

3>END_ERROR
1>ERROR: TEST = Data Bitwalk on Slave 3
1>H/W under test = CPU3 Memory
1>MSG = ERROR:     miscompare on mem test!
                    Address: 00000030.001b0038
                    Expected: 00000000.00100000
                    Observed: 00000000.00000000
1>END_ERROR

1>ERROR: TEST = Data Bitwalk on Slave 3
1>H/W under test = CPU3 Memory
1>MSG =
       *** Test Failed!! ***
1>END_ERROR
```

As shown in the preceding error message, POST reports memory errors by indicating the location (“J” number) of the failing DIMM. Use the following diagram to identify the location of a failing DIMM according to J number.


J3000
J3200
J8000
J8200
J3001
J3201
J8001
J8201
J2901
J3101
J7901
J8101
J2900
J3100
J7900
J8100

Displaying a Summary of POST Results

POST results are saved across power cycles. To display the results of POST testing, type `.show-post-results` at the `ok` prompt. The following is a sample of `.show-post-results` output.

```
{2} ok .show-post-results
CPU0/Memory:   OK
CPU1/Memory:   OK
CPU2/Memory:   OK
CPU3/Memory:   OK
CPU4/Memory:   OK
CPU5/Memory:   OK
CPU6/Memory:   OK
CPU7/Memory:   OK
Schizo0:       OK
Schizo1:       OK
BBC0:          OK
BBC1:          OK
RIO:           OK
FCAL:          OK
GEM:           OK
SCSI:          OK
Ethernet:      OK
USB:           OK
RSC:           OK
GPTwo Slots:   OK
PCI Slots:     OK
ok
```

The failed status of a device is maintained until POST diagnostics are run again and the faulty device passes. If for some reason you want to override a failed status, set `diag-level` to `off` and rerun the diagnostics. With `diag-level` set to `off`, no tests are run, and POST indicates a passed status for all devices.

```
ok setenv diag-level off
ok reset-all
```

About OpenBoot Diagnostics

OpenBoot Diagnostics code resides in the OpenBoot PROM on the system I/O board. OpenBoot Diagnostics can detect and isolate errors in the following system components:

- Motherboard and I/O board
- Disk drives and FC-AL disk backplanes
- Any PCI card that contains an on-board self-test

OpenBoot Diagnostics also tests the following I/O interfaces:

- PCI
- SCSI
- Gigabit Ethernet
- Fast Ethernet
- Serial
- USB
- RSC

You can run OpenBoot Diagnostics tests in the following ways:

- From the `ok` prompt. See "OpenBoot `ok` Prompt Commands" on page 268.
- From the OpenBoot Diagnostics menu. See "OpenBoot Diagnostics Menu" on page 271 and "How to Use OpenBoot Diagnostics" on page 276.
- Automatically after certain events. See "How to Use OpenBoot Diagnostics" on page 276.

OpenBoot Diagnostics reports test results through detailed diagnostic and error messages. See "OpenBoot Diagnostics Error Messages" on page 281 for information about error messages.

When executed automatically, OpenBoot Diagnostics displays status and error messages through a `tip` connection or a local ASCII terminal attached to the system's serial port A (`ttya`). You can also redirect OpenBoot Diagnostics messages to a remote RSC console. If you redirect output to an RSC console, you cannot display OpenBoot Diagnostics results locally. For more information about RSC, see "OpenBoot Diagnostics Results" on page 280.

When executed interactively from the `ok` prompt or the OpenBoot Diagnostics menu, OpenBoot Diagnostics displays status and error messages on any system console, including a local graphics console.

The OpenBoot firmware provides diagnostic configuration variables that you can set to control the operation of the OpenBoot Diagnostics tests. For information about the configuration variables, see "OpenBoot Configuration Variables for OpenBoot Diagnostics" on page 265.

OpenBoot Configuration Variables for OpenBoot Diagnostics

The following table lists and describes the OpenBoot diagnostic configuration variables that control the operation of OpenBoot Diagnostics.

Note – Both OpenBoot Diagnostics and POST use the settings of the configuration variables `diag-level`, `diag-switch?`, and `diag-trigger`. Changing the values of these variables will affect both POST and OpenBoot Diagnostics operation. See "OpenBoot Configuration Variables for POST" on page 253 for a complete listing and description of the OpenBoot configuration variables that control POST testing.

Variable	Setting or Keyword	Description	Default
`diag-level`		Determines the level of testing executed. **Note-** If `diag-level` is set to `menus` (for POST interactive operation), OpenBoot Diagnostics runs the default level (`min`) of testing. See "OpenBoot Configuration Variables for POST" on page 253 for more information about the `menus` setting.	`min`
	`off`	Performs no OpenBoot Diagnostics testing. **Note-**If `diag-level` is set to `off`, OpenBoot Diagnostics returns a passed status for all self-tests, but no testing is performed.	
	`min`	Performs minimal testing of core device functions.	
	`max`	Performs maximum testing of device functions.	
`diag-passes`	*n*	Specifies the number of consecutive executions of OpenBoot Diagnostics tests that are run from the OpenBoot Diagnostics menu. The maximum value for `diag-passes` is >1,000,000. **Note-** The variable `diag-passes` has no effect outside the OpenBoot Diagnostics Menu. See "OpenBoot `ok` Prompt Commands" on page 268.	`1`

Variable	Setting or Keyword	Description	Default
diag-script		Determines which OpenBoot Diagnostics tests are run automatically after the reset event specified by the variable diag-trigger.	normal
	normal	Tests all the devices shipped with a base system.	
	all	Executes all available self-tests, including tests on plug-in cards. (Same as executing test-all from the ok prompt.)	
	none	No diagnostic self-tests are run.	
diag-switch?		Toggles the system between diagnostic mode and nondiagnostic mode.	false
	true	Sets the system in diagnostic mode.	
	false	Sets the system in nondiagnostic mode.	
diag-trigger		Specifies the reset event that will cause OpenBoot Diagnostics tests to run automatically. **Note-** The OpenBoot Diagnostics tests to be run are specified by the variable diag-script.	power-reset
	power-reset	Runs OpenBoot Diagnostics tests only on power-on resets, including RSC-initiated power-on resets.	
	error-reset	Runs OpenBoot Diagnostics tests only on power-on resets and resets triggered by hardware errors, including operating system panics, and watchdog reset events.	
	soft-reset	Runs OpenBoot Diagnostics tests on all reset events.	
	none	No diagnostic tests are run.	
test-args		Customizes OpenBoot Diagnostics tests. Allows a text string of reserved keywords (separated by commas) to be specified in the following ways: • As an argument to the test command at the ok prompt • As an OpenBoot variable to the setenv command at the ok or obdiag> prompt The following are the reserved keywords for the variable test-args:	Empty string
	bist	Invokes built-in self-test (BIST) on external and peripheral devices.	
	debug	Displays all debug messages.	

Variable	Setting or Keyword	Description	Default
	`hotplug`	Enables hot-plug controller tests. (Power cycles PCI slots.) **Warning-** After the hot-plug test, the PCI cards in the slots tested are not usable until you reset the system.	
	`loopback`	Exercises external loopback path for the device.	
	`media`	Verifies external and peripheral device media accessibility.	
	`restore`	Attempts to restore original state of the device if the previous execution of the test failed.	
	`silent`	Suppresses messages announcing the name of every test run from the OpenBoot Diagnostics menu commands. (This keyword has no effect on status messages of tests run from the `ok` prompt.)	
	`subtests`	Displays name of each subtest that is called.	
	`verbose`	Displays detailed messages of progression of all tests.	
	`callers=`*N*	Displays backtrace of *N* callers when an error occurs. • `callers=0` displays backtrace of all callers on error.	
	`errors=`*N*	Continues executing the test until *N* errors are encountered. • `errors=0` displays all error reports without terminating testing.	

To display the current values of all OpenBoot configuration variables, use the `printenv` command at the `ok` prompt without specifying a variable name. To display the current values of the OpenBoot diagnostic configuration variables, use the `printenvs` menu command at the `obdiag>` prompt. For more details, see "OpenBoot Diagnostics Menu Commands" on page 272.

```
obdiag> printenvs
Variable Name          Value          Default Value

diag-switch?           true           false
diag-level             min            min
test-args              subtests
diag-passes            10             1

obdiag>
```

To set or change the value of a diagnostic configuration variable, use the `setenv` command at the `ok` prompt or at the `obdiag>` prompt. See "OpenBoot Diagnostics Menu Commands" on page 272 for more information.

```
obdiag> setenv diag-level max
diag-level =        max
```

OpenBoot `ok` Prompt Commands

OpenBoot Diagnostics detects any device that has a self-test that supports the OpenBoot standard. These devices can include both components of the basic system and any optional device with a self-test that supports the standard. Any of these devices can be tested from the `ok` prompt using the `test` or `test-all` commands. The `test` and `test-all` commands allow you to specify a particular device for testing. For more information about performing tests using the `ok` prompt commands, see "`test` Command" on page 269 and "`test-all` Command" on page 270.

Note – You should run OpenBoot Diagnostics tests at the `ok` prompt only after a power-on or system reset. You cannot run OpenBoot Diagnostics reliably after halting the operating system or aborting the operating system with the Stop-A keyboard command (or an equivalent abort key sequence). Therefore, in order to access the `ok` prompt and run OpenBoot Diagnostics, you must set the OpenBoot configuration variable `auto-boot?` to `false` and reset the system. For the detailed procedure, see "What to Do" on page 278.

`test` Command

The `test` command enables you to test an individual device. At the `ok` prompt, type `test` and the full path name or device alias of the device, as shown in the following example:

```
ok test /pci@9,700000/ebus@1/flashprom@0,0
```

To display the list of system device aliases, type `devalias` at the `ok` prompt.

```
ok devalias
disk                    /pci@8,600000/SUNW,qlc@2/fp@0,0/disk@0,0
disk0                   /pci@8,600000/SUNW,qlc@2/fp@0,0/disk@0,0
disk1                   /pci@8,600000/SUNW,qlc@2/fp@0,0/disk@1,0
disk2                   /pci@8,600000/SUNW,qlc@2/fp@0,0/disk@2,0
disk3                   /pci@8,600000/SUNW,qlc@2/fp@0,0/disk@3,0
disk4                   /pci@8,600000/SUNW,qlc@2/fp@0,0/disk@4,0
disk5                   /pci@8,600000/SUNW,qlc@2/fp@0,0/disk@5,0
disk6                   /pci@8,600000/SUNW,qlc@2/fp@0,0/disk@8,0
disk7                   /pci@8,600000/SUNW,qlc@2/fp@0,0/disk@9,0
disk8                   /pci@8,600000/SUNW,qlc@2/fp@0,0/disk@a,0
disk9                   /pci@8,600000/SUNW,qlc@2/fp@0,0/disk@b,0
disk10                  /pci@8,600000/SUNW,qlc@2/fp@0,0/disk@c,0
disk11                  /pci@8,600000/SUNW,qlc@2/fp@0,0/disk@d,0
scsi                    /pci@8,600000/SUNW,qlc@2
cdrom                   /pci@8,700000/scsi@1/disk@6,0:f
tape                    /pci@8,700000/scsi@1/tape@4,0
scsix                   /pci@8,700000/scsi@1
dload                   /pci@9,700000/network@1,1:,
net                     /pci@9,700000/network@1,1
gem                     /pci@8,600000/network@1
flash                   /pci@9,700000/ebus@1/flashprom@0,0
idprom                 /pci@9,700000/ebus@1/i2c@1,500030/idprom@0,a0
```

You can use `test-args` keywords with the `test` command to fine tune the execution of the test. See “OpenBoot Configuration Variables for OpenBoot Diagnostics” on page 265 for more information about the `test-args` options. The following is an example of using the `test-args` keywords `loopback` and `verbose` with the `test` command:

```
ok test /pci@9,700000/network@1:test-args={loopback,verbose}
```

`test-all` Command

When no device path is specified, the `test-all` command tests all devices with self-tests as detected by OpenBoot Diagnostics.

If a device path name is specified with the `test-all` command, OpenBoot Diagnostics runs the self-tests for that device and all its children that have a self-test. The following example shows the command to test the pci@9,70000 bus and all devices with self-tests that are connected to this bus.

```
ok test-all /pci9,700000

Testing /pci@9,700000/ebus@1/i2c@1,2e
Testing /pci@9,700000/ebus@1/i2c@1,30
Testing /pci@9,700000/ebus@1/i2c@1,50002e
Testing /pci@9,700000/ebus@1/i2c@1,500030
Testing /pci@9,700000/ebus@1/bbc@1,0
Testing /pci@9,700000/ebus@1/bbc@1,500000
Testing /pci@8,700000/scsi@1
Testing /pci@9,700000/network@1,1
Testing /pci@9,700000/usb@1,3
Testing /pci@9,700000/ebus@1/gpio@1,300600
Testing /pci@9,700000/ebus@1/serial@1,400000
Testing /pci@9,700000/ebus@1/pmc@1,300700
Testing /pci@9,700000/ebus@1/rtc@1,300070
ok
```

OpenBoot Diagnostics Menu

The OpenBoot Diagnostics menu is displayed when you issue the `obdiag` command at the `ok` prompt. OpenBoot Diagnostics detects each device with a self-test and displays that device name in the OpenBoot Diagnostics menu. The OpenBoot Diagnostics menu always includes the devices of the basic system. These devices include: `bbc`, `controller`, `ebus`, `flashprom`, `gpio`, `hotplugcontroller`, `i2c`, `network`, `pmc`, `rsc-control`, `rtc`, `scsi`, `serial`, and `usb`. If an optional plug-in device has a self-test that supports the OpenBoot standard, the OpenBoot Diagnostics menu also includes that device as one of the menu entries. Therefore, the menu entries may vary from system to system, depending on the optional devices installed in the system.

You invoke the OpenBoot Diagnostics menu by typing `obdiag` at the `ok` prompt. A sample OpenBoot Diagnostics menu is shown below.

```
ok obdiag
 _____________________________________________________________________________
|                                 o b d i a g                                 |
|_____________________________________________________________________________|
|                          |                          |                         |
|  1 SUNW,qlc@2             |  2 SUNW,qlc@4             |  3 SUNW,qlc@5             |
|  4 bbc@1,0                |  5 bbc@1,500000           |  6 controller@0,16        |
|  7 controller@0,1a        |  8 controller@0,1c        |  9 controller@0,1e        |
| 10 ebus@1                 | 11 flashprom@0,0          | 12 gpio@1,300600          |
| 13 hotplug-controller@0,  | 14 hotplug-controller@0,  | 15 hotplug-controller@0,  |
| 16 hotplug-controller@0,  | 17 i2c@1,2e               | 18 i2c@1,30               |
| 19 i2c@1,50002e           | 20 i2c@1,500030           | 21 network@1              |
| 22 network@1,1            | 23 pmc@1,300700           | 24 rsc-control@1,3062f8   |
| 25 rtc@1,300070           | 26 scsi@1                 | 27 serial@1,400000        |
| 28 usb@1,3                |                           |                           |
|___________________________|___________________________|___________________________|
|   Commands: test test-all except help what printenvs setenv versions exit   |
|_____________________________________________________________________________|

obdiag>
```

For information about each OpenBoot Diagnostics test, see “OpenBoot Diagnostics Test Descriptions” on page 272. For a description of the interactive commands that allow you to run OpenBoot Diagnostics from the `obdiag>` prompt, see “OpenBoot Diagnostics Menu Commands” on page 272.

OpenBoot Diagnostics Menu Commands

The following table describes the OpenBoot Diagnostics interactive menu commands that are available at the `obdiag>` prompt.

Command	Description
`exit`	Exits the OpenBoot Diagnostics menu and returns to the `ok` prompt.
`help`	Displays a brief description of each OpenBoot Diagnostics menu command and OpenBoot configuration variable.
`printenvs`	Displays the current value of diagnostics-related OpenBoot configuration variables. (See "OpenBoot Configuration Variables for OpenBoot Diagnostics" on page 265 for information about the configuration variable values.)
`setenv` *variable value*	Sets the value for an OpenBoot configuration variable. (See "OpenBoot Configuration Variables for OpenBoot Diagnostics" on page 265 for information about the configuration variable values.)
`test-all`	Tests all devices displayed in the OpenBoot Diagnostics menu. **Note:** Unlike the `test-all` command at the `ok` prompt, the `test-all` menu command at the `obdiag>` prompt does not allow you to specify a device path name.
`versions`	Displays the version, last modified date, and manufacturer of each self-test and the OpenBoot Diagnostics menu and library.
`test #,#,`	Tests only the device or devices identified by the menu entry number (#) in the command line. Specify individual tests, separated by commas. (Ex: `obdiag>` **`test 7,10`**)
`except #,#,`	Tests all devices in the OpenBoot Diagnostics menu except those identified in the list. (Ex: `obdiag>` **`except 3,5,10`**)
`what #,#,`	Displays selected properties of the devices identified by the menu entry number (#) in the command line. The information provided varies according to device type.

OpenBoot Diagnostics Test Descriptions

OpenBoot Diagnostics provides comprehensive diagnostic testing for the I/O subsystem, I^2C subsystem, and other hardware devices. Tests available through OpenBoot Diagnostics are:

- Core tests, which exercise parts of the basic system
- On-board self-tests, which exercise optional devices such as PCI cards

Note – For maximum testing of each device, set the `diag-level` variable to `max`; for limited testing, set `diag-level` to `min`. For some devices, the testing is the same at both the `min` and `max` settings.

The following table lists the devices provided with a typical system and describes the self-test of each device. The table provides the device path name, a brief description of the device's self-test, and any special considerations involved in running the test.

Note – The `test-args` keywords `verbose`, `subtests`, `debug`, `errors=N`, `callers=N` apply to all self-tests.

Device	Description of Device Self-Test	Special Considerations
`bbc@1,0` `bbc@1,500000`	Tests all writable registers in the boot bus controller and then verifies that at least one processor has boot bus access.	
`controller@0,16` `controller@0,1a`	Executes the tests in the base FC-AL backplane firmware and SSC-100 SES controllers.	
`controller@0,1c` `controller@0,1e`	Executes the tests in the expansion FC-AL backplane firmware and SSC-100 SES controllers.	Only available on systems equipped with optional expansion FC-AL backplane
`ebus@1`	Tests the PCI configuration registers, DMA control registers, and ebus mode registers. Tests DMA controller functions.	
`flashprom@0,0`	Performs a checksum of the flash PROM containing the OpenBoot firmware.	
`gpio@1,300600`	Tests the registers of the super I/O subsystem.	

`hotplugcontroller@0,e2`
`hotplugcontroller@0,e6`
`hotplugcontroller@0,e8`
`hotplugcontroller@0,ec`
	Performs hot-plug test of PCI slots.
	
	Warning- After the hot-plug test, the PCI cards in the slots tested are not usable until you reset the system.
		To run hot-plug tests, the `test-args` keyword `hotplug` must be specified.

Device	Description of Device Self-Test	Special Considerations

`i2c@1,2e`
`i2c@1,30`
`i2c@1,50002e`
`i2c@1,500030`
	Tests the devices (temperature sensors, fans, power supplies, system fault LEDs, thermal fault LEDs, and front panel keyswitch) monitored by the I^2C environmental monitoring bus.	

`network@1,1`	Tests the on-board Fast Ethernet logic, including internal and external loopback tests.	To run the external loopback test on the TPE port, you must have a TPE loopback connector attached to the TPE port and specify the `test-args` keyword `loopback`. The Sun part number for the TPE loopback connector is 501-2965-01.
`network@1`	Tests the on-board Gigabit Ethernet (GBE) logic, including internal and external loopback tests.	To run the external loopback test on the GBE port, you must have a GBE loopback connector attached to the GBE port and specify the `test-args` keyword `loopback`. This connector consists of looping back one end of the optical connector to the other end using any standard optical cable.
`pmc@1,300700`	Tests the registers of the power management controller.	
`SUNW,qlc@2`	Tests the registers of the on-board Fibre Channel-Arbitrated Loop (FC-AL) controller and FC-AL subsystem (Loop A).	
`rsc-control@1,3062f8`	Tests RSC hardware, including RSC serial and Ethernet ports.	To run external loopback tests on the RSC Ethernet port: • Variable `diag-level` must be set to `max`. • Variable `test-args` string must specify the keyword `loopback.` • RSC Ethernet port must be connected to a 10-Mbyte hub. To run external loopback tests on the RSC serial port: • Variable `diag-level` must be set to `max`. • Variable `test-args` string must specify the keyword `loopback.`

Device	Description of Device Self-Test	Special Considerations
rtc@1,300070	Tests the registers of the real-time clock and then tests the interrupt rates.	To test the ability to enable or disable the daylight savings time feature, the variable diag-level must be set to max.
scsi@1	Tests the on-board SCSI controller and SCSI bus subsystem for internal removable media devices. Checks associated registers and performs a DMA transfer.	You must specify the variable test-args keywords media and bist.
serial@1,400000	Tests all possible baud rates supported by the ttya and ttyb serial lines and performs an internal and external loopback test on each line at each speed.	If a serial line is being used by an input/output device, that line will not be tested. To run the external loopback test on the serial lines: • Variable test-args must specify the keyword loopback. • You must have a loopback connector attached to each serial port with the ttya line transmitting while the ttyb line is looped back. The Sun part number for the serial loopback connector is 501-4205-01.
usb@1,3	Tests the writable registers of the USB open host controller.	

Additional testing may be performed if your configuration includes an optional device that has an on-board self-test that supports the OpenBoot standard. Such optional devices include PCI interface cards that support parallel communication lines, audio devices, or any other device that is IEEE 1275 compatible and provides a method named "selftest." Examples of optional devices are:

- fdthree – Self-test for this device tests the control logic of a diskette drive and the operation of the drive. (A formatted diskette must be inserted into the diskette drive.)
- SUNW,CS4231– Self-test for this device verifies that an audio PCI card is present and tests associated registers. Specifying the keyword loopback for the test-args OpenBoot diagnostic configuration variable enables the following tests: external line-in/line-out loopback tests, external speaker tone tests, and external microphone/headphone loopback tests.

How to Use OpenBoot Diagnostics

When you power on the system, OpenBoot Diagnostics runs automatically under either of the following conditions:

- The front panel keyswitch is set to the Diagnostics position and both of the OpenBoot configuration variables `diag-level` and `diag-script` are set to their default values (or to any valid setting other than `none`).
- The OpenBoot configuration variable `diag-switch?` is set to `true` and all three of the variables `diag-level`, `diag-trigger`, and `diag-script` are set to their default values (or to any valid setting other than `none`).

Note – The default value for `diag-switch?` is `false`. Therefore, if all OpenBoot configuration variables are set to their default values, OpenBoot Diagnostics does not run automatically unless the keyswitch is set to the Diagnostics position. For maximum test coverage, set the `diag-level` variable to `max` prior to starting OpenBoot Diagnostics.

You can configure OpenBoot Diagnostics to run automatically after specific types of reset events by setting the values of the variables `diag-switch?` and `diag-trigger`, as shown in the following table. Note that `diag-level` and `diag-script` must be set to any valid value other than none. For more information, see "OpenBoot Configuration Variables for OpenBoot Diagnostics" on page 265.

Reset Event	OpenBoot Diagnostics Runs Automatically If...

Any power-on reset, including RSC-initiated power-on resets	The front panel keyswitch is set to the Diagnostics position
	
	`OR`
	
	`diag-switch?` is set to `true` and `diag-trigger` is set to any setting other than `none`

Any automatic reset triggered by a hardware error, including all operating system panics, and watchdog reset events	`diag-switch?` is set to `true` and `diag-trigger` is set to `error-reset` or `soft-reset`
Any user-initiated reset event	`diag-switch?` is set to `true` and `diag-trigger` is set to `soft-reset`

The setting for diag-script determines which tests are run at the reset event specified by diag-trigger. Valid settings for diag-script are:

- normal – Tests all devices shipped with a base system.
- all – Executes all available self-tests, including tests on plug-in cards.
- none – No diagnostic self-tests are run.

See "OpenBoot Configuration Variables for OpenBoot Diagnostics" on page 265 for information about the settings for diag-script.

The following sample output shows the results of OpenBoot Diagnostics tests when the variable diag-level is set to max, diag-script is set to normal, and no test-args keywords are specified.

```
Running diagnostics script obdiag/normal

Testing /pci@8,600000/network@1
Testing /pci@8,600000/SUNW,qlc@2
Testing /pci@9,700000/ebus@1/i2c@1,2e
Testing /pci@9,700000/ebus@1/i2c@1,30
Testing /pci@9,700000/ebus@1/i2c@1,50002e
Testing /pci@9,700000/ebus@1/i2c@1,500030
Testing /pci@9,700000/ebus@1/bbc@1,0
Testing /pci@9,700000/ebus@1/bbc@1,500000
Testing /pci@8,700000/scsi@1
Testing /pci@9,700000/network@1,1
Testing /pci@9,700000/usb@1,3
Testing /pci@9,700000/ebus@1/gpio@1,300600
Testing /pci@9,700000/ebus@1/serial@1,400000
Testing /pci@9,700000/ebus@1/pmc@1,300700
Testing /pci@9,700000/ebus@1/rtc@1,300070
ok
```

OpenBoot Diagnostics runs automatically, without operator intervention, under the conditions described above. However, you can also run OpenBoot Diagnostics in an interactive mode and specify which tests you want to perform. OpenBoot Diagnostics tests can be executed interactively in the following ways:

- From the ok prompt, you can use either the test or test-all command to test a particular device. See "test Command" on page 269 and "test-all Command" on page 270.
- From the obdiag> prompt, you can use the OpenBoot Diagnostics menu commands to execute the self-tests of the devices included in the OpenBoot Diagnostics menu.

The following procedure describes how to run OpenBoot Diagnostics interactively from the obdiag> prompt.

Before You Begin

You need to set up a way of viewing OpenBoot Diagnostics error and diagnostic messages if your server is configured without a system console. Use the following guidelines to set up a way of displaying the messages for your particular installation:

- If you are running OpenBoot Diagnostics interactively, you can:
  - Connect a local graphics console or an alphanumeric terminal to the Sun Fire 880 server. See "About Setting Up a Console" on page 16.
  - Establish a `tip` connection from another Sun system. See the *OpenBoot 4.x Command Reference Manual*.
  - Set up an RSC console and direct output to the RSC console. For more information, see "About Sun Remote System Control" on page 288.
- If OpenBoot Diagnostics will be running automatically after a power-on or reset event, you can:
  - Connect an alphanumeric terminal. See "About Setting Up a Console" on page 16. (You cannot view diagnostics messages at a graphics console when OpenBoot Diagnostics is running automatically.)
  - Establish a `tip` connection from another Sun system. See the *OpenBoot 4.x Command Reference Manual*.
  - Set up an RSC console and direct output to the RSC console. For more information, see "About Sun Remote System Control" on page 288.

Note – When executed automatically, OpenBoot Diagnostics output displays locally on an attached terminal or through a `tip` connection. However, if diagnostics output is redirected to an RSC console, the output will not display locally until it is directed back to the local terminal or `tip` connection. For information about directing OpenBoot Diagnostics output to an RSC console or to a local terminal or `tip` connection, see the *Sun Remote System Control (RSC) User's Guide* and "OpenBoot Diagnostics Results" on page 280.

What to Do

You should run OpenBoot Diagnostics tests interactively only after a power-on or system reset. You cannot run OpenBoot Diagnostics reliably after halting the operating system or aborting the operating system with the Stop-A keyboard command (or an equivalent abort key sequence). Therefore, in order to access the `ok` prompt and run OpenBoot Diagnostics, you must set the OpenBoot configuration variable `auto-boot?` to `false` and reset the system.

Perform the following steps to set the configuration variable `auto-boot?` and to run the OpenBoot Diagnostics tests interactively.

1. **Access the `ok` prompt.**

   To access the `ok` prompt:

   - On a Sun keyboard, hold down the Stop key and press A.
   - On a terminal keyboard, press the Break key.
   - Type ~# in a `tip` window.

   The `ok` prompt is displayed.

2. **Set the OpenBoot configuration variable `auto-boot?` to `false`, type:**

```
ok setenv auto-boot? false
```

3. **Reset or power cycle the system., type:**

```
ok reset-all
```

4. **When the `ok` prompt appears, invoke OpenBoot Diagnostics; type:**

```
ok obdiag
```

   The OpenBoot Diagnostics menu appears.

5. ***(Optional)* When the OpenBoot Diagnostics menu and `obdiag>` prompt appear, set the configuration variables.**

   See "OpenBoot Configuration Variables for OpenBoot Diagnostics" on page 265 for information about the variable values.

   The following example shows how to set the value for the variable `diag-level`, which specifies the level of testing performed:

```
obdiag> setenv diag-level max
```

Note – The default level of testing is `min`. If `diag-level` is set to `off`, OpenBoot Diagnostics returns a passed status for all tests, but no testing is performed.

---

6. **To execute one or more tests, enter the appropriate OpenBoot Diagnostics menu command and test numbers at the** `obdiag>` **prompt.**

   The following example shows the `except` command, which allows you to execute all tests except those tests you specify in the command:

```
obdiag> except 1,4
```

   For command usage and descriptions, see "OpenBoot Diagnostics Menu Commands" on page 272.

   For information about the OpenBoot Diagnostics tests, see "OpenBoot Diagnostics Menu" on page 271 and "OpenBoot Diagnostics Test Descriptions" on page 272.

OpenBoot Diagnostics Results

By default, when you run OpenBoot Diagnostics interactively, the output displays locally on the system console. You can redirect OpenBoot Diagnostics output to display remotely on an RSC console. To redirect output to an RSC console:

1. **Type the following commands at the system** `ok` **prompt:**

```
ok diag-console rsc
ok setenv input-device rsc-console
ok setenv output-device rsc-console
```

2. **To cause the changes to take effect, power cycle the system, or type:**

```
ok reset-all
```

If you redirect OpenBoot Diagnostics output to an RSC console, the output will not display on the system console. To redirect OpenBoot Diagnostics output to the local system console or to a `tip` connection, issue the `diag-console` command as shown in the following example:

```
ok> diag-console ttya
ok> reset-all
```

See the *Sun Fire 880 Server Owner's Guide* for more information about redirecting output to an RSC console.

OpenBoot Diagnostics Error Messages

Using the OpenBoot configuration variable `test-args`, you can specify keywords to set reporting controls for diagnostic and error messages:

- `debug` – Provides all debug messages.
- `silent` – Suppresses display of test name.
- `verbose` – Provides detailed test status messages.
- `callers=`*N* – Sets the number of backtrace callers reported.
- `errors=`*N* – Sets the number of errors reported before testing is terminated.

See "OpenBoot Configuration Variables for OpenBoot Diagnostics" on page 265 and "Error Messages" on page 291 for additional information about the `test-args` variable. The following is an example of how to use the variable `test-args`.

```
ok setenv test-args verbose,debug,errors=0
```

OpenBoot Diagnostics reports errors in a standard format. The following shows the `test` command for the FC-AL subsystem issued from the `obdiag>` prompt and a sample error message.

```
 _____________________________________________________________________________
|                                o b d i a g                                  |
|_____________________________________________________________________________|
|                         |                         |                         |
|  1 SUNW,qlc@2           |  2 SUNW,qlc@4           |  3 SUNW,qlc@5           |
|  4 bbc@1,0              |  5 bbc@1,500000         |  6 controller@0,16      |
|  7 controller@0,1a      |  8 controller@0,1c      |  9 controller@0,1e      |
| 10 ebus@1               | 11 flashprom@0,0        | 12 gpio@1,300600        |
| 13 hotplug-controller@0,| 14 hotplug-controller@0,| 15 hotplug-controller@0,|
| 16 hotplug-controller@0,| 17 i2c@1,2e             | 18 i2c@1,30             |
| 19 i2c@1,50002e         | 20 i2c@1,500030         | 21 network@1            |
| 22 network@1,1          | 23 pmc@1,300700         | 24 rsc-control@1,3062f8 |
| 25 rtc@1,300070         | 26 scsi@1               | 27 serial@1,400000      |
| 28 usb@1,3              |                         |                         |
|_________________________|_________________________|_________________________|
|   Commands: test test-all except help what printenvs setenv versions exit   |
|_____________________________________________________________________________|

obdiag> test 1
Testing /pci@8,60000/SUNW,qlc@2

ERROR   : No command DMA interrupt
DEVICE  : /pci@8,60000/SUNW,qlc@2
SUBTEST : selftest:loop-host-fifo-host
CALLERS : loop-host-fifo-host
MACHINE : Sun Fire 880
SERIAL# : 12980798
DATE    : 04/30/2001 16:05:39 GMT

/pci@8,600000/SUNW,qlc@2 selftest failed, return code = 1
ok
```

About SunVTS Software

SunVTS, the Sun Validation Test Suite, is an online diagnostics tool and system exerciser for verifying the configuration and functionality of hardware controllers, devices, and platforms.

SunVTS software lets you view and control a testing session over modem lines or over a network. Using a remote system, you can view the progress of a SunVTS testing session, change testing options, and control all testing features of another system on the network.

SunVTS Interfaces

SunVTS software provides the following interfaces:

- Command-line interface
- TTY interface
- Graphical interface that runs within a windowed desktop environment

You can run SunVTS software from any one of its interfaces.

For More Information

The following documents provide information about SunVTS software. They are available on the Supplement CD for your specific Solaris release and on the Web at `http://docs.sun.com`.

- *SunVTS User's Guide*

This document describes the SunVTS environment, including how to start and control the various user interfaces.

- *SunVTS Test Reference Manual*

This document describes each SunVTS test, the various test options, and command-line arguments.

- *SunVTS Quick Reference Card*

This card gives an overview of the main features of the SunVTS graphical user interface.

How to Check Whether SunVTS Software Is Installed

SunVTS software is an optional package that may or may not have been loaded when your system software was installed.

Before You Begin

To check whether SunVTS software is installed, you must access the Sun Fire 880 server from either a console or a remote machine logged in to the Sun Fire 880 server. For information about setting up a console, see "About Setting Up a Console" on page 16.

What to Do

1. **Type the following:**

```
% pkginfo -l SUNWvts
```

- If SunVTS software is loaded, information about the package will be displayed.
- If SunVTS software is not loaded, you will see an error message:

```
ERROR: information for "SUNWvts" was not found
```

2. **If necessary, use the `pkgadd` utility to load the `SUNWvts` package onto your system from the Supplement CD.**

   Note that `/opt/SUNWvts` is the default directory for installing SunVTS software.

What Next

For more information, refer to the appropriate Solaris documentation, as well as the `pkgadd` reference manual (man) page.

How to Use SunVTS Software

Before You Begin

If your system passes POST and OpenBoot Diagnostics testing and boots the operating system, yet does not function correctly, you can use SunVTS software to run additional tests. These tests verify the configuration and functionality of most hardware controllers and devices.

You will need superuser (root) access to run SunVTS tests.

What to Do

This procedure assumes you will test the server remotely by running a SunVTS session from a remote system using the SunVTS graphical interface. For information about the SunVTS interfaces and options, see the *SunVTS User's Guide.*

1. **Use the `xhost` command to give the Sun Fire 880 server access to the remote display.**

   On the remote system that will be running the SunVTS graphical interface, type:

```
% /usr/openwin/bin/xhost + server-hostname
```

   Substitute the host name of the Sun Fire 880 server for *server-hostname*.

2. **Log in to the Sun Fire 880 server as superuser (root).**

```
% rlogin server-hostname
```

3. **Check whether SunVTS software is loaded on the Sun Fire 880 server.**

   SunVTS is an optional package that may or may not have been loaded when the server software was installed. For more information, see "How to Check Whether SunVTS Software Is Installed" on page 283.

4. **To start the SunVTS software, type:**

```
# cd /opt/SUNWvts/bin
# ./sunvts -display system-hostname:0
```

Substitute the name of the system you are using for *system-hostname*. Note that `/opt/SUNWvts/bin` is the default directory for SunVTS software. If you have installed SunVTS software in a different directory, use the appropriate path instead.

5. **Fine-tune your testing session by selecting only the tests you want to run.**

   On the Test Selection panel, click to select and deselect tests. (A check mark in the box indicates the item is selected.) The following table lists and describes useful tests to run on the Sun Fire 880 server.

SunVTS Test	Description
`cdtest` `dvdtest`	Tests the DVD/CD-ROM drive by reading the disc and verifying the DVD/CD table of contents (TOC), if it exists
`cputest`	Tests the CPU
`disktest`	Verifies the internal SCSI bus and FC-AL disk drives
`dpmtest`	Verifies local FC-AL disk drives
`env5test` `i2ctest`	Tests the I^2C environment control system including all fans, all LEDs, front panel keyswitch, power supplies, and temperature sensors
`fputest`	Checks the floating-point unit
`l1dcachetest`	Tests the level 1 D cache on the CPU
`l2dcachetest`	Tests the level 2 D cache external to the CPU
`m64test`	Tests the PCI graphics card
`mptest`	Verifies multiprocessor features (for systems with more than one processor)
`nettest` `netlbtest`	Checks all the hardware associated with networking (for example, Ethernet, token ring, quad Ethernet, fiber optic, 100-Mbit per second Ethernet, Gigabit Ethernet devices)
`pmem`	Tests the physical memory (read only)
`rsctest`	Verifies the RSC functionality, including RSC Ethernet and serial ports, I^2C, and Flash RAM
`sptest`	Tests the system's on-board serial ports
`systest`	Stress tests both memory and CPUs
`tapetest`	Tests the various Sun tape devices
`usbkbtest`	Tests the keyboard
`vmem`	Tests virtual memory (a combination of the swap partition and the physical memory)

SunVTS Results

If SunVTS tests indicate an impaired or defective part, see the replacement procedures in the appropriate chapter of this manual.

Failures may be viewed using the `log` option on your SunVTS GUI or TTY interface. You can also access the log file directly at its default location, `/var/opt/SUNWvts/logs/sunvts.err`.

Note – It is important to have the `SunVTS` error log and `/var/adm/messages` system logs available when contacting your Sun Service representative for assistance.

About Sun Management Center Software

Sun Management Center software is a convenient, single solution for managing multiple Sun systems, devices, and network resources. With its intuitive Java™-based graphical interface, Sun Management Center offers powerful management capabilities that allow you to:

- Manage and monitor your server remotely from any location in the network
- Display physical and logical views of your exact server configuration
- Monitor system health conditions
- Access real-time system performance and configuration data, to diagnose potential capacity problems and performance bottlenecks
- Invoke SunVTS diagnostic software for online diagnosis of hardware problems
- Use predictive failure analysis features to warn of potential memory and disk hardware failures before they happen
- Organize systems by geographical location, server function, administrative responsibility, or other criteria for increased management flexibility
- Implement enterprise-wide security measures, such as authentication, data integrity, and access control lists

For More Information

Sun Management Center software is provided on a CD supplied in the Solaris media kit for your release. For information about installing and using Sun Management Center software, see the following documents provided with the Sun Management Center software:

- *Sun Management Center Software Installation Guide*
- *Sun Management Center Software User's Guide*
- *Sun Management Center Software Supplement for Workgroup Servers*

About Sun Remote System Control

Sun Remote System Control (RSC) software is a remote server management tool that allows you to monitor and control supported Sun servers over modem lines or over a network. RSC provides remote system administration for geographically distributed or physically inaccessible systems.

RSC software works with the RSC card included in all Sun Fire 880 servers. The RSC card runs independently of the host server, and operates off of 5-volt standby power from the system's power supplies. The card also includes a battery that provides approximately 30 minutes of back-up power in the event of a power failure. Together these features allow RSC to serve as a "lights out" management tool that continues to function even when the server operating system goes offline, the system is powered off, or a power outage occurs.

The RSC card plugs into a dedicated slot on the system I/O board and includes integrated modem, serial, and Ethernet interfaces. The card provides three ports that are accessible through an opening in the system rear panel:

- 10-Mbps Ethernet port via an R-J45 twisted-pair Ethernet (TPE) connector
- 56-Kbps modem port via an RJ-11 connector
- EIA-232D serial port via an RJ-45 connector

Once RSC is configured to manage your server, you can use it to run diagnostic tests, view diagnostic and error messages, reboot your server, and display environmental status information on a remote console. If the operating system is down, RSC can automatically notify you of any power failures, hardware failures, or other important events that may be occurring on your server.

RSC Capabilities

RSC software provides the following system administration capabilities:

- Access Solaris and OpenBoot PROM console functions remotely via the modem and Ethernet ports on the RSC card
- Run power-on self-test (POST) and OpenBoot Diagnostics from a remote console
- Remotely monitor server environmental conditions, such as fan, temperature, and power supply status, even when the server is offline
- View a graphical representation of the server's front panel, including keyswitch position and LED states
- Receive notification of server problems via e-mail or pager, even in the event of a power failure

- Perform remote server reboot, power-on, and power-off functions on demand
- Access a detailed log of RSC events, command history, and detected errors

RSC complements existing Sun monitoring and diagnostics tools such as Sun Management Center, SunVTS, POST, and OpenBoot Diagnostics.

RSC User Interfaces

RSC offers the following user interfaces:

- A graphical user interface (GUI) that runs as a Java client application on workstations connected to the server through the RSC Ethernet interface or through a standard modem connection using Point-to-Point Protocol (PPP)
- A command-line interface (CLI) that you can access through the RSC Ethernet network, through a standard modem connection, or through an alphanumeric terminal attached directly to the RSC serial port.

The Java-based GUI client application runs on workstations using the Solaris, Microsoft Windows 95, Windows 98, or Windows NT operating environments.

For More Information

Sun RSC software is included on the Computer Systems Supplement CD for your specific Solaris release. For installation instructions, see the *Solaris Sun Hardware Platform Guide* provided in the Solaris media kit. For information about configuring and using RSC, see the *Sun Remote System Control (RSC) User's Guide* provided with the RSC software.

About Troubleshooting Your System

The system provides the following features to help you identify and isolate hardware problems:

- Error indications
- Software commands
- Diagnostic tools

This section describes the error indications and software commands provided to help you troubleshoot your system. Diagnostic tools are covered in "About Diagnostic Tools" on page 250.

Error Indications

The system provides error indications via LEDs and error messages. Using the two in combination, you can isolate a problem to a particular FRU with a high degree of confidence.

The system provides status indicator LEDs in the following places:

- Front panel
- CPU/Memory board slots
- Power supplies
- Disk drives
- PCI slots
- Fan trays

Error messages are logged in the `/var/adm/messages` file and are also displayed on the system console by the diagnostic tools.

For additional information about LEDs, see "System LEDs" on page 341.

Status Indicator LEDs

Front panel LEDs provide your first indication that there is a problem with your system. Usually, a front panel LED is not the only indication of a problem. Error messages and other LEDs within the enclosure can help to isolate the problem further. For additional information about the front panel LEDs, see "About Front Panel LEDs" on page 342.

The front panel LEDs provide general system status, alert you to system problems, and help you determine the location of system faults:

- At the top of the status and control panel, three general status LEDs provide a snapshot of the system status.
- Below the Power button and security keyswitch, a graphical display provides additional LED icons to indicate specific fault conditions and locations.

Located on the rear of each power supply, the power supply LEDs indicate:

- Whether the power supply has encountered a fault
- Whether the power input and outputs are functional and within acceptable limits

For additional information about the power supply LEDs, see "About Power Supply LEDs" on page 348.

Fault LEDs within the enclosure help pinpoint the location of the faulty device. LEDs within the enclosure include:

- CPU/Memory board slot LEDs
- PCI slot LEDs
- CPU, I/O, and motherboard fan trays LEDs
- Disk drive LEDs

For detailed information about these LEDs, see "System LEDs" on page 341.

Since all front panel and power supply LEDs are powered by the system's 5-volt standby power source, fault LEDs remain illuminated for any fault condition that results in a system shutdown.

During system startup, the front panel LEDs are individually toggled on and off to verify that each one is working correctly.

Error Messages

Error messages and other system messages are saved in the file `/var/adm/messages`. The two firmware-based diagnostic tools, POST and OpenBoot Diagnostics, also display error messages in a standard format on the local system console or on an RSC console (if configured). See "Viewing POST Error Messages" on page 261 and "OpenBoot Diagnostics Error Messages" on page 281 for more information.

The amount of information displayed in OpenBoot Diagnostics messages is determined by the keywords specified for the OpenBoot configuration variable `test-args`. See "OpenBoot Configuration Variables for OpenBoot Diagnostics" on page 265 for additional details.

Software Commands

Several Solaris and OpenBoot firmware commands are available for diagnosing system problems. For more information about Solaris commands, see the appropriate man pages. For additional information about OpenBoot commands, see the *OpenBoot 4.x Command Reference Manual*. An online version of the manual is included with the *OpenBoot Collection AnswerBook* that ships with Solaris software.

Solaris `prtdiag` Command

The `prtdiag` command is a UNIX shell command used to display system configuration and diagnostic information. You can use the `prtdiag` command to display:

- System configuration, including information about clock frequencies, CPUs, memory, and I/O card types
- Diagnostic and environmental information
- Failed field-replaceable units (FRUs)

To run `prtdiag`, type:

```
# /usr/platform/sun4u/sbin/prtdiag
```

An example of prtdiag output follows.

```
# /usr/platform/sun4u/sbin/prtdiag
System Configuration:  Sun Microsystems  sun4u Sun Fire 880
System clock frequency: 150 MHz
Memory size: 2048 Megabytes

========================= CPUs ===============================================
          Run   E$     CPU    CPU
Brd  CPU  MHz   MB    Impl.   Mask
---  ---  ---  ----  ------  ----
 B    1   750   8.0  US-III  5.1
 B    3   750   8.0  US-III  5.1

========================= Memory Configuration ===============================
           Logical  Logical  Logical
     MC    Bank     Bank     Bank         DIMM    Interleave  Interleaved
 Brd  ID   num      size     Status       Size    Factor      with
----  ---  ----     ------   -----------  ------  ----------  -----------
  A    0     0       256MB   no_status     128MB     4-way        0
  A    0     2       256MB   no_status     128MB     4-way        0
  B    1     0       256MB   no_status     128MB     4-way        1
  B    1     2       256MB   no_status     128MB     4-way        1
  A    2     0       256MB   no_status     128MB     4-way        0
  A    2     2       256MB   no_status     128MB     4-way        0
  B    3     0       256MB   no_status     128MB     4-way        1
  B    3     2       256MB   no_status     128MB     4-way        1

========================= IO Cards =========================
                         Bus  Max
     IO   Port Bus       Freq Bus  Dev,
Brd  Type  ID  Side Slot MHz  Freq Func State Name                        Model
---- ---- ---- ---- ---- ---- ---- ---- ----- --------------------------- ---------
I/O  PCI   8    B    2    33   33  3,0  ok    pci108e,1000-pci108e,1000.1
I/O  PCI   8    B    2    33   33  3,1  ok    SUNW,hme-pci108e,1001
I/O  PCI   8    B    0    33   33  5,0  ok    pci12de,200-pci12de,200.0
I/O  PCI   9    B    6    33   33  2,0  ok    pci108e,3de7-pci108e,3de7.0
I/O  PCI   9    A    8    33   66  2,0  ok    pci108e,3de7-pci108e,3de7.0
```

To isolate an intermittent failure, it may be helpful to maintain a prtdiag history log. Use prtdiag with the -l (log) option to send output to a log file in /var/adm.

To display environmental information, use `prtdiag` with the `-v` option. Type:

```
% /usr/platform/sun4u/sbin/prtdiag -v
```

The `prtdiag` command with the `-v` option produces all of the output of the `prtdiag` command (shown in the preceding example) in addition to environmental information, current keyswitch position, LED indications, and other information. The following is an example of the additional output produced by the `-v` option

```
========================= Environmental Status =========================

System Temperatures (Celsius):
Device       Temperature   Status
---------------------------------------
CPU 0          xx          n/a
CPU 1          64          OK
CPU 2          xx          n/a
CPU 3          56          OK
CPU 4          xx          n/a
CPU 5          xx          n/a
CPU 6          xx          n/a
CPU 7          xx          n/a
MB             72          OK
IO             65          OK
BP0            26          OK
BP1            25          OK

=================================

Front Status Panel:
-------------------
Keyswitch position: NORMAL

System LED Status:
                   POWER                   GEN FAULT
                    [ON]                     [OFF]

                   REMOVE                  DISK FAULT
                    [OFF]                    [OFF]

                   POWER FAULT             LEFT THERMAL FAULT
                    [OFF]                    [OFF]

                   RIGHT THERMAL FAULT     LEFT DOOR
                    [OFF]                    [OFF]

                   RIGHT DOOR
                    [OFF]
=================================
```

```
Disk Status:
          Presence      Fault LED       Remove LED
DISK   0: [PRESENT]        [OFF]           [OFF]
DISK   1: [PRESENT]        [OFF]           [OFF]
DISK   2: [PRESENT]        [OFF]           [OFF]
DISK   3: [PRESENT]        [OFF]           [OFF]
DISK   4: [PRESENT]        [OFF]           [OFF]
DISK   5: [PRESENT]        [OFF]           [OFF]
DISK   6: [PRESENT]        [OFF]           [OFF]
DISK   7: [  EMPTY]
DISK   8: [  EMPTY]
DISK   9: [PRESENT]        [OFF]           [OFF]
DISK  10: [  EMPTY]
DISK  11: [  EMPTY]
=================================

Fan Bank :
----------
Bank                        Speed         Status
                           ( RPMS )
----                       --------      ---------
CPU0_PRIM_FAN                3260        [ENABLED]
CPU1_PRIM_FAN                3260        [ENABLED]
IO0_PRIM_FAN                 2884        [ENABLED]
IO1_PRIM_FAN                 2884        [ENABLED]
IO0_SEC_FAN                     0        [DISABLED]
IO1_SEC_FAN                     0        [DISABLED]
IO_BRIDGE_PRIM_FAN           3448        [ENABLED]

=================================

Power Supplies:
---------------

Supply     Status     Fan Fail  Temp Fail  CS Fail  3.3V   5V   12V   48V
------  ------------  --------  ---------  -------  ----   --   ---   ---
PS0      GOOD                                         6     6     4     2
PS1      GOOD                                         7     6     4     2
PS2      GOOD                                         7     6     4     2


========================= HW Revisions =======================================

System PROM revisions:
----------------------
OBP X.X.X 2001/03/27 11:43

IO ASIC revisions:
------------------
                     Port
Brd  Model            ID  Status Version
---- --------------- ---- ------ -------
IB-1 unknown          8    ok     3
IB-1 unknown          9    ok     3
```

Note – Refer to the `prtdiag` man page for additional information.

Solaris `prtconf` Command

The `prtconf` command displays system configuration information, including the total amount of memory and the device configuration as described by the system's device hierarchy.

To run `prtconf`, type:

```
% /usr/sbin/prtconf
```

The following is partial sample output.

```
System Configuration:  Sun Microsystems  sun4u
Memory size: 3072 Megabytes
System Peripherals (Software Nodes):

SUNW,Sun-Fire-880
    packages (driver not attached)
        SUNW,builtin-drivers (driver not attached)
        deblocker (driver not attached)
        disk-label (driver not attached)
        terminal-emulator (driver not attached)
        obp-tftp (driver not attached)
        SUNW,debug (driver not attached)
        dropins (driver not attached)
        kbd-translator (driver not attached)
        ufs-file-system (driver not attached)
    chosen (driver not attached)
    openprom (driver not attached)
        client-services (driver not attached)
    options, instance #0
    aliases (driver not attached)
    memory (driver not attached)
    virtual-memory (driver not attached)
    SUNW,UltraSPARC-III (driver not attached)
    memory-controller, instance #0
    SUNW,UltraSPARC-III (driver not attached)
    memory-controller, instance #1
```

```
pci, instance #0
        scsi, instance #0
            disk (driver not attached)
            tape (driver not attached)
            sd, instance #0 (driver not attached)
            sd, instance #1 (driver not attached)
            sd, instance #2 (driver not attached)
TSI,gfxp (driver not attached)
    pci, instance #1
        network (driver not attached)
        SUNW,qlc, instance #0
            fp (driver not attached)
                disk (driver not attached)
            fp, instance #0
                ses (driver not attached)
                ssd, instance #0
                ssd, instance #1
                ssd, instance #2
                ssd, instance #3
pci, instance #2
        ebus, instance #0
            flashprom (driver not attached)
            bbc, instance #0
            power (driver not attached)
            i2c, instance #1
                fru, instance #0
                fru, instance #1
                fru, instance #2
                fru, instance #3
                fru, instance #4
                fru, instance #5
                fru, instance #6
                fru, instance #7
                temperature, instance #0
                temperature, instance #1
                temperature, instance #2
                temperature, instance #3
                temperature, instance #4
                temperature, instance #5
                temperature, instance #6
```

Solaris `prtfru` Command

The `prtfru` command displays specific information about the following FRUs:

- I/O board
- RSC card
- Power distribution board and power supplies
- FC-AL backplane
- Motherboard
- CPU/Memory boards
- DIMMs

The `prtfru` command also displays the contents of the FRU SEEPROMs:

- FRU description
- Part number and serial number
- Hardware revision levels
- Temperature, voltage, and power data

The following is partial sample output from the `prtfru` command.

```
% prtfru
/frutree
/frutree/chassis (fru)
/frutree/chassis/io-board (container)
   SEGMENT: SD
      /ManR
      /ManR/UNIX_Timestamp32: Tue May  9 09:36:08 EDT 2000
      /ManR/Fru_Description: ASSY,PCB,PCI/IO,BRD,RHINO
      /ManR/Manufacture_Loc: BENCHMARK ELECTRONICS INC,HUNTSVILLE,ALABAMA,USA
      /ManR/Sun_Part_No: 5015142
      /ManR/Sun_Serial_No: 000069
      /ManR/Vendor_Name: NO JEDEC CODE FOR THIS VENDOR
      /ManR/Initial_HW_Dash_Level: 03
      /ManR/Initial_HW_Rev_Level: 01
      /ManR/Fru_Shortname: /Dak_IOBoardR
      /Dak_IOBoardR/PROM_Format_Version: 1
      /Dak_IOBoardR/Ambient_Temp_Array: 9223372036854775806
      /Dak_IOBoardR/Min_Power_Rating (4 iterations)
      /Dak_IOBoardR/Min_Power_Rating[0]: 11
      /Dak_IOBoardR/Min_Power_Rating[1]: 22
      /Dak_IOBoardR/Min_Power_Rating[2]: 33
      /Dak_IOBoardR/Min_Power_Rating[3]: 44
```

```
 /Dak_IOBoardR/Max_Power_Rating (4 iterations)
      /Dak_IOBoardR/Max_Power_Rating[0]: 22
      /Dak_IOBoardR/Max_Power_Rating[1]: 33
      /Dak_IOBoardR/Max_Power_Rating[2]: 44
      /Dak_IOBoardR/Max_Power_Rating[3]: 55
/frutree/chassis/rsc-board (container)
   SEGMENT: SD
/frutree/chassis/fcal-backplane-slot?Label=0
/frutree/chassis/fcal-backplane-slot?Label=0/fcal-backplane (container)
/frutree/chassis/fcal-backplane-slot?Label=1
/frutree/chassis/fcal-backplane-slot?Label=1/fcal-backplane (container)
/frutree/chassis/power-dist-board (container)
/frutree/chassis/power-dist-board/power-supply-slot?Label=0
/frutree/chassis/power-dist-board/power-supply-slot?Label=0/power-supply (container)
/frutree/chassis/power-dist-board/power-supply-slot?Label=1
/frutree/chassis/power-dist-board/power-supply-slot?Label=1/power-supply (container)
/frutree/chassis/power-dist-board/power-supply-slot?Label=2
/frutree/chassis/power-dist-board/power-supply-slot?Label=2/power-supply (container)
/frutree/chassis/system-board (container)
/frutree/chassis/system-board/cpu-mem-slot?Label=A
/frutree/chassis/system-board/cpu-mem-slot?Label=B
/frutree/chassis/system-board/cpu-mem-slot?Label=B/cpu-mem-module (container)
SEGMENT: SD
      /ManR
      /ManR/UNIX_Timestamp32: Mon Jun 12 14:31:06 EDT 2000
      /ManR/Fru_Description: ASSY,CPU,DUAL,DAK
      /ManR/Manufacture_Loc: BENCHMARK ELECTRONICS INC, HUNTSVILLE, AL, USA
      /ManR/Sun_Part_No: 5014150
      /ManR/Sun_Serial_No: 001135
      /ManR/Vendor_Name: NO JEDEC CODE FOR THIS VENDOR
      /ManR/Initial_HW_Dash_Level: 03
      /ManR/Initial_HW_Rev_Level: 06
      /ManR/Fru_Shortname:
```

Solaris `prtpicl` Command

The `prtpicl` command displays the name and Platform Information and Control Library (PICL) class of all nodes in the PICL tree.

To display the high temperature and low temperature critical thresholds for each component, use the `prtpicl -v` option. See "Environmental Failures" on page 325 for more information.

The following is partial sample output from the `prtpicl` command.

```
% prtpicl
  / (picl, 4300000001)
     SYSTEM (picl, 4300000005)
         MOTHERBOARD (picl, 430000000a)
             CPU0_PFAN_TACH (fan-tachometer, 43000000e5)
             CPU1_PFAN_TACH (fan-tachometer, 43000000ef)
             CPU0_SFAN_TACH (fan-tachometer, 43000000f9)
             CPU1_SFAN_TACH (fan-tachometer, 4300000103)
             IO_BRIDGE_PFAN_TACH (fan-tachometer, 4300000135)
             IO_BRIDGE_SFAN_TACH (fan-tachometer, 430000013f)
             IO_PFAN_ONOFF_SWITCH (switch, 430000015a)
             IO_SFAN_ONOFF_SWITCH (switch, 430000015f)
             IO_BRIDGE_PFAN_ONOFF_SWITCH (switch, 4300000164)
             IO_BRIDGE_SFAN_ONOFF_SWITCH (switch, 4300000169)
             DISK_BP0_PR_SENSOR (gpio, 430000016e)
             DISK_BP1_PR_SENSOR (gpio, 4300000175)
             RSC_PR_SENSOR (gpio, 430000017c)
             CPU_0_2_MOD_SLOT (picl, 4300000274)
             CPU_1_3_MOD_SLOT (picl, 4300000279)
                 CPU_1_3_MOD_CARD (picl, 430000028d)
                  CPU1_DIE_TEMPERATURE_SENSOR (temperature-sensor, 43000002f2)
                  CPU3_DIE_TEMPERATURE_SENSOR (temperature-sensor, 4300000306)
                     24C64_A0_1 (i2c, 4300000696)
                     24C64_A2_1 (i2c, 430000069b)
                     24C64_A4_1 (i2c, 43000006a0)
                     24C64_A6_1 (i2c, 43000006a5)
                     24C64_A8_1 (i2c, 43000006aa)
                     24C64_AA_1 (i2c, 43000006af)
                     24C64_AC_1 (i2c, 43000006b4)
                     24C64_AE_1 (i2c, 43000006b9)
                     24C64_A0_3 (i2c, 43000006e6)
                     24C64_A2_3 (i2c, 43000006eb)
                     24C64_A4_3 (i2c, 43000006f0)
                     24C64_A6_3 (i2c, 43000006f5)
                     24C64_A8_3 (i2c, 43000006fa)
```

```
CPU_4_6_MOD_SLOT (picl, 430000027e)
            CPU_5_7_MOD_SLOT (picl, 4300000283)
            CPU_0_2_MOD_PR_SENSOR (gpio, 43000002cc)
            CPU_1_3_MOD_PR_SENSOR (gpio, 43000002d3)
            CPU_4_6_MOD_PR_SENSOR (gpio, 43000002da)
            CPU_5_7_MOD_PR_SENSOR (gpio, 43000002e1)
            DAR8_DIE_TEMPERATURE_SENSOR (temperature-sensor, 430000034c)
            DCS8_DIE_TEMPERATURE_SENSOR (temperature-sensor, 4300000356)
            24C64_A8_4 (i2c, 4300000718)
            SSC050_80_5 (i2c, 4300000786)
            HPC3130_EC_5 (i2c, 43000007fe)
            24C64_A0_11 (i2c, 43000008bc)
        IO_BOARD (picl, 430000000f)
            FAN_BLAST_OFF_SWITCH (switch, 430000003c)
            CPU_PFAN_PR_SENSOR (gpio, 43000000bb)
            CPU_SFAN_PR_SENSOR (gpio, 43000000c2)
            IO_PFAN_PR_SENSOR (gpio, 43000000c9)
            IO_SFAN_PR_SENSOR (gpio, 43000000d0)
            IO_BRIDGE_PFAN_PR_SENSOR (gpio, 43000000d7)
            IO_BRIDGE_SFAN_PR_SENSOR (gpio, 43000000de)
            IO0_PFAN_TACH (fan-tachometer, 430000010d)
            IO1_PFAN_TACH (fan-tachometer, 4300000117)
            IO0_SFAN_TACH (fan-tachometer, 4300000121)
            PS1_PR_SENSOR (gpio, 430000022a)
            PS1_PR_SENSOR (gpio, 430000022a)
            PS2_PR_SENSOR (gpio, 430000026d)
            MB_AMB_TEMPERATURE_SENSOR (temperature-sensor, 4300000338)
            IOB_AMB_TEMPERATURE_SENSOR (temperature-sensor, 4300000342)
            PCI0_SLOT (picl, 43000003b4)
                PCI0_CARD (picl, 43000003e1)
            PCI1_SLOT (picl, 43000003b9)
            PCI2_SLOT (picl, 43000003be)
            PCI3_SLOT (picl, 43000003c3)
            PCI4_SLOT (picl, 43000003c8)
            PCI5_SLOT (picl, 43000003cd)
            PCI6_SLOT (picl, 43000003d2)
            PCI7_SLOT (picl, 43000003d7)
            PCI8_SLOT (picl, 43000003dc)
            PCI0_PR_SENSOR (gpio, 430000047a)
            PCI1_PR_SENSOR (gpio, 4300000481)
            PCI2_PR_SENSOR (gpio, 4300000488)
            PCI3_PR_SENSOR (gpio, 430000048f)
            PCI4_PR_SENSOR (gpio, 4300000496)
            PCI5_PR_SENSOR (gpio, 430000049d)
            PCI6_PR_SENSOR (gpio, 43000004a4)
```

Solaris `showrev` Command

The `showrev` command displays revision information for the current hardware and software. When used with the `-p` option, this command displays installed patches.

The following is partial sample output from the `showrev` command with the `-p` option:.

```
% /usr/sbin/showrev -p
Patch: 109729-01 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsu
Patch: 109783-01 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsu
Patch: 109807-01 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsu
Patch: 109809-01 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsu
Patch: 110905-01 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsu
Patch: 110910-01 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsu
Patch: 110914-01 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsu
Patch: 108964-04 Obsoletes:  Requires:  Incompatibles:  Packages: SUNWcsr
```

Solaris `psrinfo` Command

The `psrinfo` command displays the date and time each CPU came online.

The `psrinfo` command with the `-v` option displays additional information about the CPUs, including clock speed.

The following is sample output from the `psrinfo` command with the `-v` option:.

```
% /usr/sbin/psrinfo -v
Status of processor 0 as of: 04/11/01 12:03:45
  Processor has been on-line since 04/11/01 10:53:03.
  The sparcv9 processor operates at 750 MHz,
        and has a sparcv9 floating point processor.
Status of processor 2 as of: 04/11/01 12:03:45
  Processor has been on-line since 04/11/01 10:53:05.
  The sparcv9 processor operates at 750 MHz,
        and has a sparcv9 floating point processor.
```

OpenBoot `show-devs` Command

If you are working from the `ok` prompt you can use the OpenBoot `show-devs` command to list the devices in the system configuration. The following is sample `show-devs` output for a Sun Fire 880 server configured with a full complement of CPU/Memory boards, DIMMs, power supplies, and FC-AL disk backplanes. The system also includes a Sun StorEdge Dual Fibre Channel Host Adapter card to drive Loop B of the FC-AL mass storage subsystem. The `show-devs` output displays the device tree for the system. Helpful descriptions for most of the devices are provided to the right of the sample output.

```
ok show-devs
/pci@9,600000                                         PCI Bus C - Slots 7 and 8
/pci@9,700000                                         PCI Bus D - Slots 4, 5, 6, RIO ASIC
/pci@8,600000                                         PCI Bus A - FC-AL, Gigabit Ethernet
/pci@8,700000                                         PCI Bus B - Slots 0-3, SCSI controller
/memory-controller@7,400000                           Memory controller (CPU7) - Slot D
/SUNW,UltraSPARC-III@7,0                              CPU7 - Slot D
/memory-controller@6,400000                           Memory controller (CPU6) - Slot C
/SUNW,UltraSPARC-III@6,0                              CPU6 - Slot C
/memory-controller@5,400000                           Memory controller (CPU5) - Slot D
/SUNW,UltraSPARC-III@5,0                              CPU5 - Slot D
/memory-controller@4,400000                           Memory controller (CPU4) - Slot C
/SUNW,UltraSPARC-III@4,0                              CPU4 - Slot C
/memory-controller@3,400000                           Memory controller (CPU3) - Slot B
/SUNW,UltraSPARC-III@3,0                              CPU3 - Slot B
/memory-controller@2,400000                           Memory controller (CPU2) - Slot A
/SUNW,UltraSPARC-III@2,0                              CPU2 - Slot A
/memory-controller@1,400000                           Memory controller (CPU1) - Slot B
/SUNW,UltraSPARC-III@1,0                              CPU1 - Slot B
/memory-controller@0,400000                           Memory controller (CPU0) - Slot A
/SUNW,UltraSPARC-III@0,0                              CPU0 - Slot A
/virtual-memory
/memory@m0,20
/aliases
/options
/openprom
/chosen
/packages
/pci@9,600000/pci@1
/pci@9,600000/pci@1/SUNW,qlc@5                        ISP2200A PCI FC-AL controller, external
/pci@9,600000/pci@1/SUNW,qlc@4                        ISP2200A PCI FC-AL controller (Loop B)
/pci@9,600000/pci@1/SUNW,qlc@5/fp@0,0
/pci@9,600000/pci@1/SUNW,qlc@5/fp@0,0/disk
/pci@9,600000/pci@1/SUNW,qlc@4/fp@0,0
/pci@9,600000/pci@1/SUNW,qlc@4/fp@0,0/disk
/pci@9,700000/usb@1,3                                 USB open host controller
/pci@9,700000/network@1,1                             On-board Fast Ethernet interface
/pci@9,700000/ebus@1                                  E-bus
/pci@9,700000/ebus@1/mouse@2                          USB mouse
/pci@9,700000/ebus@1/keyboard@1                       USB keyboard
```

/pci@9,700000/ebus@1/serial@1,400000	Serial ports A and B
/pci@9,700000/ebus@1/rsc-console@1,3083f8	RSC card
/pci@9,700000/ebus@1/rsc-control@1,3062f8	RSC card
/pci@9,700000/ebus@1/pmc@1,300700	Power management controller
/pci@9,700000/ebus@1/gpio@1,300600	Super I/O subsystem
/pci@9,700000/ebus@1/rtc@1,300070	Real time clock
/pci@9,700000/ebus@1/i2c@1,500030	I^2C segment 11 (NVRAM)
/pci@9,700000/ebus@1/i2c@1,50002e	I^2C segments 6 - 10 (FRU PROMs)
/pci@9,700000/ebus@1/bbc@1,500000	Boot bus controller
/pci@9,700000/ebus@1/i2c@1,30	I^2C segment 5 (envrironmental)
/pci@9,700000/ebus@1/i2c@1,2e	I^2C segment 0 - 4 (FRU PROMs)
/pci@9,700000/ebus@1/power@1,30002e	
/pci@9,700000/ebus@1/bbc@1,0	Boot bus controller
/pci@9,700000/ebus@1/flashprom@0,0	OpenBoot PROM
/pci@9,700000/ebus@1/i2c@1,500030/idprom@0,a0	"NVRAM" SEEPROM
/pci@9,700000/ebus@1/i2c@1,500030/nvram@0,a0	
/pci@9,700000/ebus@1/i2c@1,50002e/temperature@4,56	MAX1617 die thermal sensor, MDR8-5
/pci@9,700000/ebus@1/i2c@1,50002e/temperature@4,54	MAX1617 die thermal sensor, MDR8-4
/pci@9,700000/ebus@1/i2c@1,50002e/temperature@4,52	MAX1617 die thermal sensor, MDR8-3
/pci@9,700000/ebus@1/i2c@1,50002e/fru@4,a2	FRU SEEPROM – CPU/Memory board D
/pci@9,700000/ebus@1/i2c@1,50002e/fru@4,a0	FRU SEEPROM – CPU/Memory board C
/pci@9,700000/ebus@1/i2c@1,50002e/fru@3,ae	FRU SEEPROM – CPU7 DIMM J8201
/pci@9,700000/ebus@1/i2c@1,50002e/fru@3,ac	FRU SEEPROM – CPU7 DIMM J8001
/pci@9,700000/ebus@1/i2c@1,50002e/fru@3,aa	FRU SEEPROM – CPU7 DIMM J8200
/pci@9,700000/ebus@1/i2c@1,50002e/fru@3,a8	FRU SEEPROM – CPU7 DIMM J8000
/pci@9,700000/ebus@1/i2c@1,50002e/fru@3,a6	FRU SEEPROM – CPU7 DIMM J8101
/pci@9,700000/ebus@1/i2c@1,50002e/fru@3,a4	FRU SEEPROM – CPU7 DIMM J7901
/pci@9,700000/ebus@1/i2c@1,50002e/fru@3,a2	FRU SEEPROM – CPU7 DIMM J8100
/pci@9,700000/ebus@1/i2c@1,50002e/fru@3,a0	FRU SEEPROM – CPU7 DIMM J7900
/pci@9,700000/ebus@1/i2c@1,50002e/fru@2,ae	FRU SEEPROM – CPU6 DIMM J8201
/pci@9,700000/ebus@1/i2c@1,50002e/fru@2,ac	FRU SEEPROM – CPU6 DIMM J8001
/pci@9,700000/ebus@1/i2c@1,50002e/fru@2,aa	FRU SEEPROM – CPU6 DIMM J8200
/pci@9,700000/ebus@1/i2c@1,50002e/fru@2,a8	FRU SEEPROM – CPU6 DIMM J8000
/pci@9,700000/ebus@1/i2c@1,50002e/fru@2,a6	FRU SEEPROM – CPU6 DIMM J8101
/pci@9,700000/ebus@1/i2c@1,50002e/fru@2,a4	FRU SEEPROM – CPU6 DIMM J7901
/pci@9,700000/ebus@1/i2c@1,50002e/fru@2,a2	FRU SEEPROM – CPU6 DIMM J8100
/pci@9,700000/ebus@1/i2c@1,50002e/fru@2,a0	FRU SEEPROM – CPU6 DIMM J7900
/pci@9,700000/ebus@1/i2c@1,50002e/fru@1,ae	FRU SEEPROM – CPU5 DIMM J3201
/pci@9,700000/ebus@1/i2c@1,50002e/fru@1,ac	FRU SEEPROM – CPU5 DIMM J3001
/pci@9,700000/ebus@1/i2c@1,50002e/fru@1,aa	FRU SEEPROM – CPU5 DIMM J3200
/pci@9,700000/ebus@1/i2c@1,50002e/fru@1,a8	FRU SEEPROM – CPU5 DIMM J3000
/pci@9,700000/ebus@1/i2c@1,50002e/fru@1,a6	FRU SEEPROM – CPU5 DIMM J3101
/pci@9,700000/ebus@1/i2c@1,50002e/fru@1,a4	FRU SEEPROM – CPU5 DIMM J2901
/pci@9,700000/ebus@1/i2c@1,50002e/fru@1,a2	FRU SEEPROM – CPU5 DIMM J3100
/pci@9,700000/ebus@1/i2c@1,50002e/fru@1,a0	FRU SEEPROM – CPU5 DIMM J2900
/pci@9,700000/ebus@1/i2c@1,50002e/fru@0,ae	FRU SEEPROM – CPU4 DIMM J3201
/pci@9,700000/ebus@1/i2c@1,50002e/fru@0,ac	FRU SEEPROM – CPU4 DIMM J3001
/pci@9,700000/ebus@1/i2c@1,50002e/fru@0,aa	FRU SEEPROM – CPU4 DIMM J3200
/pci@9,700000/ebus@1/i2c@1,50002e/fru@0,a8	FRU SEEPROM – CPU4 DIMM J3000
/pci@9,700000/ebus@1/i2c@1,50002e/fru@0,a6	FRU SEEPROM – CPU4 DIMM J3101
/pci@9,700000/ebus@1/i2c@1,50002e/fru@0,a4	FRU SEEPROM – CPU4 DIMM J2901
/pci@9,700000/ebus@1/i2c@1,50002e/fru@0,a2	FRU SEEPROM – CPU4 DIMM J3100
/pci@9,700000/ebus@1/i2c@1,50002e/fru@0,a0	FRU SEEPROM – CPU4 DIMM J2900

```
/pci@9,700000/ebus@1/i2c@1,30/hotplug-controller@0,ecHot plug controller, CPU/Memory slots
/pci@9,700000/ebus@1/i2c@1,30/hotplug-controller@0,e8Hot plug controller, PCI slots 5-8
/pci@9,700000/ebus@1/i2c@1,30/hotplug-controller@0,e6Hot plug controller, PCI slots 2-8
/pci@9,700000/ebus@1/i2c@1,30/hotplug-controller@0,e2Hot plug controller, PCI slots 0-1
/pci@9,700000/ebus@1/i2c@1,30/rscrtc@0,d0           RSC card real time clock
/pci@9,700000/ebus@1/i2c@1,30/fru@0,ae              FRU SEEPROM - power distribution board
/pci@9,700000/ebus@1/i2c@1,30/fru@0,ac              FRU SEEPROM - expansion backplane
/pci@9,700000/ebus@1/i2c@1,30/fru@0,a8              FRU SEEPROM - base backplane
/pci@9,700000/ebus@1/i2c@1,30/fru@0,a6              FRU SEEPROM - RSC card
/pci@9,700000/ebus@1/i2c@1,30/fru@0,a4              FRU SEEPROM - power supply 2
/pci@9,700000/ebus@1/i2c@1,30/fru@0,a2              FRU SEEPROM - power supply 1
/pci@9,700000/ebus@1/i2c@1,30/fru@0,a0              FRU SEEPROM - power supply 0
/pci@9,700000/ebus@1/i2c@1,30/temperature-sensor@0,9eLM75 thermal sensor, exp backplane
/pci@9,700000/ebus@1/i2c@1,30/temperature-sensor@0,9cLM75 thermal sensor, base backplane
/pci@9,700000/ebus@1/i2c@1,30/temperature@0,9a      MAX1617 die thermal sensor - CPU7
/pci@9,700000/ebus@1/i2c@1,30/temperature@0,98      MAX1617 die thermal sensor - CPU6
/pci@9,700000/ebus@1/i2c@1,30/adio@0,96             I/O board ambient temperature ADC
/pci@9,700000/ebus@1/i2c@1,30/adio@0,94             Current output monitor - power supply 2
/pci@9,700000/ebus@1/i2c@1,30/adio@0,92             Current output monitor - power supply 1
/pci@9,700000/ebus@1/i2c@1,30/adio@0,90             Current output monitor - power supply 0
/pci@9,700000/ebus@1/i2c@1,30/ioexp@0,8e            SSC-050 - expansion backplane
/pci@9,700000/ebus@1/i2c@1,30/ioexp@0,8c            SSC-050 - expansion backplane
/pci@9,700000/ebus@1/i2c@1,30/ioexp@0,8a            SSC-050 - base backplane
/pci@9,700000/ebus@1/i2c@1,30/ioexp@0,88            SSC-050 - base backplane
/pci@9,700000/ebus@1/i2c@1,30/ioexp@0,82            SSC-050 - I/O board
/pci@9,700000/ebus@1/i2c@1,30/ioexp@0,80            SSC-050 - motherboard
/pci@9,700000/ebus@1/i2c@1,30/ioexp@0,74
/pci@9,700000/ebus@1/i2c@1,30/ioexp@0,72
/pci@9,700000/ebus@1/i2c@1,30/ioexp@0,70
/pci@9,700000/ebus@1/i2c@1,30/i2c-bridge@0,60
/pci@9,700000/ebus@1/i2c@1,30/adio@0,5e             I/O board CPU fan speed control DAC
/pci@9,700000/ebus@1/i2c@1,30/controller@0,5c
/pci@9,700000/ebus@1/i2c@1,30/adio@0,5a
/pci@9,700000/ebus@1/i2c@1,30/controller@0,58
/pci@9,700000/ebus@1/i2c@1,30/temperature@0,56      MAX1617 die thermal sensor - CPU5
/pci@9,700000/ebus@1/i2c@1,30/temperature@0,54      MAX1617 die thermal sensor - CPU4
/pci@9,700000/ebus@1/i2c@1,30/temperature@0,52      MAX1617 die thermal sensor - CPU3
/pci@9,700000/ebus@1/i2c@1,30/ioexp@0,46            I/O board fan tray OK-to-Remove LEDs
/pci@9,700000/ebus@1/i2c@1,30/temperature@0,34      MAX1617 die thermal sensor - CPU2
/pci@9,700000/ebus@1/i2c@1,30/temperature@0,32      MAX1617 die thermal sensor - CPU1
/pci@9,700000/ebus@1/i2c@1,30/temperature@0,30      MAX1617 die thermal sensor - CPU0
/pci@9,700000/ebus@1/i2c@1,30/controller@0,1e       SSC100 controller Loop B exp backplane
/pci@9,700000/ebus@1/i2c@1,30/controller@0,1c       SSC100 controller Loop A exp backplane
/pci@9,700000/ebus@1/i2c@1,30/controller@0,1a       SSC100 controller Loop B base backplane
/pci@9,700000/ebus@1/i2c@1,30/smbus-ara@0,18
/pci@9,700000/ebus@1/i2c@1,30/controller@0,16       SSC100 controller Loop A base backplane
/pci@9,700000/ebus@1/i2c@1,2e/temperature@4,98      MAX1617 die thermal sensor, MDR8-2
/pci@9,700000/ebus@1/i2c@1,2e/temperature@4,56      MAX1617 die thermal sensor, MDR8-1
/pci@9,700000/ebus@1/i2c@1,2e/temperature@4,54      MAX1617 die thermal sensor, MDR8-0
/pci@9,700000/ebus@1/i2c@1,2e/temperature@4,52      MAX1617 die thermal sensor, DCS8
/pci@9,700000/ebus@1/i2c@1,2e/temperature@4,34      MAX1617 die thermal sensor, DAR8
/pci@9,700000/ebus@1/i2c@1,2e/temperature@4,32      MAX1617 die thermal sensor, PCI bridge0
/pci@9,700000/ebus@1/i2c@1,2e/temperature@4,30      MAX1617 die thermal sensor, PCI bridge1
```

```
/pci@9,700000/ebus@1/i2c@1,2e/fru@4,aa          FRU SEEPROM - I/O board
/pci@9,700000/ebus@1/i2c@1,2e/fru@4,a8          FRU SEEPROM - motherboard
/pci@9,700000/ebus@1/i2c@1,2e/fru@4,a2          FRU SEEPROM - CPU/Memory board B
/pci@9,700000/ebus@1/i2c@1,2e/fru@4,a0          FRU SEEPROM - CPU/Memory board A
/pci@9,700000/ebus@1/i2c@1,2e/fru@3,ae          FRU SEEPROM - CPU3 DIMM J8201
/pci@9,700000/ebus@1/i2c@1,2e/fru@3,ac          FRU SEEPROM - CPU3 DIMM J8001
/pci@9,700000/ebus@1/i2c@1,2e/fru@3,aa          FRU SEEPROM - CPU3 DIMM J8200
/pci@9,700000/ebus@1/i2c@1,2e/fru@3,a8          FRU SEEPROM - CPU3 DIMM J8000
/pci@9,700000/ebus@1/i2c@1,2e/fru@3,a6          FRU SEEPROM - CPU3 DIMM J8101
/pci@9,700000/ebus@1/i2c@1,2e/fru@3,a4          FRU SEEPROM - CPU3 DIMM J7901
/pci@9,700000/ebus@1/i2c@1,2e/fru@3,a2          FRU SEEPROM - CPU3 DIMM J8100
/pci@9,700000/ebus@1/i2c@1,2e/fru@3,a0          FRU SEEPROM - CPU3 DIMM J7900
/pci@9,700000/ebus@1/i2c@1,2e/fru@2,ae          FRU SEEPROM - CPU2 DIMM J8201
/pci@9,700000/ebus@1/i2c@1,2e/fru@2,ac          FRU SEEPROM - CPU2 DIMM J8001
/pci@9,700000/ebus@1/i2c@1,2e/fru@2,aa          FRU SEEPROM - CPU2 DIMM J8200
/pci@9,700000/ebus@1/i2c@1,2e/fru@2,a8          FRU SEEPROM - CPU2 DIMM J8000
/pci@9,700000/ebus@1/i2c@1,2e/fru@2,a6          FRU SEEPROM - CPU2 DIMM J8101
/pci@9,700000/ebus@1/i2c@1,2e/fru@2,a4          FRU SEEPROM - CPU2 DIMM J7901
/pci@9,700000/ebus@1/i2c@1,2e/fru@2,a2          FRU SEEPROM - CPU2 DIMM J8100
/pci@9,700000/ebus@1/i2c@1,2e/fru@2,a0          FRU SEEPROM - CPU2 DIMM J7900
/pci@9,700000/ebus@1/i2c@1,2e/fru@1,ae          FRU SEEPROM - CPU1 DIMM J3201
/pci@9,700000/ebus@1/i2c@1,2e/fru@1,ac          FRU SEEPROM - CPU1 DIMM J3001
/pci@9,700000/ebus@1/i2c@1,2e/fru@1,aa          FRU SEEPROM - CPU1 DIMM J3200
/pci@9,700000/ebus@1/i2c@1,2e/fru@1,a8          FRU SEEPROM - CPU1 DIMM J3000
/pci@9,700000/ebus@1/i2c@1,2e/fru@1,a6          FRU SEEPROM - CPU1 DIMM J3101
/pci@9,700000/ebus@1/i2c@1,2e/fru@1,a4          FRU SEEPROM - CPU1 DIMM J2901
/pci@9,700000/ebus@1/i2c@1,2e/fru@1,a2          FRU SEEPROM - CPU1 DIMM J3100
/pci@9,700000/ebus@1/i2c@1,2e/fru@1,a0          FRU SEEPROM - CPU1 DIMM J2900
/pci@9,700000/ebus@1/i2c@1,2e/fru@0,ae          FRU SEEPROM - CPU0 DIMM J3201
/pci@9,700000/ebus@1/i2c@1,2e/fru@0,ac          FRU SEEPROM - CPU0 DIMM J3001
/pci@9,700000/ebus@1/i2c@1,2e/fru@0,aa          FRU SEEPROM - CPU0 DIMM J3200
/pci@9,700000/ebus@1/i2c@1,2e/fru@0,a8          FRU SEEPROM - CPU0 DIMM J3000
/pci@9,700000/ebus@1/i2c@1,2e/fru@0,a6          FRU SEEPROM - CPU0 DIMM J3101
/pci@9,700000/ebus@1/i2c@1,2e/fru@0,a4          FRU SEEPROM - CPU0 DIMM J2901
/pci@9,700000/ebus@1/i2c@1,2e/fru@0,a2          FRU SEEPROM - CPU0 DIMM J3100
/pci@9,700000/ebus@1/i2c@1,2e/fru@0,a0          FRU SEEPROM - CPU0 DIMM J2900
/pci@8,600000/SUNW,qlc@2                        On-board FC-AL controller
/pci@8,600000/network@1                         On-board Gigabit Ethernet interface
/pci@8,600000/SUNW,qlc@2/fp@0,0
/pci@8,600000/SUNW,qlc@2/fp@0,0/disk
/pci@8,700000/scsi@1                            On-board SCSI controller
/pci@8,700000/scsi@1/tape
/pci@8,700000/scsi@1/disk
/openprom/client-services
/packages/kbd-translator
/packages/dropins
/packages/SUNW,debug
/packages/obp-tftp
/packages/terminal-emulator
/packages/disk-label
/packages/deblocker
/packages/SUNW,builtin-drivers
ok
```

OpenBoot .env Command

Use the OpenBoot .env command to display the current environmental status information.

The following is sample output from the .env command:.

```
ok .env
Environmental Status:

Power Supplies:
PS0:                          Present, receiving AC power
PS1:                          Present, receiving AC power
PS2:                          Not Present

Fans:
Tray 1 (CPU):                 Present, Fan A @ 3125 RPM, Fan B @ 3333 RPM
Tray 2 (CPU):                 Not Present
Tray 3 (I/O):                 Present, Fan A @ 2912 RPM, Fan B @ 2830 RPM
Tray 4 (I/O):                 Not Present
Fan  5 (I/O Bridge):          Present, Fan   @ 3333 RPM
Fan  6 (I/O Bridge):          Not Present

Temperatures:
CPU0:                         Ambient =  30 deg. C, Die =  53 deg. C
CPU2:                         Ambient =  29 deg. C, Die =  41 deg. C
I/O Bridge 0:                 Ambient =  29 deg. C, Die =  62 deg. C
I/O Bridge 1:                 Ambient =  28 deg. C, Die =  63 deg. C
DAR:                          Ambient =  28 deg. C, Die =  69 deg. C
DCS:                          Ambient =  28 deg. C, Die =  60 deg. C
MDR8-0:                       Ambient =  26 deg. C, Die =  48 deg. C
Motherboard:                  Ambient =  26 deg. C
I/O Board:                    Ambient =  24 deg. C
Disk Backplane 0:             Ambient =  24 deg. C
Disk Backplane 1:             Ambient =  25 deg. C

Environmental monitor is ON
```

OpenBoot `printenv` Command

Use the OpenBoot `printenv` command to display the OpenBoot configuration variables. The display includes the current values for these variables as well as the default values.

The following is sample output for the `printenv` command:.

```
ok printenv
Variable Name          Value                          Default Value

test-args              null
diag-passes            1                               1
pci8a-probe-list       1,2                             1,2
pci8b-probe-list       1,2,3,4,5                       1,2,3,4,5
pci9a-probe-list       1,2                             1,2
pci9b-probe-list       1,2,3,4                         1,2,3,4
local-mac-address?     false                           false
fcode-debug?           false                           false
silent-mode?           false                           false
scsi-initiator-id      7                               7
oem-logo                                               No default
oem-logo?              false                           false
oem-banner                                             No default
oem-banner?            false                           false
ansi-terminal?         true                            true
screen-#columns        80                              80
screen-#rows           34                              34
ttyb-rts-dtr-off       false                           false
ttyb-ignore-cd         true                            true
ttya-rts-dtr-off       false                           false
ttya-ignore-cd         true                            true
ttyb-mode              9600,8,n,1,-                    9600,8,n,1,-
ttya-mode              9600,8,n,1,-                    9600,8,n,1,-
output-device          screen                          screen
input-device           keyboard                        keyboard
auto-boot-on-error?    false                           false
load-base              16384                           16384
auto-boot?             false                           true
boot-command           boot                            boot
diag-file
diag-device            net                             net
boot-file
boot-device            /pci@8,600000/SUNW,qlc@2 ...    disk net
use-nvramrc?           false                           false
nvramrc
```

```
security-mode         none                              No default
security-password                                       No default
security-#badlogins   0                                 No default
diag-out-console      false                             false
diag-trigger          power-reset                       power-reset
diag-script           normal                            normal
diag-level            min                               min
diag-switch?          true                              false
ok
```

OpenBoot `probe-scsi` and `probe-scsi-all` Commands

To diagnose problems with the SCSI or FC-AL devices, you can use the OpenBoot `probe-scsi` and `probe-scsi-all` commands. Both commands require that you get to the `ok` prompt after a reset.

Note – When it is not practical to halt the system, you can use SunVTS software as an alternative method of testing the SCSI and FC-AL interfaces. See "About SunVTS Software" on page 282 for more information.

The `probe-scsi` command transmits an inquiry command to all SCSI and FC-AL devices connected to the on-board SCSI and FC-AL controllers. This includes any internal tape or DVD/CD-ROM drives. For any SCSI or FC-AL device that is connected and active, its target address, unit number, device type, and manufacturer name are displayed.

Note – You can also use the `probe-scsi` command to isolate failures on the FC-AL loop. See "FC-AL Loop or Disk Drive Failure" on page 317 for more information.

The `probe-scsi-all` command transmits an inquiry command to all SCSI and FC-AL devices connected to the on-board SCSI and FC-AL controllers, and any host adapters installed in PCI slots. The first identifier listed in the display is the host adapter address in the system device tree followed by the device identification data.

The following is sample output from the `probe-scsi` command:.

```
ok probe-scsi
/pci@8,600000/SUNW,qlc@2
LiD HA LUN  --- Port WWN ---  ----- Disk description -----
 0   0   0  2100002037bd356f  SEAGATE ST318304FSUN18G 042D
 6   6   0  508002000011fd5d  SUNW    SUNWGS INT FCBPL9216
 8   8   0  2100002037bd3981  SEAGATE ST318304FSUN18G 042D

/pci@8,700000/scsi@1
Target 6
  Unit 0   Removable Read Only device    TOSHIBA DVD-ROM
SD-M14011007
```

About Diagnosing Specific Problems

Network Communications Failure

Symptom

The system is unable to communicate over the network.

Action

Your system conforms to the Ethernet 10/100BASE-T standard, which states that the Ethernet 10BASE-T link integrity test function should always be enabled on both the host system and the Ethernet hub. If you have trouble establishing a connection between the Sun Fire 880 server and your Ethernet hub, verify that the Ethernet hub also has the link test function enabled.

This problem applies only to 10BASE-T network hubs, where the Ethernet link integrity test is optional. This is not a problem for 100BASE-T networks, where the test is enabled by default. Refer to the documentation provided with your Ethernet hub for more information about the link integrity test function.

Use the `test` command to test an individual network device. At the `ok` prompt, type `test` and the full path name of the device as shown in the following example:

```
ok test /pci@9,700000/network@1,1
```

If you connect the system to a network and the network does not respond, use the OpenBoot PROM command `watch-net-all` to display conditions for all network connections:

```
ok watch-net-all
```

For most PCI Ethernet cards, the link integrity test function can be enabled or disabled with a hardware jumper on the PCI card, which you must set manually. (See the documentation supplied with the card.) For the standard TPE I/O board port, the link test is enabled or disabled through software, as shown below.

Note – Some hub designs permanently enable or disable the link integrity test through a hardware jumper. In this case, refer to the hub installation or user manual for details of how the test is implemented.

Determining the Device Name of the Ethernet Interface

To enable or disable the link integrity test for the standard Ethernet interface, or for a PCI-based Ethernet interface, you must first know the device name of the desired Ethernet interface. To list the device name:

1. **Shut down the operating system and take the system to the** `ok` **prompt.**
2. **Determine the device name for the desired Ethernet interface:**

   a. **Type:**

```
ok show-devs
```

   b. **In the** `show-devs` **listing, find the device name for the desired Ethernet interface.**

   The device name is `/pci@9,700000/network@1,1` for the Fast Ethernet interface. For a PCI-based Ethernet interface, the device name may appear similar to the following: `/pci@8,700000/pci@2/SUNW,hme@0,1`

Solution 1

Use this method while the operating system is running:

1. **Become superuser.**
2. **Type:**

```
# eeprom nvramrc=”probe-all install-console banner apply
disable-link-pulse device-name”
  (Repeat for any additional device names.)
# eeprom “use-nvramrc?”=true
```

3. Reboot the system (when convenient) to make the changes effective.

Solution 2

Use this alternative method when the system is already at the OpenBoot prompt:

1. At the `ok` **prompt, type:**

```
ok nvedit
0: probe-all install-console banner
1: apply disable-link-pulse device-name
(Repeat this step for other device names as needed.)
(Press CONTROL-C to exit nvedit.)
ok nvstore
ok setenv use-nvramrc? true
```

2. Reboot the system to make the changes effective.

Power-On Failure

Symptom

The system attempts to power up but does not boot or initialize the terminal or monitor.

Action

1. Verify that the CPU/Memory boards are seated correctly.

2. Run POST diagnostics.

See “How to Use POST Diagnostics” on page 256.

3. Observe POST results.

Check the POST output using a locally attached terminal, `tip` connection, or RSC console. If you see no front panel LED activity, a power supply may be defective. See “About Power Supply LEDs” on page 348 for information about power supply LED indications.

If the front panel system fault LED remains lit or the POST output contains an error message, POST has failed. The most probable cause for this type of failure is the motherboard.

4. **Before you replace the motherboard, run the OpenBoot Diagnostics `test-all` command from the `ok` prompt or `obdiag>` prompt.**

Note – To get to the `ok` prompt, you must set the OpenBoot PROM configuration variable `auto-boot?` to `false` and then reset the system. (The default setting for `auto-boot?` is `true`.) See "How to Use OpenBoot Diagnostics" on page 276 for instructions.

```
ok test-all
```

5. **If OpenBoot Diagnostics error messages show any defective components, remove or replace those components and run firmware diagnostics again.**

   Remove any failed components that are optional. Replace any failed components that are required for a minimum configuration. Be sure the required eight DIMMs are installed in groups A0 and B0 for each CPU/Memory board installed.

6. **If POST still fails after you have removed or replaced all failed components, replace the motherboard.**

Video Output Failure

Symptom

No video at the system monitor.

Action

1. **Check that the power cord is connected to the monitor and to the wall outlet.**

2. **Verify with a volt-ohmmeter that the wall outlet is supplying AC power.**

3. **Verify that the video cable connection is secure between the monitor and the video output port.**

   Use a volt-ohmmeter to perform the continuity test on the video cable.

4. **If the cables and their connections are okay, troubleshoot the monitor and the graphics card.**

Note – To test the graphics card, a graphics display may be required.

---

5. **Use the `test` command, type:**

```
ok test screen
```

RSC Console Failure

Symptom

The system console has been redirected to an RSC console, but the RSC console is not working.

Action

The most likely cause of this problem is a faulty RSC card. To recover from this problem and gain access to the system from a local system console:

1. **Press the system Power button briefly to initiate a graceful software shutdown.**

2. **Make sure that the system is connected to a local console device.**

   Install a local console if necessary. See:

   - "About Setting Up a Console" on page 16
   - "How to Attach an Alphanumeric Terminal" on page 17
   - "How to Configure a Local Graphics Console" on page 19

3. **Press the Power button and wait until the system Fault LED on the front panel begins to blink.**

4. **Immediately press the Power button twice (with a short, one-second delay in between presses).**

   A screen similar to the following is displayed to indicate that you have successfully reset the OpenBoot NVRAM configuration variables to their default values:

```
Sun Fire 880 (8 X UltraSPARC-III), Keyboard Present
OpenBoot x.x, 256 MB memory installed, Serial #xxxxxxxx.
Ethernet address xx:xx:xx:xx:xx:xx, Host ID: xxxxxxxx.



Safe NVRAM mode, the following nvram configuration variables have
been overridden:
  ‘diag-switch?’ is true
  ‘use-nvramrc?’ is false
  ‘input-device’, ‘output-device’ are defaulted
  ‘ttya-mode’, ‘ttyb-mode’ are defaulted

These changes are temporary and the original values will be
restored after the next hardware or software reset.

ok
```

   By changing the NVRAM configuration variables to their default values, you *temporarily* redirect the system console to the local console device. Note that these NVRAM settings are reset to the defaults *for this power cycle only*. If you do nothing other than reset the system at this point, the values are not permanently changed. Only settings that you change manually at this point become permanent.

5. **To permanently redirect the system console to the local console device, type the following commands at the system `ok` prompt:**

```
ok diag-console ttya
ok setenv input-device keyboard
ok setenv output-device screen
```

6. **To cause the changes to take effect, power cycle the system, or type:**

```
ok reset-all
```

   The system permanently stores the parameter changes

7. **Run OpenBoot Diagnostics and/or SunVTS tests for the RSC card.**

8. **Replace the RSC card, if necessary.**

FC-AL Loop or Disk Drive Failure

Symptom

A disk drive read, write, or parity error is reported by the operating system or a software application.

Action

- **Replace the drive indicated by the failure message.**

Symptom

An internal FC-AL disk drive fails to boot, is not responding to commands, or an FC-AL loop fails to initialize.

Action

Run OpenBoot Diagnostics tests for the mass storage subsystem.

1. **At the `ok` prompt, type:**

```
ok setenv auto-boot? false
ok setenv diag-level max
ok setenv diag-switch true
ok setenv test-args verbose,subtests
```

2. **Power off the system.**
3. **Verify all cables attached to the FC-AL disk backplane(s) are properly connected.**
4. **Power on the system and observe the POST status messages.**

   If POST reports a problem, replace the component indicated by the failure message and repeat POST diagnostics until the problem is resolved.

5. **At the** `ok` **prompt, type:**

```
ok obdiag
```

The OpenBoot Diagnostics menu is displayed followed by the `obdiag>` prompt.

```
 ______________________________________________________________________________
|                                o b d i a g                                   |
|______________________________________________________________________________|
|                         |                         |                          |
|  1 SUNW,qlc@2           |  2 SUNW,qlc@4           |  3 SUNW,qlc@5            |
|  4 bbc@1,0              |  5 bbc@1,500000         |  6 controller@0,16       |
|  7 controller@0,1a      |  8 controller@0,1c      |  9 controller@0,1e       |
| 10 ebus@1               | 11 flashprom@0,0        | 12 gpio@1,300600         |
| 13 hotplug-controller@0,| 14 hotplug-controller@0,| 15 hotplug-controller@0, |
| 16 hotplug-controller@0,| 17 i2c@1,2e             | 18 i2c@1,30              |
| 19 i2c@1,50002e         | 20 i2c@1,500030         | 21 network@1             |
| 22 network@1,1          | 23 pmc@1,300700         | 24 rsc-control@1,3062f8  |
| 25 rtc@1,300070         | 26 scsi@1               | 27 serial@1,400000       |
| 28 usb@1,3              |                         |                          |
|_________________________|_________________________|__________________________|
|   Commands: test test-all except help what printenvs setenv versions exit    |
|______________________________________________________________________________|

obdiag>
```

6. **Test segment 5 of the I^{2}C bus (**`i2c@1,30`**) to verify that it is operating correctly.**

   Enter the test number corresponding to the `i2c@1,30` test. For example:

```
ok test 18
```

Note – Keep in mind that the OpenBoot Diagnostics menu entries and test numbers vary according to system configuration.

I^{2}C segment 5 must be working correctly in order to test the FC-AL subsystem. If this test fails, test the remaining segments of the I^{2}C bus and replace the component(s) indicated by the failure messages. Segment 5 test failures can also result from a faulty I^{2}C cable.

7. **Run the SSC-100 SES controller tests in the following order:**
   - `controller@0,16` – base backplane Loop A
   - `controller@0,1c` – expansion backplane Loop A (if installed)
   - `controller@0,1a` – base backplane Loop B
   - `controller@0,1e` – expansion backplane Loop A (if installed)

   For example:

```
ok test 6,8,7,9
```

   If the tests indicates a problem with any of the following components—DPM, CRC, SSC-100, SSC-050, or LM75—the most likely source of the problem is the backplane under test. Replace the backplane and repeat the test.

   If a `loop-empty` subtest fails in a single backplane configuration, replace the backplane and repeat the test.

   If a `loop-empty` subtest fails in a dual-backplane configuration, remove the FC-AL data cables between backplanes and repeat the test. If the failure persists, replace the backplane under test; otherwise, the failure may be due to the other backplane or the FC-AL cables between the two.

   If a failure message identifies one or more specific disks, replace the disks with known good disks and repeat the testing.

8. **Run the ISP2200A FC-AL controller tests in the following order:**
   - `SUNW,qlc@2` – on-board FC-AL controller (Loop A)
   - `SUNW,qlc@4` – PCI FC-AL controller (Loop B, if installed)

   For example:

```
ok test 1,2
```

   If a failure message identifies one or more specific disks, replace the disks with known good disks and repeat the testing. Disk failure messages identify a specific disk by its AL_PA address, according to the following table.

Base Backplane	AL_PA	Expansion Backplane	AL_PA
Disk 0	EF	Disk 6	D9
Disk 1	E8	Disk 7	D6
Disk 2	E4	Disk 8	D5
Disk 3	E2	Disk 9	D4
Disk 4	E1	Disk 10	D3
Disk 5	E0	Disk 11	D2
SSC-100 SES processor	DC		

Other types of failures during the on-board controller test usually indicate a problem with the motherboard or the motherboard FC-AL cable. When testing the PCI controller, these types of failure messages point to the PCI card or the FC-AL cable between the card and the base backplane.

In a dual-backplane configuration, removing the FC-AL cables between backplanes and repeating the testing can help to isolate the problem.

DVD-ROM Drive Failure

Symptom

A DVD-ROM drive read error or parity error is reported by the operating system or a software application.

Action

- **Replace the DVD-ROM drive.**

Symptom

DVD-ROM drive fails to boot or is not responding to commands.

Action

Test the drive response to the `probe-scsi-all` command as follows:

Note – You must halt the system to execute the `probe-scsi-all` command. If this is not practical, you can use the SunVTS software to test the DVD-ROM. See "About SunVTS Software" on page 282.

---

1. **At the `ok` prompt, type:**

```
ok setenv auto-boot? false
ok reset-all
ok probe-scsi-all
```

2. **Check the output message.**

   If a target address, unit number, device type, and manufacturer name are displayed for the device, the system SCSI controller has successfully probed the device. This indicates that the motherboard is operating correctly.

3. **Take one of the following actions depending on what the** `probe-scsi` **command reports:**

   a. **Replace the SCSI data cable.**

   b. **If the problem is still evident after replacing the cable, replace the drive.**

   c. **If the problem is still evident, replace the motherboard.**

SCSI Controller Failure

Symptom

To check whether the motherboard SCSI controller is defective, test the drive response to the `probe-scsi` command.

Action

1. **At the** `ok` **prompt, type:**

```
ok setenv auto-boot? false
ok reset-all
ok probe-scsi
```

   If a target address, unit number, device type, and manufacturer name are displayed for each installed device (DVD-ROM drive or optional tape drive), the system SCSI controller has successfully probed the devices. This indicates that the motherboard is working correctly.

2. **If a device does not respond:**

   a. **Make sure that each installed SCSI device has a unique SCSI target ID.**

      See the *Sun Fire 880 Server Owner's Guide* for more information about SCSI IDs.

   b. **Verify that the data cables and the terminators are connected securely.**

   c. **Check that there are no bent pins on the data cables.**

3. **If the problem is still evident, replace the data cables.**
4. **If the problem is still evident, replace the unresponsive device.**
5. **If the problem is still evident, replace the motherboard.**

   If you are getting occasional failures on a SCSI controller, you can run the OpenBoot Diagnostics test for the controller.

```
ok test scsi
```

Note – To run the test multiple times, set the OpenBoot configuration variable `diag-passes` to the number of times to run the test, and use the OpenBoot Diagnostics menu to test the controller. See "OpenBoot Diagnostics Menu" on page 271.

Power Supply Failure

Symptom

If there is a problem with a power supply, the environmental monitoring system lights the following LEDs:

- System Fault LED on the front panel
- Power Fault LED on the status and control panel
- Fault LED at the rear of the problem power supply

In addition, the AC Status and DC Status LEDs at the rear of each power supply indicate any problem with the AC input and DC output, respectively.

See "About Setting Up a Console" on page 16 and "About Power Supply LEDs" on page 348 for more information about the LEDs.

Action

- **After you identify the problem power supply, replace it according to the removal and installation instructions in this manual.**

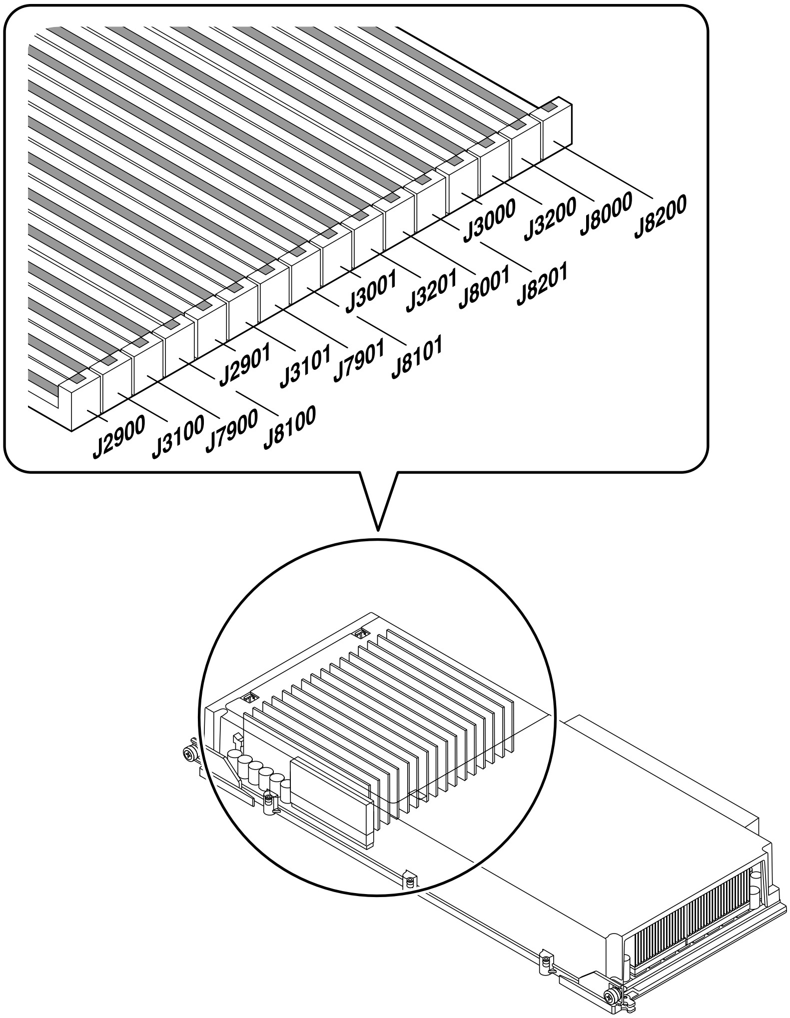
DIMM Failure

Symptom

SunVTS and POST diagnostics can report memory errors encountered during program execution. Memory error messages typically indicate the location number (J number) of the failing DIMM.

Action

1. **Use the following diagram to identify the location of a failing DIMM from its J number.**



2. **After you identify the defective DIMM, replace it according to the removal and installation instructions in this manual.**

Environmental Failures

The Sun Fire 880 server features an environmental monitoring subsystem designed to protect against:

- Extreme temperatures
- Lack of adequate air-flow through the system
- Power supply problems

Monitoring and control capabilities reside at the operating system level as well as in the system's flash PROM firmware. This ensures that monitoring capabilities remain operational even if the system has halted or is unable to boot.

The environmental monitoring subsystem uses an industry-standard I^2C bus. The I^2C bus is a simple two-wire serial bus, used throughout the system to allow the monitoring and control of temperature sensors, fans, power supplies, status LEDs, and the front panel keyswitch.

Temperature sensors are located throughout the system to monitor the ambient temperature of the system and the temperature of each CPU. The monitoring subsystem frequently polls each sensor and uses the sampled temperatures to report and respond to any overtemperature or undertemperature conditions.

The hardware and software together ensure that the temperatures within the enclosure do not stray outside predetermined "safe operation" ranges. If the temperature observed by a sensor falls below a low-temperature warning threshold or rises above a high-temperature warning threshold, the monitoring subsystem software generates a Warning message to the system console. If the temperature exceeds a low- or high-temperature critical threshold, the software issues a Critical message and proceeds to gracefully shut down the system. In both cases, the System Fault and Thermal Fault LEDs on the front status panel are illuminated to indicate the nature of the problem.

This thermal shutdown capability is also built into the hardware circuitry as a fail-safe measure. This feature provides backup thermal protection in the unlikely event that the environmental monitoring subsystem becomes disabled at both the software and firmware levels.

All error and warning messages are displayed on the system console (if one is attached) and are logged in the `/var/adm/messages` file. Front panel fault LEDs remain lit after an automatic system shutdown to aid in problem diagnosis.

The monitoring subsystem is also designed to detect fan failures. The basic system features three primary fan trays, which include a total of five individual fans. Systems equipped with the redundant cooling option include three additional (secondary) fan trays for a total of 10 individual fans. During normal operation, only the five primary fans are active.

If any primary fan fails, the monitoring subsystem detects the failure and performs the following:

- Generates an error message and logs it in the `/var/adm/messages` file
- Lights the System Fault and Thermal Fault LEDs on the status and control panel
- Lights the appropriate fan Fault LED inside the system
- Automatically activates the appropriate secondary fan tray (if installed)

The power subsystem is monitored in a similar fashion. The monitoring subsystem periodically polls the power supply status registers for a power supply OK status, indicating the status of each supply's 3.3V, 5.0V, 12V, and 48V DC outputs.

If a power supply problem is detected, an error message is displayed on the system console and logged in the `/var/adm/messages` file. The System Fault and Power Fault LEDs on the status and control panel are also lit. LEDs located on the back of each power supply indicate the source and nature of the fault.

Note – The Sun Fire 880 server power supplies have their own built-in overtemperature protection circuits that will automatically shut down the supplies in response to certain overtemperature and power fault conditions. To recover from an automatic power supply shutdown, you must disconnect the AC power cord, wait approximately 10 seconds, and then reconnect the power cord.

The error messages, generated by the monitoring subsystem in response to an environmental error condition, are listed and described in the following table. The environmental error messages are displayed on the system console (if one is attached) and logged in the `/var/adm/messages` file.

Message	Type	Description
`CRITICAL: HIGH TEMPERATURE DETECTED` *Temp* , *Temperature-Sensor*	Critical	Indicates that the temperature measured at *Temperature-Sensor* has exceeded the critical threshold. This message is displayed briefly and then followed by the shutdown message, "`The system will be shutting down in one minute`." After one minute, the system automatically shuts down. **Note -** Output from the `prtpicl -v` command shows the high temperature critical threshold for each component. See the `prtpicl` man page for information.
`CRITICAL: LOW TEMPERATURE DETECTED` *Temp* , *Temperature-Sensor*	Critical	Indicates that the temperature measured at *Temperature-Sensor* has fallen below the critical threshold. This message is displayed briefly and then followed by the shutdown message, "`The system will be shutting down in one minute`." After one minute, the system automatically shuts down. **Note -** Output from the `prtpicl -v` command shows the low temperature critical threshold for each component. See the `prtpicl` man page for information.
`WARNING: HIGH TEMPERATURE DETECTED` *Temp* , *Temperature-Sensor*	Warning	Indicates that the temperature measured at *Temperature-Sensor* has exceeded the warning threshold. If the temperature continues to rise and exceeds the critical threshold, the system issues the "`CRITICAL: HIGH TEMPERATURE...`" Warning and the shut down message. **Note -** Output from the `prtpicl` command shows the high temperature warning threshold for each component. See the `prtpicl` man page for information.
`WARNING: LOW TEMPERATURE DETECTED` *Temp* , *Temperature-Sensor*	Warning	Indicates that the temperature measured at *Temperature-Sensor* has fallen below the warning threshold. If the temperature continues to fall and goes below the critical threshold, the system issues the "`CRITICAL: LOW TEMPERATURE...`" warning and the shut down message. **Note -** Output from the `prtpicl` command shows the low temperature warning threshold for each component. See the `prtpicl` man page for information.

Message	Type	Description
`WARNING: Device` *Device* `failure detected`	Warning	Indicates that there is a problem with a power supply or fan. The system may shut down abruptly if *Device* identifies a power supply or fan in a non-redundant configuration. **Note -** PS0 is the right-side power supply; PS1 is the center power supply; PS2 is the left-side power supply.
`WARNING: Fan missing, id =` *Fan*	Warning	Appears at boot time if a primary fan tray is missing. The missing fan tray is identified by the value *Fan*.

`WARNING: Power supply overcurrent detected`
 	
`WARNING: Only 1 Power Supply in system ADD 2nd Power Supply`
 	
`WARNING: Power Supply at 95% current Remove some load`
	Warning	Indicates a power supply is overloaded. The "`Power supply overcurrent detected`" message appears with one of the other warning messages ("`...Add 2nd Power Supply`" message or the "`...Remove some load`" message).

`WARNING: Secondary fan failure, device` *Device*	Warning	Indicates a secondary fan is turned on and the speed of the fan is zero. Secondary fans are turned on only if the primary fans are not present or not operational.
`Device` *Device* `inserted`	Advisory	A hot-swap message indicating that a power supply or fan identified by *Device* was installed without service disruption.
`Device` *Device* `removed`	Advisory	A hot-swap message indicating that a power supply or fan identified by *Device* was removed without service disruption.
`Device` *Device* `OK`	Advisory	Appears when a power supply or fan failure reported by the message "`WARNING: Device failure detected`" is corrected.

`Device` *Power-Supply* `unplugged`
 	
`Device` *Power-Supply* `plugged in`
	Advisory	Indicates a power supply is inserted, but the AC power cord is not plugged in. As soon as the AC cord is plugged in, the message "`Device POWER SUPPLY plugged in`" is displayed.
		
		Note - Environmental monitoring of a power supply occurs only if the power cord is plugged in.

Disk `Error Reported` *Disk* `Error Cleared`	Advisory	Appears if a fault is detected for any of the installed internal disks. The message "*Disk* `Error cleared`" appears when the disk fault is cleared.
`Keyswitch position changed to` *Position*	Advisory	Indicates keyswitch position has changed and gives the current position.

APPENDIX **A**

Illustrated Parts Breakdown

This appendix consists of a sequence of illustrations that show how the various pieces of the system fit together. Part numbers are also provided.

Part Numbers

The following items for the Sun Fire 880 server can be replaced at the customer site by a qualified service provider.

Note – The part numbers listed in this section are correct as of the manual publication date but are subject to change without notice. Consult your authorized Sun sales representative or service provider to confirm a part number prior to ordering a replacement part.

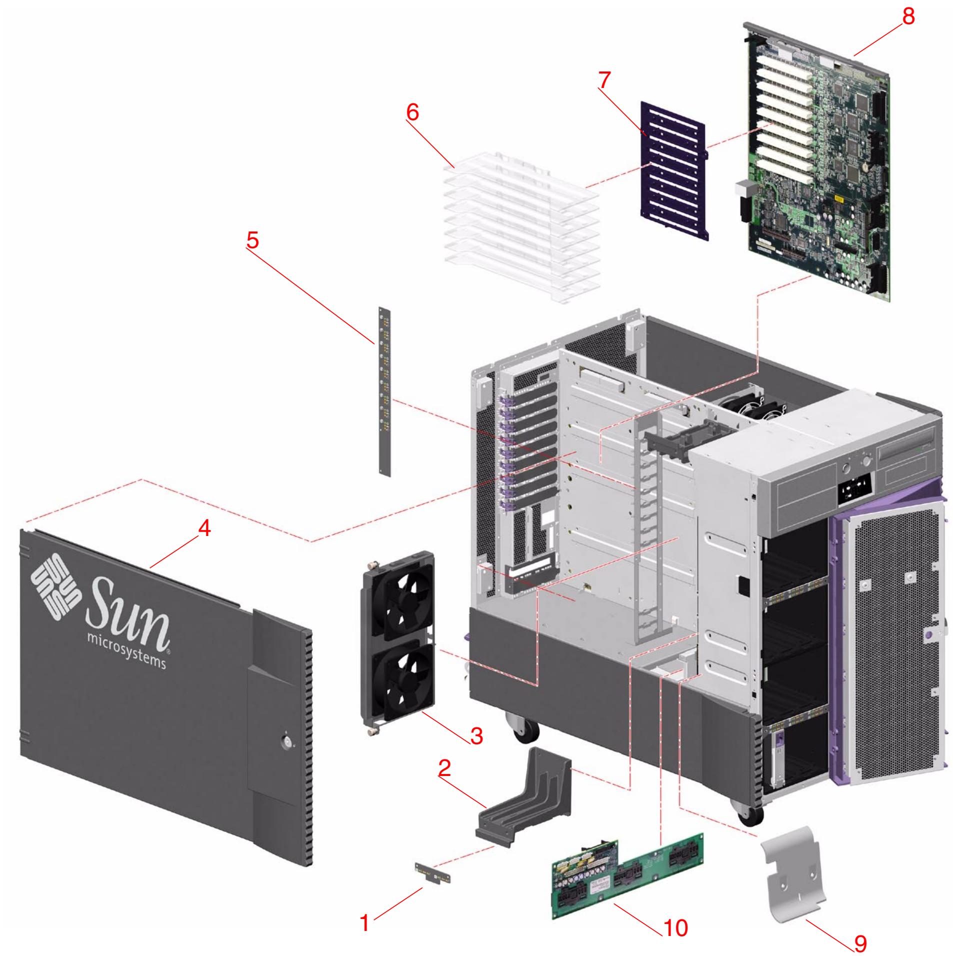
Category	Part	Part Number
Motherboard and Components	Motherboard	501-4300
	750 MHz CPU/Memory Board	501-5818
	128 MB DIMM Kit - 4x 128 MB DIMMS	595-5523
	256 MB DIMM Kit - 4x 256 MB DIMMS	595-5729
	515 MB DIMM Kit - 4x 512 MB DIMMS	595-5727
I/O Board and Components	I/O Board	501-5142
	RSC2 Card	501-5856
	System SEEPROM	Not a FRU
Power	Power Supply	300-1353
	Power Distribution Board	375-0071
FC-AL Disk Backplane	FC-AL Disk Backplane	501-5993
Storage and Removable Media Devices	12/24 DDS3 Tape Drive	370-2376
	20/40 DDS4 Tape Drive	390-0028
	18 GB 10K FC-AL Disk Drive	Not supported in the Sun Fire 880 Server
	36 GB 10K FC-AL Disk Drive	540-4525
	72 GB 10K FC-AL Disk Drive	540-4905
	DVD ROM Drive	390-0025
Fan Trays	CPU Fan Tray	540-3614
	Motherboard Fan Tray	540-4025
	I/O Fan Tray	540-3615

Category	Part	Part Number
Status Assemblies and Flex Circuits	System Status Assembly	540-3694
	CPU Fan Status Assembly	540-4453
	CPU/Memory Board Status Assembly	540-4454
	Motherboard Fan Status Flex Circuit	370-3960
	I/O Fan LED Flex Circuit	370-3962
	PCI External LED Flex Circuit	370-3963
	PCI Internal LED Flex Circuit	370-3964
	Upper Disk LED Flex Circuit	370-3958 (Not a FRU)
	Lower Disk LED Flex Circuit	370-3957 (Not a FRU)
Cables	RME Power Cable	530-2548
	RME Wide SCSI Cable	530-2569
	RME Narrow SCSI Cable	530-2748
	Wide-to-Narrow SCSI Adapter	595-6013
	I/O Board Remote Sense Cable	530-2745
	I/O Signal Cable	530-2746
	Motherboard Power Cable	530-2816
	I/O Board Power Cable	530-2818
	I^2C Cable	530-2840
	Base Backplane Power Cable	530-2841
	Base/Expansion Cable	530-2863
	FC-AL Data Cable (short)	530-2621
	FC-AL Data Cable (medium)	530-2622
	FC-AL Data Cable (long)	530-2623
	PCI Internal Status Cable	530-2835
	PCI External Status Cable	530-2836
	System Status Assembly Cable	530-2839
	Fan Power Cable	530-2747
	CPU/Memory Board Status Assembly Cable	530-2837
	Fan Status Cable	530-2838

Category	Part	Part Number
Filler Panels	FC-AL Backplane Filler Panel	340-4895 (Not a FRU)
	3.5-inch RME Metal Filler Panel	340-5934 (Not a FRU)
	5.25-inch RME Metal Filler Panel	340-5933 (Not a FRU)
	3.5-inch RME Plastic Filler Panel	330-2400 (Not a FRU)
	5.25-inch RME Plastic Filler Panel	330-2399 (Not a FRU)
	Power Supply Filler Panel	340-5519 (Not a FRU)
	CPU Fan Tray Filler Panel	340-6030 (Not a FRU)
	PCI Filler Panel	340-6627 (Not a FRU)

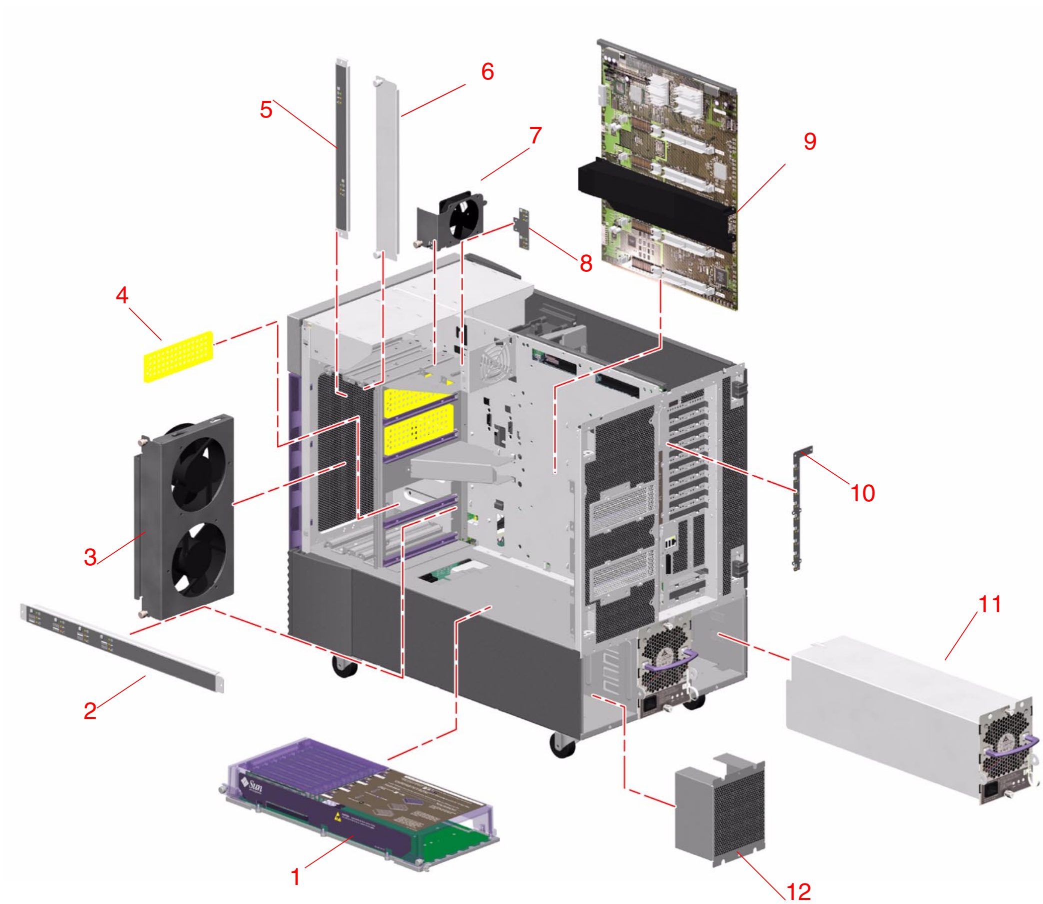
Assembly Illustrations

I/O Side Components



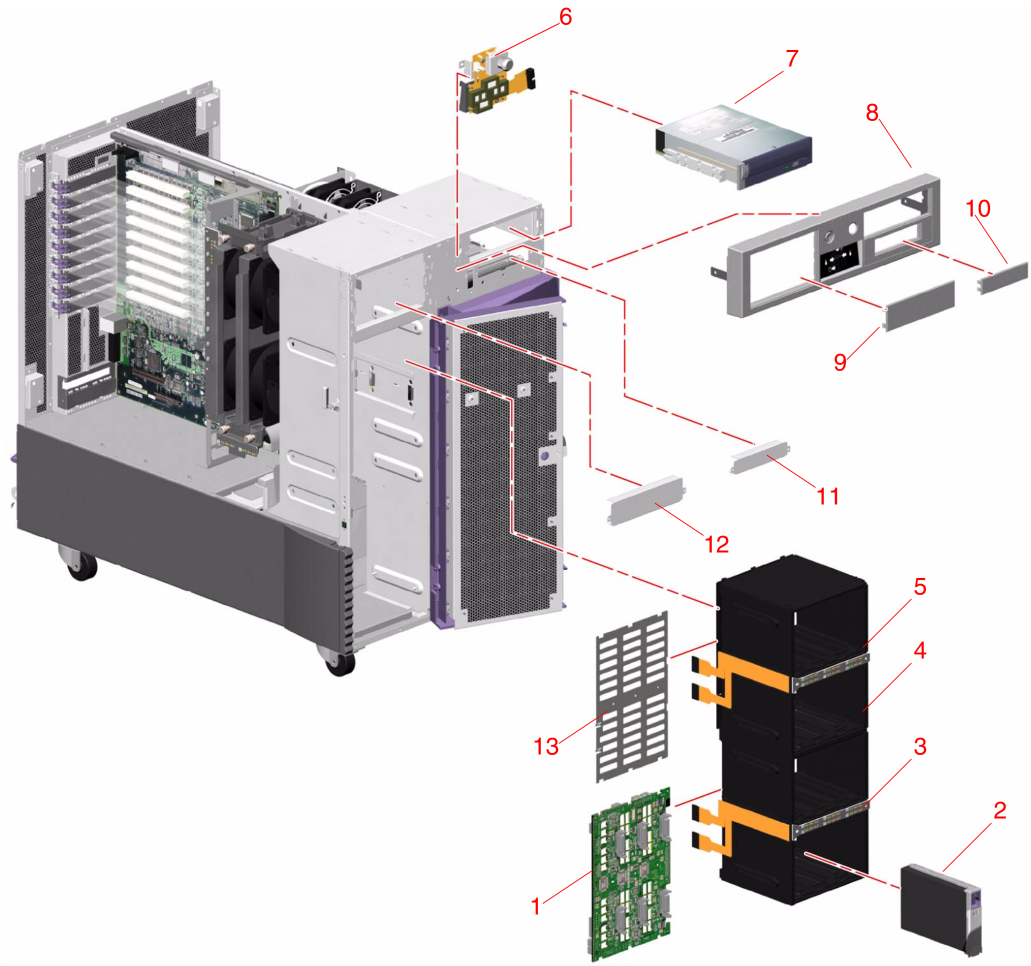
Key	Description	Part Number
1	I/O Fan LED Flex Circuit	370-3962
2	I/O Fan Bracket	Not a FRU
3	I/O Fan Tray	540-3615
4	Side Door	Not a FRU
5	PCI Internal LED Flex Circuit	370-3964
6	PCI Dividers	Not a FRU
7	PCI Divider Holder	Not a FRU
8	I/O Board	501-5142
9	I/O Air Guide	Not a FRU
10	Power Distribution Board	375-0071

CPU Side Components



Key	Description	Part Number
1	CPU/Memory Board	501-5818
2	CPU/Memory Board Status Assembly	540-4454
3	CPU Fan Tray	540-3614
4	CPU/Memory Board Air Baffle	540-4431
5	CPU Fan Status Assembly	540-4453
6	CPU Fan Filler Panel	340-6030
7	Motherboard Fan Tray	540-4025
8	Motherboard Fan Status Flex Circuit	370-3960
9	Motherboard	501-4300
10	PCI External LED Flex Circuit	370-3963
11	Power Supply	300-1353
12	Power Supply Filler Panel	340-5519

Front Side Components



Key	Description	Part Number
1	FC-AL Backplane	501-5993
2	36 GB 10K FC-AL Disk Drive	540-4525
3	Lower Disk LED Flex Circuit	370-3957
4	Disk Cage	Not a FRU
5	Upper Disk LED Flex Circuit	370-3958
6	System Status Assembly	540-3964
7	DVD ROM Drive	390-0025
8	RMA Bezel	540-4167
9	3.5-inch RMA Plastic Filler Panel	330-2400
10	5.25-inch RMA Plastic Filler Panel	330-2399
11	3.5-inch RMA Metal Filler Panel	340-5934
12	5.25-inch RMA Metal Filler Panel	340-5933
13	FC-AL Backplane Filler Panel	340-4895

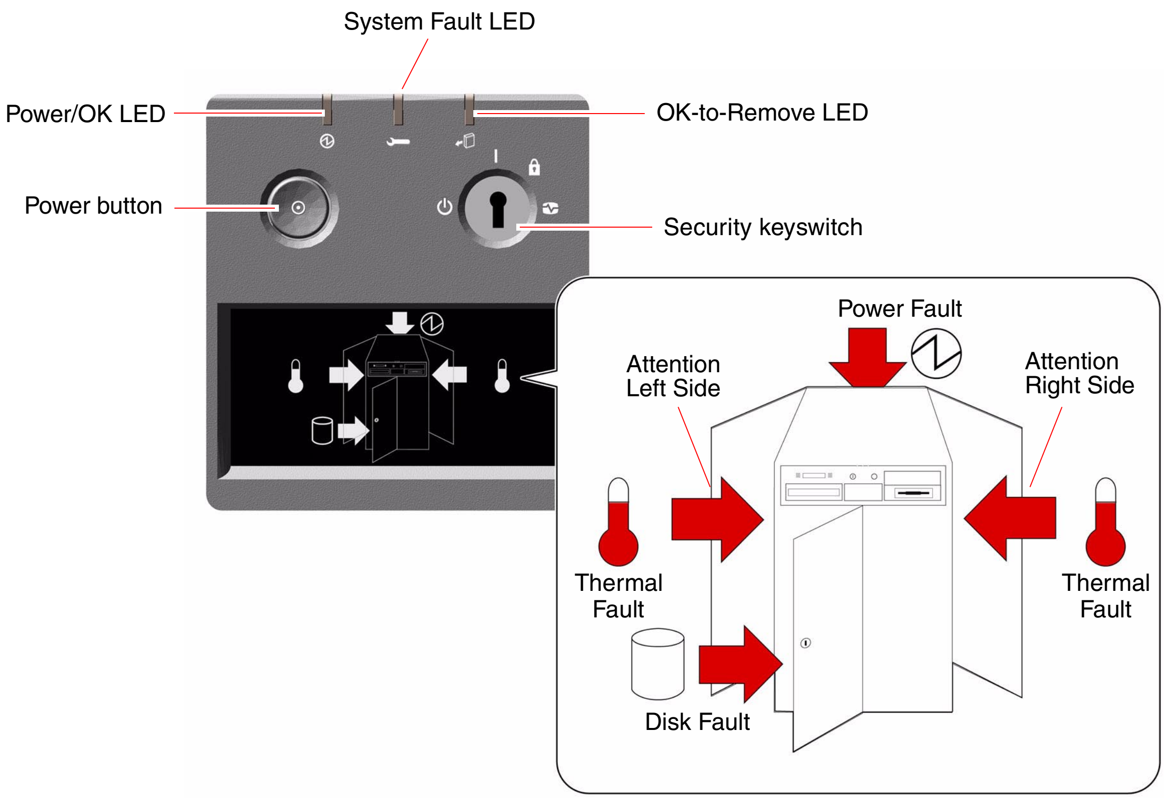
APPENDIX **B**

System LEDs

This appendix gives you reference information about the LEDs on the Sun Fire 880 server. Topics covered in this appendix include:

About Front Panel LEDs

The system status and control panel includes several LED status indicators, a Power button, and a security keyswitch. The following figure shows the status and control panel.

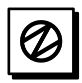
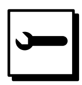
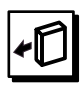
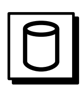
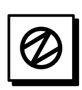


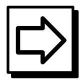
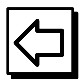
Several LED status indicators provide general system status, alert you to system problems, and help you to determine the location of system faults:

- At the top of the status and control panel, three general status LEDs provide a snapshot of the system status.
- Below the Power button and security keyswitch, a graphical display provides additional LED icons to indicate specific fault conditions and locations.

The general status LEDs work in conjunction with the specific fault LED icons. For example, a fault in the disk subsystem illuminates both the system Fault LED at the top of the panel and the Disk Fault icon in the graphical display below it. Fault LEDs within the enclosure help pinpoint the location of the faulty device. Since all front panel status LEDs are powered by the system's 5-volt standby power source, fault LEDs remain lit for any fault condition that results in a system shutdown.

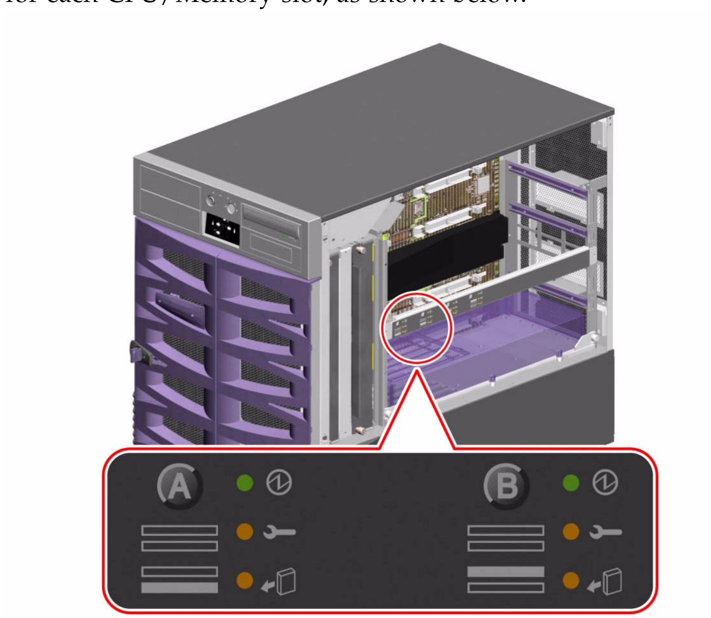
During system startup, the front panel LEDs are individually toggled on and off to verify that each one is working correctly. After that, the front panel LEDs operate as described in the following table.

Name	**Icon**	**LED Function**
Power/OK		This green LED lights when the system power is on.
System Fault		This amber LED lights to indicate a serious system fault. When this LED is lit, one or more icons in the display panel may also light to indicate the specific nature and location of the fault.
OK-to-Remove		This amber LED lights to indicate that an internal hot-pluggable component is ready for removal.
Disk Fault		This amber LED lights to indicate a serious disk subsystem fault that is likely to bring down the system. When this LED is lit, one or more disk LEDs may also be lit at the front of the disk cage, indicating the source of the fault. See "About Disk Drive LEDs" on page 351.
Power Fault		This amber LED lights to indicate a serious power subsystem fault that is likely to bring down the system. When this LED is lit, one or more power supply LEDs may also be lit on the system rear panel. See "About Power Supply LEDs" on page 348.

Name	Icon	LED Function
Thermal Fault		This amber LED lights to indicate a serious thermal fault (fan fault or overtemperature condition) that is likely to bring down the system. There are two Thermal Fault LEDs in the display to indicate whether the fault is located on the left or right side of the system. In the event of a fan fault, a fault LED inside the system will indicate the faulty fan assembly. See “About Fan Tray LEDs” on page 349.
Attention Left Side		This amber LED lights to indicate that an internal component on the left side of the system requires servicing.
Attention Right Side		This amber LED lights to indicate that an internal component on the right side of the system requires servicing.

About CPU/Memory Slot LEDs

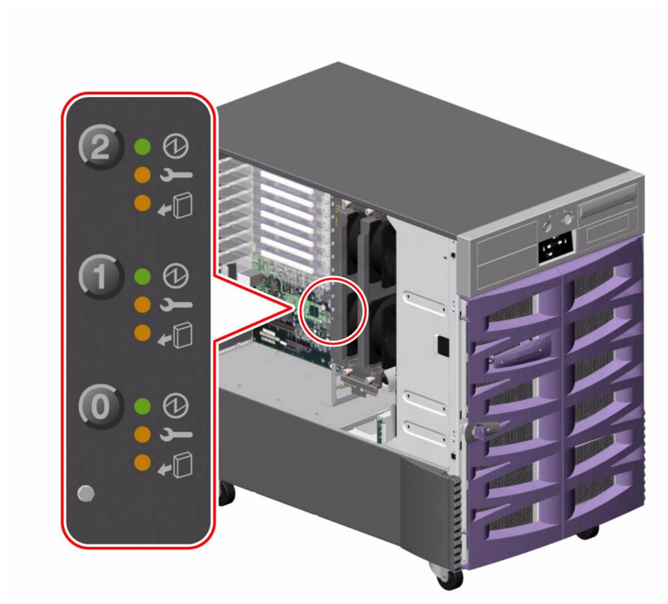
The CPU/Memory slot LEDs are located on the horizontal panel between CPU/Memory slots B and C and are visible when the right side door is open. There are three LEDs for each CPU/Memory slot, as shown below.



Icon	Name	LED Function
	Power On	Lights when the slot is receiving power.
	Fault	Reserved for future use.
	OK-to-Remove	Reserved for future use.

About PCI Slot LEDs

The PCI slot LEDs are located on the vertical bracket on the right side of the PCI slots and are visible when the left side door is open. There are three LEDs for each PCI slot, as shown below.



Icon	Name	LED Function
	Power On	Lights when the slot is receiving power.
	Fault	Blinks while the card is being tested, when a hot-plug operation is in progress, or when the card is powered on but logically detached from the operating system. Stays lit if the card encounters a fault.
	OK-to-Remove	Lights when it is safe to remove the card.

The following table shows how to interpret the various possible LED patterns.

			**Interpretation**
Off	Off	Off	The slot power is off. A PCI card can be safely inserted to start a hot-plug operation.
On	Blinking	Off	The installed card is being tested, configured, or unconfigured, or the card is powered on but logically detached from the operating system.
On	Off	Off	The slot power is on and the PCI card is operating normally.
Off	On	On	The PCI card has encountered a fault. The card can be safely removed.
Off	Off	On	The card can be safely removed.

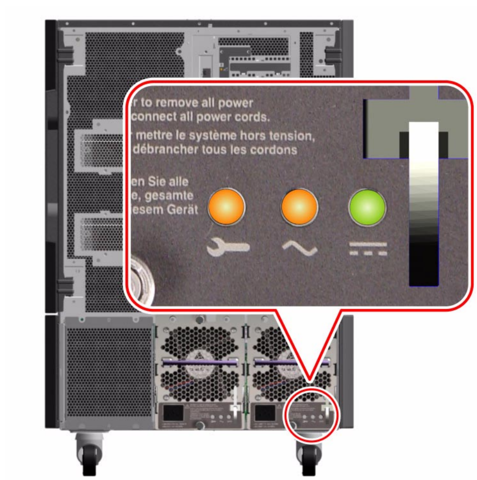
Note – If the slot is empty and the Fault or OK-to-Remove LED is on, pressing the contact push button for the slot will clear the LED.

For more information about PCI cards and hot-plug operations, see:

- "About PCI Cards and Buses" on page 230
- "About Hot-Pluggable and Hot-Swappable Components" on page 7

About Power Supply LEDs

There are three LEDs located on the rear of each power supply, as shown below.



The following table describes the function of each LED.

Icon	Name	LED Function
	Fault	Lights when the power supply encounters a fault.
	AC-Present Status	Lights when AC power input is present and within acceptable operating limits.
	DC Status	Lights when all DC outputs are functional and within acceptable operating limits.

About Fan Tray LEDs

The Thermal Fault LED on the system status and control panel indicates the overall status of the cooling system. The Thermal Fault LED lights when a fan fault or overtemperature condition is detected. LEDs inside the system indicate the fault status of each fan tray assembly.

The fan tray LEDs are located beside or beneath each fan tray assembly. There are three LEDs (Power On, Fault, and OK-to-Remove) per fan tray, as shown below.

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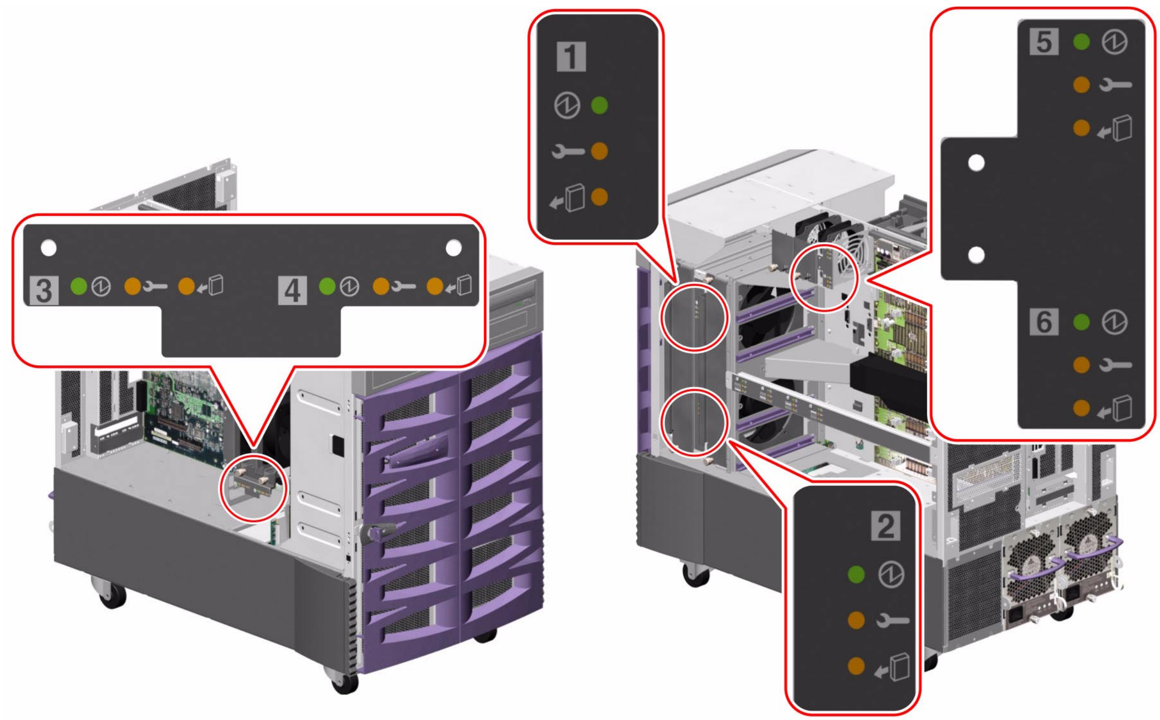


Icon	Name	LED Function
	Power On	Lights when the fan tray is receiving power.
	Fault	Lights when the fan tray encounters a fault.
	OK-to-Remove	Lights when it is safe to remove the fan tray assembly from a powered-on system (only when redundant fan trays are present).

The following table shows how to interpret the various possible LED patterns.

			Interpretation
Off	Off	Off	The fan tray is not receiving power or is improperly inserted.
On	Off	Off	The fan tray is receiving power and operating normally.
Off	On	On	The fan tray has encountered a fault and can be safely removed from a powered-on system.

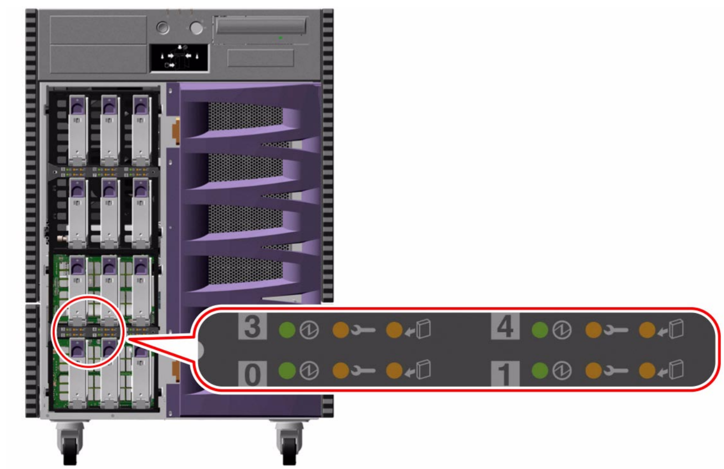
For more information about fan trays and hot-plug operations, see:

- "About Fan Trays" on page 237
- "About Hot-Pluggable and Hot-Swappable Components" on page 7

About Disk Drive LEDs

The Disk Fault LED on the system status and control panel indicates the general status of the disk subsystem. The Disk Fault LED lights when a fault is detected in the disk subsystem. LEDs inside the system indicate the fault status of individual disk drives.

There are three LEDs (Activity, Fault, OK-to-Remove) for each disk drive. The disk drive LEDs are located on the front of the disk cage, as shown below.



Icon	Name	LED Function
	Activity	Blinks slowly while the disk drive is being tested, configured, or unconfigured during a hot-plug operation. Blinks rapidly as the disk drive spins up or spins down. Stays lit when the disk drive is at speed and operating normally but experiencing no read or write activity. Blinks rapidly and irregularly in response to disk read or write activity.
	Fault	Lights when the disk drive encounters a fault.
	OK-to-Remove	Lights when it is safe to remove the disk drive during a hot-plug operation. Blinks (under software control) to direct attention to a disk drive.

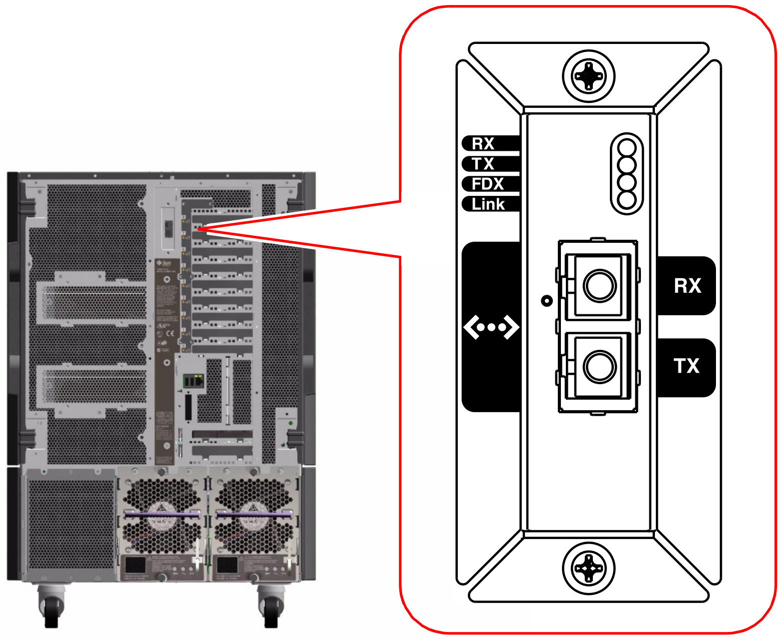
The following table shows how to interpret the various possible LED patterns.

			**Interpretation**
Off	Off	Off	Slot power is off. A disk drive can be safely inserted as part of a hot-plug operation.
Rapid Blinking	Off	Off	Disk drive is spinning up or down.
Slow Blinking	Off	Off	Disk drive is being configured or unconfigured during a hot-plug operation.
On	Off	Off	Disk drive is up to speed and operating normally.
Irregular Blinking	Off	Off	Disk drive is experiencing read or write activity.
On	On	Off	Disk drive has encountered a fault.
Off	Off	On	Disk drive can be safely removed as part of a hot-plug operation.

For more information about disk drives, see the *Sun Fire 880 Server Owner's Guide*. For more information about hot-plug operations, see "About Hot-Pluggable and Hot-Swappable Components" on page 7.

About Gigabit Ethernet LEDs

Four LEDs provide status information for the Gigabit Ethernet port. The LEDs are located above the Gigabit Ethernet port on the system rear panel, as shown below.



The following table describes the function of each LED.

Label	Name	LED Function
RX	Receive Activity	Indicates data activity on the receive channel.
TX	Transmit Activity	Indicates data activity on the transmit channel.
FDX	Full Duplex	Indicates that the Gigabit Ethernet interface is operating in Full Duplex mode.
Link	Link Present	Indicates that a link is established with a link partner.

APPENDIX **C**

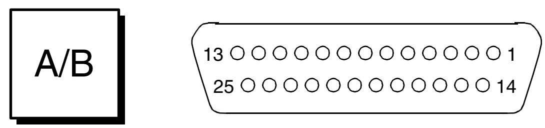
Connector Pinouts

This appendix gives you reference information about the system's rear panel ports and pin assignments. Topics covered in this appendix include:

Reference for the Serial Port A and B Connectors

Serial Port Connector Diagram

The serial port conforms to EIA-423 and EIA-232D specifications.



Serial Port Signals

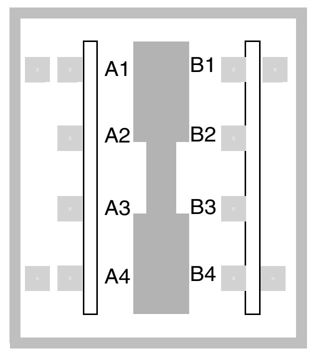
Signal descriptions ending in “A” indicate that the signal is associated with the port provided by a standard DB-25 serial cable or the connector labeled “A” on the optional DB-25 splitter cable. Signal descriptions ending in “B” indicate that the signal is associated with the port provided by the connector labeled “B” on the optional DB-25 splitter cable.

Pin	Signal Description	Pin	Signal Description
1	No Connection	14	Transmit Data B
2	Transmit Data A	15	Transmit Clock A(External)
3	Receive Data A	16	Receive Data B
4	Ready To Send A	17	Receive Clock A
5	Clear To Send A	18	Receive Clock B
6	Synchronous A	19	Ready To Send B
7	Signal Ground A	20	Data Terminal Ready A
8	Data Carrier Detect A	21	No Connection
9	No Connection	22	No Connection
10	No Connection	23	No Connection
11	Data Terminal Ready B	24	Transmit Clock A(Internal)
12	Data Carrier Detect B	25	Transmit Clock B
13	Clear To Send B		

Reference for the USB Connectors

Two Universal Serial Bus (USB) connectors are located on the system I/O board and can be accessed from the rear panel.

USB Connector Diagram



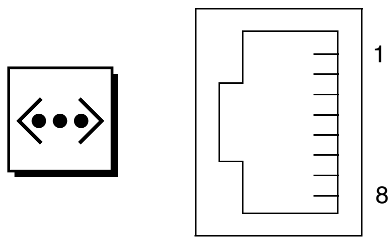
USB Connector Signals

Pin	Signal Description	Pin	Signal Description
A1	+5 VDC	B1	+5 VDC
A2	Port Data_N	B2	Port Data_N
A3	Port Data_P	B3	Port Data_P
A4	Ground	B4	Ground

Reference for the Twisted-Pair Ethernet Connector

The twisted-pair Ethernet (TPE) connector is an RJ-45 connector located on the system I/O board and can be accessed from the rear panel.

TPE Connector Diagram



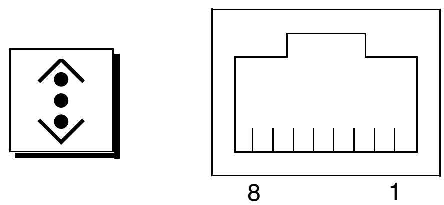
TPE Connector Signals

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 RSC Ethernet Connector

The Remote System Control (RSC) Ethernet connector is an RJ-45 connector located on the RSC board and can be accessed from the rear panel.

RSC Ethernet Connector Diagram



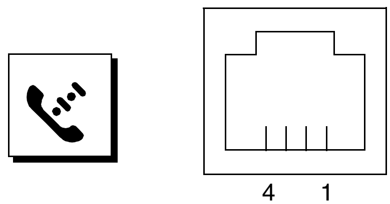
RSC Ethernet Connector Signals

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 RSC Modem Connector

The Remote System Control (RSC) modem connector is an RJ-11 connector located on the RSC card and can be accessed from the rear panel.

RSC Modem Connector Diagram



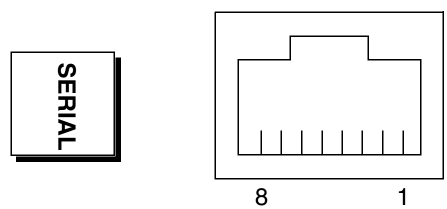
RSC Modem Connector Signals

Pin	Signal Description	Pin	Signal Description
1	No Connection	3	Tip
2	Ring	4	No Connection

Reference for the RSC Serial Connector

The Remote System Control (RSC) serial connector is an RJ-45 connector located on the RSC card and can be accessed from the rear panel.

RSC Serial Connector Diagram



RSC Serial Connector Signals

Pin	Signal Description	Pin	Signal Description
1	Ready To Send	5	Ground
2	Data Terminal Ready	6	Receive Data
3	Transmit Data	7	No Connection
4	Ground	8	Clear To Send

APPENDIX **D**

System Specifications

This appendix provides the following specifications for the Sun Fire 880:

Reference for Physical Specifications

The dimensions and weight of the system are as follows.

Measurement	U.S	Metric	Comments
Height (with casters)	28.1 in	71.4 cm	
Width	18.9 in	48.0 cm	
Depth	32.9 in	83.6 cm	
Weight:			
Minimum	194.0 lb	88.0 kg	Actual weight depends upon
Maximum	288.0 lb	130.6 kg	the installed options
Power Cord	8.2 ft	2.5 m	

Reference for Electrical Specifications

The following table provides the electrical specifications for the system.

Parameter	Value
Input	
Nominal Frequencies	50 Hz or 60 Hz nominal
Nominal Voltage Range	Autoranging 100-240 VAC
Maximum Current AC RMS	15.0 A @ 100 VAC (each power cord)
AC Operating Range	90 - 264 Vrms, 47 - 63Hz
Output	
+3.3 VDC	3 to 72 A
+5 VDC	3 to 56 A
+12 VDC	1 to 35 A
+48 VDC	0 to 31.2 A
Maximum DC Power Output	2240 Watts
Maximum AC Power Consumption	3000 Watts
Maximum Heat Dissipation	10,308 BTU/hr
Volt-Ampere Rating	1515 VA with 1120 Watt load (PF=0.99)

Reference for Environmental Requirements

The operating and non-operating environmental requirements for the system are as follows.

Parameter	Value
Operating	
Temperature	5°C to 35°C (41°F to 95°F)—IEC 68-2-1, 68-2-2
Humidity	20% to 80% RH, noncondensing; 27 °C max wet bulb—IEC 68-2-2, 68-2-3
Altitude	0 to 3000 meters (0 to 10,000 feet)—IEC 68-2-40, 68-2-41
Vibration:	
Deskside	0.0002 g^2/Hz, 5–500 Hz (random)—IEC 68-2-6
Rackmounted	0.00015 g^2/Hz, 5–500 Hz (random)—IEC 68-2-6
Shock:	
Deskside	4 g peak, 11 milliseconds half-sine pulse—IEC 68-2-27
Rackmounted	3 g peak, 11 milliseconds half-sine pulse—IEC 68-2-27
Declared Acoustics	6.7 bels dB(A) operating, 7.6 bels dB(A) at `ok` prompt
Non-Operating	
Temperature	-20°C to 60°C (-4°F to 140°F)—IEC 68-2-1, 68-2-2
Humidity	95% RH, noncondensing at 40°C—IEC 68-2-2, 68-2-3
Altitude	0 to 12,000 meters (0 to 40,000 feet)—IEC 68-2-40, 68-2-41
Vibration:	
Deskside	0.002 g^2/Hz, 5–500 Hz (random)—IEC 68-2-6
Rackmounted	0.0015 g^2/Hz, 5–500 Hz (random)—IEC 68-2-6
Shock:	
Deskside	15 g peak, 11 milliseconds half-sine pulse—IEC 68-2-27e
Rackmounted	10 g peak, 11 milliseconds half-sine pulse—IEC 68-2-27e
Handling Drops	50 mm—IEC 68-2-31
Threshold Impact	1 m/s—SUN 900-1813

Reference for Agency Compliance Specifications

The system complies with the following specifications.

Category	Relevant Standards
Safety	EN60950/IEC950 TUV UL 1950, CB Scheme IEC 950, C22.2 No. 950 from UL EK from KTL
RFI/EMI	Australia/New Zealand AS/NZ 3548 Class A Industry Canada ICES-003 Class A European Community EN55022 Class A Japan VCCI Class A Taiwan CNS 13438 Class A US FCC 47CFR15.B Class A
Immunity	EN55024 EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-5 EN61000-4-6 EN61000-4-8 EN61000-4-11
X-ray	US DHHS 21CFR Subchapter J PTB German X-ray Decree

Reference for Clearance and Service Access Specifications

Minimum clearances needed for proper cooling are as follows.

Blockage	Required Clearance
Front blockage only	3.0 in (7.6 cm)
Rear blockage only	3.5 in (8.9 cm)
Front and rear blockage	
Front clearance	3.5 in (8.9 cm)
Rear clearance	4.0 in (10.2 cm)

Minimum clearances needed for servicing the system are as follows.

Area	Required Clearance
Front	
Deskside system	36 in (91 cm)
Rackmounted system	48 in (122 cm)
Rear	36 in (91 cm)
Right	36 in (91 cm)
Left	36 in (91 cm)

APPENDIX **E**

Safety Precautions

Safety Agency Compliance Statements

Read this section before beginning any procedure. The following text provides safety precautions to follow when installing a Sun Microsystems product.

Safety Precautions

For your protection, observe the following safety precautions when setting up your equipment:

- Follow all cautions and instructions marked on the equipment.
- Ensure that the voltage and frequency of your power source match the voltage and frequency inscribed on the equipment's electrical rating label.
- Never push objects of any kind through openings in the equipment. Dangerous voltages may be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock, or damage to your equipment.

Symbols

The following symbols may appear in this book:

Caution – There is risk of personal injury and equipment damage. Follow the instructions.

Caution – Hot surface. Avoid contact. Surfaces are hot and may cause personal injury if touched.

Caution – Hazardous voltages are present. To reduce the risk of electric shock and danger to personal health, follow the instructions.

On – Applies AC power to the system.

Depending on the type of power switch your device has, one of the following symbols may be used:

Off - Removes AC power from the system.

Standby – The On/Standby switch is in the standby position.

Modifications to Equipment

Do not make mechanical or electrical modifications to the equipment. Sun Microsystems is not responsible for regulatory compliance of a modified Sun product.

Placement of a Sun Product

Caution – Do not block or cover the openings of your Sun product. Never place a Sun product near a radiator or heat register. Failure to follow these guidelines can cause overheating and affect the reliability of your Sun product.

Caution – The workplace-dependent noise level defined in DIN 45 635 Part 1000 must be 70Db(A) or less.

SELV Compliance

Safety status of I/O connections comply to SELV requirements.

Power Cord Connection

Caution – Sun products are designed to work with single-phase power systems having a grounded neutral conductor. To reduce the risk of electric shock, do not plug Sun products into any other type of power system. Contact your facilities manager or a qualified electrician if you are not sure what type of power is supplied to your building.

Caution – Not all power cords have the same current ratings. Household extension cords do not have overload protection and are not meant for use with computer systems. Do not use household extension cords with your Sun product.

Caution – Your Sun product is shipped with a grounding type (three-wire) power cord. To reduce the risk of electric shock, always plug the cord into a grounded power outlet.

The following caution applies only to devices with a Standby power switch:

Caution – The power switch of this product functions as a standby type device only. The power cord serves as the primary disconnect device for the system. Be sure to plug the power cord into a grounded power outlet that is nearby the system and is readily accessible. Do not connect the power cord when the power supply has been removed from the system chassis.

Lithium Battery

Caution – The Sun Fire 880 system I/O board and RSC card contain lithium batteries. Batteries are not customer replaceable parts. They may explode if mishandled. Do not dispose of the battery in fire. Do not disassemble it or attempt to recharge it.

Battery Pack

Caution – There is a sealed NiMH battery pack in Sun Fire 880 units. There is danger of explosion if the battery pack is mishandled or incorrectly replaced. Replace only with the same type of Sun Microsystems battery pack. Do not disassemble it or attempt to recharge it outside the system. Do not dispose of the battery in fire. Dispose of the battery properly in accordance with local regulations.

System Unit Cover

You must open the side doors of your Sun Fire 880 server to add cards, memory, or internal options. Be sure to close and secure the doors before powering on your system.

Caution – Do not operate your system while the side doors are open. Failure to take this precaution may result in personal injury and system damage.

Laser Compliance Notice

Sun products that use laser technology comply with Class 1 laser requirements.

Class 1 Laser Product
Luokan 1 Laserlaite
Klasse 1 Laser Apparat
Laser KLasse 1

CD-ROM

Caution – Use of controls, adjustments, or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

Einhaltung sicherheitsbehördlicher Vorschriften

Auf dieser Seite werden Sicherheitsrichtlinien beschrieben, die bei der Installation von Sun-Produkten zu beachten sind.

Sicherheitsvorkehrungen

Treffen Sie zu Ihrem eigenen Schutz die folgenden Sicherheitsvorkehrungen, wenn Sie Ihr Gerät installieren:

- Beachten Sie alle auf den Geräten angebrachten Warnhinweise und Anweisungen.
- Vergewissern Sie sich, daß Spannung und Frequenz Ihrer Stromquelle mit der Spannung und Frequenz übereinstimmen, die auf dem Etikett mit den elektrischen Nennwerten des Geräts angegeben sind.
- Stecken Sie auf keinen Fall irgendwelche Gegenstände in Öffnungen in den Geräten. Leitfähige Gegenstände könnten aufgrund der möglicherweise vorliegenden gefährlichen Spannungen einen Kurzschluß verursachen, der einen Brand, Stromschlag oder Geräteschaden herbeiführen kann.

Symbole

Die Symbole in diesem Handbuch haben folgende Bedeutung:

Achtung – Gefahr von Verletzung und Geräteschaden. Befolgen Sie die Anweisungen.

Achtung – Hohe Temperatur. Nicht berühren, da Verletzungsgefahr durch heiße Oberfläche besteht.

Achtung – Gefährliche Spannungen. Anweisungen befolgen, um Stromschläge und Verletzungen zu vermeiden.

Ein – Setzt das System unter Wechselstrom.

Je nach Netzschaltertyp an Ihrem Gerät kann eines der folgenden Symbole benutzt werden:

Aus – Unterbricht die Wechselstromzufuhr zum Gerät.

Wartezustand (Stand-by-Position) - Der Ein-/Wartezustand-Schalter steht auf Wartezustand. Änderungen an Sun-Geräten.

Nehmen Sie keine mechanischen oder elektrischen Änderungen an den Geräten vor. Sun Microsystems, übernimmt bei einem Sun-Produkt, das geändert wurde, keine Verantwortung für die Einhaltung behördlicher Vorschriften

Aufstellung von Sun-Geräten

Achtung – Um den zuverlässigen Betrieb Ihres Sun-Geräts zu gewährleisten und es vor Überhitzung zu schützen, dürfen die Öffnungen im Gerät nicht blockiert oder verdeckt werden. Sun-Produkte sollten niemals in der Nähe von Heizkörpern oder Heizluftklappen aufgestellt werden.

Achtung – Der arbeitsplatzbezogene Schalldruckpegel nach DIN 45 635 Teil 1000 beträgt 70Db(A) oder weniger.

Einhaltung der SELV-Richtlinien

Die Sicherung der I/O-Verbindungen entspricht den Anforderungen der SELV-Spezifikation.

Anschluß des Netzkabels

Achtung – Sun-Produkte sind für den Betrieb an Einphasen-Stromnetzen mit geerdetem Nulleiter vorgesehen. Um die Stromschlaggefahr zu reduzieren, schließen Sie Sun-Produkte nicht an andere Stromquellen an. Ihr Betriebsleiter oder ein qualifizierter Elektriker kann Ihnen die Daten zur Stromversorgung in Ihrem Gebäude geben.

Achtung – Nicht alle Netzkabel haben die gleichen Nennwerte. Herkömmliche, im Haushalt verwendete Verlängerungskabel besitzen keinen Überlastungsschutz und sind daher für Computersysteme nicht geeignet.

Achtung – Ihr Sun-Gerät wird mit einem dreiadrigen Netzkabel für geerdete Netzsteckdosen geliefert. Um die Gefahr eines Stromschlags zu reduzieren, schließen Sie das Kabel nur an eine fachgerecht verlegte, geerdete Steckdose an.

Die folgende Warnung gilt nur für Geräte mit Wartezustand-Netzschalter:

Achtung – Der Ein/Aus-Schalter dieses Geräts schaltet nur auf Wartezustand (Stand-By-Modus). Um die Stromzufuhr zum Gerät vollständig zu unterbrechen, müssen Sie das Netzkabel von der Steckdose abziehen. Schließen Sie den Stecker des Netzkabels an eine in der Nähe befindliche, frei zugängliche, geerdete Netzsteckdose an. Schließen Sie das Netzkabel nicht an, wenn das Netzteil aus der Systemeinheit entfernt wurde.

Lithiumbatterie

Achtung – CPU-Karten von Sun verfügen über eine Echtzeituhr mit integrierter Lithiumbatterie (Teile-Nr. MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, oder MK48T08). Diese Batterie darf nur von einem qualifizierten Servicetechniker ausgewechselt werden, da sie bei falscher Handhabung explodieren kann. Werfen Sie die Batterie nicht ins Feuer. Versuchen Sie auf keinen Fall, die Batterie auszubauen oder wiederaufzuladen.

Batterien

Achtung – Die Geräte Sun Fire 880 enthalten auslaufsichere Bleiakkumulatoren. Produkt-Nr. TLC02V50 für portable Stromversorgung. Werden bei der Behandlung oder beim Austausch der Batterie Fehler gemacht, besteht Explosionsgefahr. Batterie nur gegen Batterien gleichen Typs von Sun Microsystems austauschen. Nicht demontieren und nicht versuchen, die Batterie außerhalb des Geräts zu laden. Batterie nicht ins Feuer werfen. Ordnungsgemäß entsprechend den vor Ort geltenden Vorschriften entsorgen.

Gehäuseabdeckung

Sie müssen die obere Abdeckung Ihres Sun-Systems entfernen, um interne Komponenten wie Karten, Speicherchips oder Massenspeicher hinzuzufügen. Bringen Sie die obere Gehäuseabdeckung wieder an, bevor Sie Ihr System einschalten.

Achtung – Bei Betrieb des Systems ohne obere Abdeckung besteht die Gefahr von Stromschlag und Systemschäden.

Einhaltung der Richtlinien für Laser

Sun-Produkte, die mit Laser-Technologie arbeiten, entsprechen den Anforderungen der Laser Klasse 1.

Class 1 Laser Product
Luokan 1 Laserlaite
Klasse 1 Laser Apparat
Laser KLasse 1

CD-ROM

Warnung – Die Verwendung von anderen Steuerungen und Einstellungen oder die Durchfhrung von Prozeduren, die von den hier beschriebenen abweichen, knnen gefhrliche Strahlungen zur Folge haben.

Conformité aux normes de sécurité

Ce texte traite des mesures de sécurité qu'il convient de prendre pour l'installation d'un produit Sun Microsystems.

Mesures de sécurité

Pour votre protection, veuillez prendre les précautions suivantes pendant l'installation du matériel :

- Suivre tous les avertissements et toutes les instructions inscrites sur le matériel.
- Vérifier que la tension et la fréquence de la source d'alimentation électrique correspondent à la tension et à la fréquence indiquées sur l'étiquette de classification de l'appareil.
- Ne jamais introduire d'objets quels qu'ils soient dans une des ouvertures de l'appareil. Vous pourriez vous trouver en présence de hautes tensions dangereuses. Tout objet conducteur introduit de la sorte pourrait produire un court-circuit qui entraînerait des flammes, des risques d'électrocution ou des dégâts matériels.

Symboles

Vous trouverez ci-dessous la signification des différents symboles utilisés :

Attention: – risques de blessures corporelles et de dégâts matériels. Veuillez suivre les instructions.

Attention: – surface à température élevée. Evitez le contact. La température des surfaces est élevée et leur contact peut provoquer des blessures corporelles.

Attention: – présence de tensions dangereuses. Pour éviter les risques d'électrocution et de danger pour la santé physique, veuillez suivre les instructions.

MARCHE – Votre système est sous tension (courant alternatif).

Un des symboles suivants sera peut-être utilisé en fonction du type d'interrupteur de votre système:

ARRET - Votre système est hors tension (courant alternatif).

VEILLEUSE – L'interrupteur Marche/Veilleuse est en position « Veilleuse ».

Modification du matériel

Ne pas apporter de modification mécanique ou électrique au matériel. Sun Microsystems n'est pas responsable de la conformité réglementaire d'un produit Sun qui a été modifié.

Positionnement d'un produit Sun

Attention: – pour assurer le bon fonctionnement de votre produit Sun et pour l'empêcher de surchauffer, il convient de ne pas obstruer ni recouvrir les ouvertures prévues dans l'appareil. Un produit Sun ne doit jamais être placé à proximité d'un radiateur ou d'une source de chaleur.

Attention: – Le niveau de pression acoustique au poste de travail s'élève selon la norme DIN 45 635 section 1000, à 70 dB (A) ou moins.

Conformité SELV

Sécurité : les raccordements E/S sont conformes aux normes SELV.

Connexion du cordon d'alimentation

Attention: – les produits Sun sont conçus pour fonctionner avec des alimentations monophasées munies d'un conducteur neutre mis à la terre. Pour écarter les risques d'électrocution, ne pas brancher de produit Sun dans un autre type d'alimentation secteur. En cas de doute quant au type d'alimentation électrique du local, veuillez vous adresser au directeur de l'exploitation ou à un électricien qualifié.

Attention: – tous les cordons d'alimentation n'ont pas forcément la même puissance nominale en matière de courant. Les rallonges d'usage domestique n'offrent pas de protection contre les surcharges et ne sont pas prévues pour les systèmes d'ordinateurs. Ne pas utiliser de rallonge d'usage domestique avec votre produit Sun.

Attention: – votre produit Sun a été livré équipé d'un cordon d'alimentation à trois fils (avec prise de terre). Pour écarter tout risque d'électrocution, branchez toujours ce cordon dans une prise mise à la terre.

L'avertissement suivant s'applique uniquement aux systèmes équipés d'un interrupteur VEILLEUSE:

Attention: – le commutateur d'alimentation de ce produit fonctionne comme un dispositif de mise en veille uniquement. C'est la prise d'alimentation qui sert à mettre le produit hors tension. Veillez donc à installer le produit à proximité d'une prise murale facilement accessible. Ne connectez pas la prise d'alimentation lorsque le châssis du système n'est plus alimenté.

Batterie au lithium

Attention: – sur les cartes CPU Sun, une batterie au lithium (référence MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, ou MK48T08.) a été moulée dans l'horloge temps réel SGS. Les batteries ne sont pas des pièces remplaçables par le client. Elles risquent d'exploser en cas de mauvais traitement. Ne pas jeter la batterie au feu. Ne pas la démonter ni tenter de la recharger.

Bloc-batterie

Attention: – Les unités Sun Fire 880 contiennent une batterie étanche au plomb (produits énergétiques portatifs n°TLC02V50). Il existe un risque d'explosion si ce bloc-batterie est manipulé de façon erronée ou mal mis en place. Ne remplacez ce bloc que par un bloc-batterie Sun Microsystems du même type. Ne le démontez pas et n'essayez pas de le recharger hors du système. Ne faites pas brûler la batterie mais mettez-la au rebut conformément aux réglementations locales en vigueur.

Couvercle

Pour ajouter des cartes, de la mémoire, ou des unités de stockage internes, vous devrez démonter le couvercle de l'unité système Sun. Ne pas oublier de remettre ce couvercle en place avant de mettre le système sous tension.

Attention: – il est dangereux de faire fonctionner un produit Sun sans le couvercle en place. Si l'on néglige cette précaution, on encourt des risques de blessures corporelles et de dégâts matériels.

Conformité aux certifications Laser

Les produits Sun qui font appel aux technologies lasers sont conformes aux normes de la classe 1 en la matière.

Class 1 Laser Product
Luokan 1 Laserlaite
Klasse 1 Laser Apparat
Laser KLasse 1

CD-ROM

Attention: – L'utilisation de contrôles, de réglages ou de performances de procédures autre que celle spécifiée dans le présent document peut provoquer une exposition à des radiations dangereuses.

Normativas de seguridad

El siguiente texto incluye las medidas de seguridad que se deben seguir cuando se instale algún producto de Sun Microsystems.

Precauciones de seguridad

Para su protección observe las siguientes medidas de seguridad cuando manipule su equipo:

- Siga todas los avisos e instrucciones marcados en el equipo.
- Asegúrese de que el voltaje y la frecuencia de la red eléctrica concuerdan con las descritas en las etiquetas de especificaciones eléctricas del equipo.
- No introduzca nunca objetos de ningún tipo a través de los orificios del equipo. Pueden haber voltajes peligrosos. Los objetos extraños conductores de la electricidad pueden producir cortocircuitos que provoquen un incendio, descargas eléctricas o daños en el equipo.

Símbolos

En este libro aparecen los siguientes símbolos:

Precaución – Existe el riesgo de lesiones personales y daños al equipo. Siga las instrucciones.

Precaución – Superficie caliente. Evite el contacto. Las superficies están calientes y pueden causar daños personales si se tocan.

Precaución – Voltaje peligroso presente. Para reducir el riesgo de descarga y daños para la salud siga las instrucciones.

Encendido – Aplica la alimentación de CA al sistema.

Según el tipo de interruptor de encendido que su equipo tenga, es posible que se utilice uno de los siguientes símbolos:

Apagado - Elimina la alimentación de CA del sistema.

En espera – El interruptor de Encendido/En espera se ha colocado en la posición de En espera.

Modificaciones en el equipo

No realice modificaciones de tipo mecánico o eléctrico en el equipo. Sun Microsystems no se hace responsable del cumplimiento de las normativas de seguridad en los equipos Sun modificados.

Ubicación de un producto Sun

Precaución – Para asegurar la fiabilidad de funcionamiento de su producto Sun y para protegerlo de sobrecalentamien-tos no deben obstruirse o taparse las rejillas del equipo. Los productos Sun nunca deben situarse cerca de radiadores o de fuentes de calor.

Precaución – De acuerdo con la norma DIN 45 635, Parte 1000, se admite un nivel de presión acústica para puestos de trabajo máximo de 70Db(A).

Cumplimiento de la normativa SELV

El estado de la seguridad de las conexiones de entrada/salida cumple los requisitos de la normativa SELV.

Conexión del cable de alimentación eléctrica

Precaución – Los productos Sun están diseñados para trabajar en una red eléctrica monofásica con toma de tierra. Para reducir el riesgo de descarga eléctrica, no conecte los productos Sun a otro tipo de sistema de alimentación eléctrica. Póngase en contacto con el responsable de mantenimiento o con un electricista cualificado si no está seguro del sistema de alimentación eléctrica del que se dispone en su edificio.

Precaución – No todos los cables de alimentación eléctrica tienen la misma capacidad. Los cables de tipo doméstico no están provistos de protecciones contra sobrecargas y por tanto no son apropiados para su uso con computadores. No utilice alargadores de tipo doméstico para conectar sus productos Sun.

Precaución – Con el producto Sun se proporciona un cable de alimentación con toma de tierra. Para reducir el riesgo de descargas eléctricas conéctelo siempre a un enchufe con toma de tierra.

La siguiente advertencia se aplica solamente a equipos con un interruptor de encendido que tenga una posición "En espera":

Precaución – El interruptor de encendido de este producto funciona exclusivamente como un dispositivo de puesta en espera. El enchufe de la fuente de alimentación está diseñado para ser el elemento primario de desconexión del equipo. El equipo debe instalarse cerca del enchufe de forma que este último pueda ser fácil y rápidamente accesible. No conecte el cable de alimentación cuando se ha retirado la fuente de alimentación del chasis del sistema.

Batería de litio

Precaución – En las placas de CPU Sun hay una batería de litio insertada en el reloj de tiempo real, tipo SGS Núm. MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, o MK48T08. Las baterías no son elementos reemplazables por el propio cliente. Pueden explotar si se manipulan de forma errónea. No arroje las baterías al fuego. No las abra o intente recargarlas.

Paquete de pilas

Precaución – Las unidades Sun Fire 880 contienen una pila de plomo sellada, Productos de energía portátil nº TLC02V50. Existe riesgo de estallido si el paquete de pilas se maneja sin cuidado o se sustituye de manera indebida. Las pilas sólo deben sustituirse por el mismo tipo de paquete de pilas de Sun Microsystems. No las desmonte ni intente recargarlas fuera del sistema. No arroje las pilas al fuego. Deséchelas siguiendo el método indicado por las disposiciones vigentes.

Tapa de la unidad del sistema

Debe quitar la tapa del sistema cuando sea necesario añadir tarjetas, memoria o dispositivos de almacenamiento internos. Asegúrese de cerrar la tapa superior antes de volver a encender el equipo.

Precaución – Es peligroso hacer funcionar los productos Sun sin la tapa superior colocada. El hecho de no tener en cuenta esta precaución puede ocasionar daños personales o perjudicar el funcionamiento del equipo.

Aviso de cumplimiento con requisitos de láser

Los productos Sun que utilizan la tecnología de láser cumplen con los requisitos de láser de Clase 1.

Class 1 Laser Product
Luokan 1 Laserlaite
Klasse 1 Laser Apparat
Laser KLasse 1

CD-ROM

Precaución – El manejo de los controles, los ajustes o la ejecución de procedimientos distintos a los aquí especificados pueden exponer al usuario a radiaciones peligrosas.

GOST-R Certification Mark

Nordic Lithium Battery Cautions

Norge

ADVARSEL – Litiumbatteri — Eksplosjonsfare.Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

Sverige

VARNING – Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

Danmark

ADVARSEL! – Litiumbatteri — Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

Suomi

VAROITUS – Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.