

# Sun Blade™ 1500 Service, Diagnostics, and Troubleshooting Manual

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(Silver)



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# Preface

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The *Sun Blade 1500 Service, Diagnostic, and Troubleshooting Manual* is an aid to troubleshooting problems with and replacing components within the Sun Blade 1500 workstation.



---

**Note** – This document is intended for users of Sun Blade 1500 systems with a *silver* bezel. If your system has a *red* bezel, refer to the *Sun Blade 1500 Service, Diagnostics, and Troubleshooting Manual*, **816-7564**.

---

This manual is written for technicians, service personnel, and system administrators who service and repair computer systems.

The person qualified to use this manual:

- Can open a system chassis, identify, and replace internal components.
- Understands the Solaris™ Operating System and the command-line interface.
- Has superuser privileges for the system being serviced.
- Understands typical hardware troubleshooting tasks.

If you are not comfortable performing any of the procedures described in this book, refer to your Sun™ Microsystems™ service representative.

---

# About the Multimedia Links in This Manual

Removal and replacement procedures for selected workstation components are illustrated with interactive audio and video instructions in the Sun Blade 1500 ShowMe How™ multimedia documentation. This multimedia documentation is available through links to ShowMe How movie files located throughout this manual.

You can access these multimedia video clips wherever you see the film-clip icon; as shown in FIGURE P-1.



**FIGURE P-1** Link to Multimedia Instructions

Clicking on the above link displays a guided tour of the Sun Blade 1500 workstation.

---

## How This Book Is Organized

[Chapter 1](#) explains how to use the flowcharts in this manual.

[Chapter 2](#) provides a product description of the Sun Blade 1500 workstation.

[Chapter 3](#) contains basic troubleshooting tasks, commands, and system responses.

[Chapter 4](#) provides the troubleshooting flowcharts for the Sun Blade 1500 workstation.

[Chapter 5](#) introduces advanced troubleshooting using Power-On Self-Test (POST), OpenBoot™ Diagnostics, and SunVTS™ software.

[Chapter 6](#) provides information about the NVRAM and alternatives to the Stop-A and Stop-N key commands.

[Chapter 7](#) describes using POST to diagnose problems with the Sun Blade 1500 workstation.

[Chapter 8](#) instructs how to use OpenBoot Diagnostics to troubleshoot the Sun Blade 1500 workstation.

[Chapter 9](#) summarizes using SunVTS software to exercise a Sun Blade 1500 workstation and its components.

[Chapter 10](#) provides preliminary steps necessary to prepare for component replacement.

[Chapter 11](#) contains replacement procedures for components found on the motherboard.

[Chapter 12](#) has replacement procedures for data storage components.

[Chapter 13](#) explains replacement procedures for components that are part of the Sun Blade 1500 chassis.

[Chapter 14](#) describes how to replace system cabling.

[Chapter 15](#) provides steps to finish component replacement.

[Chapter 16](#) describes how to customize your Sun Blade 1500 workstation.

[Appendix A](#) lists the specifications of the Sun Blade 1500 workstation.

[Appendix B](#) outlines the external signal descriptions.

[Appendix C](#) provides a functional description of the Sun Blade 1500 workstation.

[Appendix D](#) describes how to manage power-saving modes of the Sun Blade 1500 workstation.

---

## Safety Information

Read this section before beginning any procedure in the *Sun Blade 1500 Diagnostics, Service, and Troubleshooting Manual*. For your protection, observe the following safety precautions when removing or installing components, configuring, and troubleshooting your Sun Blade 1500 workstation.

- Follow all cautions and instructions marked on the equipment.
- Make sure 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 might be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock, or damage to your equipment.



---

**Caution** – Hazardous voltages are present. To reduce the risk of electric shock and danger to personal health, follow the instructions.

---



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**Caution** – Do not operate Sun products without the access cover in place. Failure to follow this precaution might result in personal injury or equipment damage.

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---

**Caution** – There is a risk of personal injury and equipment damage. Follow the instructions.

---

The book, *Important Safety Information for Sun Hardware Systems*, 816-7190, contains a listing of safety precautions for Sun workstations. The document is located in the packing carton for the Sun Blade 1500 workstation.

The Sun Blade 1500 workstation complies with regulatory requirements of safety and EMI as documented in the *Sun Blade 1500 Safety and Compliance Guide*, 817-5130. This document is available online at:

- <http://www.sun.com/documentation>
- <http://docs.sun.com>

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## Using UNIX Commands

This document might not contain information on basic UNIX<sup>®</sup> 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*
- Online documentation for the Solaris operating system available at:  
<http://docs.sun.com>
- *Sun Blade 1500 Getting Started Guide*, 817-5129
- *Sun Blade 1500 Troubleshooting Card*, 817-5125
- Other software documentation that you received with your system



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# Typographic Conventions

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

\* Your browser settings might differ

# Shell Prompts

Shell	Prompt
C shell	<i>machine-name%</i>
C shell superuser	<i>machine-name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

# Related Documentation

TABLE P-1    Related Documentation

Application	Title	Part Number
Setting up poster	<i>Sun Blade 1500 Start Here</i>	817-5123
Handy reference information	<i>Sun Blade 1500 Troubleshooting Card</i>	817-5125
Preinstalled software	<i>Sun Blade 1500 Getting Started Guide</i>	817-5129
Last minute information	<i>Sun Blade 1500 Product Notes</i>	817-5131
Safety and compliance	<i>Sun Blade 1500 Safety and Compliance Guide</i>	817-5130
	<i>Important Safety Information for Sun Hardware Systems</i>	816-7190
Configuration	<i>Solaris 8 2/04 Sun Hardware Platform Guide</i>	817-4347
	<i>Solaris 9 9/04 Sun Hardware Platform Guide</i>	817-6357
	<i>Solaris Handbook for Sun Peripherals</i>	816-4468
SunVTS documentation	<i>SunVTS 5.1 User's Guide</i>	816-5144
	<i>SunVTS Quick Reference Card</i>	816-5146
	<i>SunVTS 5.1 Test Reference Manual</i>	816-5145
	<i>SunVTS 5.1 Patch Set 5 Documentation Supplement</i>	817-4350

**TABLE P-1** Related Documentation (*Continued*)

<b>Application</b>	<b>Title</b>	<b>Part Number</b>
Graphics accelerator documentation	<i>Sun XVR-100 Graphics Accelerator Installation Guide</i>	816-7560
	<i>Sun XVR-600 Graphics Accelerator Installation and User's Guide</i>	817-2195
	<i>Sun XVR-1200 Graphics Accelerator Installation and User's Guide</i>	816-7386
Co-processor board documentation	<i>SunPCi™ III 3.2.1 User's Guide</i>	817-3630
	<i>SunPCi III Quick Start Installation Guide</i>	817-4343
	<i>SunPCi III 3.2.1 Product Notes</i>	817-3631

## Additional Support Resources

This manual contains troubleshooting flowcharts and diagnostic procedures that assist in identifying and replacing faulty components. It is written to resolve most common component failures.

[TABLE P-2](#) lists resources for troubleshooting assistance.

**TABLE P-2** Additional Support Resources

<b>Sun Blade 1500 Support Resources</b>	<b>URL or Telephone Number</b>
Find Solaris and other software documents here. This is also an alternative web site for some Sun Blade 1500 documents. This web site has full search capabilities.	<a href="http://docs.sun.com">http://docs.sun.com</a>
Warranty and Contract Support contacts. Links to other service tools.	<a href="http://www.sun.com/service/online">http://www.sun.com/service/online</a>
Discussion and Troubleshooting Forums.	<a href="http://supportforum.sun.com/">http://supportforum.sun.com/</a>
Support, Diagnostic Tools, Alerts, for all Sun products.	<a href="http://www.sun.com/bigadmin/">http://www.sun.com/bigadmin/</a>
SunSolve <sup>sm</sup> : Contains links to software patches. Lists some system specifications, troubleshooting and maintenance information, and other tools.	<a href="http://www.sunsolve.sun.com/handbook_pub/">http://www.sunsolve.sun.com/handbook_pub/</a>
Lists warranties for every Sun product.	<a href="http://www.sun.com/service/support/warranty">http://www.sun.com/service/support/warranty</a>
Sun Service Support phone number.	1-800-872-4786 (1-800-USA-4Sun) Select Option 1

**TABLE P-2** Additional Support Resources (*Continued*)

Sun Blade 1500 Support Resources	URL or Telephone Number
This web site lists international telephone numbers for Sun Service Support.	<a href="http://www.sun.com/service/contacting/solution.html">http://www.sun.com/service/contacting/solution.html</a>

---

**Note** – Access to some Sun proprietary information is restricted to authorized Sun personnel.

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Some low-level hardware and software failures require troubleshooting techniques that are beyond the scope of this document, and are best resolved by those persons with experience and skill in fault analysis. Your Sun Microsystems service representative can provide these types of services.

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## Accessing Sun Documentation Online

You can view, print, or purchase a broad selection of Sun documentation, including localized versions, at:

<http://www.sun.com/documentation>

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## Contacting Sun Technical Support

If you have technical questions about this product that are not answered in this document, go to:

<http://www.sun.com/service/contacting>

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## Sun Welcomes Your Comments

Sun is interested in improving its documentation and welcomes your comments and suggestions. You can submit your comments by going to:

<http://www.sun.com/hwdocs/feedback>

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

*Sun Blade 1500 Service, Diagnostics, and Troubleshooting Manual*, part number 817-5127-11.



# Start Here

---

This chapter provides an overview of how to use this manual. The diagnostics and troubleshooting flowcharts within this manual can help you determine the root cause of problems that you might encounter with the Sun Blade 1500 workstation.

This chapter contains the following topics:

- [“Diagnostic Tools Available” on page 1-1](#)
- [“About Flowcharts” on page 1-3](#)
- [“How to Use This Manual” on page 1-4](#)

---

## 1.1 Diagnostic Tools Available

The *Sun Blade 1500 Service, Diagnostic, and Troubleshooting Manual* uses displayed messages, system sounds, flowcharts, and firmware and software diagnostic tools to help you locate and identify workstation malfunctions.

The diagnostic tools used in the Sun Blade 1500 workstation include but are not limited to:

- System displayed messages (such as flashing LEDs or error messages)
- Workstation sounds (such as beeps)
- Nonvolatile random access memory (NVRAM)
- Power-on self-test (POST) diagnostics
- OpenBoot PROM diagnostics
- SunVTS validation test suite software
- Solaris diagnostic commands

[TABLE 1-1](#) provides a summary of these diagnostics tools.

**TABLE 1-1** Summary of Diagnostic Tools

<b>Diagnostic Tool</b>	<b>Type of Tool</b>	<b>What the Tool Does</b>	<b>How Tool is Used</b>
System LEDs	Hardware	Shows status of system or of a specific component.	Power button LED indicates system state. TPE and optical drive LEDs indicate activity. Motherboard LED indicates standby power.
System sounds	Hardware	Indicates system condition.	Beeps heard from workstation internal speaker indicate POST completion, Solaris boot, or system failure. See <a href="#">“Audio Responses” on page 3-12</a> .
NVRAM	Firmware	Contains properties and flags to configure system and diagnostic tests.	The <code>setenv</code> command typed at the <code>ok</code> prompt or the <code>eeprom</code> command in a terminal window can configure the OpenBoot PROM for diagnostics and automatic execution of scripts. See <a href="#">“NVRAM” on page 6-1</a> .
POST diagnostics	Firmware	Tests workstation core components such as CPU and memory.	Checks low-level interaction between CPU, caches, memory, JBus, and PCI bridge. Output displayed through serial port. See <a href="#">“Power-On Self-Test” on page 7-1</a> .
OpenBoot Diagnostics	Firmware	Tests system motherboard and component interfaces.	Component tests are selected from menu. If component is PCI card with IEEE 1275 compliant Fcode, internal self-test is executed. See <a href="#">“OpenBoot Diagnostics” on page 8-5</a> .
SunVTS	Software	Exercises and stresses workstation components.	Invoked from the Solaris operating system. Command-line or GUI user interface. SunVTS must be installed on the system under test. See <a href="#">“SunVTS” on page 9-1</a> .
Solaris Operating System	Software	Commands display system information.	Commands <code>iostat</code> , <code>prtdiag</code> , <code>prtconf</code> , <code>netstat</code> , <code>ping</code> , <code>ps</code> , and <code>prstat</code> are run with superuser privileges. See <a href="#">“Troubleshooting Commands” on page 3-15</a> .



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# 1.2 About Flowcharts

The *Sun Blade 1500 Service, Diagnostics, and Troubleshooting Manual* contains flowcharts that you can use to:

- Determine how to use this book.
- Identify workstation malfunctions.
- Verify workstation operation after completing the service procedure.

Each flowchart begins with a problem statement and a description of normal operation.

Flowcharts use structural elements, as described in [TABLE 1-2](#):

**TABLE 1-2** Flowchart Elements

Element	Description	Purpose
	Rectangles at the top left and throughout flow of the flowchart.	Bold text states a problem. Plain text states an action.
	Rectangle at the top right of the flowchart.	Text describes normal operation or provides details about normal conditions.
	Rectangle drawn with bold lines.	Text gives a cross-reference to another flowchart, table, or procedure. The cross-references are clickable links.
	Diamond shape.	Text asks questions to be answered Yes or No. If you answer Yes, move down the chart to the next element. If you answer No, move right to the next element.
	Circle	The letter in the circle directs you to a continuation of the flowchart. Some flowcharts have more than one continuation path.

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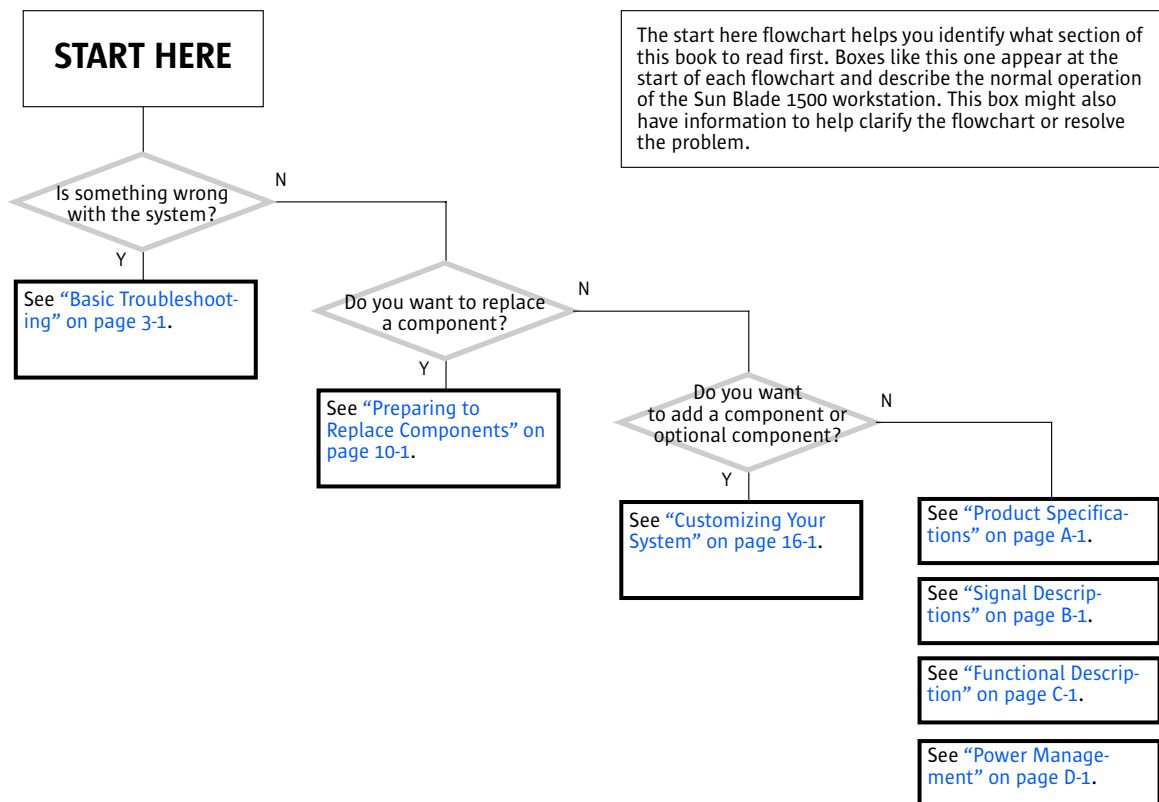
**Note** – Some flowcharts also point to additional diagnostic information in other Sun documents.

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## 1.3 How to Use This Manual

When you service the Sun Blade 1500 workstation, begin with the Start Here flowchart, [FIGURE 1-1](#). The Start Here flowchart links you to information about:

- Troubleshooting
- Component removal, installation, and verification
- Workstation customization
- Product information



**FIGURE 1-1** Start Here Flowchart

# Product Description

---

Topics covered in this chapter are:

- [“Product Overview” on page 2-1](#)
- [“External System Description” on page 2-3](#)
- [“Replaceable Components” on page 2-7](#)
- [“Supported Sun Monitors” on page 2-10](#)

---

## 2.1 Product Overview

The Sun Blade 1500 workstation has the power and expandability to handle a wide range of tasks. Examples of these tasks range from entry-level 2D graphics EDA applications to mid-range 3D graphics MCAD applications. Combined with the power of the Solaris operating system, Sun Blade 1500 workstation offers reliability and scalability to match the power of its UltraSPARC IIIi.

The Sun Blade 1500 workstation provides the following features in the base configuration:

- UltraSPARC IIIi 1.5 GHz 64-bit processor
- 1 GB of DDR1 memory
- Sun XVR-100 graphics accelerator
- 120 GB ATA 100 hard drive
- High-speed optical drive

The Sun Blade 1500 workstation is configured with the features described in [TABLE 2-1](#).

**TABLE 2-1** Sun Blade 1500 Configured Features

Feature	Description
Processor	1.5 GHz UltraSPARC IIIi CPU with 1 MB integrated Level2 cache, heat sink, and fan
Operating system	Preinstalled Solaris 8 2/04 and Solaris 9 9/04 operating system supporting 32 and 64-bit applications
Enclosure	Deskside system enclosure with front-panel access to optical media drive and smart card reader
Memory options	From a minimum of 1 GB to a maximum of 8 GB of ECC error-correcting DDR-1 SDRAM memory, using matched pairs of 512 MB, 1 GB, or 2 GB DIMMs Maximum of 2 DIMM pairs per system (4 DIMMS total)
Power supply	420 W autoranging
Internal storage	One or two 120 GB ATA 100 3.5-inch hard drives (7,200 rpm) Note: Internal drive mirroring is not supported.
Optical media	DVD/CD-RW drive
Audio	CD-quality audio
Controlled system access	Smart card reader
Graphics accelerator	PCI-based graphics accelerators •Sun XVR-100 - up to 3 •Sun XVR-600 - up to 2 •Sun XVR-1200 - one
Keyboard	Sun Type-6 USB AT 101 layout
Mouse	Sun 3-button Crossbow USB mouse
Expansion slots on the motherboard	Peripheral component interconnect (PCI) slots: 1 64-bit at 66 MHz connector (slot 4) 2 64-bit at 33 MHz connectors (slots 2 and 3) 2 32-bit at 33 MHz connectors (slots 0 and 1)

**TABLE 2-1** Sun Blade 1500 Configured Features *(Continued)*

Feature	Description
Rear panel connectors for external options	2 universal serial bus (USB) 1.1 connectors 2 serial connectors (DB-9) 1 parallel connector (DB-25) 1 twisted-pair Ethernet (TPE) 10/100/1000BASE-T connector (RJ-45) 1 audio line-in connector 1 audio line-out connector 1394/USB card: 2 IEEE 1394A connectors and 3 universal serial bus (USB) 2.0 connectors
Front panel connectors for external options	2 USB 1.1 connectors 1 headphone connector 1 microphone connector

**Note** – Some diskless Sun Blade 1500 workstations are configured without a hard drive or optical drive.

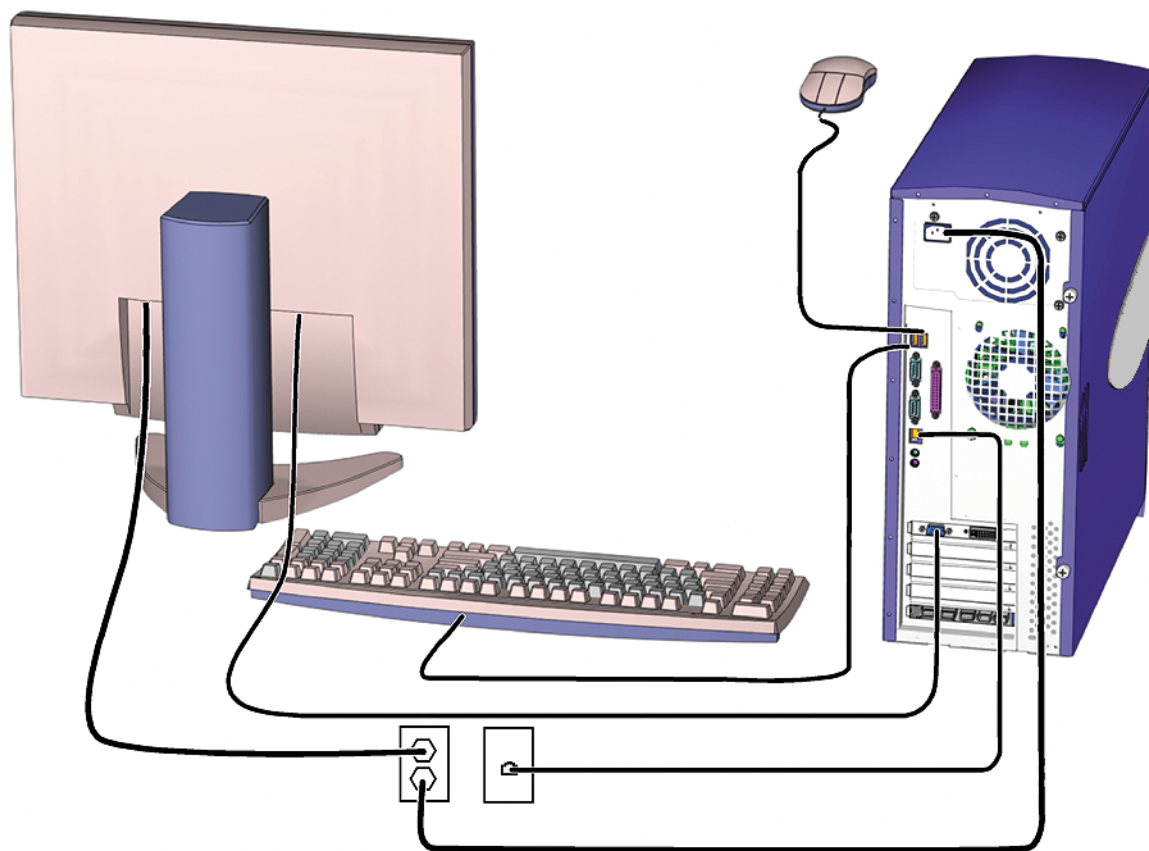
**Note** – If you have a plastic rivet in the headphone jack of the optical drive, do not remove the rivet. Instead, use the headphone jack at the bottom of the front panel.

The Sun Blade 1500 workstation also supports the following options:

- Second hard drive
- PCI SCSI host bus adapters
- PCI serial communications adapters
- PCI network adapters
- PCI Fibre Channel adapters
- SunPCi III Pro coprocessor cards
- Sun StorEdge™ A1000, A5x00, and D1000 hard drive arrays
- Sun StorEdge L1000 and L11000 tape drive arrays

## 2.2 External System Description

[FIGURE 2-1](#), [FIGURE 2-2](#), and [FIGURE 2-3](#) identify external components and connectors of the Sun Blade 1500 workstation.

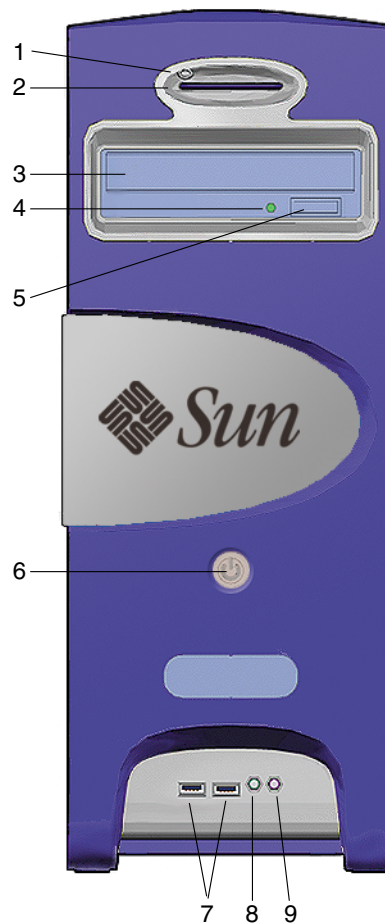


**FIGURE 2-1** Monitor, Keyboard, Mouse, and Sun Blade 1500 Workstation

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**Note** – Make sure that the keyboard and mouse are only connected to USB 1.1 compliant connectors on the bezel or rear panel. See [“Rear Panel Overview, Sun Blade 1500 Workstation”](#) on page 2-6.

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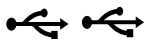




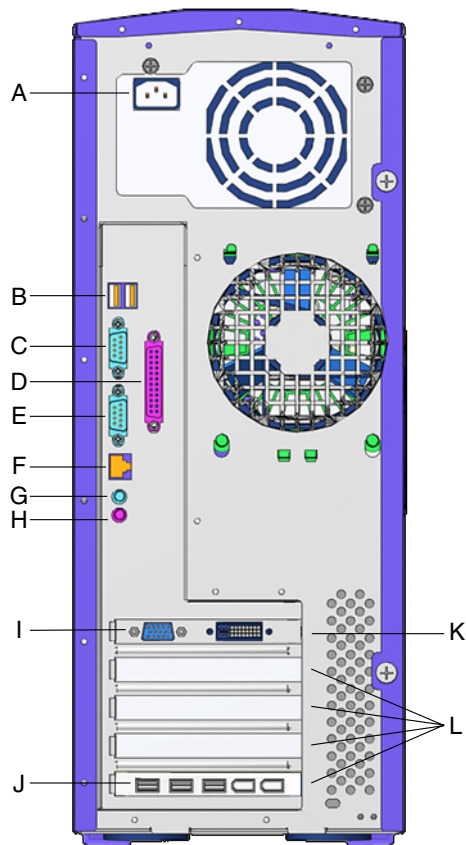
**FIGURE 2-2** Bezel Overview, Sun Blade 1500 Workstation

**TABLE 2-2** Bezel Overview, Sun Blade 1500 Workstation

Callout in FIGURE 2-2	Part Description	Bezel Symbol
1	Smart card reader LED	none
2	Smart card reader	none
3	Optical drive	none
4	Optical drive status LED	none
5	Optical drive eject button	▲

**TABLE 2-2** Bezel Overview, Sun Blade 1500 Workstation (*Continued*)









Callout in FIGURE 2-2	Part Description	Bezel Symbol
6	Power button with LED	
7	USB v1.1 connector (2)	
8	Audio connector, headphone	
9	Audio connector, microphone	



**FIGURE 2-3** Rear Panel Overview, Sun Blade 1500 Workstation



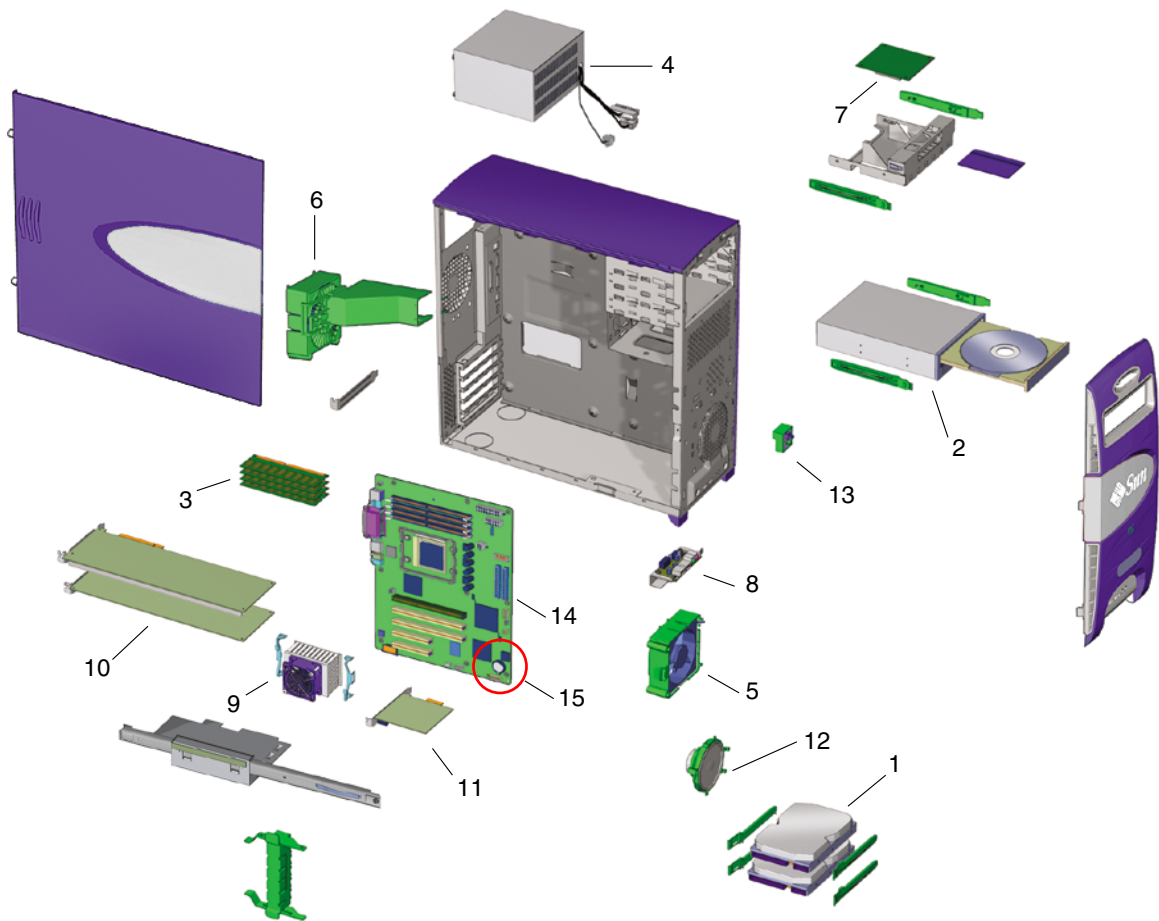
**TABLE 2-3** Rear Panel Overview, Sun Blade 1500 Workstation

Callout in FIGURE 2-3	Part Description	Rear Panel Symbol
A	Power connector	none
B	USB v1.1 connector (2)	
C	Serial1 connector (DB-9)	 1
D	Parallel connector (DB-25)	//
E	Serial2 connector (DB-9)	 2
F	Twisted-pair Ethernet (TPE)	
G	Audio connector, line-out	
H	Audio connector, line-in	
I	Graphics accelerator	
J	IEEE 1394/USB v2.x combination card with 2 IEEE 1394a connectors and 3 USB v2.0 ports	
K	PCI card connector (66 MHz): PCI connector 4	<b>PCI 4</b> <b>66</b>
L	PCI card connectors (33 MHz): PCI connector 0, PCI connector 1, PCI connector 2, and PCI connector 3	<b>PCI 3</b> <b>PCI 2</b> <b>PCI 1</b> <b>PCI 0</b>

**Note** – The combination card connectors for your Sun Blade 1500 workstation might be reversed when compared with [FIGURE 2-3](#). Their function is the same.

## 2.3 Replaceable Components

[FIGURE 2-4](#) shows the replaceable components of the Sun Blade 1500 workstation.



**FIGURE 2-4** Exploded Diagram of Sun Blade 1500 Replaceable Components

More information about the replaceable components is listed in [TABLE 2-4](#).

**TABLE 2-4** Sun Blade 1500 Replaceable Components

Callout in <a href="#">FIGURE 2-4</a>	Component	Description
1	Hard drive	Hard drive, 120 GB, ATA 100/IDE
2	Optical drive	DVD/CD-RW

**TABLE 2-4** Sun Blade 1500 Replaceable Components (*Continued*)

Callout in <a href="#">FIGURE 2-4</a>	Component	Description
3	DIMM (512 MB) DIMM (1 GB) DIMM (2 GB)	DIMM, 512 MB, DDR1, ECC DIMM, 1 GB, DDR1, ECC DIMM, 2 GB, DDR1, ECC
4	Power supply	Power Supply, 420 W, 100 - 240 VAC
5	Front fan	Front fan, Sun Blade 1500 chassis, 12VDC
6	Rear fan	Rear fan, Sun Blade 1500 chassis, 12VDC
7	Smart card reader	Smart card reader, bare board
8	Audio USB board	USB connector board, mounting bracket
9	CPU fan and heat sink assembly	Heat sink, integrated fan, 12VDC
10	Graphics accelerator	Sun XVR-600 PCI graphics card Sun XVR-100 PCI graphics card Sun XVR-1200 PCI graphics card
11	Combination card	IEEE 1394/USB 2.0 I/O PCI card
12	Speaker assembly	Speaker, 8 ohms
13	Power switch and cable kit	Cable kit, Sun Blade 1500 chassis
14	Motherboard	Sun Blade 1500 motherboard
15	Lithium battery	Type CR2032

Contact your Sun Microsystems service representative if you need a component.

**Note** – The components listed in [TABLE 2-4](#) 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 component, or search:  
<http://www.sun.com/ibb/spares>

## 2.4 Supported Sun Monitors

The Sun Blade 1500 workstation supports the monitors listed in [TABLE 2-5](#). The Sun XVR-100 and Sun XVR-1200 graphics accelerators can be configured to support multiple displays.

**TABLE 2-5** Monitors supported by the Sun Blade 1500 Workstation

Monitor	Maximum resolution	Number of monitors supported		
		Sun XVR-100	Sun XVR-600	Sun XVR-1200
17-inch color	1152 x 900 @ 66 Hz	Up to 2	1	Up to 2
19-inch LCD color	1280 x 1024 @ 60/76 Hz	Up to 2	1	Up to 2
22-inch CRT color	1600 x 1200 @ 75 Hz	Up to 2	1	Up to 2
24.1-inch LCD flat screen color	1920 x 1200 @ 60 Hz	Up to 2	1	Up to 2

Dual monitor support requires special cabling and software configuration. For more information about the Sun XVR-100, Sun XVR-600, and Sun XVR-1200 graphics accelerators, refer to the *Sun XVR-100 Graphics Accelerator Installation Guide*, 816-7560, the *Sun XVR-600 Graphics Accelerator Installation and User's Guide*, 817-2195, or the *Sun XVR-1200 Graphics Accelerator Installation and User's Guide*, 816-7386.

## Basic Troubleshooting

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This chapter provides basic troubleshooting assistance. Topics include:

- [“Power-On Sequence” on page 3-1](#)
- [“Display and Audio Responses” on page 3-2](#)
- [“Troubleshooting Commands” on page 3-15](#)

---

### 3.1 Power-On Sequence

When you power on the Sun Blade 1500 workstation, a series of tasks and processes brings the workstation to a user-ready state.

The following lists the sequence of power-on events that occur before a user can interact with the Sun Blade 1500 workstation.

1. Power button is pressed.
2. OpenBoot PROM initiates system power-on reset (SPOR).
3. OpenBoot PROM initiates power-on self-test (POST) (if enabled).
4. OpenBoot PROM loads device drivers.
5. OpenBoot PROM loads workstation configuration from NVRAM.
6. OpenBoot PROM initializes bus and PCI card self-test diagnostics.
7. OpenBoot PROM loads and executes boot block.
8. Boot block loads and executes bootstrap program.
9. Bootstrap loads Solaris kernel.
10. Bus connections and hardware components are probed.

11. `init` program is loaded and executed.
12. `init` program reads `/etc/inittab`.
13. `init` program launches `rc` scripts, which read, check, and mount file systems.
14. `/etc/vfstab` file system is checked and mounted.
15. Additional `rc` script files are executed.

If the power-on behavior seems erratic, see [“Power-On Flowchart” on page 4-3](#)

## 3.2 Display and Audio Responses

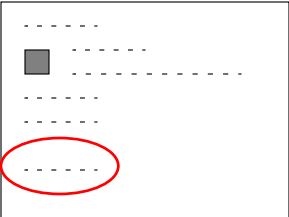
Component failures can often be diagnosed by looking at the monitor or listening to the system. Topics in this section include:

- [“Displayed Screens” on page 3-2](#)
- [“Displayed Messages” on page 3-5](#)
- [“Audio Responses” on page 3-12](#)

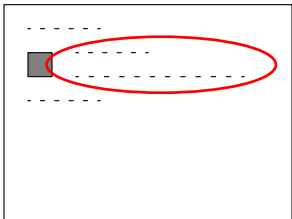
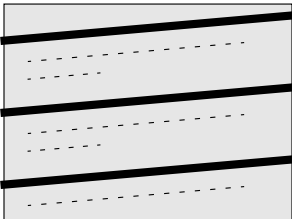
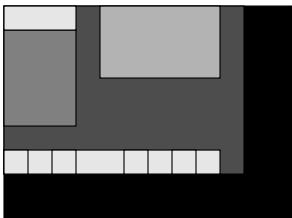
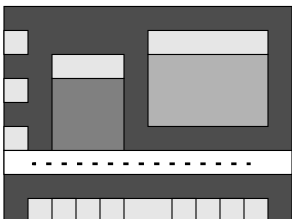

### 3.2.1 Displayed Screens

[TABLE 3-1](#) describes what you might see on the monitor, what the images mean, and where to find assistance in this manual to resolve the problem.

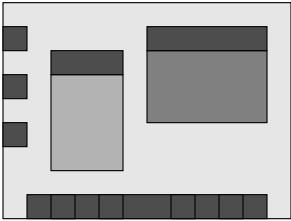
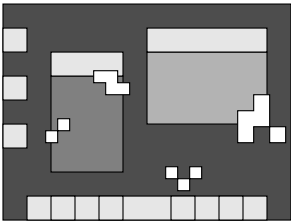
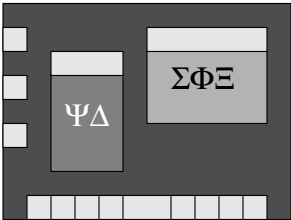
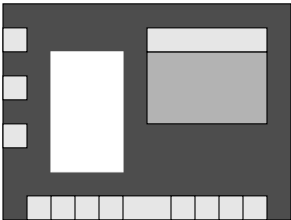

**TABLE 3-1** Screen Images and What They Mean

Screen Images	Description	Meaning	Comment
	White screen with banner and text. Error message displayed.	Error from OpenBoot PROM.	See <a href="#">“OpenBoot PROM Messages” on page 3-6</a> .
		Error from Solaris operating system.	See <a href="#">“Solaris Error Messages” on page 3-8</a> .

**TABLE 3-1** Screen Images and What They Mean (*Continued*)

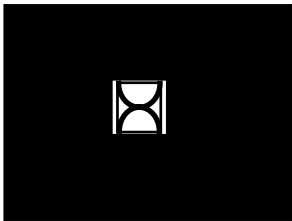
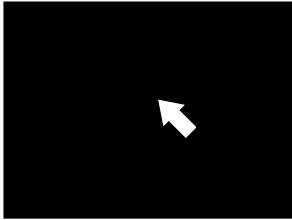
Screen Images	Description	Meaning	Comment
	White screen with banner and text. Information displayed in banner is incorrect.	Corruption of OpenBoot PROM. Corruption of NVRAM.	See <a href="#">“OpenBoot PROM Messages”</a> on page 3-6. See <a href="#">“NVRAM Problem”</a> on page 4-39.
	Display has flickering horizontal lines.	Monitor sync problem.	Verify monitor can sync to set frequency. See <a href="#">“Graphics Accelerators”</a> on page C-21. Also see monitor documentation.  See <a href="#">“Monitor Problem”</a> on page 4-14.  See <a href="#">“PCI Card Problem”</a> on page 4-28.
	GUI is too small, too large, or not centered.	Monitor settings or sync problem.	Adjust monitor according to monitor manual.  Verify monitor can sync to set frequency. See <a href="#">“Graphics Accelerators”</a> on page C-21.  See <a href="#">“Monitor Problem”</a> on page 4-14.
	White bar with black text across GUI.	Error occurred in Solaris kernel.	See <a href="#">“Other Messages”</a> on page 3-11.
	Error message in terminal window.	Error occurred in process started from that terminal.	See <a href="#">“Solaris Error Messages”</a> on page 3-8. See <a href="#">“Other Messages”</a> on page 3-11. See <a href="#">“Graphical User Interface Problem”</a> on page 4-22.

**TABLE 3-1** Screen Images and What They Mean (*Continued*)

Screen Images	Description	Meaning	Comment
	GUI colors flash or are wrong.	Color registers exhausted.	Allocate more colors to GUI. See <a href="#">“Avoiding Colormap Flash” on page 11-37.</a>
		Monitor problem.	See <a href="#">“Monitor Problem” on page 4-14.</a>
	GUI has artifacts.	Graphics accelerator problem.	See <a href="#">“PCI Card Problem” on page 4-28.</a>
	GUI is in wrong language.	Locale problem.	<ol style="list-style-type: none"> <li>1. Log out.</li> <li>2. At the login GUI Options pulldown, select Language.</li> <li>3. Select your language.</li> <li>4. Log in as usual.</li> </ol>
	Window in GUI is completely white.	Window process is hung.	See <a href="#">“Graphical User Interface Problem” on page 4-22.</a>
	Display is all one color.	Monitor problem.	See <a href="#">“Monitor Problem” on page 4-14.</a>
		Graphics accelerator problem.	See <a href="#">“PCI Card Problem” on page 4-28.</a>
		NVRAM problem.	See <a href="#">“NVRAM Problem” on page 4-39.</a>

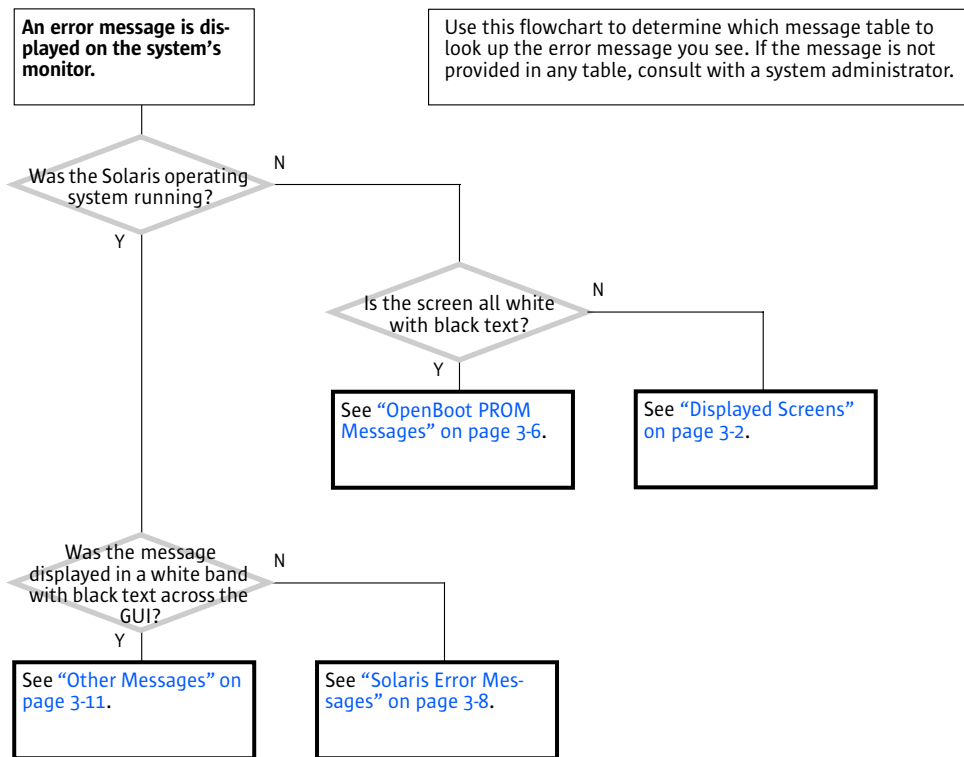


**TABLE 3-1** Screen Images and What They Mean *(Continued)*

Screen Images	Description	Meaning	Comment
	Display is black with hourglass.	Network problem.	See <a href="#">“Network Problem” on page 4-17.</a>
		Dtlogin problem.	See <a href="#">“Login Problem” on page 4-20.</a>
	Display is black with mouse pointer.	Network problem.	See <a href="#">“Network Problem” on page 4-17.</a>
		Dtlogin problem.	See <a href="#">“Login Problem” on page 4-20.</a>

### 3.2.2 Displayed Messages

When a failure occurs, a message might be displayed on the system’s monitor. Use the following flowchart to determine which message table addresses the error message you see.



**FIGURE 3-1** Displayed Messages Flowchart

### 3.2.2.1 OpenBoot PROM Messages

**TABLE 3-2** lists some common fault messages or *portions* of fault messages displayed by the OpenBoot PROM, their meanings, and what to do next.

**TABLE 3-2** OpenBoot PROM Messages and Their Meaning

Message	Meaning	What to Do
The date is displayed as: 01/01/2000 00:00:00 GMT	The battery has drained.	Replace the battery. See <a href="#">"Replacing the Battery" on page 11-22.</a>

**TABLE 3-2** OpenBoot PROM Messages and Their Meaning (*Continued*)

Message	Meaning	What to Do
Can't open boot device	The device specified for boot is unavailable.	<ul style="list-style-type: none"> <li>For hard drive, check internal connections. Drive might be corrupted. See <a href="#">"Hard Drive Problem" on page 4-8</a>.</li> <li>For optical drive, check that disc is bootable. Check internal connections. See <a href="#">"Optical Drive Problem" on page 4-25</a>.</li> <li>For network, check network connections. Check boot server. See <a href="#">"Network Problem" on page 4-17</a>.</li> </ul>
Can't run OBDIAG from the device tree node or with the active instance	Attempt to run OpenBoot Diagnostics from a selected device node.	Type: ok <b>unselect-dev</b>
NOTICE - CPUx Banky DIMMs are from different vendors.	A pair of DIMMs are each from different manufacturers.	Install DIMMs in identical pairs. See <a href="#">"Replacing the DIMMs" on page 11-2</a> .
NOTICE - CPUx Banky DIMMs have different architectures and will not be used.	A pair of DIMMs are each of different architectures. The DIMMs are not used.	Install DIMMs in identical pairs. See <a href="#">"Replacing the DIMMs" on page 11-2</a> .
Searching for self-test methods . . . Rejecting alloc-mem!	OpenBoot Diagnostics failed to start. Some devices might be tied to other processes.	Type: ok <b>unselect-dev</b>
Starting xv-500 self-test	Sun XVR-1200 PROM error.	Type: ok <b>show-devs</b> search for the text: xvr-1200
The process "cs00.sh" has been exited with retcode#256	The battery has drained.	Replace the battery. See <a href="#">"Replacing the Battery" on page 11-22</a> .
Timeout waiting for ARP/RARP packet	Network connection problem.	Check network connection. See <a href="#">"Network Problem" on page 4-17</a> .
/usr/bin/ps/getexecname () has failed	The battery has drained.	Replace the battery. See <a href="#">"Replacing the Battery" on page 11-22</a> .

**TABLE 3-2** OpenBoot PROM Messages and Their Meaning (Continued)

Message	Meaning	What to Do
WARNING: Timed out waiting for NIS to come up	The name service cannot be found.	Check network connection. See <a href="#">“Network Problem” on page 4-17</a> . Check system name service configuration information.

### 3.2.2.2 Solaris Error Messages

[TABLE 3-3](#) lists some common error messages or *portions* of error messages displayed while the Solaris operating system is functioning, their meanings, and what to do next. These messages are high-level and might be related to software, rather than hardware failure.

**TABLE 3-3** Solaris Error Messages and Their Meanings

Message	Meaning	What to do
Arguments too long	Too many arguments follow a C shell command.	Run the command in the Bourne shell.
automountd[int]: server <i>hostname</i> responding	An NFS server cannot be mounted.	Check the NFS server’s status and network connection.
Bad address	The value of an address is invalid.	Determine and use the correct address.
Bad file number	A program error where the application does not have permission to interact with the file.	Program bug, or change permissions of the file.
BAD TRAP	Faulty hardware or mismatch of hardware and its configuration. Can sometimes indicate a bad or earlier version CPU. Usually precedes a panic.	Check configuration. Check hardware functionality.
Broken pipe	Occurs when a pipe ( ) directs without data.	Check the structure of the command.
Bus error	I/O was attempted on a nonexistent device. Might be caused by invalid file descriptors, bad memory allocation, or corrupt boot blocks.	Check for device and its connection.
Command not found	The C shell could not find the command you typed.	Check the command path. Type the command explicitly.
Connection closed (by foreign host)	Timeout has occurred or network connection failed from remote host using either rlogin or telnet.	Try again. Check network connection.

**TABLE 3-3** Solaris Error Messages and Their Meanings (*Continued*)

Message	Meaning	What to do
Connection refused	Remote host actively refused connection or network security policy was violated.	Try issuing <code>xhost +</code> on the local host.
Connection reset by peer	Connection timed out.	Try again.
Device busy	Device is already mounted or there was an attempt to unmount a device while a file was in use. Typically seen when ejecting an optical media disc.	Close all files and quit all applications from that mount point. If it is an optical media disc, stop the volume manager.
Error Host Unknown	Name services have not been set up correctly or an alias is missing from NS maps.	Reconfigure name services or update NS maps.
Exec format error	Software is not compatible with platform. File is not an executable, though identified as such.	Check that the Binary Compatibility Package is installed. Check that the file is truly executable.
File descriptor in bad state	Permissions on file prevent reading.	Check and reset file permissions.
File exists	An attempt to overwrite a file occurred.	Rename or remove the existing file.
File name too long	A file name was greater than 256 characters, or a path name was over 1024 characters.	If more characters are required, edit the <code>/usr/include/limits.h</code> file.
giving up	An action has been retried until it has timed out. Can occur when syncing SCSI hard drive file systems.	Check cabling to suspect hardware. Check hardware driver.
Illegal Instruction	Application for a different platform was run, there is too little swap space available, or a data file was run as an executable.	Verify the compatibility of the software. Check swap space. Set correct permissions for the file.
Illegal seek	Misuse of the pipe ( <code> </code> ).	Direct the output to a file, then use the file as input.
INIT: Cannot create /var/adm/utmpx	The root file system has been mounted as read only, or has become corrupted.	Run <code>fsck</code> on the root file system. If unsuccessful, replace the root file system.
Invalid argument	An invalid parameter was specified that the system cannot interpret.	Check that the actions you are taking make logical sense. For example, don't mount a nonexistent file system.

**TABLE 3-3** Solaris Error Messages and Their Meanings (*Continued*)

Message	Meaning	What to do
Invalid null command	Typographical error when using the pipe ( ). For example, a double pipe or no command following a pipe.	Check the format of the command.
I/O error	Hardware error has occurred on storage device.	Check device media. If a hard drive, run <code>fsck</code> .
process killed	Swap space is too small or stack size is too large.	Check swap space. Set stack size to 8192.
ld.so.1	Runtime linker could not find file or symbol. Swap space has been diminished by rogue program. Memory leak.	Check for missing file. Reboot system.
No carrier	Network connection faulty.	Check network connection. See <a href="#">“Network Problem” on page 4-17</a> .
Network is down	Network connection faulty.	Check network connection. See <a href="#">“Network Problem” on page 4-17</a> .
Network is unreachable	There is no route to network, or gateways are refusing packets.	Check network security.
NFS read failed for server	File-sharing permissions changed while the file was open.	Close the file and reset the permissions.
NFS server not responding still trying	NFS server is down or slow to respond. NFS server network connection might be down.	Check resource load and network connection of NFS server.
No child process	Application is trying to communicate with subprocess that does not exist.	Restart the parent process.
No default media available	No removable media exists or volume manager is confused.	Insert media or update the volume manager with the <code>volcheck</code> command.
No such device	Device does not exist.	Check hardware connections of suspect device.
No utmpx entry	File system is full.	In single-user mode, zero-out the <code>/var/adm/utmp</code> and <code>/var/adm/utmpx</code> files. Bring system up and clean out large files starting in the <code>/var</code> directory.

**TABLE 3-3** Solaris Error Messages and Their Meanings (*Continued*)

Message	Meaning	What to do
Not on system console	Security is set so that superuser logins occur only at the console.	Comment out the CONSOLE line in the /etc/default/login file. This action compromises security.
Package not installed	A software package is missing.	Install the package.
RPC: program not registered	Corruption of the rpc.bynumber NIS map.	Check the rpc.bynumber NIS map.
Segmentation fault	A programming error.	The command file core returns the application that caused the fault.
Stale NFS file handle	A file or directory opened by a NFS client was removed from or permissions changed on the NFS server.	Reboot the NFS client.

### 3.2.2.3 Other Messages

[TABLE 3-4](#) lists portions of fault messages that might also be displayed while the Solaris software is functioning, their meanings, and what to do next. These messages are mostly related to hardware failures.

**TABLE 3-4** Other Messages and Their Meaning

Message	Meaning	What to do
Panic in kernel	The Solaris kernel can no longer continue to run. Usually precedes a core dump.	Message might identify hardware that is at fault. Check memory. See <a href="#">“Memory Problem” on page 4-37</a> .
xntpd[356]: too many recvbufs allocated (30)	Problem with network time protocol daemon.	Check network. See <a href="#">“Network Problem” on page 4-17</a> . Check time server. Contact system administrator.
metainit:hostname: there are no existing databases	The Solstice Disk Suite software is installed, but not configured.	Not a problem. Message can be ignored.
WARNING: timeout: reset target chno = 0 targ = 0 WARNING: timeout: reset bus chno = 0 targ = 0	Hard drive is not responding to resets. For this example, it is HDD0.	Check hard drive and connections. See <a href="#">“Hard Drive Problem” on page 4-8</a> .

**TABLE 3-4** Other Messages and Their Meaning (*Continued*)

Message	Meaning	What to do
Bad magic number in disk label Can't open disk label package	Partitions are corrupted on hard drive.	Repartition and format hard drive. Refer to Solaris documentation.
starting rpc services: rpcbin keyserv	Network problem if system does not boot and message persists.	Check network. See <a href="#">“Network Problem” on page 4-17</a> . Check time server.
The X-server can not be started on display :0 ...	The GUI cannot be started for certain software components are not configured properly	Attach a mouse to the rear panel USB connectors. Check mouse and connection.
WARNING: fcsn: _init: Transport Layer driver 'fp' load failed	Might appear in /var/adm/messages.	Not a problem. Message can be ignored.

### 3.2.3 Audio Responses

[TABLE 3-5](#) describes what sounds you might hear from different areas of the system, what the sounds mean, and where to find assistance in this manual to resolve the problem.

**TABLE 3-5** System Sounds at Locations and What They Mean

Location	Sound	Meaning	Comment
System	Silence	Power delivery problem.	See <a href="#">“Power Problem” on page 4-6</a> .



**TABLE 3-5**    System Sounds at Locations and What They Mean (*Continued*)

Location	Sound	Meaning	Comment
Monitor	Tickling	Monitor is searching for video mode or trying to sync.	Verify monitor can sync to set frequency. See <a href="#">“Graphics Accelerators” on page C-21</a> . Also see monitor documentation.  See <a href="#">“Monitor Problem” on page 4-14</a> .  See <a href="#">“PCI Card Problem” on page 4-28</a> .
	Very high-pitched whine	Monitor cannot sync.	Change graphics accelerator resolution. See graphics accelerator documentation.  See <a href="#">“Monitor Problem” on page 4-14</a> .  See <a href="#">“PCI Card Problem” on page 4-28</a> .
Monitor or power supply	Low-pitched buzz	Power supply degraded.	Replace the power supply. See <a href="#">“Replacing the Power Supply” on page 13-2</a> .
		Monitor power supply degraded.	Replace the monitor.

**TABLE 3-5** System Sounds at Locations and What They Mean (*Continued*)

Location	Sound	Meaning	Comment
Front of system chassis	Upon power on, three beeps and the system powers off	Invalid configuration. Memory or CPU does not match requirements.	See <a href="#">“Memory Problem” on page 4-37</a> or <a href="#">“Motherboard Problem” on page 4-34</a> .
	Upon power on, four beeps and the system powers off	FRU ID checksum error.	Replace motherboard. See <a href="#">“Replacing the Motherboard” on page 11-43</a> .
	Upon power on, five beeps and the system powers off	Internal reset failed.	See <a href="#">“Motherboard Problem” on page 4-34</a> .
	Continuous beeping	Keyboard key is stuck or connection is bad.	See <a href="#">“Keyboard Problem” on page 4-19</a> .
	Quiet scratching	hard drive heads are moving.	Hard drive is normal.
	High-pitched humming	hard drive bearings are failing.	Replace the hard drive. See <a href="#">“Replacing a Hard Drive” on page 12-2</a> .
Front or rear of system chassis	Low shrill sound	Front fan bearing is failing.	Replace front fan. See <a href="#">“Replacing the Front Fan” on page 13-8</a> .
		Rear fan bearing is failing.	Replace rear fan. See <a href="#">“Replacing the Rear Fan” on page 13-15</a> .
		Power supply fan bearing is failing.	Replace the power supply. See <a href="#">“Replacing the Power Supply” on page 13-2</a> .
	Quiet grumbling sound	Temperature is such that fans are barely turning.	Fans are normal.
	Silence from fans	Front fan is not spinning. Rear fan is not spinning.	See <a href="#">“System Fan Problem” on page 4-9</a> .
		Power supply fan is not spinning.	See <a href="#">“Power Problem” on page 4-6</a> .

**TABLE 3-5** System Sounds at Locations and What They Mean (*Continued*)

Location	Sound	Meaning	Comment
Optical drive	Repetitive quiet clunking	Disc is unbalanced.	Reposition disc.
	Rapid shifting	Laser pickup head is moving.	Optical drive normal.
	Rushing air that is constant or intermittently changes	Disc is spinning properly.	Optical drive normal.
	Rushing air that is rhythmically changing	Laser pickup head cannot locate tracks on disc.	Try a different disc. If the problem continues, see <a href="#">“Optical Drive Problem”</a> on page 4-25.
	Very high-pitched squeaking	Laser pickup head is out of alignment.	Try a different disc. If the problem continues, replace optical drive. See <a href="#">“Replacing the Optical Drive”</a> on page 12-9.

## 3.3 Troubleshooting Commands

The section discusses superuser commands that assist in troubleshooting problems with the Sun Blade 1500 workstation. Commands discussed are:

- [“iostat Command”](#) on page 3-15
- [“prtdiag Command”](#) on page 3-18
- [“prtconf Command”](#) on page 3-20
- [“netstat Command”](#) on page 3-23
- [“ping Command”](#) on page 3-25
- [“ps Command”](#) on page 3-27
- [“prstat Command”](#) on page 3-29

Most of these commands are located in the `/usr/bin` or `/usr/sbin` directories.

### 3.3.1 iostat Command

The `iostat` command iteratively reports terminal, drive, and tape I/O activity, as well as CPU utilization.

### 3.3.1.1 Options

TABLE 3-6 describes options for the `iostat` command and how those options can help troubleshoot the Sun Blade 1500 workstation.

TABLE 3-6 Options for `iostat`

Option	Description	How It Can Help
No option	Reports status of local I/O devices.	A quick three-line output of device status.
-c	Reports the percentage of time the system has spent in user mode, in system mode, waiting for I/O, and idling.	Quick report of CPU status.
-e	Displays device error summary statistics. The total errors, hard errors, soft errors, and transport errors are displayed.	Provides a short table with accumulated errors. Identifies suspect I/O devices.
-E	Displays all device error statistics.	Provides information about devices: manufacturer, model number, serial number, size, and errors.
-n	Displays names in descriptive format.	Descriptive format helps identify devices.
-x	For each drive, reports extended drive statistics. The output is in tabular form.	Similar to the <code>-e</code> option, but provides rate information. This helps identify poor performance of internal devices and other I/O devices across the network.

### 3.3.1.2 Examples

The following examples show output for the `iostat` command and its options.

```
# iostat
      tty      dad0      sd0      nfs1      nfs2      cpu
tin tout kps tps serv kps tps serv kps tps serv kps tps serv us sy wt id
  0    5 128 15    6    0    0    0    0    0    0    50    3    9    2    8    4    86
```

```
# iostat -c
      cpu
us sy wt id
  2  7  4 87
```

```
# iostat -e
      ---- errors ---
device    s/w h/w trn tot
dad0       0  0  0  0
sd0        0  2  0  2
nfs1       0  0  0  0
nfs2       0  0  0  0
nfs3       0  0  0  0
nfs4       0  0  0  0
nfs5       0  0  0  0
```

```
# iostat -x
      extended device statistics
device    r/s    w/s    kr/s    kw/s wait actv  svc_t  %w  %b
dad0      12.3    0.9  106.6    3.7  0.0  0.1    5.9   1   4
sd0        0.0    0.0    0.0    0.0  0.0  0.0    0.0   0   0
nfs1       0.0    0.0    0.0    0.0  0.0  0.0    0.0   0   0
nfs2       1.2    1.1   20.9   21.2  0.0  0.0    9.3   0   2
nfs3       0.2    0.0    0.9    0.0  0.0  0.0    2.5   0   0
nfs4       0.0    0.0    0.0    0.0  0.0  0.0    0.0   0   0
nfs5       1.5    0.0   30.2    0.0  0.0  0.1   38.6   0   4
```

```
# iostat -En
c0t0d0      Soft Errors: 0 Hard Errors: 0 Transport Errors: 0
Model: ST3120026A    Revision: 8.01    Serial No: 3JT4H4C2
Size: 120.03GB <120031641600 bytes>
Media Error: 0 Device Not Ready: 0 No Device: 0 Recoverable: 0
Illegal Request: 0
c0t2d0      Soft Errors: 0 Hard Errors: 0 Transport Errors: 0
Vendor: LITE-ON    Product: COMBO SOHC-4832K Revision: 03K1
Serial No:
Size: 0.00GB <0 bytes>
Media Error: 0 Device Not Ready: 0 No Device: 0 Recoverable: 0
Illegal Request: 0 Predictive Failure Analysis: 0
```

# 3.3.2 prtdiag Command

The `prtdiag` command displays configuration and diagnostic information for a system. The diagnostic information identifies any failed component in the system.

The `prtdiag` command is located in the `/usr/platform/platform-name/sbin/` directory.

---

**Note** – The `prtdiag` command might indicate a slot number different than that identified elsewhere in this manual. This is normal.

---

## 3.3.2.1 Options

[TABLE 3-7](#) describes options for the `prtdiag` command and how those options can help troubleshoot the Sun Blade 1500 workstation.

**TABLE 3-7** Options for `prtdiag`

Option	Description	How It Can Help
No option	Lists system components.	Identifies CPU timing and PCI cards installed.
-v	Verbose mode. Displays the time of the most recent AC power failure, the most recent hardware fatal error information, and (if applicable) environmental status.	Provides the same information as no option. Additionally lists fan status, temperatures, ASIC, and PROM revisions.

## 3.3.2.2 Examples

The following examples show output for the `prtdiag` command and its options.

```

# /usr/platform/sun4u/sbin/prtdiag
System Configuration: Sun Microsystems sun4u Sun Blade 1500 workstation
System clock frequency: 160 MHz
Memory size: 1GB
===== CPUs =====
CPU  Freq      E$      CPU      CPU      Temperature
----  ----      -      -      -      -
0    1500 MHz  1MB      SUNW,UltraSPARC-IIIf  3.3      68C   30C   online   MB/0
===== IO Devices =====
Bus  Freq      Slot +  Name +
Type MHz      Status Path      Model
----  ----      -      -
pci   33      MB      isa/su (serial)
okay  /pci@1e,600000/isa@7/serial@0,3f8
pci   33      MB      isa/su (serial)
okay  /pci@1e,600000/isa@7/serial@0,2e8
.
.
.
pci   66      MB      pci108e,1647 (network)
okay  /pci@1f,700000/network@2
pci   66      MB/PCI4 SUNW,XVR-600 (display)      SUNW,375-3153
okay  /pci@1f,700000/SUNW,XVR-600@3
===== Memory Configuration =====
Segment Table:
-----
Base Address      Size      Interleave Factor  Contains
-----
0x0                1GB              1      BankIDs 0
Bank Table:
-----
Physical Location
ID      ControllerID  GroupID  Size      Interleave Way
-----
0        0              0        1GB        0
Memory Module Groups:
-----
ControllerID  GroupID  Labels      Status
-----
0              0        MB/DIMM0
0              0        MB/DIMM1
===== usb Devices =====
Name      Port#
-----
mouse      1
keyboard   2

```

```
# /usr/platform/sun4u/sbin/prtdiag -v
System Configuration: Sun Microsystems   sun4u Sun Blade 1500 workstation
System clock frequency: 160 MHZ
Memory size: 1GB

. . .

===== Environmental Status =====
Fan Speeds:
-----
Location      Sensor      Status  Speed
-----
F2            CPU         okay    3183rpm
F1            Intake      okay    2280rpm
F0            Outtake     okay    2280rpm

Temperature sensors:
-----
Location      Sensor      Temperature  Lo   LoWarn  HiWarn   Hi   Status
-----
MB/0          Die         68C         -10C  0C      95C      100C  okay
MB            Ambient     37C         -10C  0C      70C      75C   okay
MB            Ambient     30C         -11C  0C      60C      70C   okay

===== HW Revisions =====
ASIC Revisions:
-----
Path          Device      Status      Revision
-----
/pci@1e,600000 pci108e,a801 okay        4
/pci@1f,700000 pci108e,a801 okay        4

System PROM revisions:
-----
OBP 4.16.3 2004/11/05 18:29 Sun Blade 1500 (Silver)
OBDIAG 4.16.3 2004/11/05 18:31
```

### 3.3.3 prtconf Command

Similar to the `show-devs` command run at the `ok` prompt, the `prtconf` command displays the devices that are configured for the Sun Blade 1500 workstation.

The `prtconf` command identifies hardware that is recognized by the Solaris operating system. If hardware is not suspected bad, yet software applications are having trouble with the hardware, the `prtconf` command can indicate if the Solaris software recognizes the hardware, and if a driver for the hardware is loaded.



### 3.3.3.1 Options

TABLE 3-8 describes options for the `prtconf` command and how those options can help troubleshoot the Sun Blade 1500 workstation.

TABLE 3-8 Options for `prtconf`

Option	Description	How It Can Help
No option	Displays the device tree of devices recognized by the operating system.	If a hardware device is recognized, then it is probably functioning properly. If the message “(driver not attached)” is displayed for the device or for a sub-device, then the driver for the device is corrupt or missing.
-D	Similar to the output of no option, however the device driver is listed.	Informs you of the driver needed or used by the operating system to enable the device.
-p	Similar to the output of no option, yet is abbreviated.	Does not report a “(driver not attached)” message, only a quick view of the devices.
-V	Displays the version and date of the OpenBoot PROM firmware.	Provides a quick check of firmware version.

### 3.3.3.2 Examples

The following examples show output for the `prtconf` command and its options.

```
# prtconf
System Configuration:  Sun Microsystems  sun4u
Memory size: 1024 Megabytes
System Peripherals (Software Nodes):

SUNW,Sun-Blade-1500
  packages (driver not attached)
    SUNW,builtin-drivers (driver not attached)
    deblocker (driver not attached)
    disk-label (driver not attached)
    terminal-emulator (driver not attached)
    dropins (driver not attached)
    kbd-translator (driver not attached)
    obp-tftp (driver not attached)
    SUNW,i2c-ram-device (driver not attached)
    SUNW,fru-device (driver not attached)
    SUNW,asr (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)
. . .
```

```
# prtconf -D
System Configuration: Sun Microsystems sun4u
Memory size: 1024 Megabytes
System Peripherals (Software Nodes):
. . .
aliases
memory
virtual-memory
SUNW,UltraSPARC-IIIfi, instance #0 (driver name: us)
memory-controller, instance #0 (driver name: mc-us3i)
pci, instance #0 (driver name: pcisch)
isa, instance #0 (driver name: ebus)
flashprom
rtc
i2c, instance #0 (driver name: pcf8584)
hardware-monitor, instance #0 (driver name: adm1031)
motherboard-fru-prom, instance #0 (driver name: seeprom)
dimm-spd, instance #1 (driver name: seeprom)
dimm-spd, instance #2 (driver name: seeprom)
clock-generator, instance #0 (driver name: ics951601)
. . .
```

## 3.3.4 netstat Command

The netstat command displays the network status.

### 3.3.4.1 Options

[TABLE 3-9](#) describes options for the netstat command and how those options can help troubleshoot the Sun Blade 1500 workstation.

**TABLE 3-9** Options for netstat

Option	Description	How It Can Help
-i	Displays the interface state, including packets in/out, error in/out, collisions, and queue.	Provides a quick overview of the system's network status.
-i <i>interval</i>	Providing a trailing number with the -i option repeats the netstat command every interval seconds.	Helps identify intermittent or long duration network events. By piping netstat output to a file, overnight activity can be viewed all at once.
-p	Displays the media table.	Provides MAC address for hosts on the subnet.

**TABLE 3-9** Options for netstat (*Continued*)

Option	Description	How It Can Help
-r	Displays the routing table.	Provides routing information.
-n	Replaces host names with IP addresses.	When an address is more useful than a host name.

### 3.3.4.2 Examples

The following examples show output for the netstat command and its options.

# netstat -i 1										
input		bge0	output			input (Total)		output		
packets	errs	packets	errs	colls	packets	errs	packets	errs	colls	
32703	0	23906	0	0	35527	0	26730	0	0	
3	0	0	0	0	5	0	2	0	0	
3	0	0	0	0	5	0	2	0	0	
5	0	0	0	0	7	0	2	0	0	
4	0	0	0	0	6	0	2	0	0	
3	0	0	0	0	5	0	2	0	0	
3	0	0	0	0	5	0	2	0	0	
. . .										

```
# netstat -p
```

```
Net to Media Table: IPv4
```

Device	IP Address	Mask	Flags	Phys Addr
bge0	phatair-46	255.255.255.255		08:00:20:92:4a:47
bge0	ns-umpk27-02-46	255.255.255.255		08:00:20:93:fb:99
bge0	moreair-46	255.255.255.255		08:00:20:8a:e5:03
bge0	fermpk28a-46	255.255.255.255		00:00:0c:07:ac:2e
bge0	fermpk28as-46	255.255.255.255		00:50:e2:61:d8:00
bge0	kayakr	255.255.255.255		08:00:20:d1:83:c7
bge0	matlock	255.255.255.255	SP	00:03:ba:27:01:48
bge0	toronto2	255.255.255.255		08:00:20:b6:15:b5
bge0	tucknott	255.255.255.255		08:00:20:7c:f5:94
bge0	mpk28-lobby	255.255.255.255		08:00:20:a6:d5:c8
bge0	eggfooyoung	255.255.255.255		08:00:20:8d:6a:80
bge0	froggy	255.255.255.255		08:00:20:73:70:44
bge0	d-mpk28-46-245	255.255.255.255		00:10:60:24:0e:00
bge0	224.0.0.0	240.0.0.0	SM	01:00:5e:00:00:00

```
# netstat -r
```

```
Routing Table: IPv4
```

Destination	Gateway	Flags	Ref	Use	Interface
mpk28-046-n	matlock	U	1	6	bge0
224.0.0.0	matlock	U	1	0	bge0
default	fermpk28a-46	UG	1	22	
localhost	localhost	UH	25	3018	lo0

### 3.3.5 ping Command

The ping command sends ICMP ECHO\_REQUEST packets to network hosts. Depending upon how the ping command is configured, the output displayed can identify troublesome network links or nodes. The destination host is specified in the variable *hostname*.

### 3.3.5.1 Options

TABLE 3-10 describes options for the ping command and how those options can help troubleshoot the Sun Blade 1500 workstation.

TABLE 3-10 Options for ping

Option	Description	How It Can Help
<i>hostname</i>	The probe packet is sent to <i>hostname</i> and returned.	Verifies that a host is active on the network.
-g <i>hostname</i>	Forces the probe packet to route through a specified gateway.	By identifying different routes to the target host, those individual routes can be tested for quality.
-i <i>interface</i>	Designates which interface to send and receive the probe packet through.	Enables a simple check of secondary network interfaces.
-n	Replaces host names with IP addresses.	Used when an address is more beneficial than a host name.
-s	Ping continuously in one second intervals. Ctrl-C aborts. Upon abort, statistic are displayed.	Helps identify intermittent or long-duration network events. By piping ping output to file, activity overnight is later viewed at once.
-svR	Displays the route the probe packet followed in one second intervals.	Indicates probe packet route and number of hops. Comparing multiple routes can identify bottlenecks.

### 3.3.5.2 Examples

The following examples show output for the ping command and its options.

```
# ping -s teddybear
PING teddybear: 56 data bytes
64 bytes from teddybear (192.146.77.140): icmp_seq=0. time=1.
ms
64 bytes from teddybear (192.146.77.140): icmp_seq=1. time=0.
ms
64 bytes from teddybear (192.146.77.140): icmp_seq=2. time=0.
ms
^C
----teddybear PING Statistics----
3 packets transmitted, 3 packets received, 0% packet loss
round-trip (ms)  min/avg/max = 0/0/1
```

```
# ping -svR teddybear
PING teddybear: 56 data bytes
64 bytes from teddybear (192.146.77.140): icmp_seq=0. time=2. ms
  IP options:  <record route> smuscampk27s02-r01 (192.146.5.123),
smuscampk14s19-r02-v516 (192.146.5.90), rmpk16a-077 (192.146.77.2),
teddybear (192.146.77.140), smuscampk16s02-r01 (192.146.5.83),
smuscampk11s10-r02-v827 (192.146.5.137), fermpk28ap-46 (192.146.46.2),
matlock (192.146.46.111),  (End of record)
^C
----teddybear PING Statistics----
1 packets transmitted, 1 packets received, 0% packet loss
round-trip (ms)  min/avg/max = 2/2/2
```

## 3.3.6 ps Command

The `ps` command lists the status of system processes. Using options and rearranging the command output can assist in determining the Sun Blade 1500 workstation resource allocation.

### 3.3.6.1 Options

[TABLE 3-11](#) describes options for the `ps` command and how those options can help troubleshoot the Sun Blade 1500 workstation.

**TABLE 3-11** Options for `ps`

Option	Description	How It Can Help
-e	Displays information for every process.	Identifies the process ID and the executable.
-f	Generates a full listing.	Provides the following process information: user ID, parent process ID, system time when executed, and the path to the executable.
-o <i>option</i>	Allows configurable output. The <code>pid</code> , <code>pcpu</code> , <code>pmem</code> , and <code>comm</code> options display process ID, percent CPU consumption, percent memory consumption, and the responsible executable, respectively.	Provides only most important information. Knowing the percentage of resource consumption helps identify processes that are affecting system performance and might be hung.

### 3.3.6.2 Examples

The following examples show output for the `ps` command and its options.

```
# ps -ef
  UID      PID   PPID  C    STIME TTY      TIME  CMD
  root         0       0  0  10:06:30 ?        0:18  sched
  root         1       0  0  10:06:32 ?        0:00  /etc/init -
  root         2       0  0  10:06:32 ?        0:00  pageout
  root         3       0  0  10:06:32 ?        0:00  fsflush
  root 100311      1  0  10:06:50 ?        0:00  /usr/lib/saf/sac -t 300
. . .
```

```
# ps -eo pcpu,pid,comm|sort -rn
1.4 100317 /usr/openwin/bin/Xsun
0.9 100460 dtwm
0.1 100677 ps
0.1 100600 ksh
0.1 100591 /usr/dt/bin/dtterm
0.1 100462 /usr/dt/bin/sdtperfmeter
0.1 100333 mibiisa
%CPU    PID COMMAND
0.0 100652 /bin/csh
. . .
```

```
# ps -eo pmem,pid,comm|sort -rn
14.2 100317 /usr/openwin/bin/Xsun
4.4 100524 /net/dickens/fmsgml60/bin/sunxm.s5.sparc/makersgml
1.8 100460 dtwm
1.1 100591 /usr/dt/bin/dtterm
1.0 100650 /usr/dt/bin/dtterm
1.0 100494 /usr/dt/bin/dtterm
1.0 100462 /usr/dt/bin/sdtperfmeter
1.0 100453 /usr/dt/bin/dtsession
0.8 100452 /usr/dt/bin/ttsession
. . .
```

---

**Note** – When using `sort` with the `-r` option, the column headings are printed at the point where the value in the first column is equal to zero.

---



## 3.3.7 prstat Command

The `prstat` utility iteratively examines all active processes on the system and reports statistics based on the selected output mode and sort order. The `prstat` command provides output similar to the `ps` command.

### 3.3.7.1 Options

[TABLE 3-12](#) describes options for the `prstat` command and how those options can help troubleshoot the Sun Blade 1500 workstation.

**TABLE 3-12** Options for `prstat`

Option	Description	How It Can Help
No option	Displays a sorted list of the top processes which are consuming the most CPU resources. List is limited to the height of the terminal window and the total number of processes. Output is automatically updated every five seconds. Ctrl-C aborts.	Output identifies process ID, user ID, memory used, state, CPU consumption, and command name. By default, list is sorted by CPU consumption.
<code>-n number</code>	Limits output to number of lines.	Limits amount of data displayed and identifies primary resource consumers.
<code>-s key</code>	Permits sorting list by key parameter.	Useful keys are <code>cpu</code> (default), <code>time</code> , and <code>size</code> .
<code>-v</code>	Verbose mode.	Displays additional parameters.

### 3.3.7.2 Examples

The following examples show output for the `prstat` command and its options.

```
# prstat
  PID USERNAME  SIZE  RSS STATE PRI NICE   TIME    CPU PROCESS/NLWP
100688 root      1760K 1376K cpu0   59    0  0:00.00  0.1% prstat/1
100524 mm39236    28M   21M sleep   48    0  0:00.25  0.1% maker6X.exe/1
100317 root      28M   69M sleep   59    0  0:00.25  0.1% Xsun/1
100591 mm39236   7584K 5416K sleep   59    0  0:00.02  0.1% dtterm/1
100333 root     2448K 2152K sleep   58    0  0:00.00  0.0% mibiisa/12
100236 root     2232K 1832K sleep   58    0  0:00.00  0.0% lp/1
100600 root     1872K 1432K run     37    0  0:00.00  0.0% ksh/1
. . .
100403 mm39236   1832K 1368K sleep   59    0  0:00.00  0.0% csh/1
100311 root     1800K 1232K sleep   58    0  0:00.00  0.0% sac/1
Total: 65 processes, 159 lwps, load averages: 0.01, 0.02, 0.04
```

```
# prstat -n 5 -s size
  PID USERNAME  SIZE  RSS STATE PRI NICE   TIME    CPU PROCESS/NLWP
100524 mm39236    28M   21M sleep   48    0  0:00.26  0.3% maker6X.exe/1
100317 root      28M   69M sleep   59    0  0:00.26  0.7% Xsun/1
100460 mm39236    11M 8760K sleep   59    0  0:00.03  0.0% dtwm/8
100453 mm39236   8664K 4928K sleep   48    0  0:00.00  0.0% dtsession/4
100591 mm39236   7616K 5448K sleep   49    0  0:00.02  0.1% dtterm/1
Total: 65 processes, 159 lwps, load averages: 0.03, 0.02, 0.04
```

```
# prstat -n 5 -v
  PID USERNAME  USR  SYS TRP TFL DFL LCK SLP LAT VCX ICX SCL SIG PROCESS/NLWP
100692 root        31   62  -  -  -  -   31  -    0 463 57K   0 prstat/1
100524 mm39236    0.6 0.3  -  -  -  -   99  -   89 114  2K   0 maker6X.exe/1
100317 root      0.3 0.5  -  -  -  -   99  -  288  45  2K 108 Xsun/1
100591 mm39236    0.1 0.0  -  -  -  -  100  -   52   9 230   0 dtterm/1
100236 root      0.0 0.0  -  -  -  -  100  -    5   0  52   0 lp/1
Total: 65 processes, 159 lwps, load averages: 0.02, 0.02, 0.03
```

## Troubleshooting Flowcharts

---

This chapter contains flowcharts to help you troubleshoot problems with your Sun Blade 1500 workstation. The flowcharts are ordered parallel to the power-on sequence. Flowchart topics covered are:

- “Power-On Flowchart” on page 4-2
- “Start Up Problems” on page 4-5
  - “Power Problem” on page 4-6
  - “Hard Drive Problem” on page 4-8
  - “System Fan Problem” on page 4-9
  - “USB Problem” on page 4-10
  - “Audio Output Problem” on page 4-12
  - “Monitor Problem” on page 4-14
  - “Network Problem” on page 4-17
  - “Keyboard Problem” on page 4-19
  - “Login Problem” on page 4-20
  - “Graphical User Interface Problem” on page 4-22
  - “Data Access and Running Applications Problems” on page 4-23
- “Storage Problems” on page 4-24
  - “Optical Drive Problem” on page 4-25
  - “PCI Card Problem” on page 4-28
  - “IEEE 1394 Problem” on page 4-30
  - “Smart Card Reader Problem” on page 4-32
- “Advanced Problems” on page 4-33
  - “Motherboard Problem” on page 4-34
  - “Memory Problem” on page 4-37
  - “NVRAM Problem” on page 4-39
  - “Battery Problem” on page 4-40

---

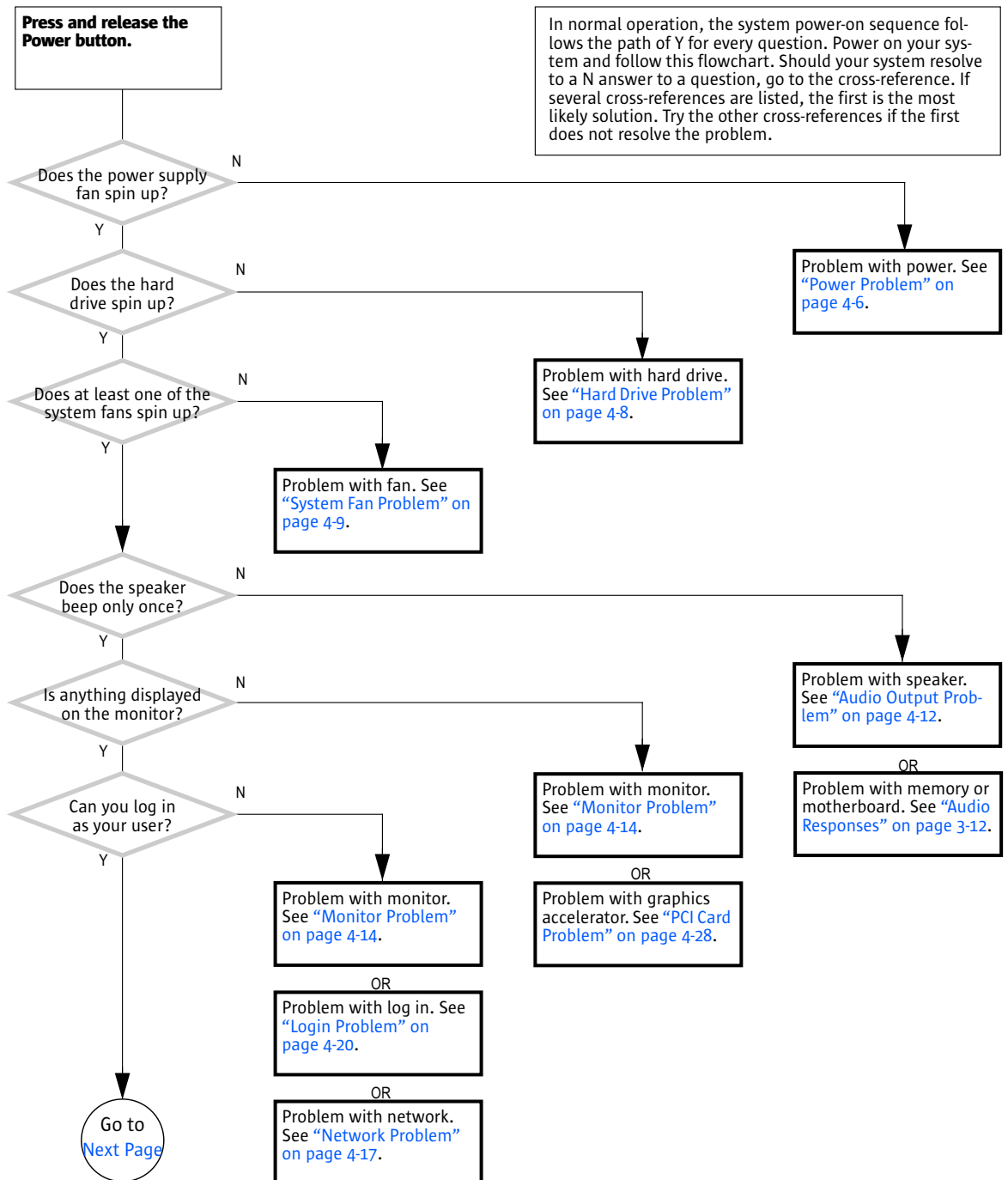
## 4.1 Power-On Flowchart

The [“Power-On Flowchart” on page 4-3](#) indicates points where proper startup can be recognized. This flowchart helps identify what aspect of the Sun Blade 1500 workstation is at fault.

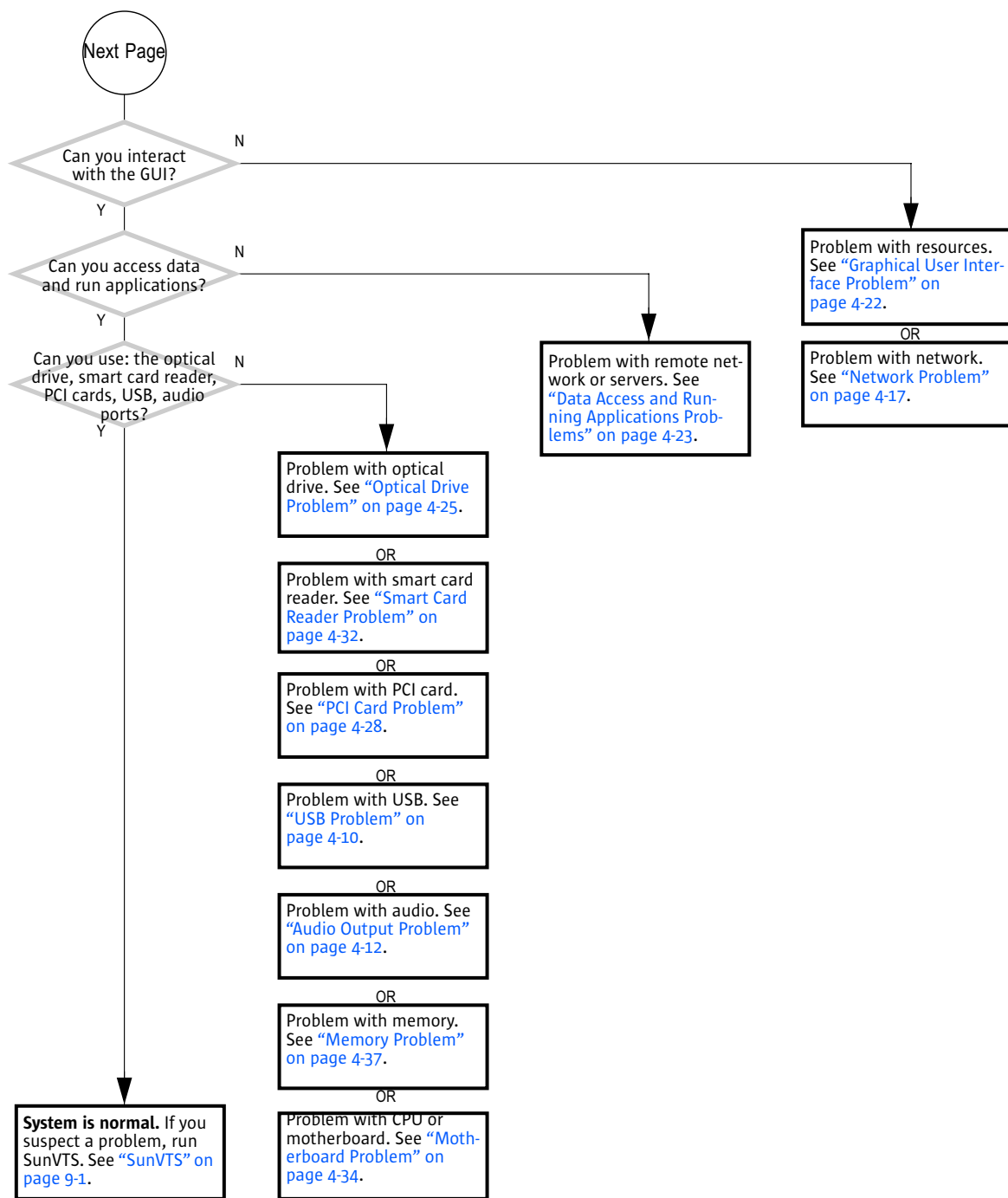
If you suspect a system failure, power on the system and follow the flowchart.

If you answer “No” to a question, direct your attention to the section provided or to other flowchart cross-references.

If you complete the flowchart without answering “No” to any questions yet you still suspect a failure with the Sun Blade 1500 workstation, see [“Introduction to Advanced Troubleshooting” on page 5-1](#) for more in-depth procedures.



**FIGURE 4-1** Power-On Flowchart



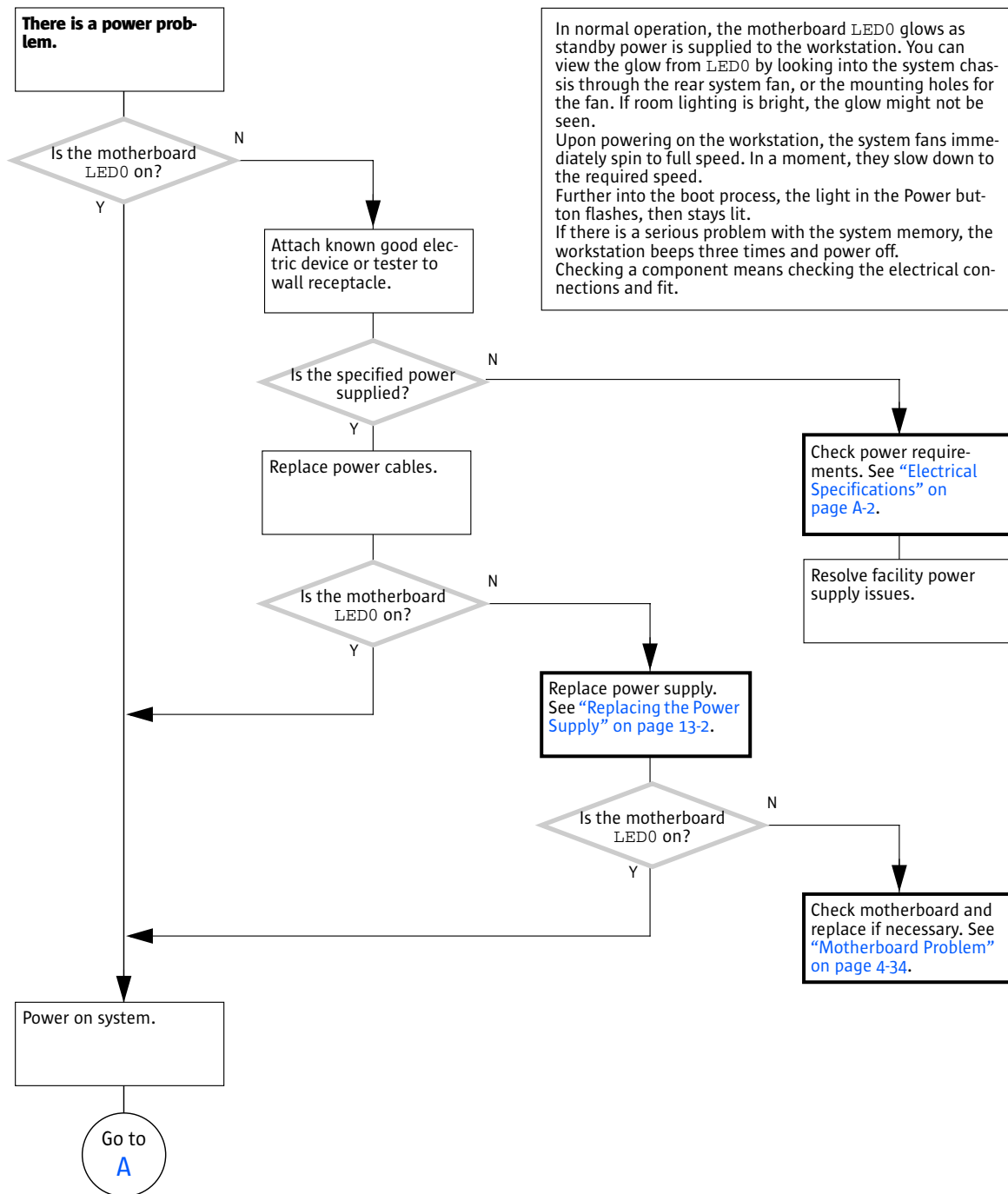
**FIGURE 4-2** Power-On Flowchart (*Continued*)

---

## 4.2 Start Up Problems

The following flowcharts help troubleshoot problems that occur during system startup.

- [“Power Problem” on page 4-6](#)
- [“Hard Drive Problem” on page 4-8](#)
- [“System Fan Problem” on page 4-9](#)
- [“USB Problem” on page 4-10](#)
- [“Audio Output Problem” on page 4-12](#)
- [“Monitor Problem” on page 4-14](#)
- [“Network Problem” on page 4-17](#)
- [“Keyboard Problem” on page 4-19](#)
- [“Login Problem” on page 4-20](#)
- [“Graphical User Interface Problem” on page 4-22](#)
- [“Data Access and Running Applications Problems” on page 4-23](#)



**FIGURE 4-3** Power Problem



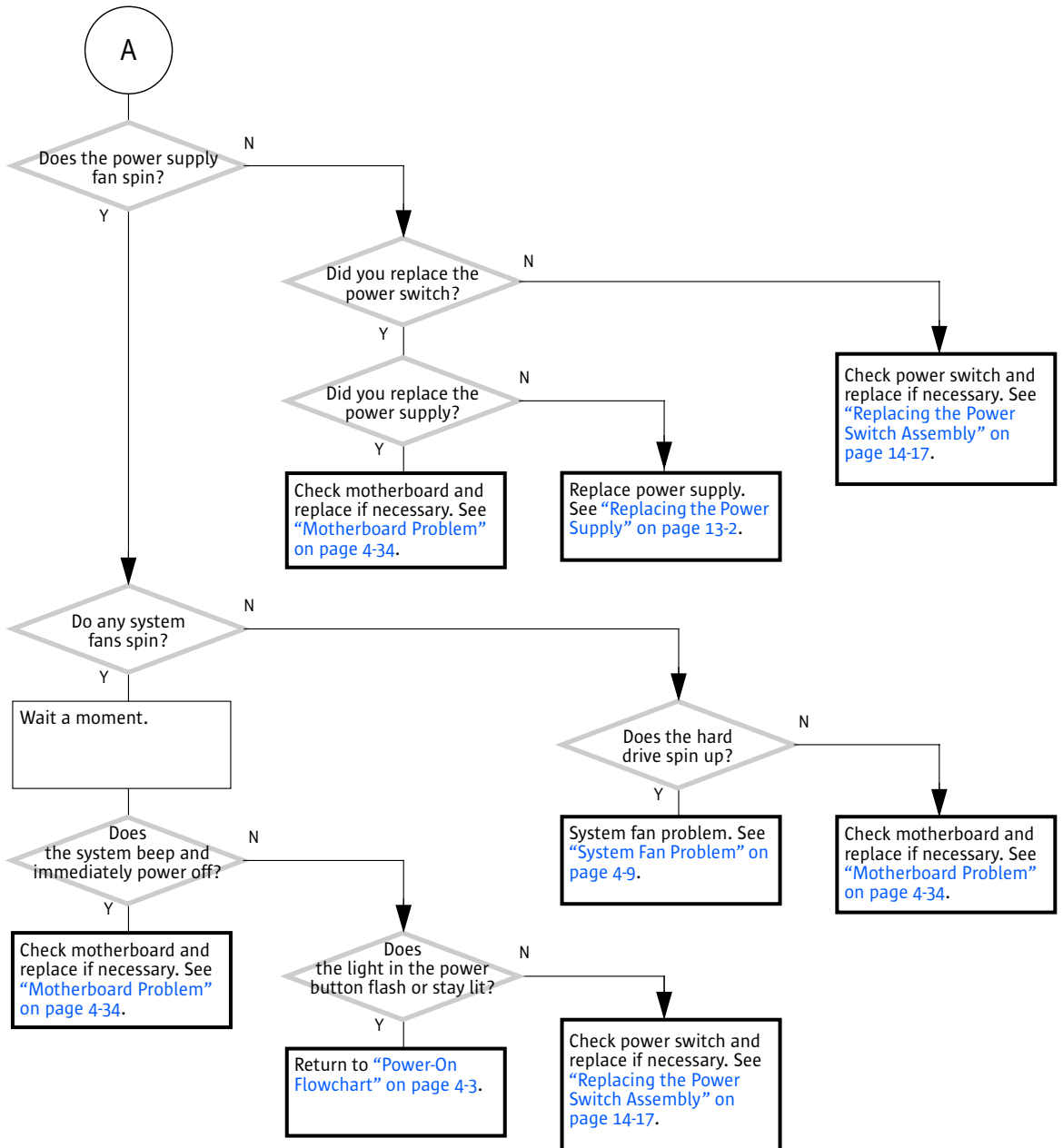
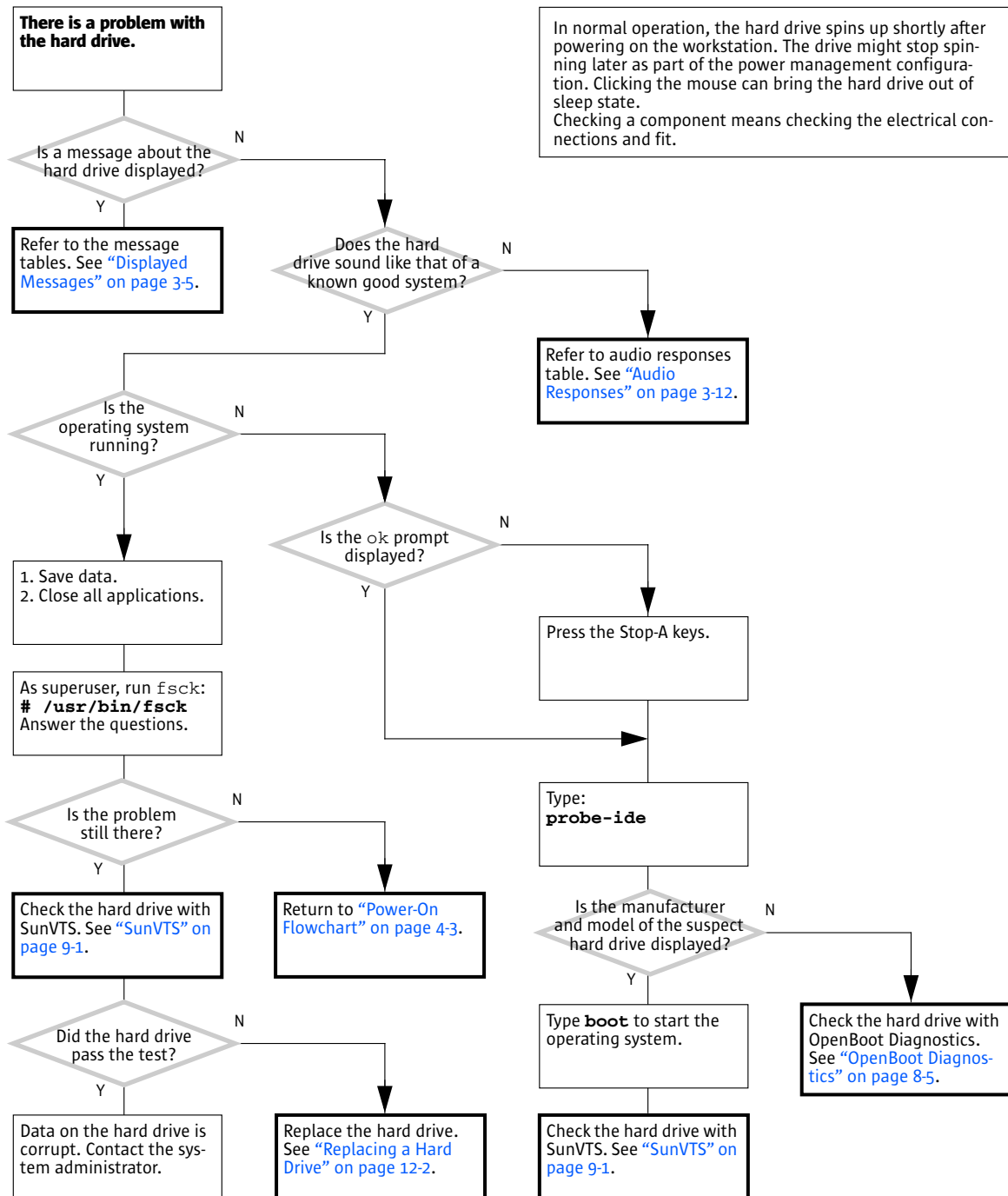
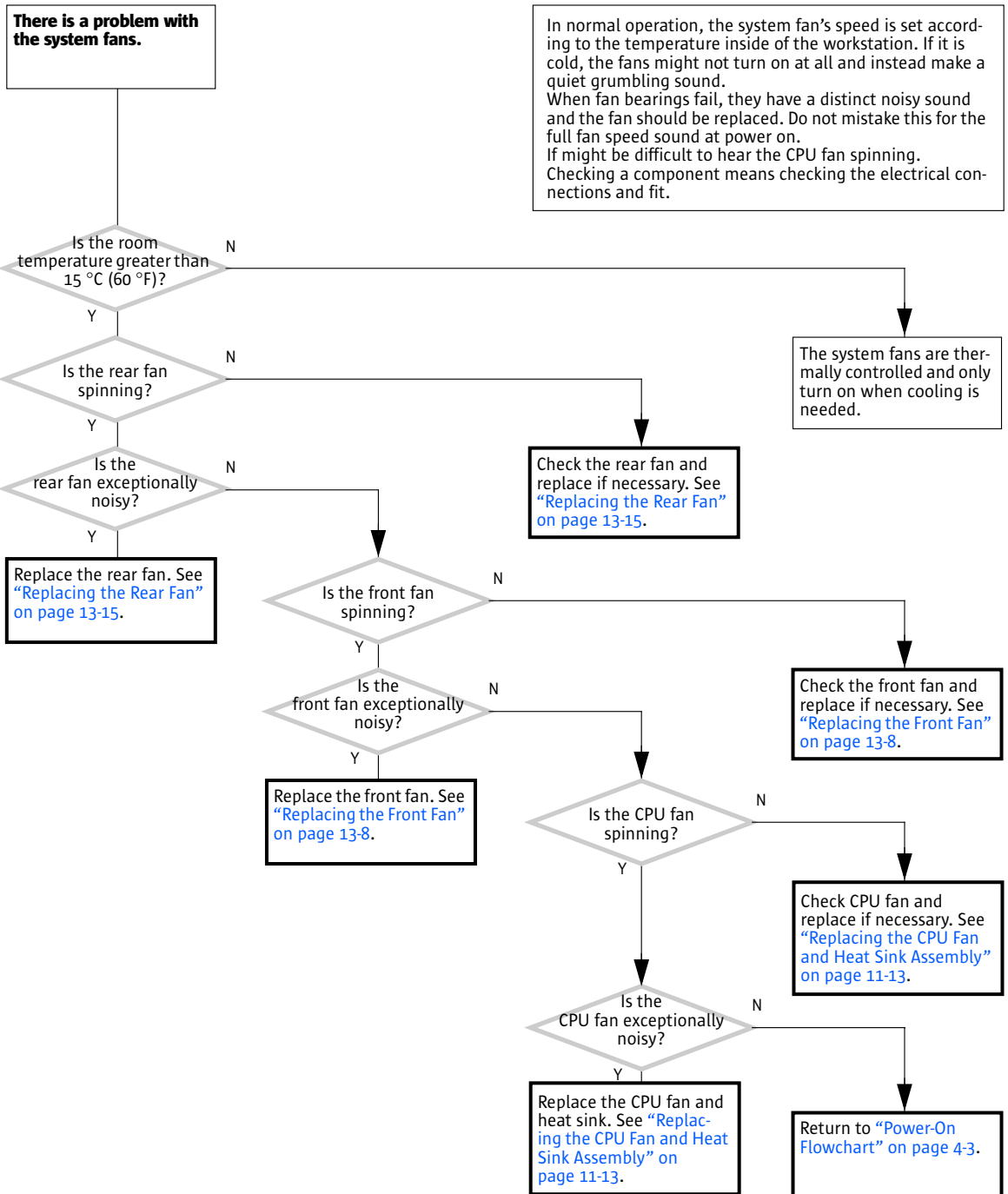


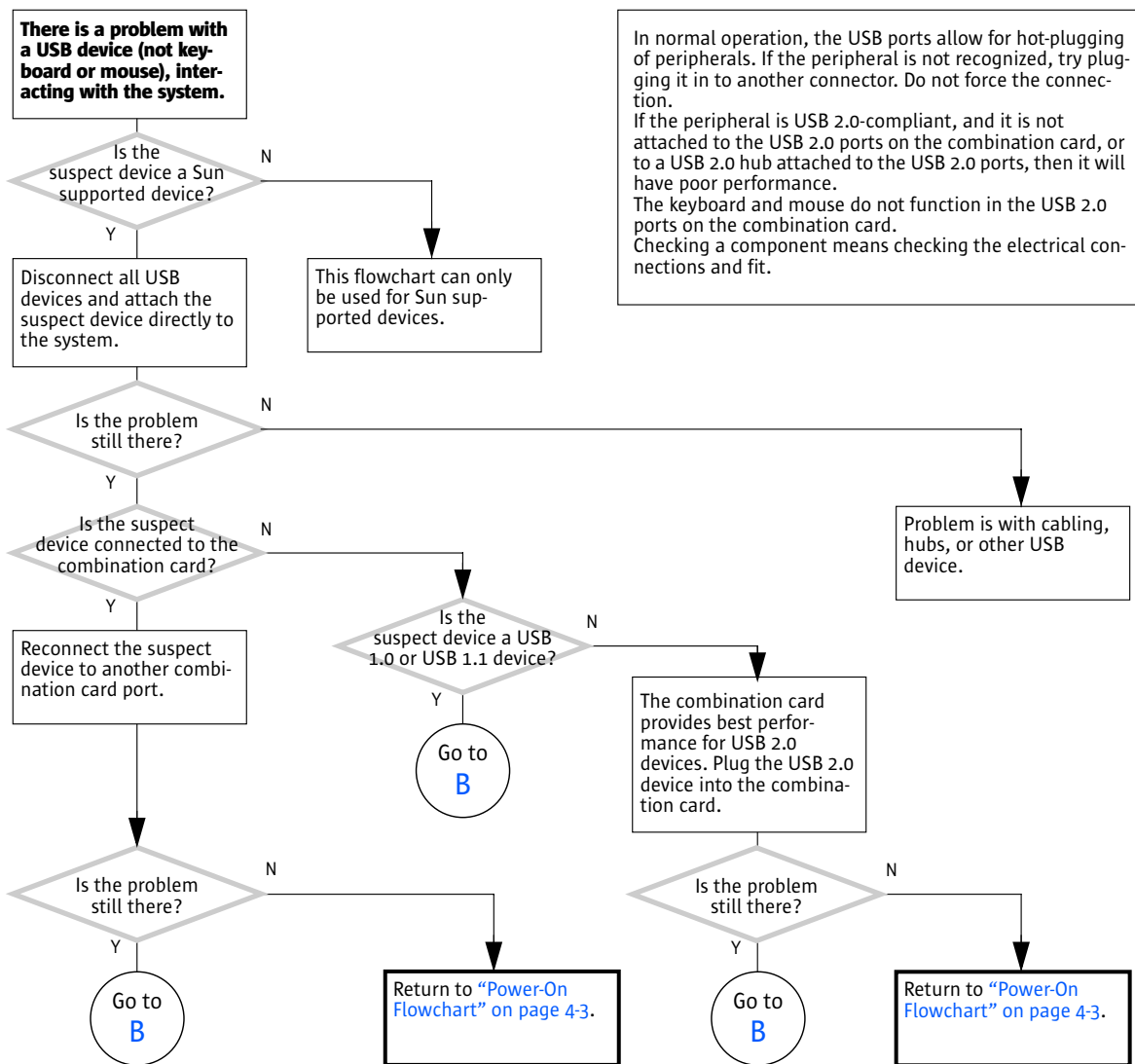
FIGURE 4-4 Power Problem (Continued)



**FIGURE 4-5** Hard Drive Problem



**FIGURE 4-6** System Fan Problem



**FIGURE 4-7** USB Problem

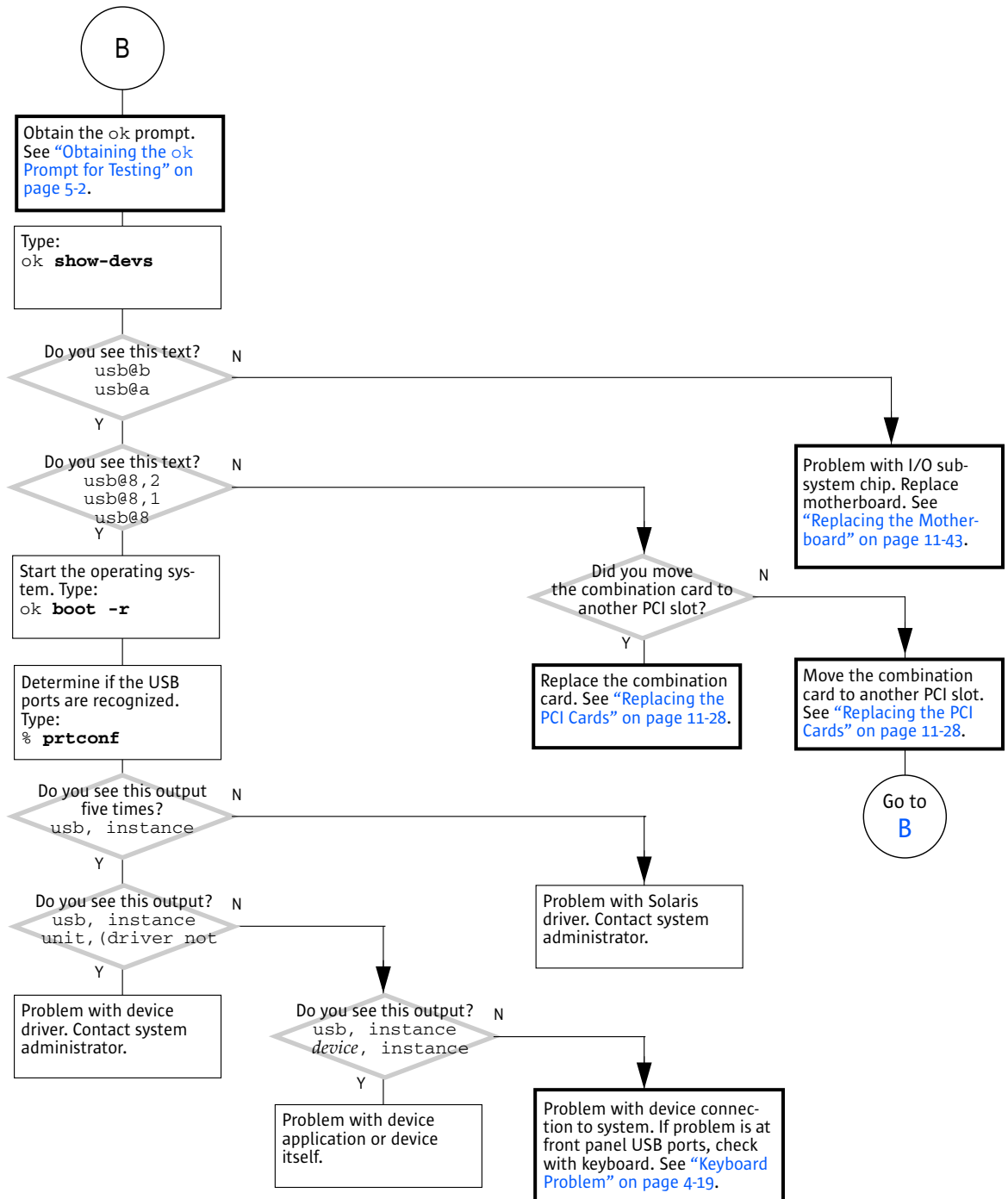
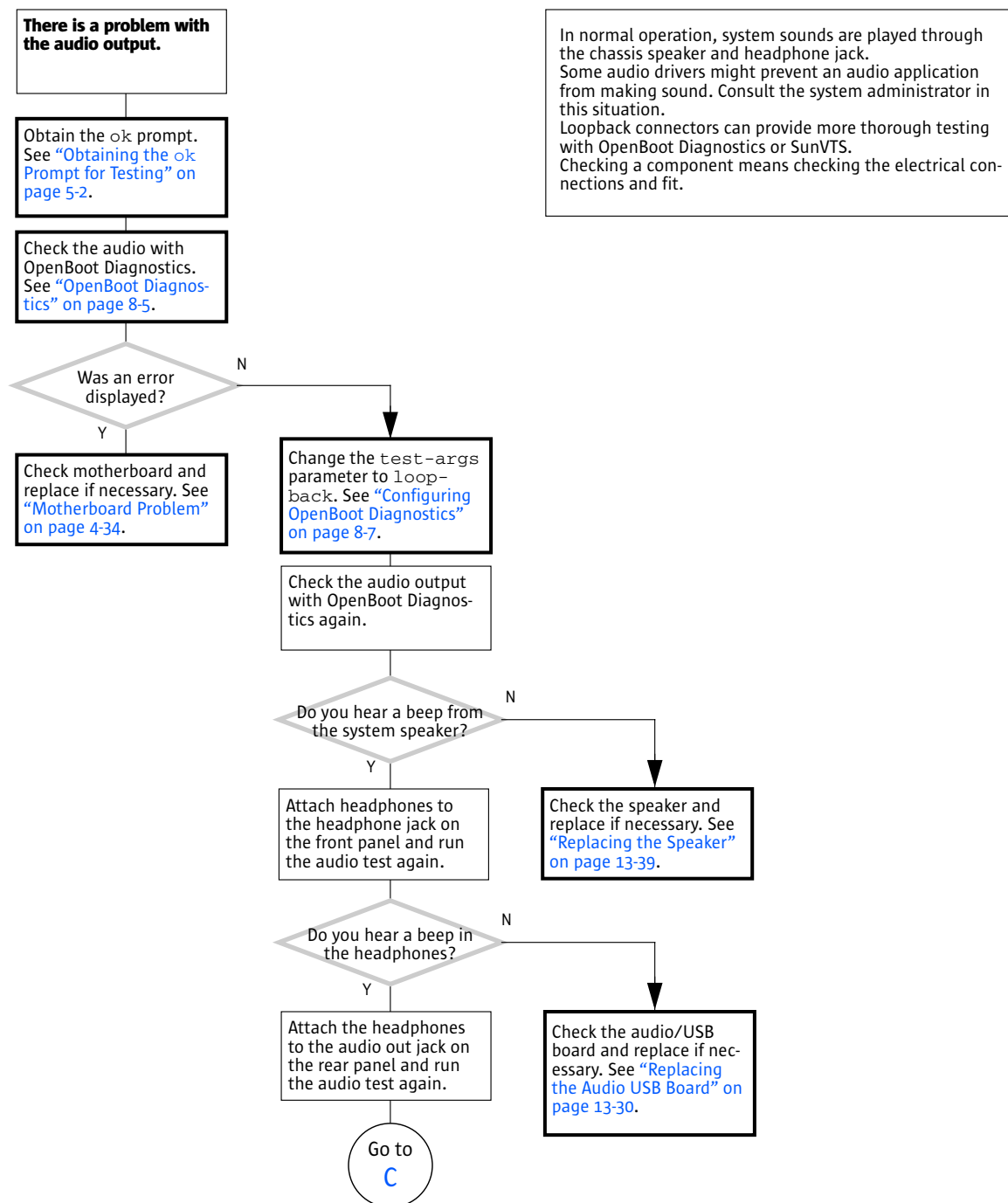
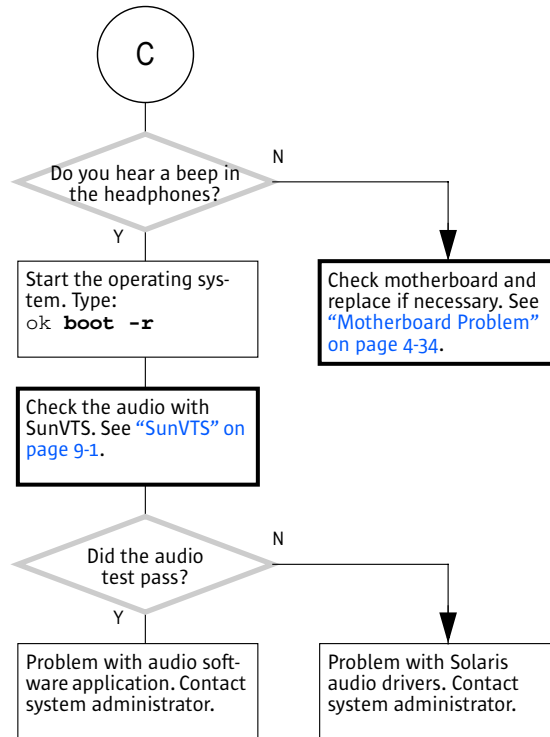


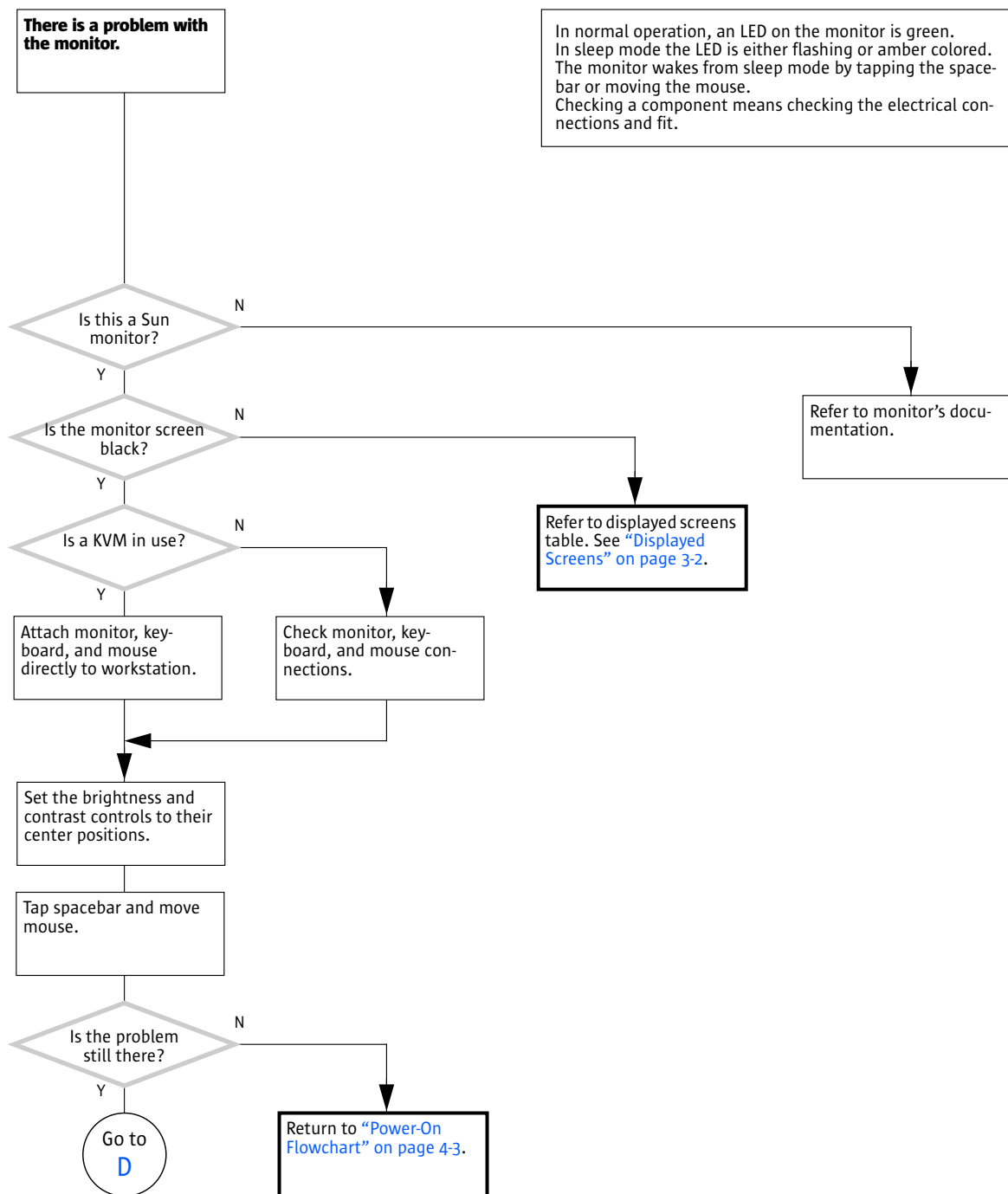
FIGURE 4-8 USB Problem (Continued)



**FIGURE 4-9** Audio Output Problem



**FIGURE 4-10** Audio Output Problem (*Continued*)



**FIGURE 4-11** Monitor Problem



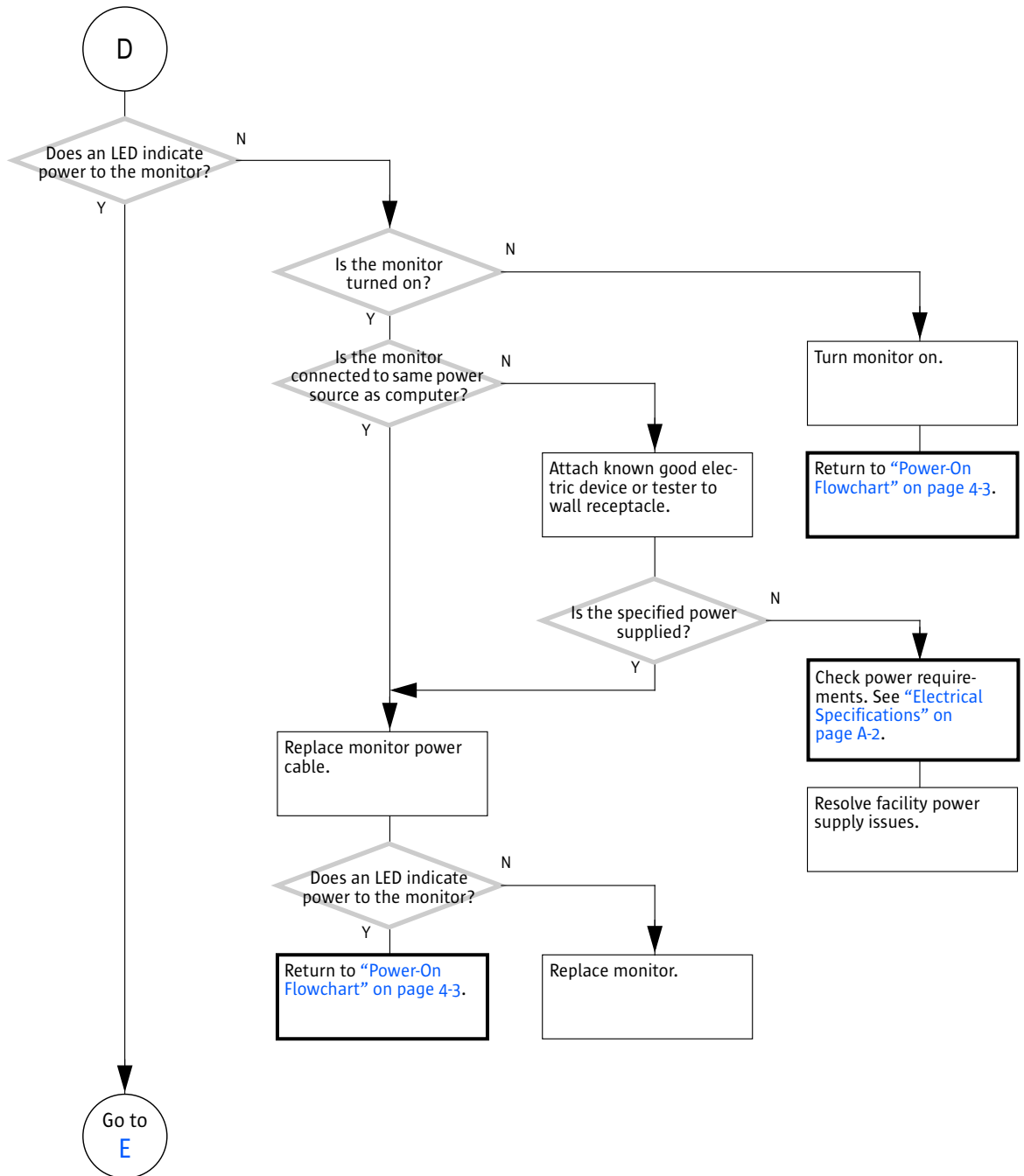
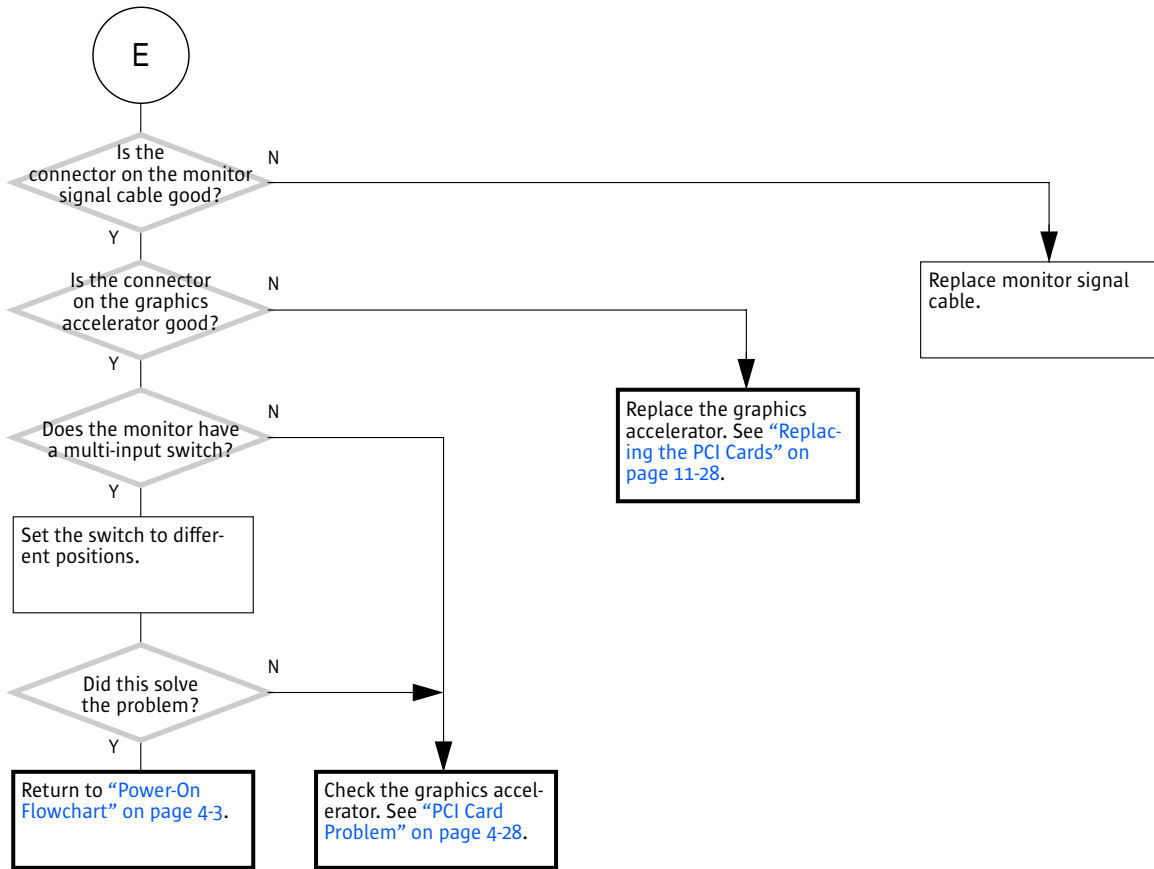


FIGURE 4-12 Monitor Problem (Continued)



**FIGURE 4-13** Monitor Problem (Continued)



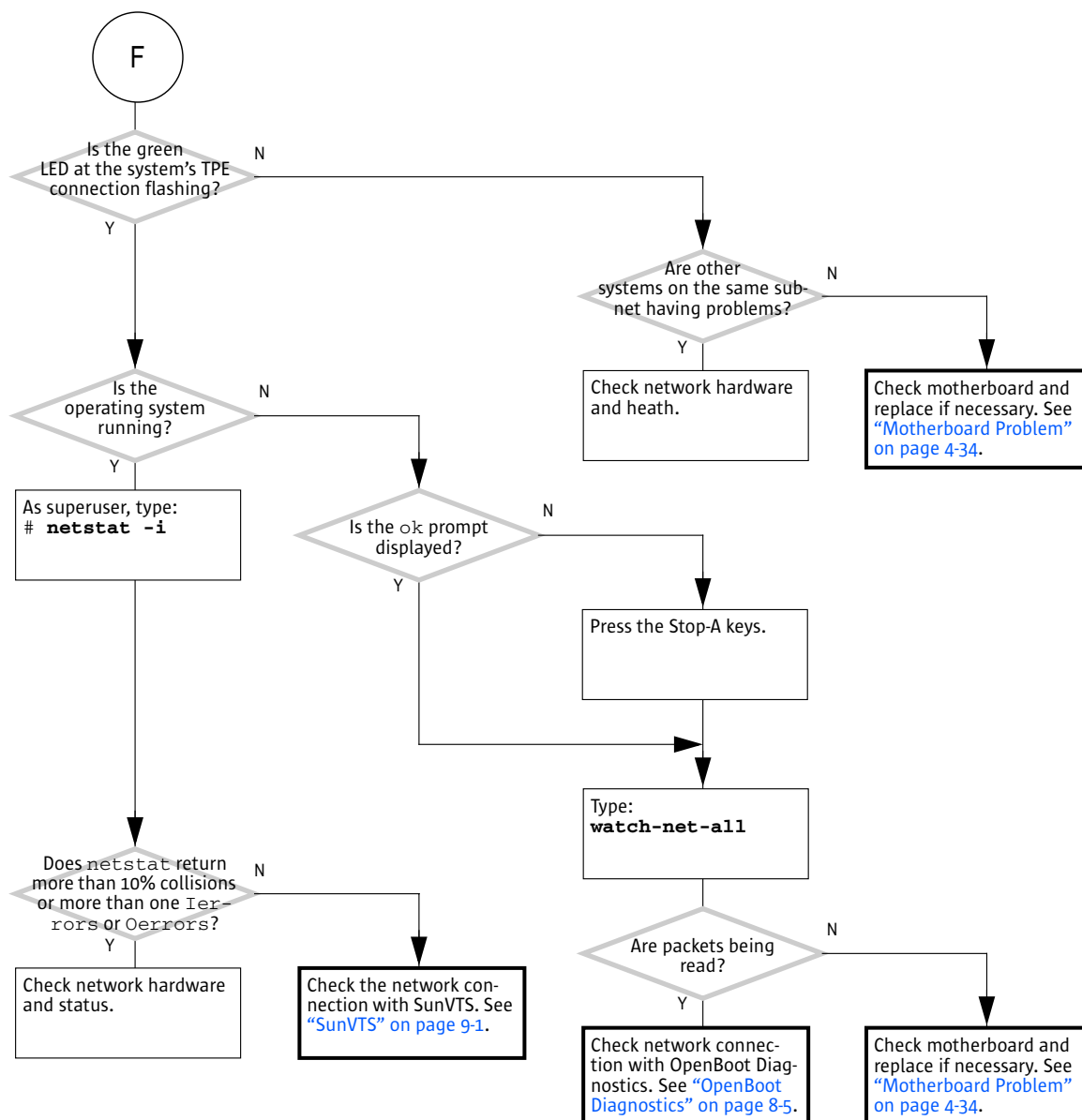
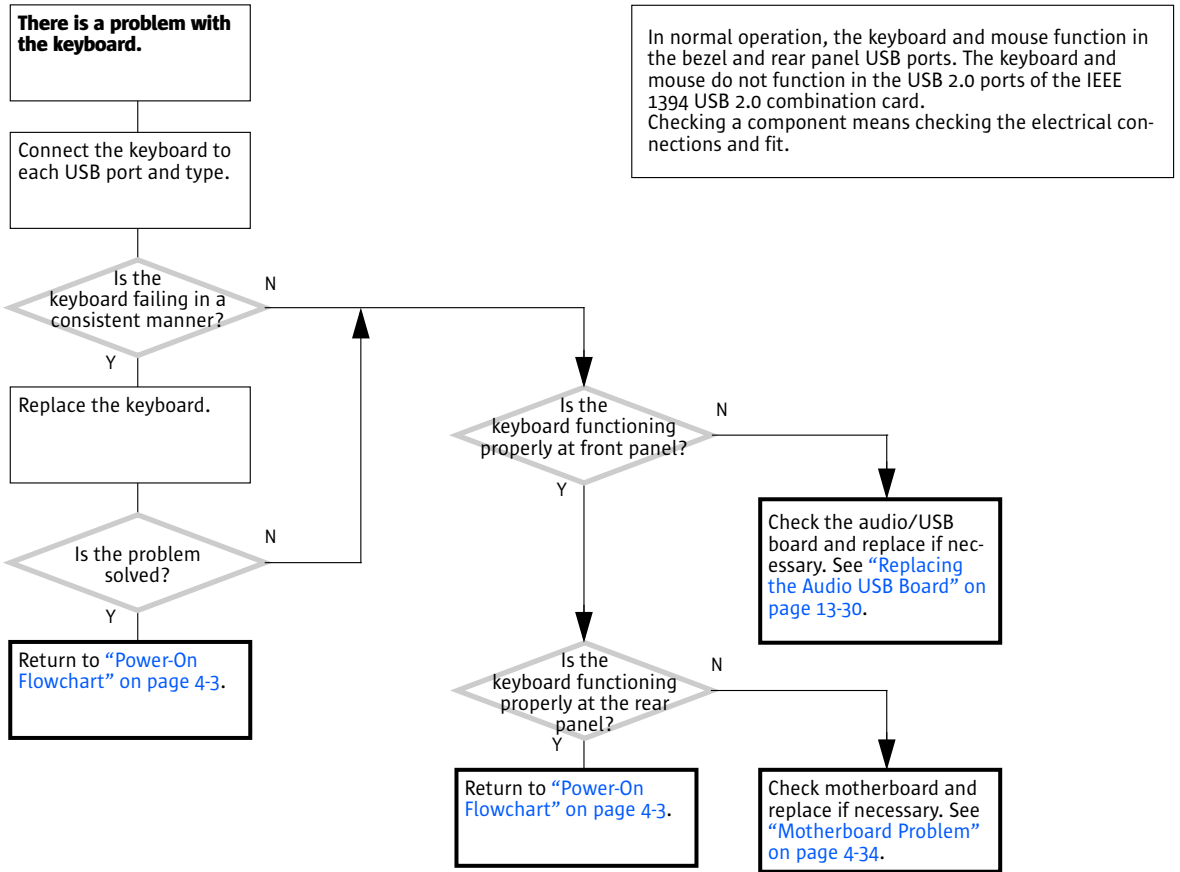
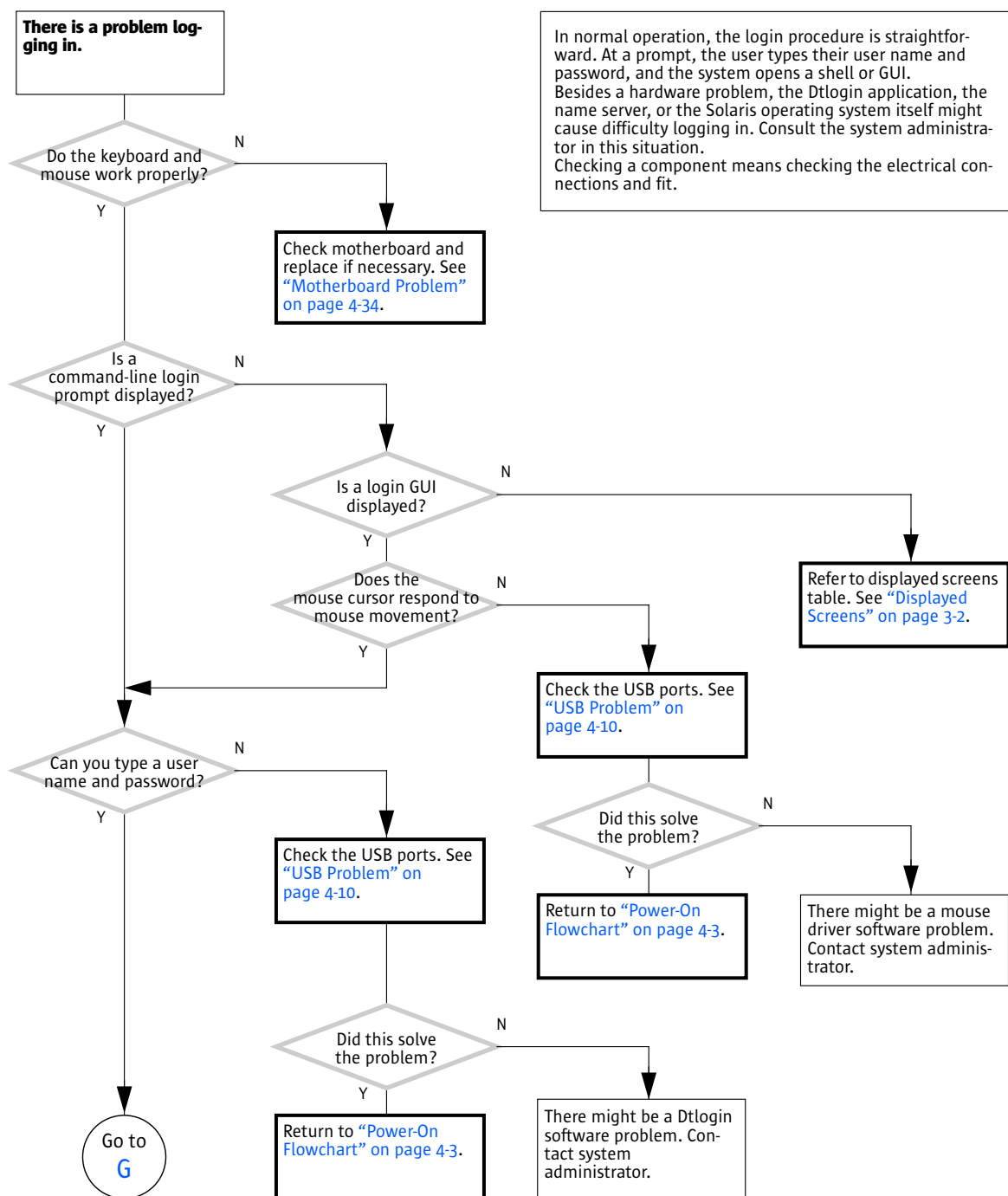


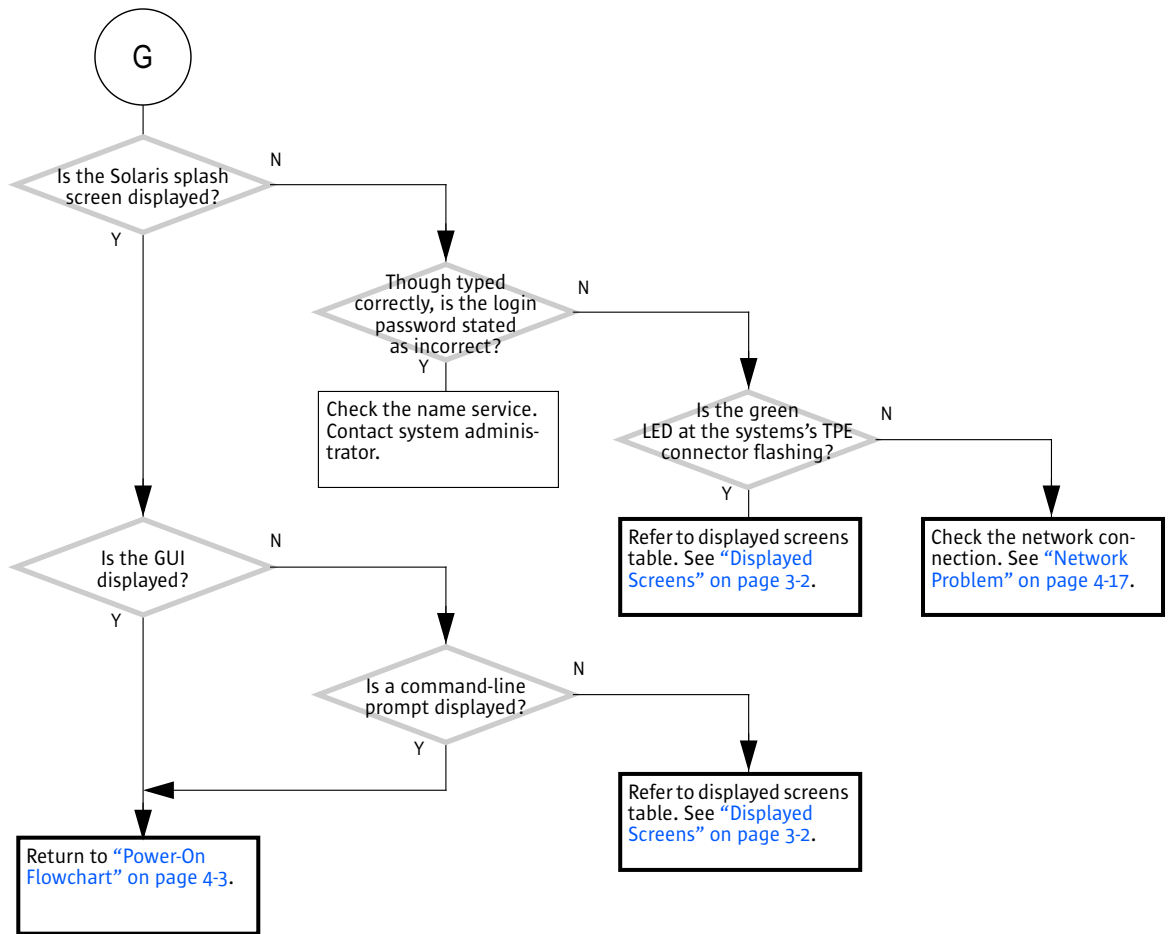
FIGURE 4-15 Network Problem (Continued)



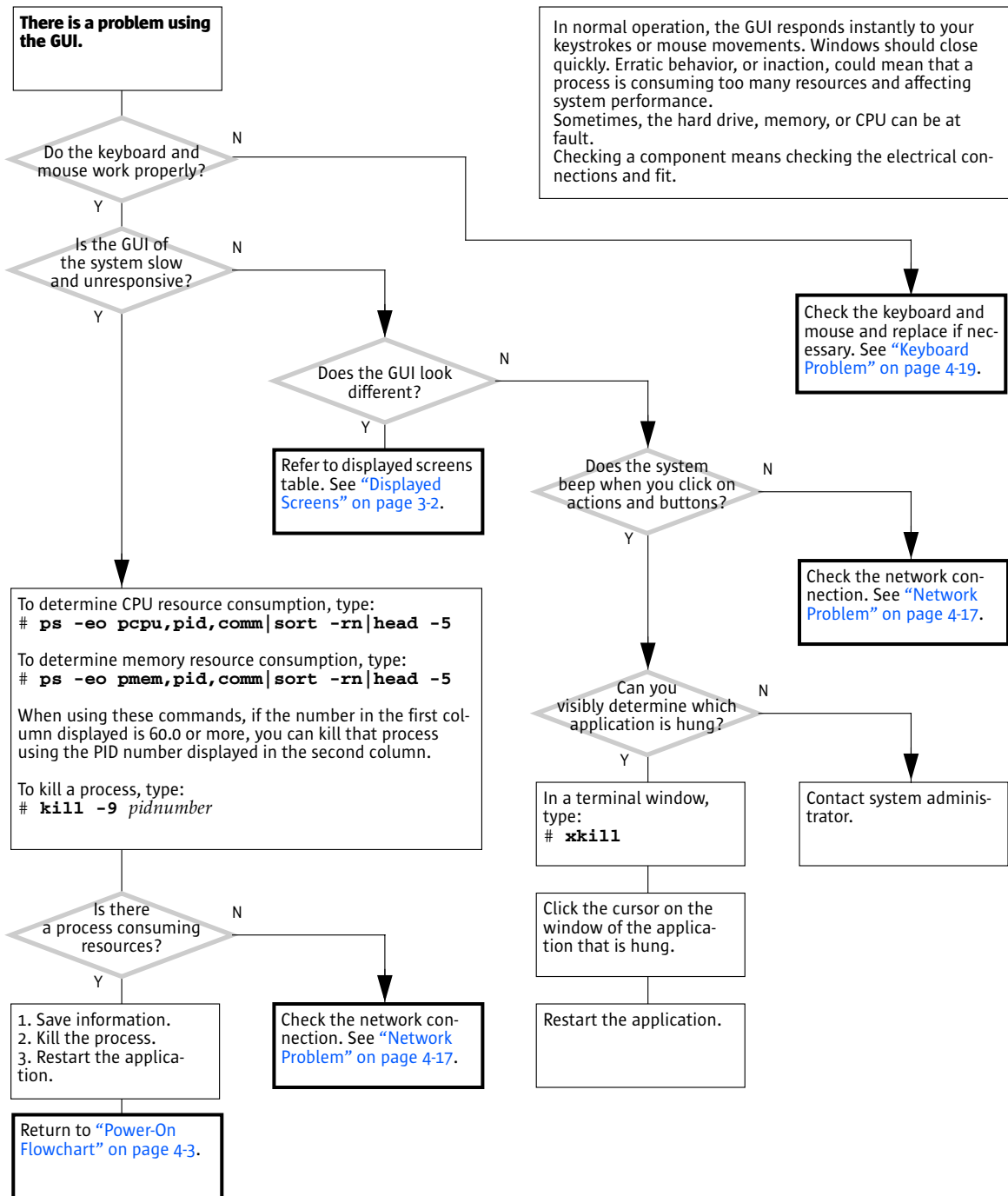
**FIGURE 4-16** Keyboard Problem



**FIGURE 4-17** Login Problem

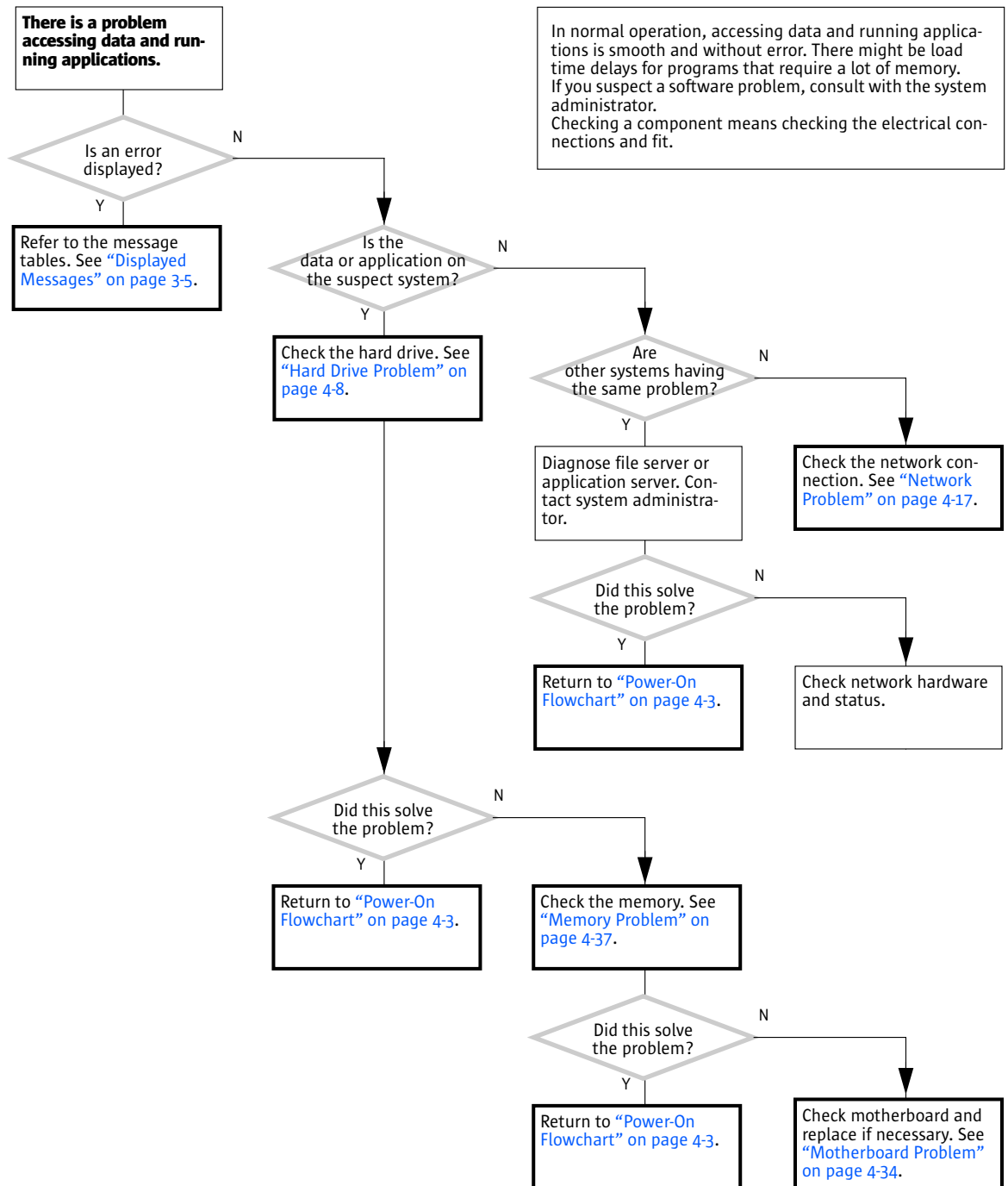


**FIGURE 4-18** Login Problem (Continued)



**FIGURE 4-19** Graphical User Interface Problem





**FIGURE 4-20** Data Access and Running Applications Problems

---

## 4.3 Storage Problems

The following flowcharts help troubleshoot problems with storage devices.

- [“Optical Drive Problem” on page 4-25](#)
- [“PCI Card Problem” on page 4-28](#)
- [“IEEE 1394 Problem” on page 4-30](#)
- [“Smart Card Reader Problem” on page 4-32](#)

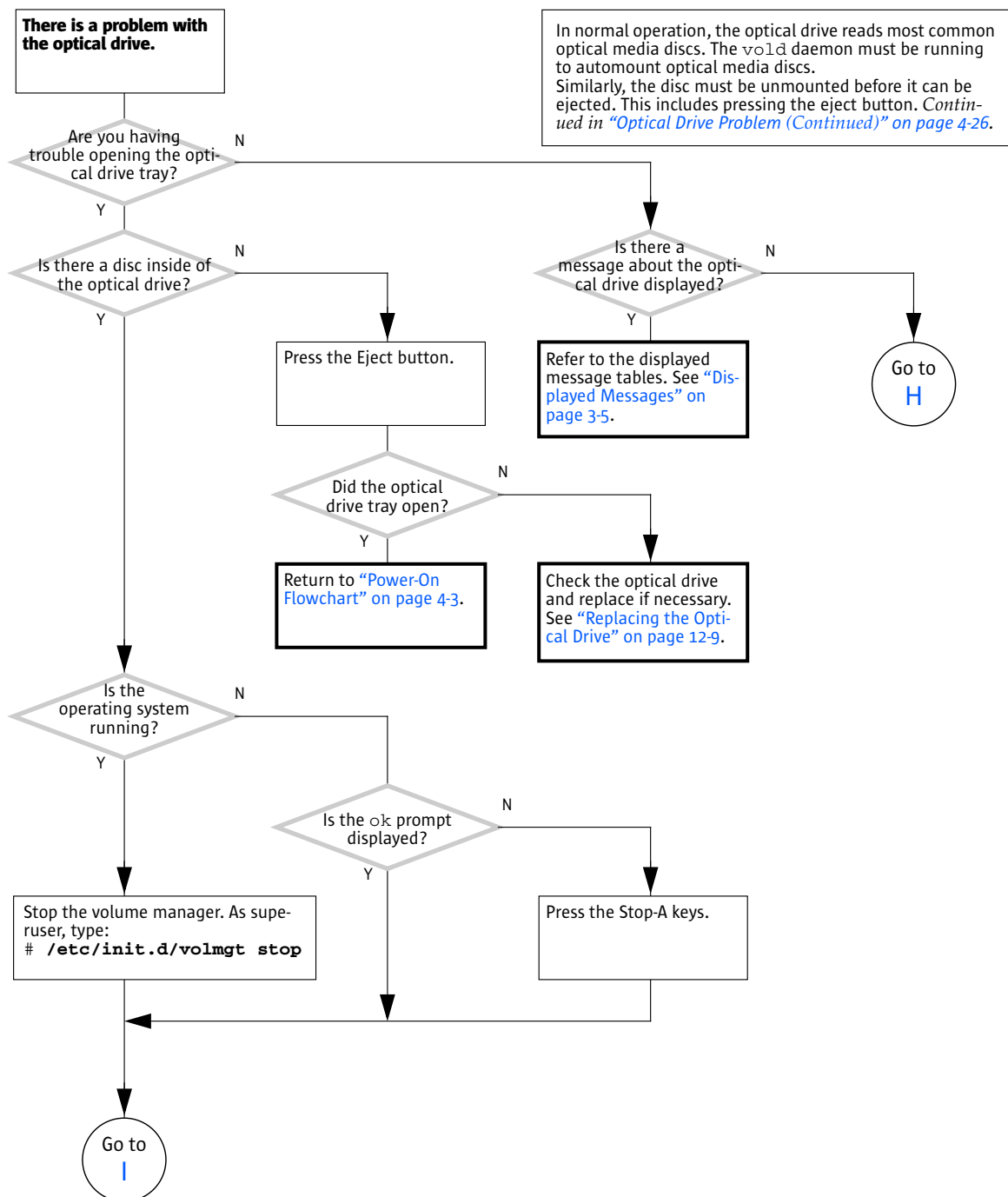


FIGURE 4-21 Optical Drive Problem

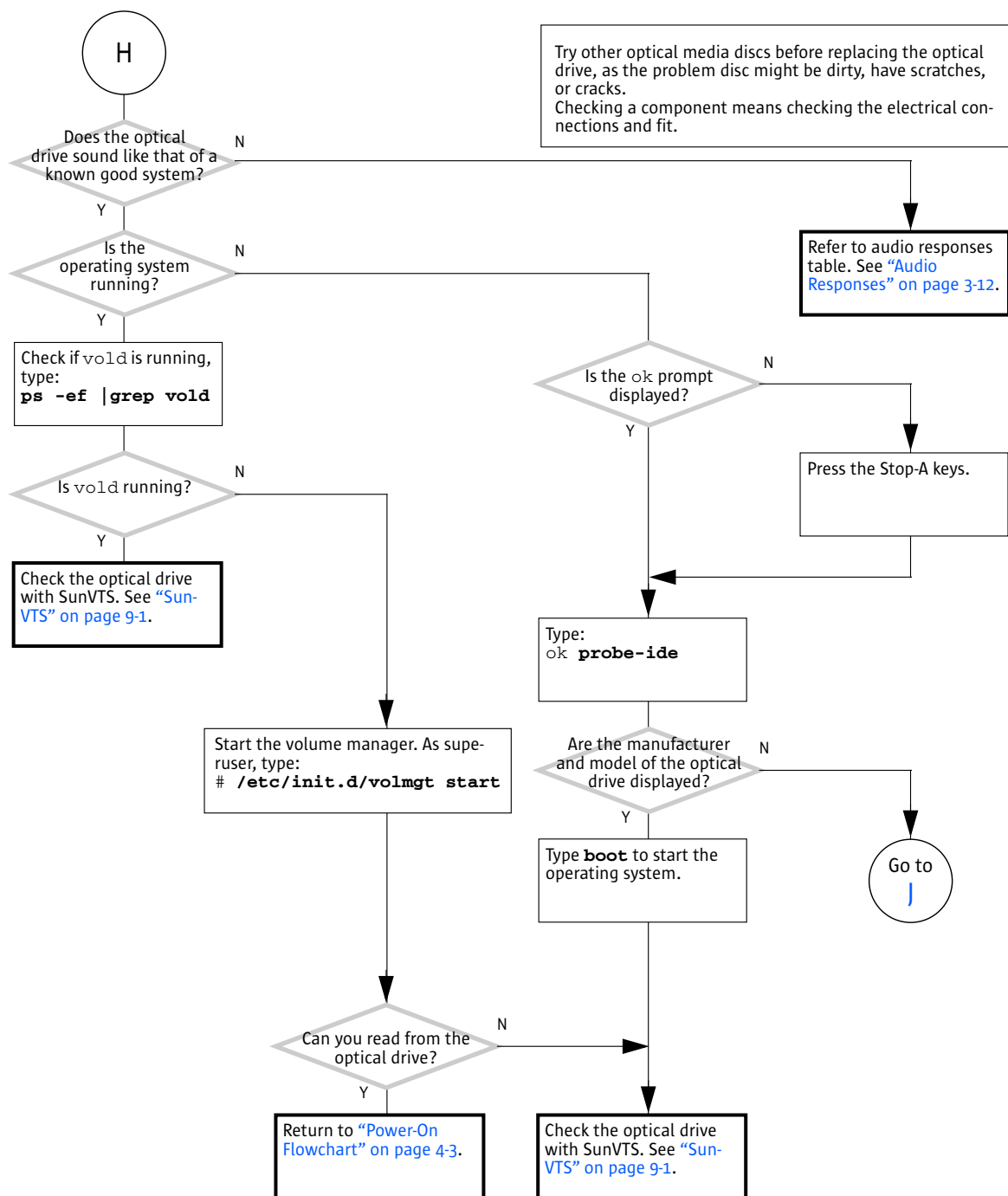


FIGURE 4-22 Optical Drive Problem (Continued)

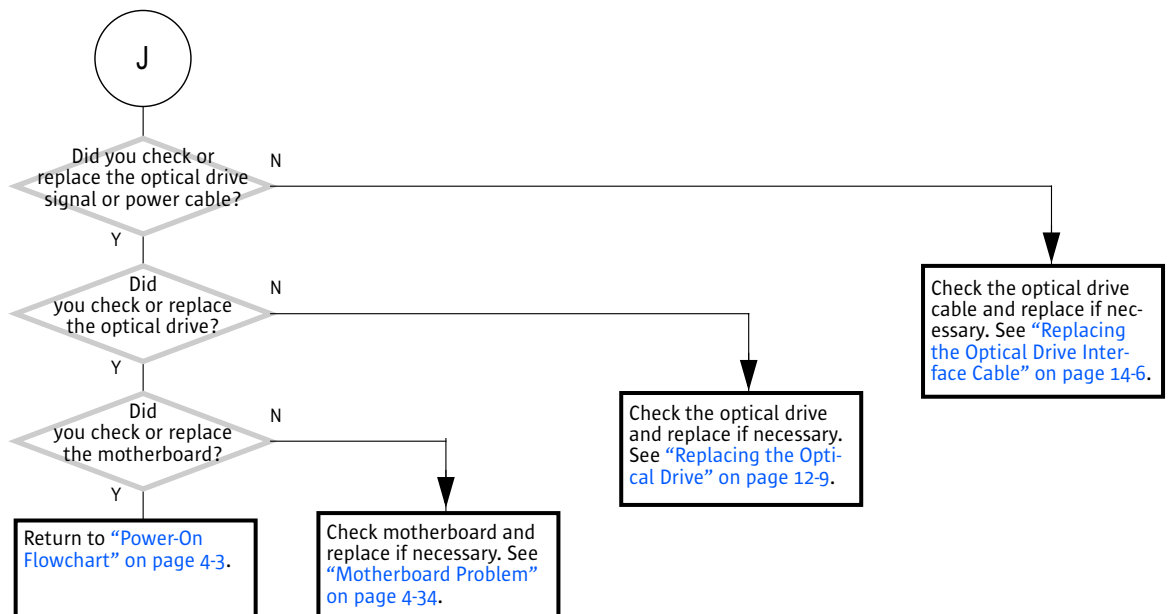
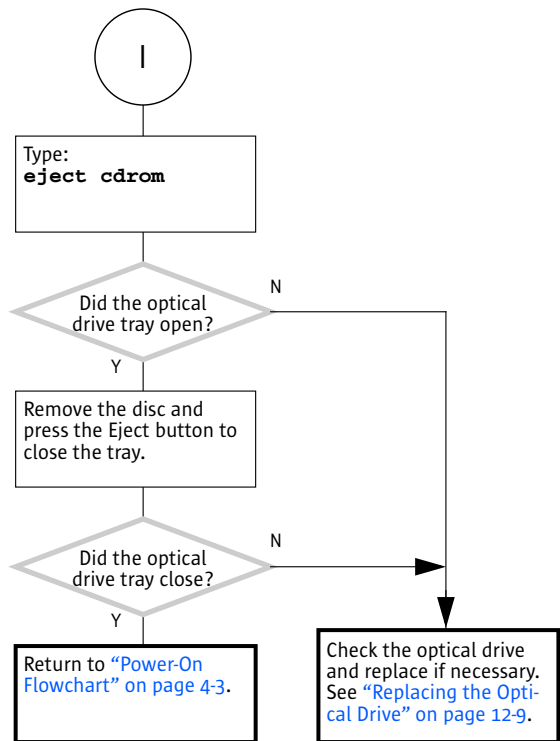
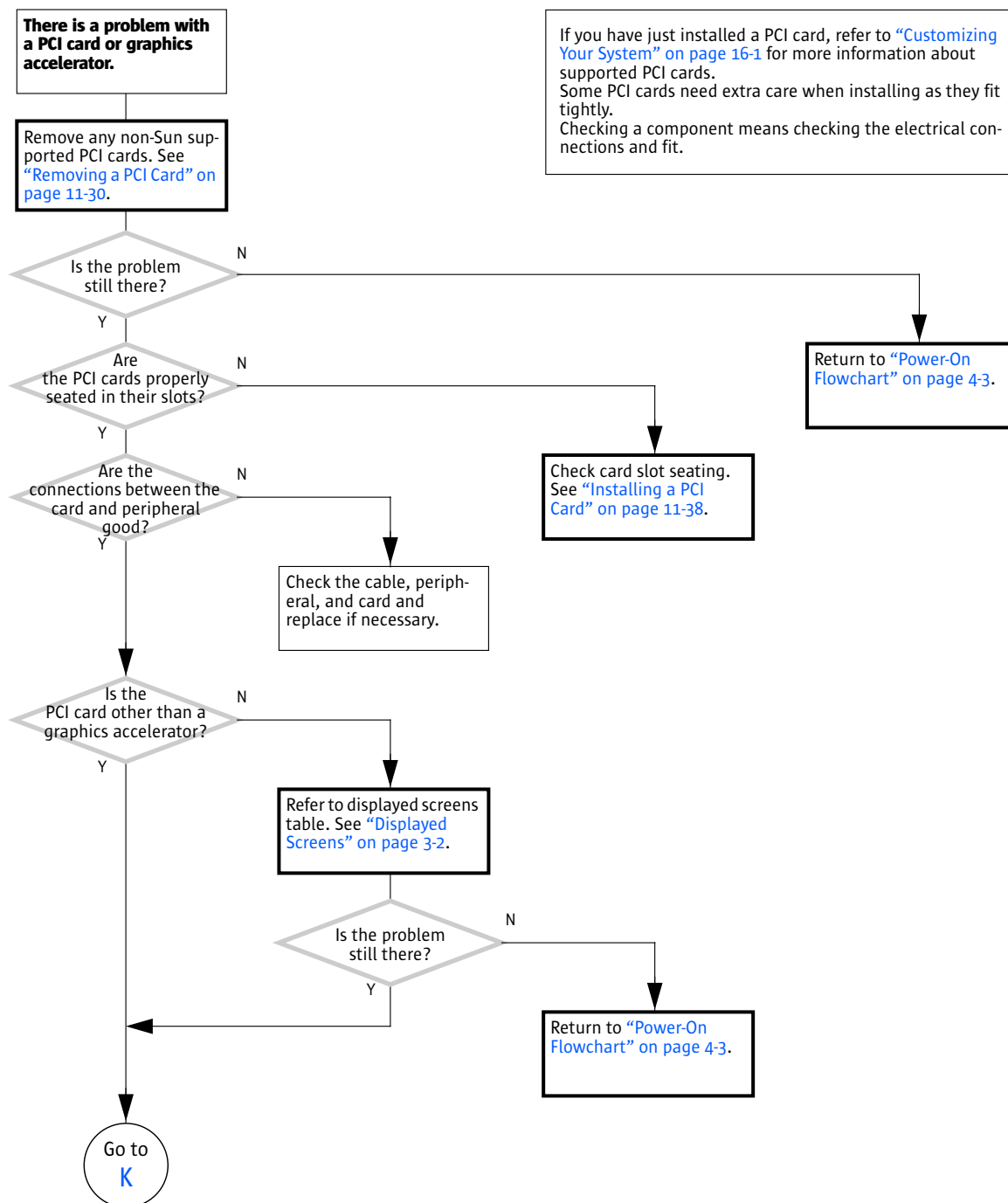
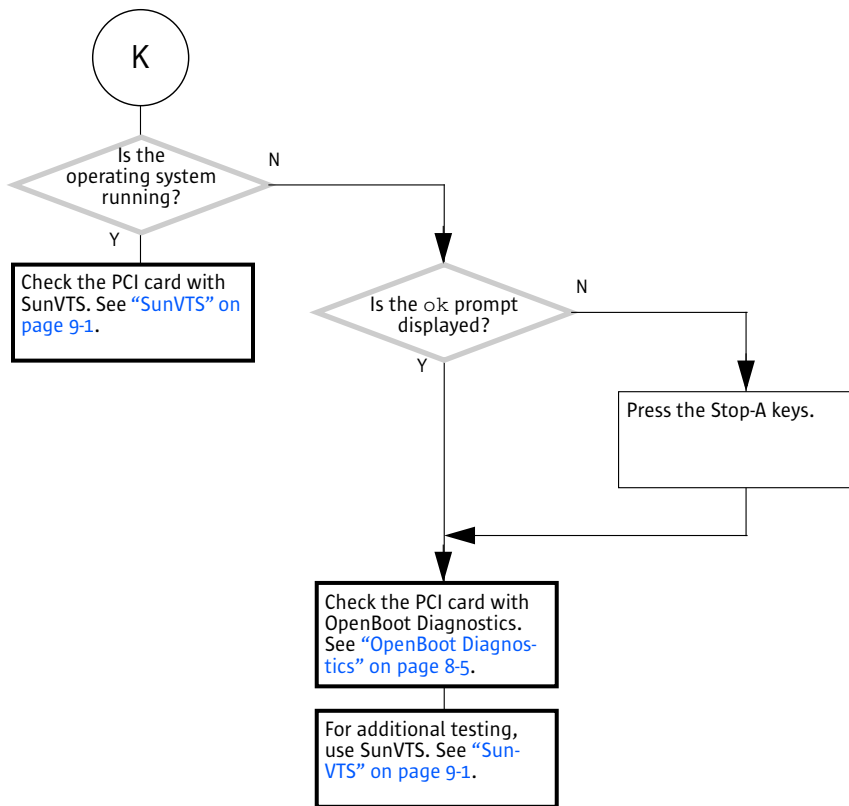


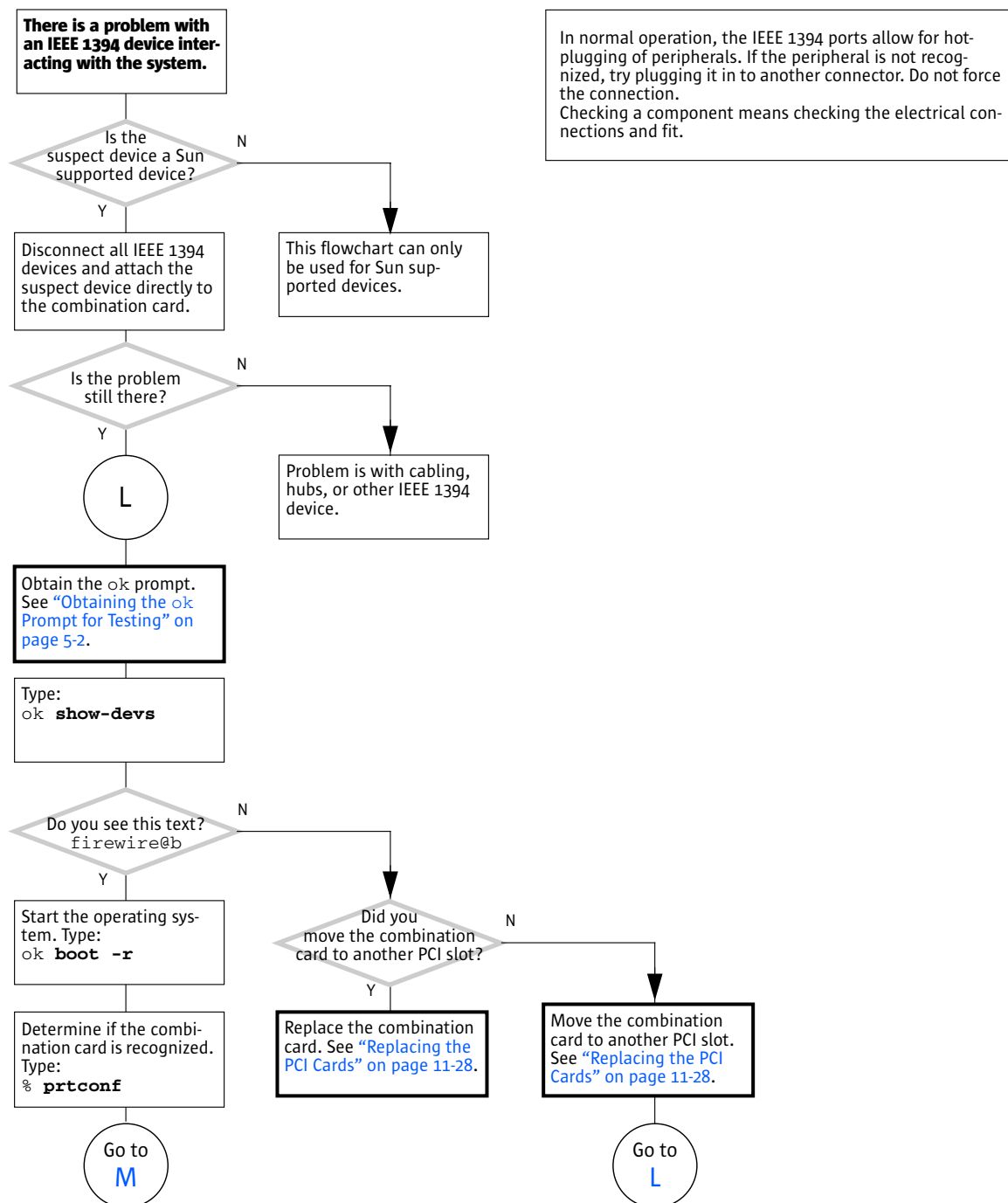
FIGURE 4-23 Optical Drive Problem (Continued)



**FIGURE 4-24** PCI Card Problem

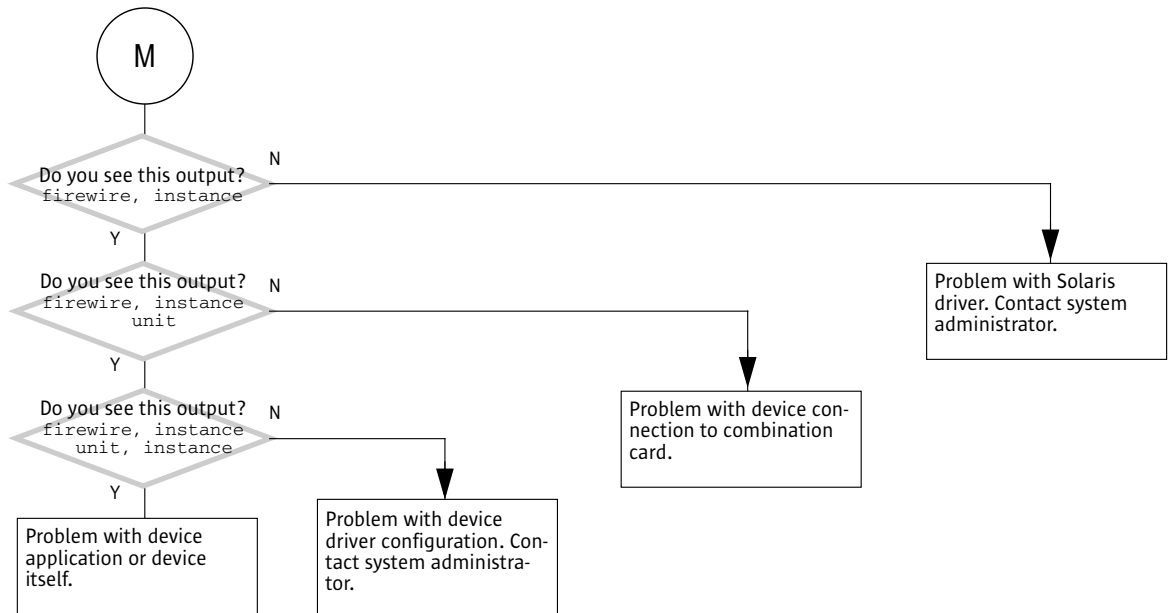


**FIGURE 4-25** PCI Card Problem (Continued)

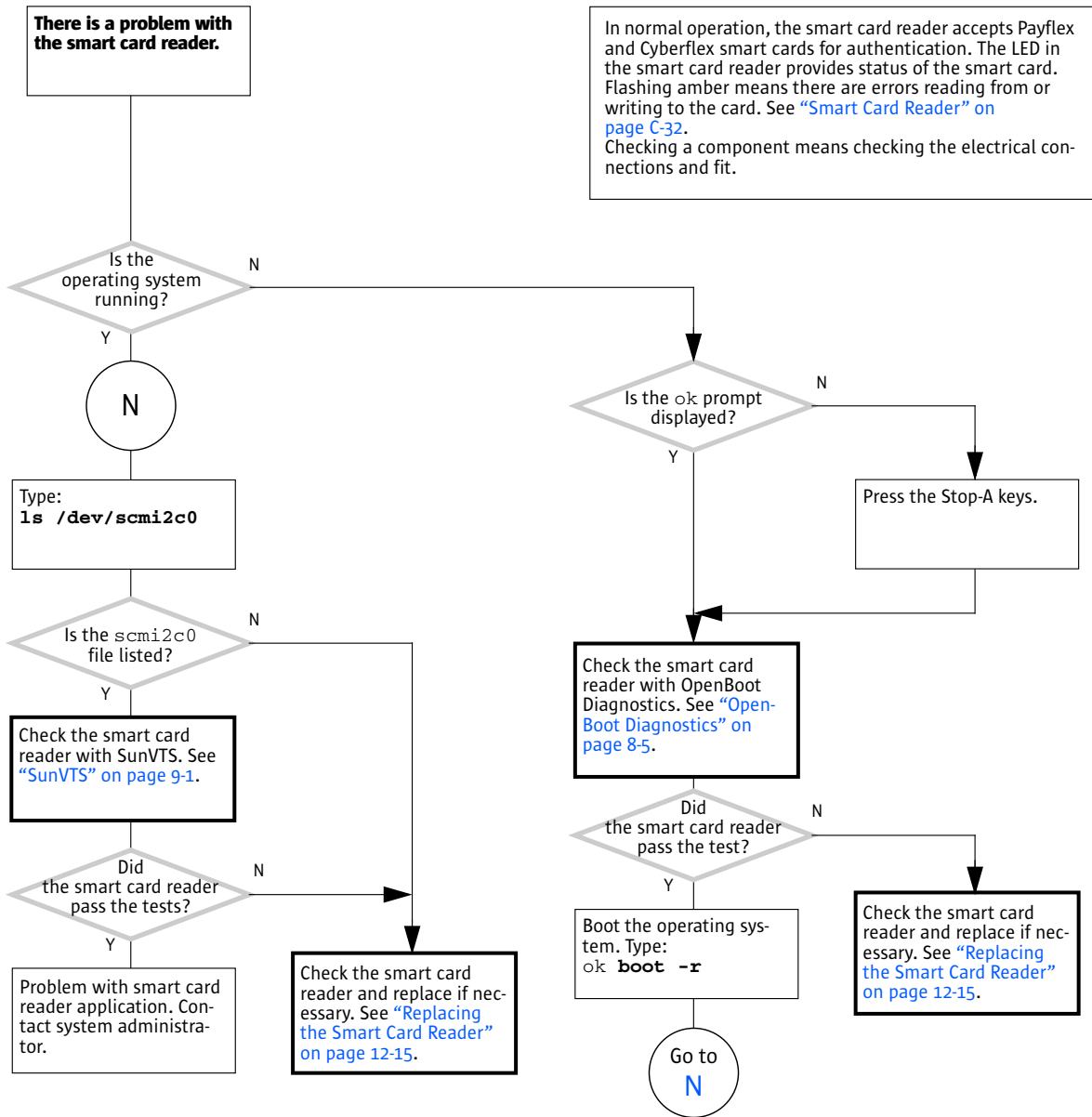


**FIGURE 4-26** IEEE 1394 Problem





**FIGURE 4-27** IEEE 1394 Problem (*Continued*)



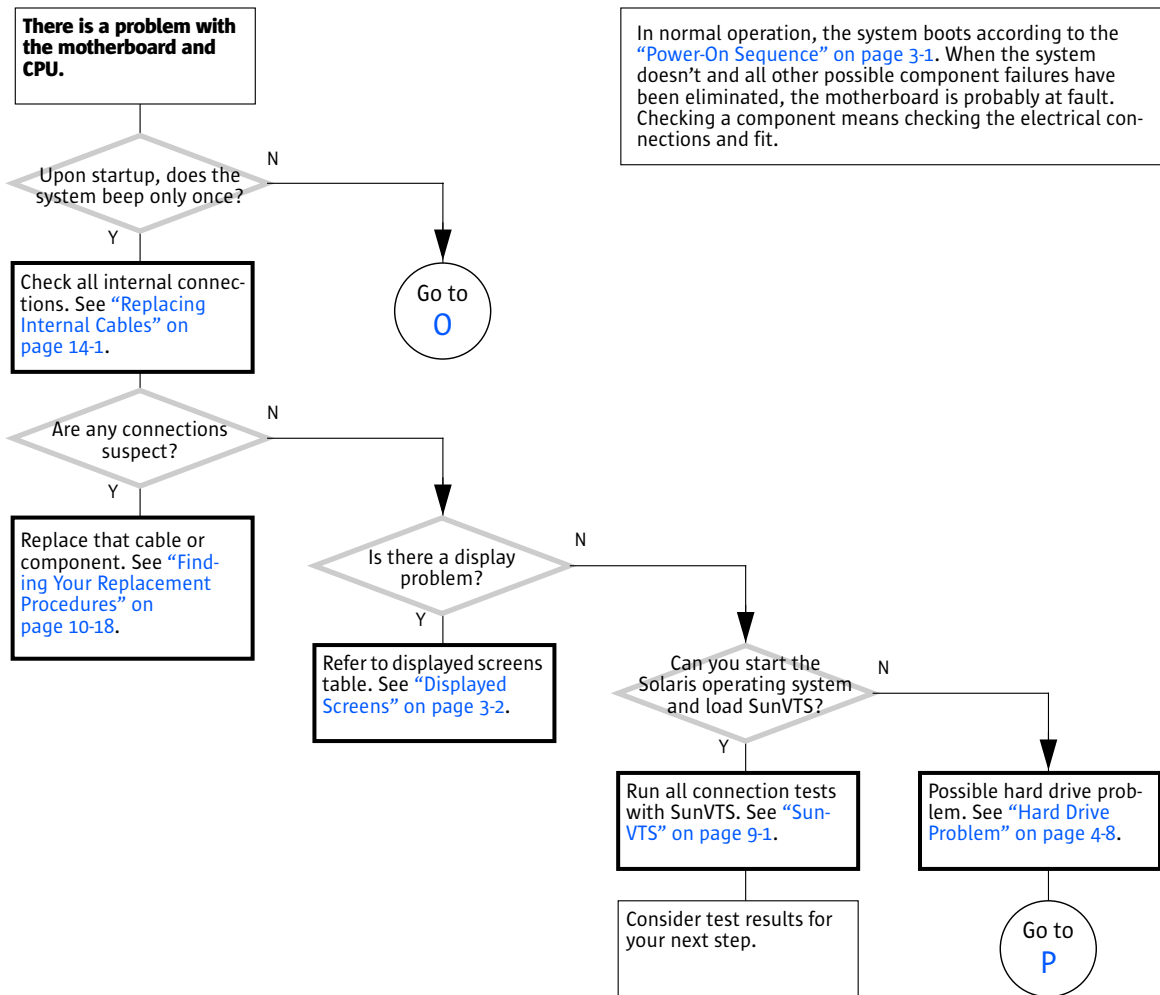
**FIGURE 4-28** Smart Card Reader Problem

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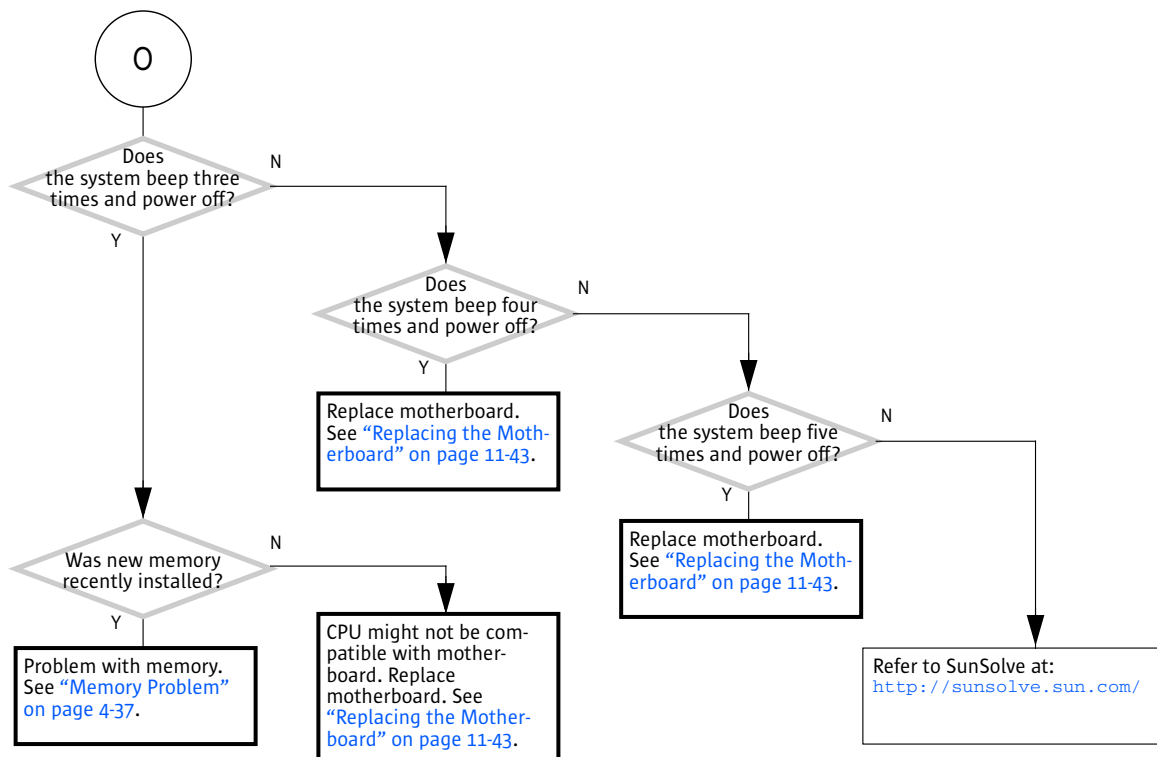
## 4.4 Advanced Problems

The following flowcharts help troubleshoot advanced problems with the motherboard and motherboard components.

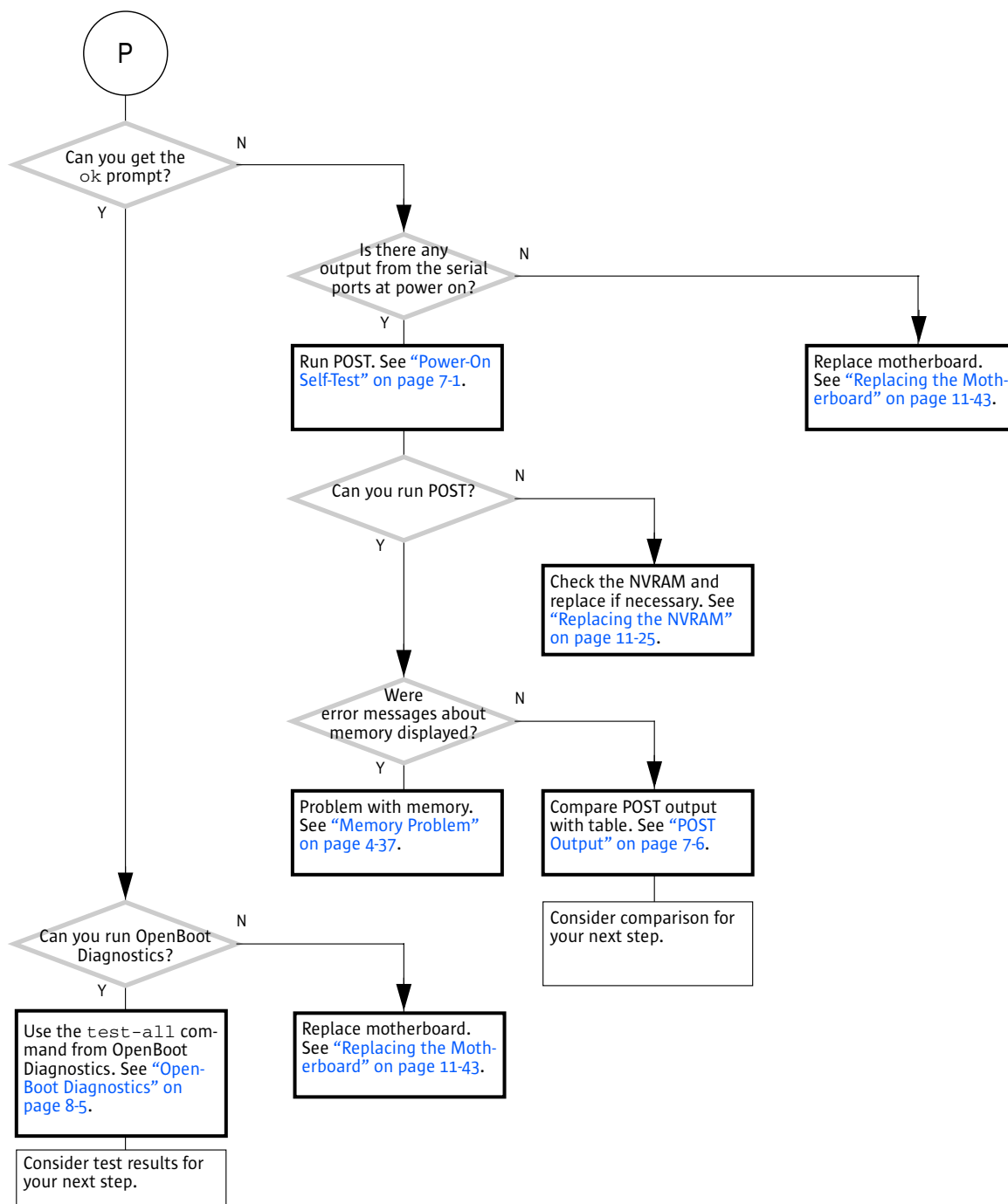
- [“Motherboard Problem” on page 4-34](#)
- [“Memory Problem” on page 4-37](#)
- [“NVRAM Problem” on page 4-39](#)
- [“Battery Problem” on page 4-40](#)



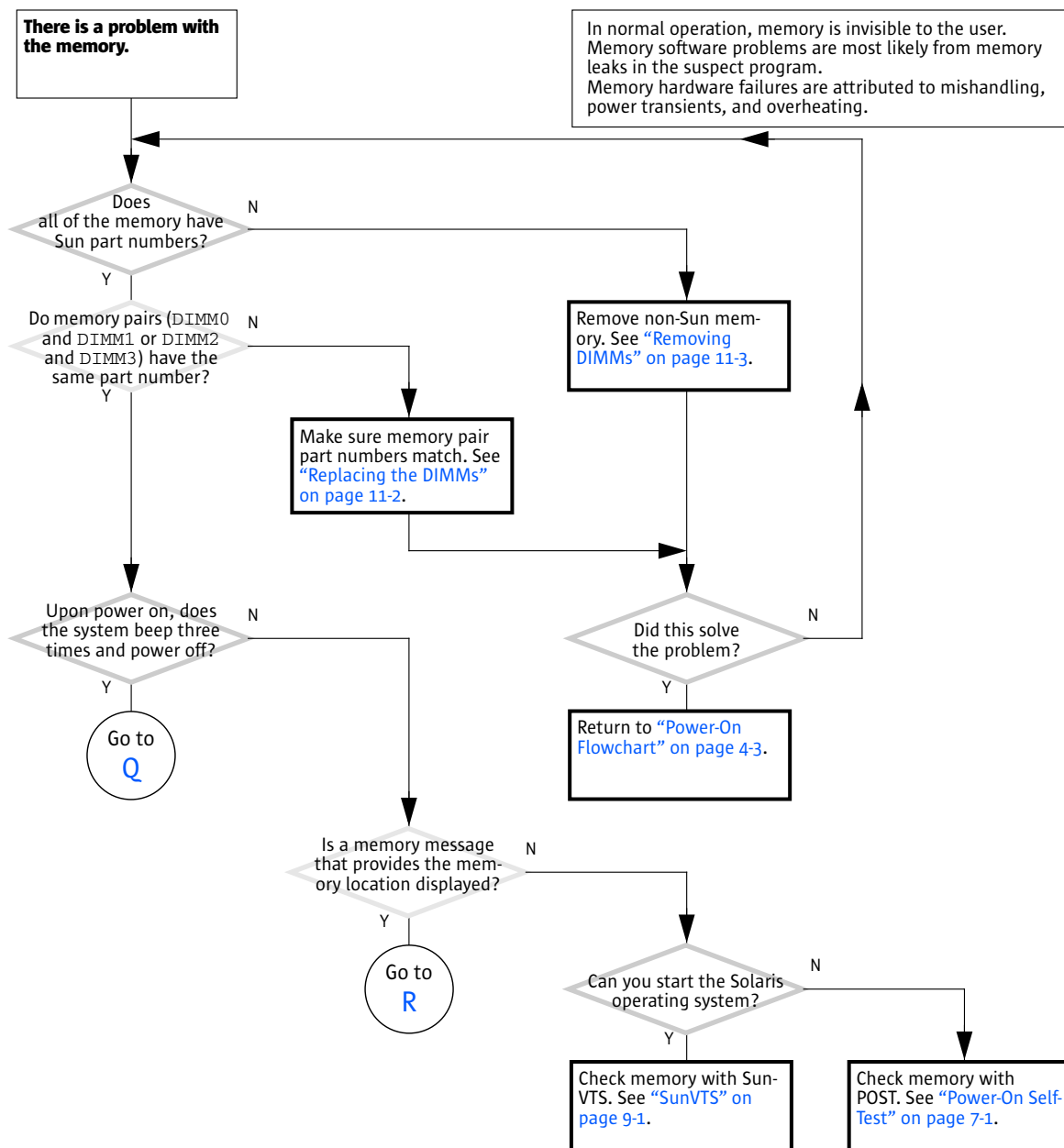
**FIGURE 4-29** Motherboard Problem



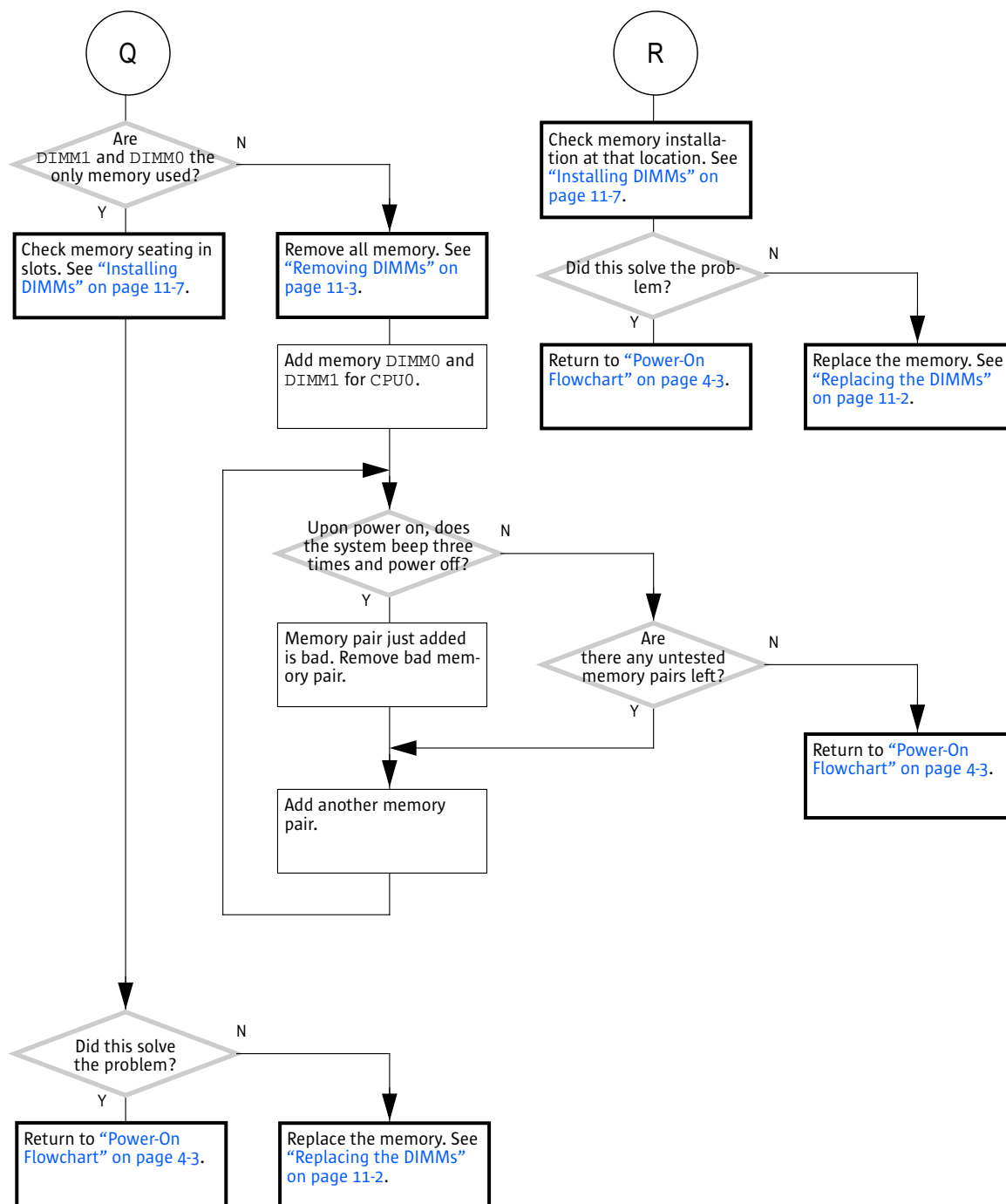
**FIGURE 4-30** Motherboard Problem (Continued)



**FIGURE 4-31** Motherboard Problem (*Continued*)

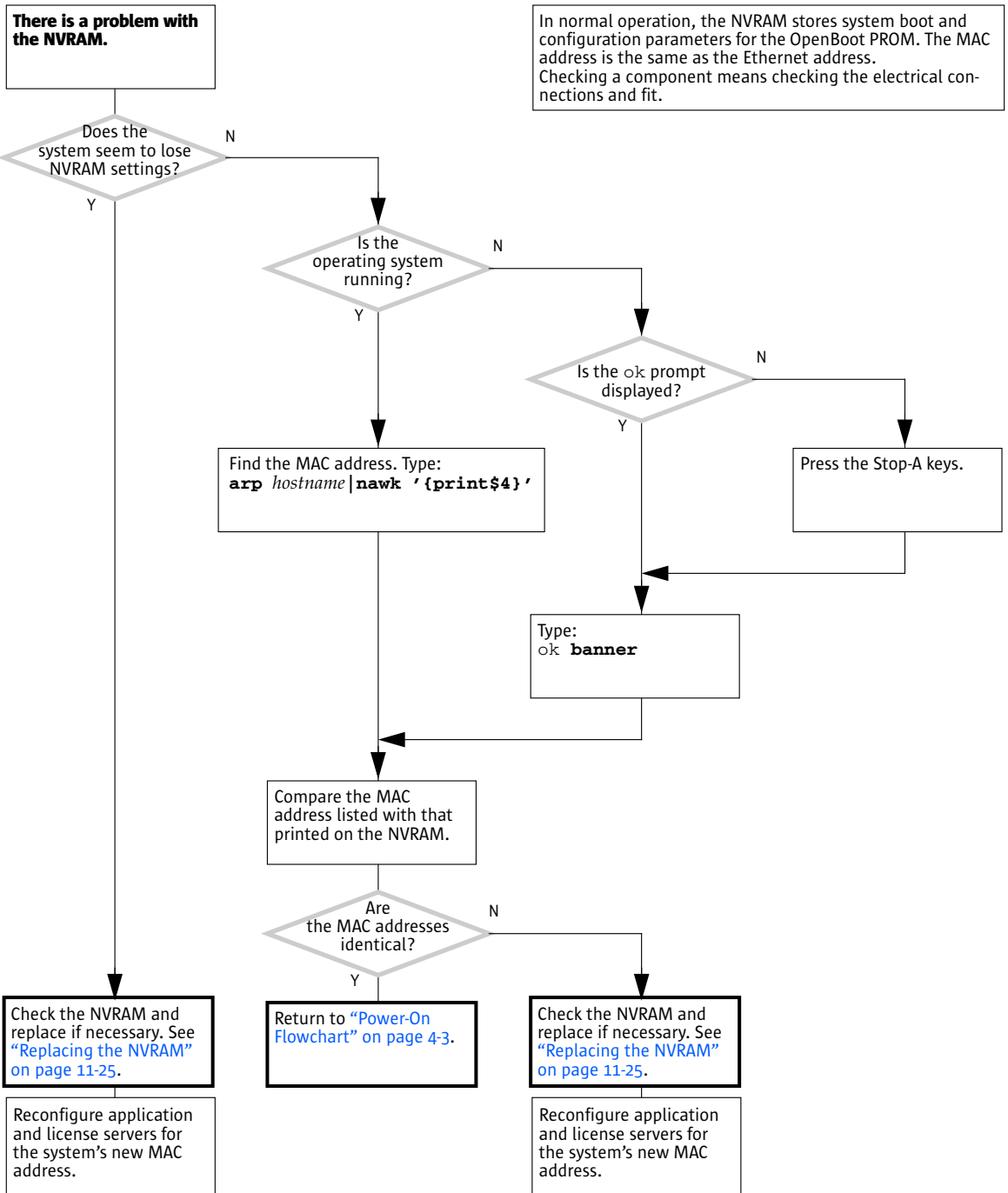


**FIGURE 4-32** Memory Problem

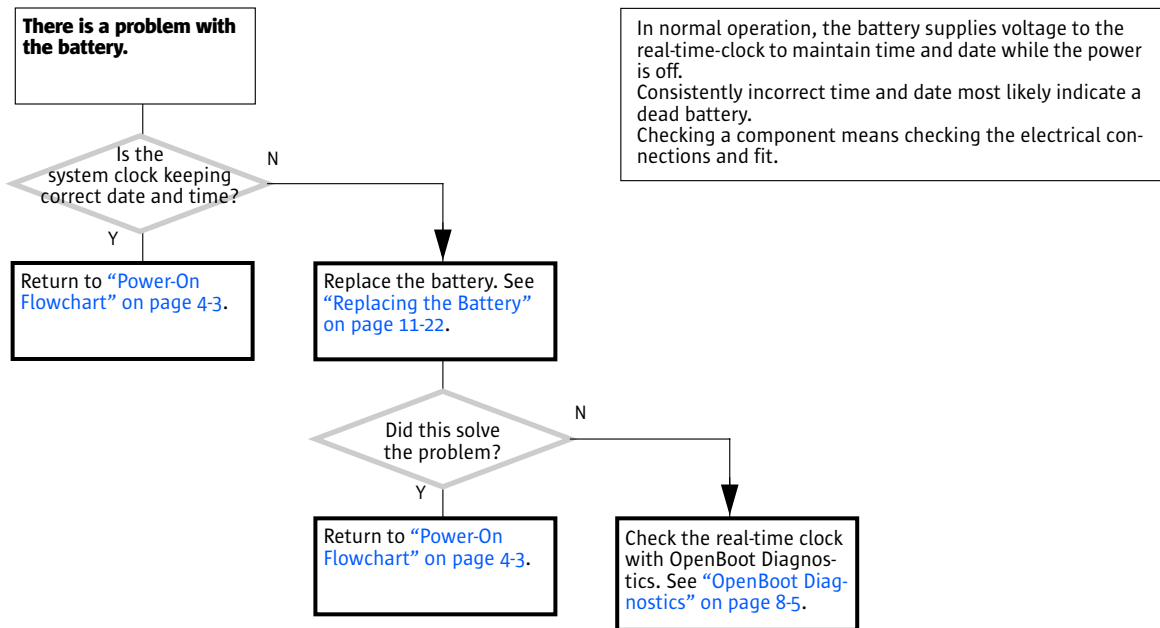


**FIGURE 4-33** Memory Problem (Continued)





**FIGURE 4-34** NVRAM Problem



**FIGURE 4-35** Battery Problem

# Introduction to Advanced Troubleshooting

---

This chapter discusses advanced troubleshooting using the following software tools:

- “NVRAM” on page 5-1
- “Obtaining the ok Prompt for Testing” on page 5-2
- “Diagnostic Tests Summary” on page 5-3
- “Power-On Self-Test” on page 5-4
- “OpenBoot PROM” on page 5-5
- “SunVTS Software” on page 5-6
- “Sun Install Check” on page 5-7

---

## 5.1 NVRAM

[Chapter 6](#) contains information on how to use the NVRAM to help troubleshoot the Sun Blade 1500 workstation.

On the Sun Blade 1500 motherboard is a nonvolatile random access memory (NVRAM). The NVRAM stores parameters that are used for configuring system startup. Different from previous NVRAM, the module in the Sun Blade 1500 workstation uses SEEPROM technology. Also, the real-time clock is now located in the I/O subsystem chip and is powered by a replaceable lithium battery on the motherboard. The interaction the user has with the SEEPROM is no different than with an NVRAM and as such, it is still called an NVRAM.

The NVRAM configuration parameters are set at either the `ok` prompt or by using the `eeeprom` command from the operating system.

# 5.2 Obtaining the ok Prompt for Testing

When the Sun Blade 1500 workstation is put into run level state 0, the `ok` prompt is displayed. At the `ok` prompt, you can make changes to the NVRAM and conduct OpenBoot PROM tests. [TABLE 5-1](#) lists methods for obtaining the `ok` prompt, listed from most preferred to least desirable.



**Caution** – The Stop-A key sequence causes a system abort which loses the system state and might corrupt file systems. Method 1 is the preferred procedure.

**TABLE 5-1** Methods for Obtaining the `ok` Prompt

Method	Situation	Procedure
1	Operating system is functioning normally. You have superuser access.	<ol style="list-style-type: none"><li>1. Save all data and close all active applications.</li><li>2. Become superuser of the system.</li><li>3. Type: # <code>init 0</code></li></ol>
2	Operating system is functioning normally. You do not have superuser access.	<ol style="list-style-type: none"><li>1. Save all data and close all active applications.</li><li>2. Momentarily press and release the front panel Power button.</li><li>3. Select Shutdown from the Power Off window (if a GUI is displayed).</li><li>4. In a few moments, the system powers off.</li><li>5. Momentarily press and release the front panel Power button to power the system back on.</li><li>6. When the power LED flashes, press the Power button twice quickly.</li></ol>
3	System is off.	<ol style="list-style-type: none"><li>1. Momentarily press and release the front panel Power button to power the system back on.</li><li>2. When the power LED flashes, press the Power button twice quickly.</li></ol>
4	Operating system is not functioning normally. You can log in as superuser remotely.	Type: # <code>init 0</code>
5	System has just been powered on.	When the Power LED flashes, press the Power button twice quickly.
6	No other alternatives are available.	Press the Stop and A keys simultaneously. The Stop-A key sequence causes a system abort which loses the system state and might corrupt file systems. Method 1 is the preferred procedure

## 5.3 Diagnostic Tests Summary

POST, OpenBoot PROM, and the SunVTS software offer tools which can help you troubleshoot and diagnose problems with your Sun Blade 1500 workstation. Use [TABLE 5-2](#) to determine which diagnostic program to use to troubleshoot the suspected component.

**TABLE 5-2** POST, OpenBoot Diagnostics, and SunVTS Tests Available for Components

Component	POST	OpenBoot Diagnostics	SunVTS
CPU module	Performs cache, MMU, CPU, and FPU tests	No testing	cpu-unit0 (cputest) cpu-unit0 (iutest) cpu-unit0 (fputest) l1cache (l1dcachetest)
Memory	Max diag level performs tests including block memory and quick memory tests	No testing	mem (pmemtest) kmem (vmemtest)
I/O bridge chip	Performs several tests including register tests	No testing	No testing
Assorted motherboard components	No testing	i2c@0,320 pmu@6 rtc@0,70	adm1031 (env3test)
Flash PROM	Verification of POST portion checksum	flashprom@2,0	seeprom0 (seepromtest)
Graphics accelerator	No testing	SUNW,XVR-600@3 SUNW,XVR-100@3 SUNW,XVR-1200@3	jfb0 (jfbtest) xvrtest (pfbtest) jfb0 (jfbtest)
PCI cards	No testing	Tests available if card has IEEE 1275 self-test	
Hard drive	No testing	ide@d	c0t0d0 (disktest)
Optical drive	No testing	ide@d	c0t2d0s2 (cddvdrwtest) c0t2d0s2 (cdtest) c0t2d0s2 (dvdtest)
Smart card reader	No testing	card-reader@0,40	scmi2c0 (sc2test)
Network*	No testing	network@2	ce0 (nettest) bge0 (netlbttest)

**TABLE 5-2** POST, OpenBoot Diagnostics, and SunVTS Tests Available for Components *(Continued)*

Component	POST	OpenBoot Diagnostics	SunVTS
USB	No testing	usb@a and usb@b	c1t0d0 (disktest) For USB removable media device.
Keyboard and mouse	No testing	keyboard@x (x varies as to which USB port the keyboard is attached.)	kbd (usbkbtest)
Parallel port*	No testing	parallel@0,378	ecpp0 (eccptest)
Serial ports*	Used for POST output	serial@0,2e8 and serial@0,3f8	su0 (sutest)
Audio ports*	No testing	sound@8	sound0 (audiotest)

\* More thorough test results are possible with a loopback connector, however these results are not addressed.

## 5.4 Power-On Self-Test

[Chapter 7](#) contains information about how to set up and use power-on self-test (POST) on the Sun Blade 1500 workstation.

### 5.4.1 POST Overview

Typing the `post` command from the `ok` prompt initiates tests that check the CPU, I/O bridge chip, and memory modules. The output of the `post` command is directed to the serial port of the system under test. An external display device and a TIP connection are required to view this output.

### 5.4.2 Configuring POST Output

The `post` command uses two variables to determine its output. It is in the form of:

`post level verbosity`

Where:

- *level* is min or max
- *verbosity* is min, normal, or max

[TABLE 5-3](#) describes the diagnostic levels.

**TABLE 5-3** POST Diagnostic Levels

POST Diagnostic Level	Output
min	Testing of CPU, cache, some memory, and I/O bridge chip.
max	Same tests as min, with additional extensive memory testing.

[TABLE 5-4](#) describes the output verbosity.

**TABLE 5-4** POST Output Verbosity

POST Output Verbosity	Output
min	Only “Executing Power On Self Test” is displayed.
normal	Build information and test groups are indicated.
max	Each step of POST is identified.

---

## 5.5 OpenBoot PROM

### 5.5.1 OpenBoot PROM Overview

OpenBoot PROM is the core software installed on the Sun Blade 1500 motherboard. This software enables the CPU, memory, I/O bridge, I/O subsystem, and other motherboard components to perform minimal communication to initially boot the Sun Blade 1500 workstation to a state where it can further load an operating system from either an installed hard drive, an optical drive, the network, or from some external boot device. Because this software is permanent to the motherboard hardware, it is called *firmware*.

As seen in [“Power-On Sequence” on page 3-1](#), the OpenBoot PROM plays a major role in starting the Sun Blade 1500 workstation. If an error occurs during that process, a message is likely to be displayed. The error might happen while the OpenBoot PROM loads the Solaris operating system. Refer to [“Power-On Self-Test” on page 7-1](#) for information about POST.

## 5.5.2 OpenBoot Diagnostics

The OpenBoot PROM also has a collection of more in-depth testing programs, available from the `obdiag` prompt.

[Chapter 8](#) contains information about how to use OpenBoot Diagnostics on the Sun Blade 1500 workstation.

---

## 5.6 SunVTS Software

[Chapter 9](#) contains information how to use some basic SunVTS configurations to help determine if a particular component within the workstation is failing.

### 5.6.1 SunVTS Overview

Sun's validation test suite software, SunVTS, is a comprehensive software diagnostic package that tests and validates hardware by verifying the connectivity and functionality of most hardware components. SunVTS is a system exerciser that you can use to check for intermittent or long term failures.

SunVTS software executes multiple diagnostic tests from a GUI that provides test configuration and status monitoring. The user interface can run in the CDE or OPEN LOOK environments or through a TTY-mode interface for situations when running a GUI on the system under test is not possible.

The SunVTS interface can run on one workstation to display a SunVTS test session of another workstation on the network.

SunVTS software is already installed on the Sun Blade 1500 workstation hard drive, and is also available from this URL:

<http://www.sun.com/oem/products/vts/>

### 5.6.2 SunVTS Requirements

Your workstation must meet the following requirements to run SunVTS software:

- The SunVTS packages must be installed. The main package is `SUNWvts`. There are additional supporting packages that differ based on the revision of the Solaris operating system that is installed. For specific details, refer to the corresponding SunVTS documentation.



- The workstation must be booted to the multiuser level (run level 3).
- To run SunVTS software with a GUI, that GUI must be installed. Otherwise, run SunVTS software with the TTY-mode interface.

## 5.6.3 SunVTS Documentation

Because of its complexity and depth of application, SunVTS software is not thoroughly discussed in this book. In-depth SunVTS information can be found in:

- *SunVTS 5.1 User's Guide* describes how to install, configure, and run the SunVTS diagnostic software.
- *SunVTS Quick Reference Card* provides an overview of how to use the SunVTS CDE interface.
- *SunVTS 5.1 Test Reference Manual* provides details about each individual SunVTS test.
- *SunVTS 5.1 Patch Set 5 Documentation Supplement* provides information specific for Solaris 8 2/04 and Solaris 9 9/04 operating systems.

---

## 5.7 Sun Install Check

### 5.7.1 Sun Install Check Overview

The Sun Install Check tool verifies and provides information about your Sun Blade 1500 workstation hardware and software configuration. Before you can run the Sun Install Check tool, you need to download it from the following web site:

<http://www.sun.com/software/installcheck/index.html>

The following procedure describes how to download the Sun Install Check tool. When installed, the Sun Install Check tool occupies 15 MB of drive space.

### 5.7.2 Downloading Sun Install Check

1. **As superuser of the Sun Blade 1500 workstation, open a web browser and go to the Install Check web site:**

<http://www.sun.com/software/installcheck/index.html>

2. Click Get the Software.
3. Click Download Sun Install Check Tool.
4. Log in with your My Sun<sup>SM</sup>, Sun Store, or SunSolve<sup>SM</sup> username and password.

---

**Note** – If you are not a registered user, click Register Now and register.

---

5. Read and accept the licensing agreement.
6. Click the link to download and save the .zip file to a download directory.
7. Go to the download directory and unzip the .zip file.

```
# unzip filename.zip
```

A subdirectory is created, containing a README file.

8. Read the README file for further instructions to install and run the Sun Install Check tool.

# NVRAM

---

The workstation's system configuration parameters are stored in NVRAM. These NVRAM parameters contain values which determine the startup configuration of your workstation. You can modify or reset the parameter values by using commands from the `ok` prompt, the `eeeprom` command from a terminal window, or by key commands.

This chapter contains information about the following topics:

- [“Changing NVRAM Configuration Parameter Values” on page 6-1](#)
- [“Setting NVRAM Security Mode” on page 6-7](#)
- [“`eeeprom` Command” on page 6-8](#)
- [“Key Commands” on page 6-9](#)

---

## 6.1 Changing NVRAM Configuration Parameter Values

The NVRAM configuration parameter values set the startup behavior of the Sun Blade 1500 workstation. Changes made to the variables typically survive power cycling and if not configured properly, might have an adverse affect. As such, use discretion when changing or resetting NVRAM configuration parameter values.

## 6.1.1 Displaying and Changing Parameter Values

NVRAM configuration parameter values are viewed and modified using the commands listed in [TABLE 6-1](#).

**TABLE 6-1** NVRAM Parameter Configuration Commands

Command	Description
<code>printenv <i>parameter</i></code>	Displays the current value for the <i>parameter</i> . If no parameter is provided, all parameters, their current value, and their default value are displayed.
<code>setenv <i>parameter value</i></code>	Set <i>parameter</i> to <i>value</i> . Values are typically textual or numeric. Changes made with the <code>setenv</code> command are permanent, but require a reset or power cycle to take affect.
<code>set-default <i>parameter</i></code>	Resets the <i>parameter</i> to the default value.
<code>set-defaults</code>	Resets all parameters to their default values.
<code>reset-all</code>	Initiates a warm boot where most NVRAM configuration parameters are read. With power cycling or a cold boot, all NVRAM configuration parameters are read.
<code>password</code>	Sets the <code>security-password</code>

You can display your system's current and default parameter values by typing `printenv` at the ok prompt. For example:

ok <b>printenv</b>		
Variable Name	Value	Default Value
asr-policy	normal	normal
test-args		
diag-passes	1	1
local-mac-address?	true	true
fcode-debug?	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
error-reset-recovery	sync	sync
load-base	16384	16384
auto-boot?	true	true
boot-command	boot	boot
diag-file		
diag-device	net	net
boot-file		
boot-device	disk net	disk net
use-nvramrc?	false	false
nvramrc		
security-mode	none	No default
security-password		No default
security-#badlogins	0	No default
verbosity	min	min
diag-trigger	none	none
service-mode?	false	false
diag-script	normal	normal
diag-level	max	max
diag-switch?	false	false

To change a parameter value, use the `setenv` command. For example:

```
ok setenv diag-switch? true
```

This example enables diagnostics.

---

**Note** – Parameters that end with a question mark (?) can only be set `true` or `false`.

---







## 6.1.2 Configuration Parameter Default Values

Typing `set-defaults` resets all parameters to their default values. [TABLE 6-2](#) lists the NVRAM configuration parameters, the default values, and a description.

**TABLE 6-2** NVRAM Configuration Parameter Default Values

Parameter	Default Value	Description
asr-policy	normal	Reserved.
test-args		The arguments which configure OpenBoot Diagnostics.
diag-passes	1	The number of passes that diagnostics are to make before continuing to boot.
local-mac-address?	true	A value of <code>true</code> means to use the MAC address within the motherboard.
fcode-debug?	false	A value of <code>false</code> disables debugging of Fcode.
scsi-initiator-id	7	The identifying number of any SCSI host bus adapter.
oem-logo	no default	The bitmap of a custom OEM logo.
oem-logo?	false	A value of <code>false</code> disables use of a custom logo.
oem-banner	no default	The text of a custom OEM banner.
oem-banner?	false	A value of <code>false</code> disables use of a custom banner.
ansi-terminal?	true	A value of <code>true</code> enables the terminal emulator to interpret ANSI escape sequences.

**TABLE 6-2** NVRAM Configuration Parameter Default Values (*Continued*)

Parameter	Default Value	Description
screen-#columns	80	The number of character columns displayed on the console.
screen-#rows	34	The number of character rows displayed on the console.
ttyb-rts-dtr-off	false	A value of false disables hardware handshaking for ttyb (serial2  2).
ttyb-ignore-cd	true	A value of true ignores carrier detect for ttyb (serial 2  2).
ttya-rts-dtr-off	false	A value of false disables hardware handshaking for ttya (serial1  1).
ttya-ignore-cd	true	A value of true ignores carrier detect for ttya (serial 1  1).
ttyb-mode	9600,8,n,1,-	The communication parameters for ttyb (serial2  2). 9600 baud, 8 data bits, no parity, 1 stop bit, no handshaking.
ttya-mode	9600,8,n,1,-	The communication parameters for ttya (serial1  1). 9600 baud, 8 data bits, no parity, 1 stop bit, no handshaking.
output-device	screen	The device alias of the console output display. screen is aliased to the first graphics accelerator found in probe order.
input-device	keyboard	The device alias of the console input device.
auto-boot-on-error?	false	A value of false disables autoboot upon error.
error-reset-recovery	sync	The command to be executed upon recovery from an error.
load-base	16384	The decimal address of the start of the client program.
auto-boot?	true	A value of true enables the system to boot the Solaris operating system without intervention.
boot-command	boot	The string which is aliased to the action of booting the system.
diag-file		The path and filename of the diagnostics file.
diag-device	net	The device alias of the hardware which has the diagnostics file.

**TABLE 6-2** NVRAM Configuration Parameter Default Values (*Continued*)

Parameter	Default Value	Description
boot-file		The path and filename of the boot file.
boot-device	disk net	The device alias of the hardware which has the boot file. Aliases may be separated by a space, and are checked in left to right order.
use-nvramrc?	false	A value of false disables use of the information in the nvramrc space.
nvramrc		A storage space for special conditions and variables used for booting the system.
security-mode	No default	Firmware security level.
security-password	No default	Firmware security password.
security-#badlogins	No default	The number of failed security password attempts.
verbosity	min	A value of min provides almost no output during diagnostics.
diag-trigger	none	Reserved.
service-mode?	false	Reserved.
diag-script	none	The name of the diagnostics script.
diag-level	max	A value of max enables enhanced diagnostics.
diag-switch?	false	A value of false disables diagnostics under the OpenBoot PROM.

More information about the NVRAM configuration parameters is available from the `eeeprom` man page.



## 6.2 Setting NVRAM Security Mode

The NVRAM has the ability to restrict the set of operations that users can perform. When the `security-mode` parameter is set to either `full` or `command`, only users with the `security-password` may bypass the enforcement policy. [TABLE 6-3](#) lists the different security modes and their conditions.

**TABLE 6-3** `security-mode` Values and Their Enforcement Policy

Value	Enforcement Policy
<code>full</code>	All commands except <code>go</code> require the <code>security-password</code> .
<code>command</code>	All commands except <code>boot</code> (without arguments) and <code>go</code> require the <code>security-password</code> .
<code>none</code>	All commands are available, no password is required.



**Caution** – You must set the security password before setting the security mode. Forgetting the password or configuring security mode before the password requires a call to customer support to make the system bootable.

To configure security mode:

1. Obtain the `ok` prompt.

See [“Obtaining the `ok` Prompt for Testing” on page 5-2](#).

2. Set the security password.

- Type:

```
ok password
New password (8 characters max)
Retype new password:
ok
```

- Or, type:

```
ok setenv security-password password
security-password =
ok
```

This is the only instance in which the security password is ever displayed.

3. Set the security mode to full or command. Type:

```
ok setenv security-mode full  
security-mode =      full  
ok
```

4. Enable the security-mode. Type:

```
ok reset-all
```

Upon reset, the ok prompt appears as a > symbol and the password is required. For example:

```
> printenv  
Firmware Password:
```

After supplying the correct password, the command is run. If an incorrect password is supplied, the user is required to wait for 10 seconds until authorization can be re-attempted. For example:

```
> printenv  
Firmware Password:  
Sorry.  Waiting 10 seconds.  
  
>
```

---

## 6.3 eeprom Command

It is possible to display and change NVRAM configuration parameters from the Solaris operating system by using the `eeprom` command. The `eeprom` command is executed by superuser in the form of:

```
# eeprom parameter=value
```

If no parameter is specified, the `eeeprom` command displays only the current NVRAM configuration parameter values, similar to the `printenv` command. For example:

```
# eeeprom
asr-policy=normal
test-args: data not available.
diag-passes=1.
.
.
.
diag-script=normal
diag-level=max
diag-switch?=false
```

A previous example described how to enable diagnostics. Using the `eeeprom` command:

```
# eeeprom diag-switch?=true
```

The `eeeprom` command requires a system reboot for the changes to take effect. For more information, refer to the `eeeprom` man page.

---

## 6.4 Key Commands

This section describes how to use your USB keyboard to abort or reset NVRAM by using the Stop-A or Stop-N equivalent commands:

- [“Stop-A Command” on page 6-10](#)
- [“Stop-N Equivalent Command Procedure” on page 6-10](#)

Before powering on the workstation, make sure that the keyboard and mouse are connected to the front panel or rear panel USB ports. Connecting the keyboard or mouse to the IEEE 1394/USB 2 combination card is not recommended

---

**Note** – The Stop-A and Stop-N keys are sometimes referred to as “OpenBoot Emergency Procedures”.

---

## 6.4.1 Stop-A Command

Use the Stop-A command to abort an OpenBoot process. To issue the Stop-A command for the Sun Blade 1500 workstation, press both the Stop and A keys (Stop-A) immediately after powering on the workstation. Hold both keys down until the workstation beeps.



---

**Caution** – Performing the Stop-A command while the Solaris operating system is running causes a system halt. The system state is lost, file systems are not synchronized, and data might be lost or corrupted.

---

---

**Note** – Using Stop-A does not allow the workstation to perform a core dump. This information could be useful to you if the operating system has crashed.

---

## 6.4.2 Stop-N Equivalent Command Procedure

For older Sun systems, issuing the Stop-N command upon startup resets workstation configuration variables. The Sun Blade 1500 workstation uses a Sun Type-6 USB keyboard. It is not possible to issue a Stop-N command with a USB keyboard because by the time the USB keyboard driver is loaded, the interval to use the Stop-N command has expired. Instead, the following Stop-N equivalent procedure must be used to reset your workstation configuration variables. This procedure puts the Sun Blade 1500 workstation into a Safe NVRAM mode.

### 6.4.2.1 Resetting the NVRAM Temporarily

1. **Power on the workstation and wait until the front panel Power button LED begins to flash and you hear a beep.**
2. **Quickly press the front panel Power button twice (similar to the way you would double-click a mouse).**

---

**Note** – Once the Power button LED stops flashing and stays lit, pressing the Power button again powers off the system.

---

A screen similar to the following is displayed to indicate that you have successfully reset NVRAM contents to the default values and are in Safe NVRAM mode. If a screen similar to the following is not displayed, allow the system to boot, shut down the system, and repeat steps 1 and 2.

```
Sun Blade 1500 (Silver), Keyboard Present
OpenBoot 4.16.3, 1024 MB memory installed, Serial #53463596.
Ethernet address 0:3:ba:2f:ca:2c, Host ID: 832fca2c.

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
```


While in the Safe NVRAM mode, some of the NVRAM configuration parameters are reset to their default values. They include parameters that are more likely to cause problems, such as TTYA settings. These default NVRAM settings exist only for this power cycle and are not permanent. If you change configuration parameters while in Safe NVRAM mode, those changes are permanent and survive a reset.

**TABLE 6-4** lists the configuration parameters that are reset to default values, and describes those values.

**TABLE 6-4** Stop-N Equivalent Configuration Parameters

Parameter	Stop-N Equivalent Value	Description
diag-switch?	true	Workstation runs in diagnostic mode.
use-nvramrc?	false	Do not use the contents of nvramrc.
input-device	keyboard	Console input device.
output-device	screen	Console output device.
ttya-mode	9600,8,n,1,-	Serial1 (  1 ) port default settings. See <a href="#">“Setting Up for POST” on page 7-2.</a>

**TABLE 6-4** Stop-N Equivalent Configuration Parameters (Continued)

Parameter	Stop-N Equivalent Value	Description
ttyb-mode	9600,8,n,1,-	Serial2 (  2) port default settings. See <a href="#">“Setting Up for POST” on page 7-2.</a>

### 6.4.2.2 Resetting the NVRAM Permanently

When the `ok` prompt is displayed, typing `set-defaults` discards any customized NVRAM values and permanently restores the default values for all NVRAM configuration parameters. See [TABLE 6-2](#) for NVRAM configuration parameter default values.

### 6.4.2.3 Workstation Power Cycling

Use one of the following two methods to perform a workstation power cycle by shutting down and immediately restarting the workstation:

■ **System reboot**

A system reboot shuts down any running applications and the operating system, then restarts the operating system. A system reboot does not take the workstation to a standby power state.

■ **Shutdown and Power On**

Powering off the workstation shuts down any running applications and the operating system, and takes the workstation to a standby (power-off) state. To restart the workstation, you must manually press the Power button, which initiates the boot process.

# Power-On Self-Test

---

This chapter describes the Sun Blade 1500 workstation power-on self-test (POST). Topics covered are:

- [“The post Command” on page 7-1](#)
- [“Setting Up for POST” on page 7-2](#)
- [“POST Output” on page 7-6](#)
- [“Analyzing POST Results” on page 7-18](#)

---

**Note** – Starting with OpenBoot PROM, version 4.16.0, POST is now initiated with the `post` command.

---

---

## 7.1 The post Command

The `post` command enables you to override NVRAM settings and execute POST on-demand with different diagnostic levels and output verbosity. For example:

```
ok post level verbosity
```

Where:

- *level* is min or max
- *verbosity* is min, normal, or max

If no diagnostic level or output verbosity is provided, then the `post` command uses the NVRAM settings of `diag-level` and `verbosity`. See [“Changing NVRAM Configuration Parameter Values” on page 6-1](#) for more information about these parameters.

# 7.1.1 Diagnostic Levels

TABLE 7-1 summarizes the tests performed at min and max diagnostic levels.

TABLE 7-1 Test Performed at min and max Diagnostic Levels

min Level	max Level
<ul style="list-style-type: none"><li>• Initialize critical CPU resources</li><li>• CPU tests</li><li>• CPU I<sup>2</sup>C tests</li><li>• CPU memory</li><li>• CPU pin checks</li><li>• Internal cache tests</li><li>• CPU memory scrub</li><li>• I/O bridge chip tests</li></ul>	Same as min level, but with an additional full memory tests.

# 7.1.2 Output Verbosity

TABLE 7-2 describes the output seen when output verbosity is set to min, normal, and max.

TABLE 7-2 Output Seen at min, normal, and max Output Verbosity

min Verbosity	normal Verbosity	max Verbosity
Only the following text is displayed: Executing Power On Self Test	<ul style="list-style-type: none"><li>• Build information is displayed</li><li>• Test groups are indicated</li></ul>	Each step of POST is identified

**Note** – The output of max verbosity is similar to the output seen of previous versions of POST.

Samples of POST output at different diagnostic levels and output verbositys are provided in “POST Output” on page 7-6.

# 7.2 Setting Up for POST

To execute POST and view its output, you must:



- “Verify the Baud Rate” on page 7-3
- “Disable Diagnostics and Auto Boot” on page 7-3
- “Obtain the ok Prompt” on page 7-4
- “Configure an External Display Device” on page 7-4
- “Run POST” on page 7-6

## 7.2.1 Verify the Baud Rate

Make sure the communication parameters are correct.

- From the `ok` prompt of the system to run POST, type:

```
ok setenv ttya-mode=9600,8,n,1,-
```

- Or, as superuser in a terminal window of the system to run POST, type:

```
# eeprom ttya-mode=9600,8,n,1,-
```

## 7.2.2 Disable Diagnostics and Auto Boot

Make sure that diagnostics are turned *off* and that the system *does not* auto boot.

- From the `ok` prompt of the system to run POST, type:

```
ok setenv diag-switch? false
```

and

```
ok setenv auto-boot? false
```

- Or, as superuser in a terminal window of the system to run POST, type:

```
# eeprom diag-switch?=false
```

and


```
# eeprom auto-boot?=false
```

# 7.2.3 Obtain the ok Prompt

- As superuser in a terminal window of the system to run POST, type:

# init 0

# 7.2.4 Configure an External Display Device

POST directs its output to the to  1 serial port of the system being tested. You can view this output by connecting a serial terminal or a second system running a TIP connection through a terminal window.

## 7.2.4.1 Serial Terminal

You can view POST output through any VT-100 RS-232 compatible serial terminal. The terminal connects to the Sun Blade 1500 workstation at the port labeled:

 1

This is a DB-9 F connector. Use a straight-through cable and connect to the serial terminal's DCE port. Configure the serial terminal to the communication parameters listed in [TABLE 7-3](#).

**TABLE 7-3** Serial Terminal Communication Parameters

Parameter	Value
Baud	9600
Data bits	8
Parity	None
Stop bits	1
Handshaking	None
Duplex	Full

If a DCE port is not available, then use a crossover cable as described in [FIGURE 7-1](#).

## 7.2.4.2 Second System

Instead of a serial terminal, you can use a second system running a TIP connection through a terminal window.

The second system must have a serial port capable of RS-232 communications. Use a crossover cable with the TIP connection.

FIGURE 7-1 shows the wiring for a crossover cable. If your system does not have a DB-9 F connector at its serial port, adapters are available from most computer supply stores or from your Sun Microsystems sales representative.

The following URL provides part numbers for adapters and other Sun cables:

[http://sunsolve.sun.com/handbook\\_pub/Devices/Cables/cables\\_ext\\_data.html](http://sunsolve.sun.com/handbook_pub/Devices/Cables/cables_ext_data.html)

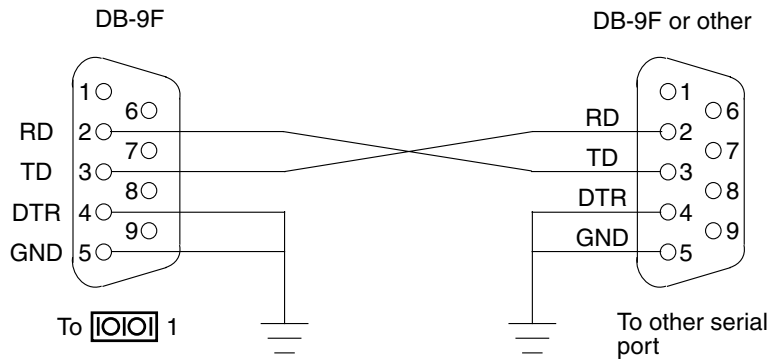


FIGURE 7-1 Crossover Cable Wiring Diagram

### 7.2.4.3 Make a TIP Connection

Making a TIP connection requires configuring the serial port of the second system and using the `tip` command. The following procedure configures for serial port A, or `/dev/ttya`.

1. As superuser of the second system, edit the `/etc/remote` file.
2. Replace the `hardwire` property with the following:

```
hardwire:\
:dv=/dev/term/a:br#9600:el=^C^S^Q^U^D:ie=%$:oe=^D:
```

3. Make sure the communication parameters are correct. Type:

```
# eeprom ttya-mode=9600,8,n,1,-
```

## 7.2.5 Run POST

1. Attach the crossover cable to the system being tested and then to the serial terminal or second system.
2. If you are using a second system, start the TIP connection. Type:

```
# tip hardware
```

3. Press the return key a couple of times to synchronize the handshaking between the two systems.

You should see the ok prompt.

4. Type the `post` command.

For example:

```
ok post min max
```

POST is run. See [“POST Output” on page 7-6](#) for examples of POST output.

---

**Note** – POST execution can be aborted by pressing the Ctrl-X keys of the serial terminal or second system. POST then returns control to the OpenBoot PROM.

---

---

## 7.3 POST Output

The contents of the POST output depends on the values of the diagnostic level and output verbosity. For the examples in this section, the Sun Blade 1500 workstation was configured with two 512 MB DIMMs.

---

**Note** – The `0>` that precedes the output text is the CPU identifier and indicates the output is from POST. If you do not see these characters, the output is from the OpenBoot PROM.

---

### 7.3.1 post min min

The following is the output of POST with min diagnostic level and min output verbosity. The duration of POST was 75 seconds.

```
ok post min min

Executing Power On Self Test

Configuring system memory & CPU(s)

Probing system devices
Probing memory
Probing I/O buses

Sun Blade 1500 (Silver), Keyboard present
Copyright 1998-2004 Sun Microsystems, Inc. All rights reserved.
OpenBoot 4.16.3, 1024 MB memory installed, Serial #53463596.
Ethernet address 0:3:ba:2f:ca:2c, Host ID: 832fca2c.
```

POST conducted the tests, however, no output was provided.

**Note** – The output beginning with “Configuring system mem...” indicates the actual end of POST and return of control to the OpenBoot PROM. This text is not provided in subsequent examples of POST output.

### 7.3.2 post min normal

The following is the output of POST with min diagnostic level and normal output verbosity. The duration of POST was 85 seconds. The left column of the table is the output. The right column is information detailing what is happening. If the POST output you see from your system does not match that in the left column, use the information in the right column to help diagnose the problem.

TABLE 7-4 post min normal Output Comparison

Output Displayed	What Is Happening
ok post min normal	POST is initiated.
Executing Power On Self Test	
0>@(#) Sun Blade[TM] 1500 POST 4.16.3 2004/11/05 19:58	POST build version and date is displayed.

**TABLE 7-4** post min normal Output Comparison (Continued)

Output Displayed	What Is Happening
/dat/fw/common-source/firmware_re/post/post-build-4.16.3/Fiesta/taco/integrated (firmware_re)	POST build path is displayed.
0>Copyright © 2004 Sun Microsystems, Inc. All rights reserved SUN PROPRIETARY/CONFIDENTIAL. Use is subject to license terms.	Copyright and license are displayed.
0>OBP->POST Call with %o0=00000800.01012000. 0>Diag level set to MIN. 0>Verbosity level set to NORMAL.	CPU0 is acknowledged and POST configuration is identified.
0>Start Selftest.....	Testing is started.
0>CPUs present in system: 0 0>Test CPU(s)....Done	CPU is identified and tested.
0>Interrupt Crosscall....Done	Interrupt handlers are set up and checked.
0>Init Memory....Done 0>PLL Reset....Done 0>Init Memory....Done 0>Test Memory....Done	Memory is initialized, phase locked loops (PLL) are reset, memory is reinitialized and tested.
0>IO-Bridge Tests....Done	I/O bridge is tested.
0>INFO: 0> POST Passed all devices. 0> 0>POST: Return to OBP.	POST has passed successfully and returns control to the OpenBoot PROM.

**Note** – The 0> that precedes the output text in the preceding and following examples is the CPU identifier. It indicates the output is from POST. If you do not see these characters, the output is from the OpenBoot PROM.

### 7.3.3 post min max

The following is the output of POST with min diagnostic level and max output verbosity. The duration of POST was 90 seconds. The left column of the table is the output. The right column is information detailing what is happening. If the POST output you see from your system does not match that in the left column, use the information in the right column to help diagnose the problem.

**TABLE 7-5** post min max Output Comparison

Output Displayed	What Is Happening
ok post min max	POST is initiated.

**TABLE 7-5** post min max Output Comparison (*Continued*)

Output Displayed	What Is Happening
@(#)OBP 4.16.3 2004/11/05 18:29 Sun Blade 1500 (Silver) Clearing TLBs Executing Power On Self Test	OpenBoot PROM resets the system and starts POST.
0>@(#) Sun Blade[TM] 1500 POST 4.16.3 2004/11/05 19:58	POST build version and date is displayed.
/dat/fw/common-source/firmware_re/post/post-build-4.16.3/Fiesta/taco/integrated (firmware_re)	POST build path is displayed.
0>Copyright © 2004 Sun Microsystems, Inc. All rights reserved SUN PROPRIETARY/CONFIDENTIAL. Use is subject to license terms.	Copyright and license displayed.
0>Soft Power-on RST thru SW 0>OBP->POST Call with %o0=00001000.01012000. 0>Diag level set to MIN. 0>Verbosity level set to MAX. 0>MFG scrpt mode set NORM 0>I/O port set to TTYA.	CPU0 is acknowledged and POST configuration is read from register.
0>Start Selftest..... 0>CPUs present in system: 0 0>Test CPU(s)..... 0>Init SB 0>Initialize I2C Controller 0>Init CPU 0>DMMU 0>DMMU TLB DATA RAM Access 0>DMMU TLB TAGS Access 0>IMMU Registers Access 0>IMMU TLB DATA RAM Access 0>IMMU TLB TAGS Access 0>Init mmu regs	CPU, I/O bridge, data memory management unit (DMMU), and instruction memory management unit (IMMU) are initialized.
0>Setup L2 Cache 0>L2 Cache Control = 00000000.00f04400 0>Size = 00000000.00100000... 0>Scrub and Setup L2 Cache	L2 cache is set up and scrubbed (data values set to defaults).
0>Setup and Enable DMMU 0>Setup DMMU Miss Handler	DMMU is set up.
0>Test Mailbox 0>Scrub Mailbox	Mailbox register is checked and initialized.
0>CPU Tick and Tick Compare Registers Test	Operation of TICK registers is verified.
0>CPU Stick and Stick Compare Registers Test	Operation of STICK registers is verified.
0>Set Timing	Motherboard timing is to be configured.
0> UltraSPARC[TM] IIIi, Version 3.4	CPU version is identified.

**TABLE 7-5** post min max Output Comparison (*Continued*)

Output Displayed	What Is Happening
0>Interrupt Crosscall..... 0>Setup Int Handlers	Interrupt handlers are set up.
0>MB: Part-Dash-Rev#: 3753187-01-Serial#:	Motherboard part number and serial number is read from FRU ID.
0>Set CPU/System Speed 0>CPU Config Jumper = 00000004	Jumpers for CPU and JBus frequency are read.
0>Init Memory.....	Memory is initialized
0>Probe Dimms	Presence of DIMMs is checked.
0>Init Mem Controller Regs	Memory controller registers are initialized.
0>Set JBUS config reg	JBus frequency register is set.
0>IO-Bridge unit 1 init test	I/O bridge chip is initialized.
0>Do PLL reset	Phase locked loop (PLL) is reset.
0>Setting timing to 10:1 12:1, system frequency 160 MHz, CPU frequency 1500 MHz	Reconfigured frequencies are displayed.
0>Soft Power-on RST thru SW	Soft reset.
0>PLL Reset..... 0>Init SB 0>Initialize I2C Controller 0>Init CPU 0>Init mmu regs 0>Setup L2 Cache 0>L2 Cache Control = 00000000.00f04400 0>Size = 00000000.00100000... 0>Setup and Enable DMMU 0>Setup DMMU Miss Handler 0>Scrub Mailbox	Initializations and setups are repeated.
0>Timing is 10:1 12:1, sys 160 MHz, CPU 1500 MHz, mem 133 MHz.	New timing ratios and frequencies are displayed.
0> UltraSPARC[TM] IIIi, Version 3.4 0>Init Memory..... 0>Probe Dimms 0>Init Mem Controller Sequence 0>IO-Bridge unit 1 init test	Repeated initialization continues.
0>Test Memory..... 0>Select Bank Config 0>Probe and Setup Memory 0>INFO: 1024MB Bank 0, Dimm Type X4 0>INFO: No memory detected in Bank 1 0>INFO: No memory detected in Bank 2 0>INFO: No memory detected in Bank 3	Memory is probed.



**TABLE 7-5** post min max Output Comparison (Continued)

Output Displayed	What Is Happening
0>Data Bitwalk on Master	CPU data pins are tested.
0>        Test Bank 0.	Where found, memory is tested.
0>Address Bitwalk on Master 0>Addr walk mem test on CPU 0 Bank 0: 00000000.00000000 to 00000000.40000000.	CPU address pins are tested.
0>Set Mailbox	Mailbox register is set.
0>Final mc1 is b0000026.3e781c61.	Memory control register 1 is set.
0>Setup Final DMMU Entries	Memory is allocated for POST.
0>Post Image Region Scrub	Allocated memory is set to defaults.
0>Run POST from Memory	POST is transferred to new memory and executed.
0>Verifying checksum on copied image. 0>The Memory's CHECKSUM value is 3f81. 0>The Memory's Content Size value is 68111. 0>Success... Checksum on Memory Validated.	Copied data is verified.
0>FPU Registers and Data Path 0>FPU Move Registers	Floating point unit (FPU) is checked.
0>FSR Read/Write	FPU status register is checked.
0>FPU Block Register Test	Additional FPU testing is performed.
0>Scrub Memory	Memory is set to zero.
0>Quick Block Mem Test 0>Quick Test 4194304 bytes at 00000000.00600000	A quick test of memory is made at a particular address.
0>Flush Caches	Caches are set to zero.
0>XBus SRAM	XBus buffer memory is checked.
0>IO-Bridge SouthBridge Remap Devs	I/O bridge and I/O subsystem probe for devices.
0>IO-Bridge Tests.....	I/O bridge is checked.
0>JBUS quick check 0>        to IO-bridge_1	JBus communication with I/O bridge is checked.
0>IO-Bridge unit 1 sram        test	32K scratch pad SRAM is checked.
0>IO-Bridge unit 1 reg        test	I/O bridge registers are checked.
0>IO-Bridge unit 1 mem        test	I/O bridge memory is checked.
0>IO-Bridge unit 1 PCI id       test	I/O bridge PCI buses are checked.

**TABLE 7-5**    post min max Output Comparison (Continued)

Output Displayed	What Is Happening
0>IO-Bridge unit 1 interrupt test	I/O bridge interrupts are checked.
0>Print Mem Config	Memory configuration is to be displayed.
0>Caches : Icache is ON, Dcache is ON, Wcache is ON, Pcache is ON.	Cache status is displayed.
0>Memory interleave set to 0 0>        Bank 0 1024MB : 00000000.00000000 -> 00000000.40000000.	4 megabyte portion of memory is scrubbed and tested.
0>INFO: 0>        POST Passed all devices. 0> 0>POST: Return to OBP.	POST has passed successfully and returns control to the OpenBoot PROM.

### 7.3.4    post max min

The following is the output of POST with max diagnostic level and min output verbosity. The duration of POST was 120 seconds.

```
ok post max min

Executing Power On Self Test
```

POST conducted the tests, however, no output was provided.

### 7.3.5    post max normal

The following is the output of POST with max diagnostic level and normal output verbosity. The duration of POST was 160 seconds. The left column of the table is the output. The right column is information detailing what is happening. If the POST output you see from your system does not match that in the left column, use the information in the right column to help diagnose the problem.

**TABLE 7-6**    post max normal Output Comparison

Output Displayed	What Is Happening
ok post max normal	POST is initiated.
Executing Power On Self Test	
0>@(#) Sun Blade[™] 1500 POST 4.16.3 2004/11/05 19:58	POST build version and date is displayed.

**TABLE 7-6** post max normal Output Comparison (*Continued*)

Output Displayed	What Is Happening
/dat/fw/common-source/firmware_re/post/post-build-4.16.3/Fiesta/taco/integrated (firmware_re)	POST build path is displayed.
0>Copyright © 2004 Sun Microsystems, Inc. All rights reserved SUN PROPRIETARY/CONFIDENTIAL. Use is subject to license terms.	Copyright and license are displayed.
0>OBP->POST Call with %o0=00000800.01012000. 0>Diag level set to MAX. 0>Verbosity level set to NORMAL.	CPU0 is acknowledged and POST configuration is identified.
0>Start Selftest.....	Testing is started.
0>CPUs present in system: 0 0>Test CPU(s)....Done	CPU is identified and tested.
0>Interrupt Crosscall....Done	Interrupt handlers are set up and checked.
0>Init Memory....Done 0>PLL Reset....Done 0>Init Memory....Done 0>Test Memory....Done	Memory is initialized, phase locked loops (PLL) are reset, memory is reinitialized and tested.
0>Test CPU Caches....Done	CPU caches are tested.
0>Functional CPU Tests....Done	CPU is tested.
0>IO-Bridge Tests....Done	I/O bridge is tested.
0>INFO: 0> POST Passed all devices. 0> 0>POST: Return to OBP.	POST has passed successfully and returns control to the OpenBoot PROM.

## 7.3.6 post max max

The following is the output of POST with max diagnostic level and max output verbosity. The duration of POST was 140 seconds. The left column is the output. The right column is information detailing what is happening. If the POST output you see from your system does not match that in the left column, use the information in the right column to help diagnose the problem.

**TABLE 7-7** post max max Output Comparison

Output Displayed	What Is Happening
ok post max max	POST is initiated.
@(#)OBP 4.16.3 2004/11/05 18:29 Sun Blade 1500 (Silver) Clearing TLBs Executing Power On Self Test	OpenBoot PROM resets the system and starts POST.

**TABLE 7-7** post max max Output Comparison (*Continued*)

Output Displayed	What Is Happening
0>@(#) Sun Blade[TM] 1500 POST 4.16.3 2004/11/05 19:58	POST build version and date is displayed.
/dat/fw/common-source/firmware_re/post/post-build-4.16.3/Fiesta/taco/integrated (firmware_re)	POST build path is displayed.
0>Copyright © 2004 Sun Microsystems, Inc. All rights reserved SUN PROPRIETARY/CONFIDENTIAL. Use is subject to license terms.	Copyright and license displayed.
0>Soft Power-on RST thru SW 0>OBP->POST Call with %o0=00001000.01014000. 0>Diag level set to MAX. 0>Verbosity level set to MAX. 0>MFG script mode set NORM 0>I/O port set to TTYA.	CPU0 is acknowledged and POST configuration is read from register.
0>Start Selftest..... 0>CPUs present in system: 0 0>Test CPU(s)..... 0>Init SB 0>Initialize I2C Controller 0>Init CPU 0>DMMU 0>DMMU TLB DATA RAM Access 0>DMMU TLB TAGS Access 0>IMMU Registers Access 0>IMMU TLB DATA RAM Access 0>IMMU TLB TAGS Access 0>Init mmu regs	CPU, I/O bridge, data memory management unit (DMMU), and instruction memory management unit (IMMU) are initialized.
0>Setup L2 Cache 0>L2 Cache Control = 00000000.00f04400 0>Size = 00000000.00100000... 0>L2 Cache Tags Test 0>Scrub and Setup L2 Cache	L2 cache is set up and scrubbed (data values set to defaults).
0>Setup and Enable DMMU 0>Setup DMMU Miss Handler	DMMU is set up.
0>Test Mailbox 0>Scrub Mailbox	Mailbox register is checked and initialized.
0>CPU Tick and Tick Compare Registers Test	Operation of TICK registers is verified.
0>CPU Stick and Stick Compare Registers Test	Operation of STICK registers is verified.
0>Set Timing	Motherboard timing is to be configured.
0>UltraSPARC[TM] IIIi, Version 3.4	CPU version is identified.
0>Interrupt Crosscall..... 0>Setup Int Handlers	Interrupt handlers are set up.

**TABLE 7-7** post max max Output Comparison (Continued)

Output Displayed	What Is Happening
0>MB: Part-Dash-Rev#: 3753187-01-Serial#:	Motherboard part number and serial number is read from FRU ID.
0>CPU0 DIMM 0: 0>Part#: M3 12L6420ETS-CA2 Serial#: 4505079a Date Code: 0347 Rev#: 5345 0>CPU0 DIMM 1: 0>Part#: M3 12L6420ETS-CA2 Serial#: 45040799 Date Code: 0347 Rev#: 5345	DIMM part numbers, serial numbers, date codes, and revisions are read from FRU IDs.
0>Set CPU/System Speed 0>CPU Config Jumper = 00000004	Jumpers for CPU and JBus frequency are read.
0>Init Memory.....	Memory is initialized
0>Probe Dimms	Presence of DIMMs is checked.
0>Init Mem Controller Regs	Memory controller registers are initialized.
0>Set JBUS config reg	JBus frequency register is set.
0>IO-Bridge unit 1 init test	I/O bridge chip is initialized.
0>Do PLL reset	Phase locked loop (PLL) is reset.
0>Setting timing to 10:1 12:1, system frequency 160 MHz, CPU frequency 1500 MHz	Reconfigured frequencies are displayed.
0>Soft Power-on RST thru SW	Soft reset.
0>PLL Reset..... 0>Init SB 0>Initialize I2C Controller 0>Init CPU 0>Init mmu regs 0>Setup L2 Cache 0>L2 Cache Control = 00000000.00f04400 0> Size = 00000000.00100000... 0>Setup and Enable DMMU 0>Setup DMMU Miss Handler 0>Scrub Mailbox	Initializations and set ups are repeated.
0>Timing is 10:1 12:1, sys 160 MHz, CPU 1500 MHz, mem 133 MHz.	New timing ratios and frequencies are displayed.
0> UltraSPARC[TM] IIIi, Version 3.3 0>Init Memory..... 0>Probe Dimms 0>Init Mem Controller Sequence 0>IO-Bridge unit 1 init test	Repeated initialization continues.

**TABLE 7-7** post max max Output Comparison (*Continued*)

Output Displayed	What Is Happening
0>Test Memory..... 0>Select Bank Config 0>Probe and Setup Memory 0>INFO: 1024MB Bank 0, Dimm Type X4 0>INFO: No memory detected in Bank 1 0>INFO: No memory detected in Bank 2 0>INFO: No memory detected in Bank 3	Memory is probed.
0>Data Bitwalk on Master	CPU data pins are tested.
0>          Test Bank 0.	Where found, memory is tested.
0>Address Bitwalk on Master 0>Addr walk mem test on CPU 0 Bank 0: 00000000.00000000 to 00000000.40000000.	CPU address pins are tested.
0>Set Mailbox	Mailbox register is set.
0>Final mc1 is 10000006.3e581c61.	Memory control register1 is set.
0>Setup Final DMMU Entries	Memory is allocated for POST.
0>Post Image Region Scrub	Allocated memory is set to defaults.
0>Run POST from Memory	POST is transferred to new memory and executed.
0>Verifying checksum on copied image. 0>The Memory's CHECKSUM value is 3f81. 0>The Memory's Content Size value is 68111. 0>Success... Checksum on Memory Validated.	Copied data is verified.
0>Test CPU Caches.....	CPU caches are tested.
0>I-Cache RAM Test 0>I-Cache Tag RAM 0>I-Cache Valid/Predict TAGS Test 0>I-Cache Snoop Tag Field 0>I-Cache Branch Predict Array Test	Instruction cache is tested.
0>Branch Prediction Initialization 0>D-Cache RAM 0>D-Cache Tags 0>D-Cache Micro Tags 0>D-Cache SnoopTags Test 0>W-Cache RAM 0>W-Cache Tags 0>W-Cache Valid bit Test 0>W-Cache Bank valid bit Test 0>W-Cache SnoopTAGS Test	Data and write caches are tested.
0>P-Cache RAM 0>P-Cache Tags 0>P-Cache SnoopTags Test 0>P-Cache Status Data Test	Prefetch cache is tested.

**TABLE 7-7** post max max Output Comparison (*Continued*)

Output Displayed	What Is Happening
0>8k DMMU TLB 0 Data 0>8k DMMU TLB 1 Data 0>8k DMMU TLB 0 Tags 0>8k DMMU TLB 1 Tags 0>8k IMMU TLB Data 0>8k IMMU TLB Tags	Translation look-aside buffers (TLB) are tested for data and instruction buffers.
0>FPU Registers and Data Path 0>FPU Move Registers	Floating point unit (FPU) is checked.
0>FSR Read/Write	FPU status register is checked.
0>FPU Block Register Test 0>FPU Branch Instructions 0>FPU Functional Test	Additional FPU testing is performed.
0>Scrub Memory	Memory is set to zero.
0>Flush Caches	Caches are set to zero.
0>Functional CPU Tests.....	CPU is checked.
0>XBus SRAM	XBus buffer memory is checked.
0>IO-Bridge SouthBridge Remap Devs	I/O bridge and I/O subsystem probe for devices.
0>IO-Bridge Tests.....	I/O bridge is checked.
0>JBUS quick check 0>          to IO-bridge_1	JBus communication with I/O bridge is checked.
0>IO-Bridge unit 1 sram          test	32K scratch pad SRAM is checked.
0>IO-Bridge unit 1 reg          test	I/O bridge registers are checked.
0>IO-Bridge unit 1 mem          test	I/O bridge memory is checked.
0>IO-Bridge unit 1 PCI id      test	I/O bridge PCI buses are checked.
0>IO-Bridge unit 1 interrupt test	I/O bridge interrupts are checked.
0>Print Mem Config	Memory configuration is to be displayed.
0>Caches : Icache is ON, Dcache is ON, Wcache is ON, Pcache is ON.	Cache status is displayed.
0>Memory interleave set to 0 0>      Bank 0 1024MB : 00000000.00000000 -> 00000000.40000000.	4 megabyte portion of memory is scrubbed and tested.
0>Block Memory	Memory is checked again.

**TABLE 7-7** post max max Output Comparison (Continued)

Output Displayed	What Is Happening
0>Test 1067450368 bytes on bank 0.... 0>0% Done... 0>2% Done... 0>3% Done... 0>4% Done... ... 0>97% Done... 0>98% Done... 0>99% Done...	Memory is checked in bank0.
0>INFO: 0> POST Passed all devices. 0> 0>POST: Return to OBP.	POST has passed successfully and returns control to the OpenBoot PROM.

## 7.4 Analyzing POST Results

POST has three categories of messages:

- [“Error Messages” on page 7-18](#)
- [“Warning Messages” on page 7-20](#)
- [“Info Messages” on page 7-20](#)

### 7.4.1 Error Messages

When an error occurs during POST, an error message is displayed. The error message is bounded by the text `ERROR` and `END_ERROR`. Several error messages might be displayed at different times of the POST process for any single error condition.

The following error examples were caused by a defective 1 GB DIMM in the slot labeled DIMM0. The first error message occurred when the DIMMs were probed:

```
0>ERROR: TEST = Probe and Setup Memory
0>H/W under test = CPU0 Memory
0>Repair Instructions: Replace items in order listed by 'H/W under
test' above
0>MSG = ERROR:  miscompare on mem test!
                  Address: 00000000.00000000
                  Expected: a5a5a5a5.a5a5a5a5
                  Observed: a5a6a5a5.a5a5a5a5

0>END_ERROR
```



At address 00000000.00000000, there was a test pattern mis-match. A string of a5a6a5a5 was observed when a string of a5a5a5a5 was expected.

The second error message identified where the fault was located:

```
0>ERROR: TEST = Probe and Setup Memory
0>H/W under test = CPU0: Bank 0  DIMM0 side 0, Motherboard
0>Repair Instructions: Replace items in order listed by 'H/W under
test' above
0>MSG = Pin 72 failed on CPU0: Bank 0  DIMM0 side 0, Motherboard
0>END_ERROR
```

The DIMM in slot DIMM0 was at fault. Several other error messages were displayed, and a summary was provided:

```
0>ERROR:
0>      POST toplevel status has the following failures:
0>          CPU0: Bank 0  DIMM0 side 0, Motherboard
0>          CPU0: Bank 1  DIMM0 side 1, Motherboard
0>END_ERROR
```

The DIMM in slot DIMM0 should be replaced. Because memory works in pairs, POST disables both slots DIMM0 and DIMM1. POST returns system status and control back to the OpenBoot PROM which then displays messages regarding the results of POST. For example:

```
Power On Selftest Failed.
  CPU: 0 cause: CPU0: Bank 0  DIMM0 side 0, Motherboard
ERROR: CPU0 has 2048/4096MB of memory disabled

ERROR: POST failed
```

Because of the error, two DIMM slots have been disabled (bank0), so only half of the original memory (2048/4096MB) is available for use.

---

**Note** – If only two DIMMs were installed and this set of errors occurred, the system would have beeped 3 times and powered off.

---

## 7.4.2 Warning Messages

Warning messages have a structure similar to error messages, however the messages are bounded by the text `WARNING` and `END_WARNING`. Warning messages do not contain a Repair Instructions line.

The following warning message example indicates that there is a DIMM size mismatch in slots `DIMM0` and `DIMM1`:

```
0>WARNING: TEST = Probe and Setup Memory
0>H/W under test = CPU0 Memory
0>MSG = DIMM size does not match for dimm set 0, Dimm0=
00000000.40000000, Dimm1=00000000.20000000
0>END_WARNING
```

`DIMM0` is a 1 GB DIMM and `DIMM1` is a 512 MB DIMM.

## 7.4.3 Info Messages

Info messages are simple and are only preceded by the text, `INFO`. Info messages provide non-critical facts, as seen in this example:

```
0>Probe and Setup Memory
0>INFO: 1024MB Bank 0, Dimm Type X4
0>INFO: 1024MB Bank 1, Dimm Type X4
0>INFO: 1024MB Bank 2, Dimm Type X4
0>INFO: 1024MB Bank 3, Dimm Type X4
```

These info messages indicate that a 1 GB DIMM is installed into each DIMM slot.

# OpenBoot PROM

---

This chapter discusses troubleshooting the Sun Blade 1500 workstation using the OpenBoot PROM firmware. Topics covered are:

- [“OpenBoot PROM Utilities” on page 8-1](#)
- [“OpenBoot Diagnostics” on page 8-5](#)

---

## 8.1 OpenBoot PROM Utilities

In an idle state, OpenBoot PROM can provide information from basic utilities:

- [“show-devs Utility” on page 8-2](#)
- [“watch-net Utility” on page 8-2](#)
- [“probe-ide Utility” on page 8-3](#)
- [“banner Utility” on page 8-3](#)
- [“watch-clock Utility” on page 8-4](#)
- [“date Utility” on page 8-4](#)
- [“.version Utility” on page 8-4](#)

## 8.1.1 show-devs Utility

The show-devs utility displays the devices installed in the Sun Blade 1500 workstation recognized by the OpenBoot PROM. For example:

```
ok show-devs
/i2c@1f,464000
/pci@1f,700000
/ppm@1e,0
/pci@1e,600000
/memory-controller@0,0
/SUNW,UltraSPARC-IIIi@0,0
. . .
/packages/kbd-translator
/packages/dropins
/packages/terminal-emulator
/packages/disk-label
/packages/deblocker
/packages/SUNW,builtin-drivers
```

If an installed device is missing from the list, check slot or cable connections of the suspect device.

## 8.1.2 watch-net Utility

The watch-net utility displays packet activity on the primary network connection. For example:

```
ok watch-net
100 Mbps FDX Link up
Looking for Ethernet Packets.
'.' is a Good Packet. 'X' is a Bad Packet.
Type any key to stop.
.....
```

- If no periods (.) are displayed, then no network activity is detected. Check the Ethernet cable.
- If Xs are displayed, then the network connection has too many collisions or packets are being corrupted or dropped. Check the overall network status.

### 8.1.3 probe-ide Utility

The `probe-ide` utility displays the manufacturer and model of devices attached to the IDE buses. For example:

```
ok probe-ide
Device 0   ( Primary Master )
           ATA Model: ST3120026A

Device 1   ( Primary Slave )
           Not Present

Device 2   ( Secondary Master )
           Removable ATAPI Model: LITE-ON COMBO SOHC-4832K

Device 3   ( Secondary Slave )
           Not Present
```

If no information regarding an installed device is displayed, check the cable connections inside of the Sun Blade 1500 chassis.

### 8.1.4 banner Utility

The `banner` utility displays the banner seen during system startup. The banner includes:

- System model
- Firmware version
- Installed memory
- Serial number
- Ethernet address
- Host ID

For example:

```
ok banner
Sun Blade 1500 (Silver), Keyboard present
Copyright 1998-2004 Sun Microsystems, Inc. All rights reserved.
OpenBoot 4.16.3, 1024 MB memory installed, Serial #53463596.
Ethernet address 0:3:ba:2f:ca:2c, Host ID: 832fca2c
```

If the banner displays information that is suspect, there might be a problem with the memory, NVRAM, or the motherboard flash PROM.

## 8.1.5 watch-clock Utility

The `watch-clock` utility displays a seconds counter updated in one second intervals. For example:

```
ok watch-clock
Watching the 'seconds' register of the real time clock chip.
It should be 'ticking' once a second.
Type any key to stop.
14
```

If the seconds values do not change, or are longer or shorter than one second in duration, there is a problem with the real-time clock chip on the motherboard.

## 8.1.6 date Utility

The `date` utility displays the current date and time stored in the real-time clock. For example:

```
ok date
02/27/2000 21:32:20 GMT
```

If the real-time clock loses accuracy or the date or time is incorrect after a power cycle, replace the battery.

## 8.1.7 .version Utility

The `.version` utility displays the software version of:

- OpenBoot PROM
- OpenBoot Diagnostics
- POST

For example:

```
ok .version
Release 4.16.3   created 2004/11/05 18:29
OBP 4.16.3 2004/11/05 18:29 Sun Blade 1500 (Silver)
OBDIAG 4.16.3 2004/11/05 18:31
POST 4.16.3 2004/11/05 19:58
```

---

## 8.2 OpenBoot Diagnostics

Within the OpenBoot PROM software is a suite of tests which can help you diagnose problems with the motherboard components and system interfaces to peripherals. The OpenBoot Diagnostics tests are generalized and function at a low level. They help you narrow down a problem to a specific component.

### 8.2.1 Starting OpenBoot Diagnostics

OpenBoot Diagnostics is started either from the console of the system under test or remotely through an external display device. To run OpenBoot Diagnostics remotely, see [“Configure an External Display Device” on page 7-4](#). An advantage of running OpenBoot Diagnostics through a TTP connection is that long output can be scrolled and saved.

**1. Obtain the ok prompt.**

See [“Obtaining the ok Prompt for Testing” on page 5-2](#).

**2. Set the auto-boot? property to false. Type:**

```
ok setenv auto-boot? false
```

**3. Reset the system. Type:**

```
ok reset-all
```

The system restarts and the ok prompt is displayed again.

**4. Set the diag-switch? property to true. Type:**

```
ok setenv diag-switch? true
```

**5. Start OpenBoot Diagnostics, type:**

```
ok obdiag
```

## 8.2.2 obdiag Menu

Once started, OpenBoot Diagnostics polls the system for device nodes. If a PCI card component is IEEE 1275 compliant, then its connection can be tested. If the device has a self-test, its function can be verified. When the poll is finished, OpenBoot Diagnostics lists a menu of the test that can be executed. For example:

```
o b d i a g

1 SUNW,XVR-600@3      2 card-reader@0,40    3 flashprom@2,0
4 i2c@0,320           5 ide@d              6 network@2
7 parallel@0,378      8 pmu@6              9 rtc@0,70
10 serial@0,2e8       11 serial@0,3f8      12 sound@8
13 usb@a              14 usb@b

Commands: test test-all except help what setenv set-default exit

diag-passes=1 diag-level=max test-args=verbose,subtests

obdiag>
```

The diagnostics displayed are dynamic in that if a device node is not recognized, it is not listed in the menu. For example: if the Sun XVR-600 graphics accelerator were removed from the system, its test would not be available, and all remaining tests would shift location and drop a digit. For example:

```
o b d i a g

1 card-reader@0,40    2 flashprom@2,0      3 i2c@0,320
4 ide@d              5 network@2          6 parallel@0,378
7 pmu@6              8 rtc@0,70           9 serial@0,2e8
10 serial@0,3f8      11 sound@8           12 usb@a
13 usb@b

Commands: test test-all except help what setenv set-default exit

diag-passes=1 diag-level=max test-args=verbose,subtests
```



## 8.2.3 Configuring OpenBoot Diagnostics

OpenBoot Diagnostics is configurable, and for the simplest testing, follow this procedure.

1. At the `obdiag` prompt, set the diagnostic passes to 1. Type:

```
obdiag> setenv diag-passes 1
```

2. Set the diagnostic level to maximum. Type:

```
obdiag> setenv diag-level max
```

3. Set the diagnostics to be verbose and display subtest names during test execution. Type:

```
obdiag> setenv test-args verbose,subtests
```

These settings are stored in the NVRAM `test-args` parameter and survive power cycling.

---

**Note** – The `help` command provides additional information for configuring OpenBoot Diagnostics.

---

## 8.2.4 Initiating a Test

Select a test by typing `test` and the diagnostic's corresponding number listed in the menu and press Return. Using the previous examples:

```
obdiag> test 5
```

This initiates the diagnostics of the IDE interface.

## 8.2.5 Test Output

When OpenBoot Diagnostics runs a test, output is displayed.

The following is a successful pmu@6 test.

```
obdiag> test 8
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/pmu@6
Subtest pmu-reg-test
Selftest at /pci@1e,600000/pmu@6 ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:0
```

If a test detects an error, an error message is displayed. The following is an example of a flashprom@2,0 test error.

```
ERROR   : There is no POST in this FLASHROM or POST header is unrecognized
DEVICE  : /pci@1e,600000/isa@7/flashprom@2,0
SUBTEST : selftest:crc-subtest
MACHINE : Sun Blade 1500 (Silver)
SERIAL#  : 51221819
DATE    : 11/03/2004 00:21:40 GMT
CONTROLS: diag-level=max test-args=loopback,debug

Error: /pci@1e,600000/isa@7/flashprom@2,0 selftest failed, return code = 1
Selftest at /pci@1e,600000/isa@7/flashprom@2,0 (errors=1) ..... failed
Pass:1 (of 1) Errors:1 (of 1) Tests Failed:1 Elapsed Time: 0:0:0:1
```

In this situation, the binary code that identifies POST was corrupted in the motherboard flash PROM. The motherboard was replaced.

## 8.2.6 OpenBoot Diagnostics Tests

The OpenBoot PROM for the Sun Blade 1500 workstation can perform the following diagnostic tests:

- “SUNW,XVR-600@3 Test” on page 8-11
- “card-reader@0,40 Test” on page 8-11
- “flashprom@2,0 Test” on page 8-12
- “i2c@0,320 Test” on page 8-13
- “ide@d Test” on page 8-14
- “network@2 Test” on page 8-14
- “parallel@0,378 Test” on page 8-17
- “pmu@6 Test” on page 8-17
- “rtc@0,70 Test” on page 8-18
- “serial@0,2e8 Test” on page 8-18
- “serial@0,3f8 Test” on page 8-18
- “sound@8 Test” on page 8-19

- [“usb@a Test” on page 8-20](#)
- [“usb@b Test” on page 8-21](#)

The [TABLE 8-1](#) lists each OpenBoot Diagnostics test, its purpose, and what an error in the test result might mean.

**TABLE 8-1** OpenBoot Diagnostics Test Usage

OpenBoot Diagnostics Test	Purpose	What Error Results Might Mean and What to Do
SUNW, XVR-600@3 SUNW, XVR-100@3 SUNW, XVR-1200@3	Tests the display and memory of the respective graphics accelerator.	Graphics accelerator not properly seated into PCI slot or graphics memory is bad. Reseat the graphics accelerator in the PCI slot or replace it. See <a href="#">“PCI Card Problem” on page 4-28</a> or <a href="#">“Replacing the PCI Cards” on page 11-28</a> .
card-reader@0, 40	Checks for the presence of the smart card reader.	Problem with the smart card reader, smart card reader cable, or I <sup>2</sup> C chip on motherboard. See <a href="#">“Smart Card Reader Problem” on page 4-32</a> or <a href="#">“Motherboard Problem” on page 4-34</a> .
flashprom@2, 0	Checks headers and checksums.	Problem with flash PROM on motherboard. Check the motherboard and replace if necessary. See <a href="#">“Motherboard Problem” on page 4-34</a> .
i2c@0, 320	Checks for the presence of the I <sup>2</sup> C devices and memory PROMs.	Problem on the I <sup>2</sup> C bus or controller, motherboard SEEPROM, DIMM SEEPROM or motherboard clock generator. Check the DIMM memory or the motherboard. See <a href="#">“Memory Problem” on page 4-37</a> or <a href="#">“Motherboard Problem” on page 4-34</a> .
ide@d	Checks the IDE controller and provides the identity of devices attached to the IDE bus.	Problem with hard drive, optical drive, IDE cables, or I/O subsystem chip. See <a href="#">“Hard Drive Problem” on page 4-8</a> or <a href="#">“Optical Drive Problem” on page 4-25</a> or <a href="#">“Motherboard Problem” on page 4-34</a> .
network@2	Tests the network controller chip.	Problem with network or Gigabit Ethernet controller on motherboard. See <a href="#">“Network Problem” on page 4-17</a> or <a href="#">“Motherboard Problem” on page 4-34</a> .
parallel@0, 378	Tests the parallel port.	Problem with parallel port connector or I/O subsystem chip. Check the motherboard. See <a href="#">“Motherboard Problem” on page 4-34</a> .
pmu@6	Checks for the presence of the power management unit.	Problem with the power management unit. Check the motherboard. See <a href="#">“Motherboard Problem” on page 4-34</a> .
rtc@0, 70	Tests the real-time clock.	Problem with the battery or the M5819 chip. Check the battery or motherboard. See <a href="#">“Battery Problem” on page 4-40</a> or <a href="#">“Motherboard Problem” on page 4-34</a> .

**TABLE 8-1** OpenBoot Diagnostics Test Usage (*Continued*)

OpenBoot Diagnostics Test	Purpose	What Error Results Might Mean and What to Do
serial@0,2e8 serial@0,3f8	Tests the secondary or primary serial port at different baud rates.	Problem with the item connected to the serial port or I/O subsystem chip. If not the item, check the motherboard. See <a href="#">“Motherboard Problem” on page 4-34</a> .
sound@8	Tests the audio controller and the CODEC chip.	Problem with item attached to the audio ports, the I/O subsystem chip, the CODEC chip, speaker, or speaker cable. If not item, check the audio and motherboard. See <a href="#">“Audio Output Problem” on page 4-12</a> or <a href="#">“Motherboard Problem” on page 4-34</a> .
usb@a	Tests the first USB controller.	Problem with the item attached to the front USB ports. Audio/USB board not making good connection to the motherboard or I/O subsystem chip. If not item, check cable, audio/USB board, and motherboard. See <a href="#">“USB Problem” on page 4-10</a> or <a href="#">“Motherboard Problem” on page 4-34</a> .
usb@b	Tests the second USB controller.	Problem with item attached to the rear USB ports or I/O subsystem chip. If not item, check motherboard. See <a href="#">“Motherboard Problem” on page 4-34</a> .

### 8.2.6.1 SUNW, XVR-600@3 Test

The following is an example of a successful SUNW, XVR-600@3 test:

```
obdiag> test 1
Hit the spacebar to interrupt testing
Testing /pci@1f,700000/SUNW,XVR-600@3

Starting XV-600 Selftest
(This will take an estimated
 2-4 minutes for the full test)

Direct access framebuffer test:
  address test ovl0 pass
  address test ovl1 pass
  pattern test ovl0 00 ff a5 5a pass
  pattern test ovl1 00 ff a5 5a pass
passed

Frame buffer color test:
  The frame buffer will be painted with:
    red in the top third
    green in the middle third
    blue in the bottom third.

Direct Burst memory test:
  address test db mem pass
  pattern test db mem 00 ff a5 5a pass
Selftest at /pci@1f,700000/SUNW,XVR-600@3 ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:20
```

### 8.2.6.2 card-reader@0,40 Test

The following is an example of a successful card-reader@0,40 test:

```
obdiag> test 2
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/pmu@6/i2c@0,0/card-reader@0,40
>> Smartcard Reader is attached
Selftest at /pci@1e,600000/pmu@6/i2c@0,0/card-reader@0,40 ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:0
```

### 8.2.6.3 flashprom@2,0 Test

The following is an example of a successful flashprom@2,0 test:

```
obdiag> test 3
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/isa@7/flashprom@2,0
Subtest crc-subtest
>> Verifying OBP header
>> Verifying POST header
>> Calculating CRC-32 and checksum of the flashprom
>> Flashprom CRC-32    : 99b12afd
>> Flashprom checksum : 7365a8a
Selftest at /pci@1e,600000/isa@7/flashprom@2,0 ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:1
```

## 8.2.6.4 i2c@0,320 Test

The following is an example of a successful i2c@0,320 test:

```
obdiag> test 4
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/isa@7/i2c@0,320
Testing /pci@1e,600000/isa@7/i2c@0,320/hardware-monitor@0,5c
>> Manufacturer's ID: 0x41
>> Device ID: 0x31
>> Configuration Register 1: 0x91
>> Configuration Register 2: 0x7f
>> Fan 1 Pulswidth Modulated output Enabled
>> Fan 2 Pulswidth Modulated output Enabled
>> Tach 1 input Enabled
>> Tach 2 input Enabled
>> Interrupts on Local Temperature Channel Enabled
>> Interrupts on Remote 1 Channel Enabled
>> Interrupts on Remote 2 Channel Enabled
> Checking for fan1 fault in Auto mode
> Setting ADM1031 to Manual mode while checking for fan1 fault
> Restoring ADM1031 to Automatic Speed Ctrl mode.
> Restoring Config Reg 1 to 0x91
> Restoring Fan Speed Config Reg to 0x23
> Checking for fan2 fault in Auto mode
> Setting ADM1031 to Manual mode while checking for fan2 fault
> Restoring ADM1031 to Automatic Speed Ctrl mode.
> Restoring Config Reg 1 to 0x91
> Restoring Fan Speed Config Reg to 0x23
Testing /pci@1e,600000/isa@7/i2c@0,320/motherboard-fru-prom@0,a8
Testing /pci@1e,600000/isa@7/i2c@0,320/dimm-spd@0,a0
Testing /pci@1e,600000/isa@7/i2c@0,320/dimm-spd@0,a2
Testing /pci@1e,600000/isa@7/i2c@0,320/clock-generator@0,d2
Selftest at /pci@1e,600000/isa@7/i2c@0,320 ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:5
```

## 8.2.6.5 ide@d Test

The following is an example of a successful ide@d test:

```
obdiag> test 5
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/ide@d
>> Primary interface selected.
Subtest pci-config-reg-tests
Subtest pci-config-reg-tests:vendor-id-test
Subtest pci-config-reg-tests:device-id-test
Subtest pci-config-reg-tests:status-reg-test
Subtest pci-config-reg-tests:rom-expansion-test
>> Primary interface selected.
Subtest pri-cmd-blk-reg-test4
>> Testing IDE Command register
>> Make sure IDE device is attached
Subtest reset&check-diag
>> Checking device reset capability
Subtest identify-ata
>> Checking that an ATA device is attached.
>> ATA disk responds to Identify Device Command
    ATA Model: ST3120026A
>> Secondary interface selected.
Subtest sec-cmd-blk-reg-test4
>> Testing Secondary IDE Command register
>> Make sure IDE device is attached
Subtest reset&check-diag
>> Checking device reset capability
Subtest identify-atapi
>> Checking that an ATAPI device is attached.
>> ATAPI device responds to Identify Packet Device Command
    >> Removable ATAPI Model: LITE-ON COMBO SOHC-4832K
Selftest at /pci@1e,600000/ide@d ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:1
```

## 8.2.6.6 network@2 Test

The following is an example of a successful network@2 test:

```
obdiag> test 6
Hit the spacebar to interrupt testing
Testing /pci@1f,700000/network@2
Subtest reset-tests
Subtest reset-tests:mac-global-reset-test
Subtest reset-tests:tx-risc-reset-test
```



```

Subtest reset-tests:rx-risc-reset-test
Subtest reg-tests
Subtest reg-tests:pci-config-regs-test
Subtest reg-tests:mbox-regs-test
Subtest reg-tests:mbox-regs-test:bcm-mbox-int-mbox0-test
Subtest reg-tests:mbox-regs-test:bcm-mbox-gen-mbox1-test
Subtest reg-tests:mbox-regs-test:bcm-mbox-reload-stat-mbox-test
Subtest reg-tests:mbox-regs-test:bcm-mbox-rx-bd-rr1-cidx-test
Subtest reg-tests:mbox-regs-test:bcm-mbox-tx-bd-r1-nic-pidx-test
Subtest reg-tests:mac-regs-test
Subtest reg-tests:mac-regs-test:bcm-mac-mode-test
Subtest reg-tests:mac-regs-test:bcm-mac-event-en-test
Subtest reg-tests:mac-regs-test:bcm-mac-led-test
Subtest reg-tests:mac-regs-test:bcm-mac-addr-hil-test
Subtest reg-tests:mac-regs-test:bcm-mac-addr-lol-test
Subtest reg-tests:mac-regs-test:bcm-mac-wol-pat-ptr-test
Subtest reg-tests:mac-regs-test:bcm-mac-rx-mtu-size-test
Subtest reg-tests:mac-regs-test:bcm-mac-gbit-pcs-test-test
Subtest reg-tests:mac-regs-test:bcm-mac-tx-auto-nego-test
Subtest reg-tests:mac-regs-test:bcm-mac-rx-auto-nego-test
Subtest reg-tests:mac-regs-test:bcm-mac-mi-comm-test
Subtest reg-tests:mac-regs-test:bcm-mac-mi-mode-test
Subtest reg-tests:mac-regs-test:bcm-mac-tx-mode-test
Subtest reg-tests:mac-regs-test:bcm-mac-rx-mode-test
Subtest reg-tests:mac-regs-test:bcm-mac-hash-reg0-test
Subtest reg-tests:mac-regs-test:bcm-mac-rx-bd-rules-cntl0-test
Subtest reg-tests:tx-regs-test
Subtest reg-tests:tx-regs-test:bcm-tdi-mode-test
Subtest reg-tests:tx-regs-test:bcm-tdi-statistics-cntl-test
Subtest reg-tests:tx-regs-test:bcm-tdc-mode-test
Subtest reg-tests:tx-regs-test:bcm-tbdrs-mode-test
Subtest reg-tests:tx-regs-test:bcm-tbdi-mode-test
Subtest reg-tests:tx-regs-test:bcm-tbdc-mode-test
Subtest reg-tests:rx-regs-test
Subtest reg-tests:rx-regs-test:bcm-rlp-mode-test
Subtest reg-tests:rx-regs-test:bcm-rlp-rsl-lock-test
Subtest reg-tests:rx-regs-test:bcm-rlp-cfg-test
Subtest reg-tests:rx-regs-test:bcm-rlp-statistics-cntl-test
Subtest reg-tests:rx-regs-test:bcm-rlp-statistics-en-msk-test
Subtest reg-tests:rx-regs-test:bcm-rlp-rsl1-head-test
Subtest reg-tests:rx-regs-test:bcm-rlp-rsl1-cnt-test
Subtest reg-tests:rx-regs-test:bcm-rdrbdi-mode-test
Subtest reg-tests:rx-regs-test:bcm-rdc-mode-test
Subtest reg-tests:rx-regs-test:bcm-rbdi-mode-test
Subtest reg-tests:rx-regs-test:bcm-rbdc-mode-test
Subtest reg-tests:rx-regs-test:bcm-rls-mode-test
Subtest reg-tests:mcf-regs-test
Subtest reg-tests:mcf-regs-test:bcm-mcf-mode-test
Subtest reg-tests:hc-regs-test

```

```

Subtest reg-tests:hc-regs-test:bcm-hc-mode-test
Subtest reg-tests:hc-regs-test:bcm-hc-rx-coalescing-ticks-test
Subtest reg-tests:hc-regs-test:bcm-hc-tx-coalescing-ticks-test
Subtest reg-tests:ma-regs-test
Subtest reg-tests:ma-regs-test:bcm-ma-mode-test
Subtest reg-tests:ma-regs-test:bcm-ma-trap-addr-lo-test
Subtest reg-tests:ma-regs-test:bcm-ma-trap-addr-hi-test
Subtest reg-tests:bm-regs-test
Subtest reg-tests:bm-regs-test:bcm-bm-mode-test
Subtest reg-tests:bm-regs-test:bcm-bm-pool-ba-test
Subtest reg-tests:bm-regs-test:bcm-bm-rdma-lo-water-mrk-test
Subtest reg-tests:bm-regs-test:bcm-bm-rx-risc-req-test
Subtest reg-tests:bm-regs-test:bcm-bm-tx-risc-req-test
Subtest reg-tests:bm-regs-test:bcm-bm-dmad-lo-water-mrk-test
Subtest reg-tests:bm-regs-test:bcm-bm-dmad-hi-water-mrk-test
Subtest reg-tests:dma-regs-test
Subtest reg-tests:dma-regs-test:bcm-rdma-mode-test
Subtest reg-tests:dma-regs-test:bcm-wdma-mode-test
Subtest reg-tests:msi-regs-test
Subtest reg-tests:msi-regs-test:bcm-msi-mode-test
Subtest reg-tests:gen-regs-test
Subtest reg-tests:gen-regs-test:bcm-gen-mode-test
Subtest reg-tests:gen-regs-test:bcm-gen-misc-config-test
Subtest reg-tests:gen-regs-test:bcm-gen-misc-loc-ctl-test
Subtest reg-tests:gen-regs-test:bcm-gen-seeprom-addr-test
Subtest reg-tests:gen-regs-test:bcm-gen-seeprom-data-test
Subtest reg-tests:gen-regs-test:bcm-gen-seeprom-ctl-test
Subtest reg-tests:gen-regs-test:bcm-gen-mdi-ctl-test
Subtest reg-tests:asf-regs-test
Subtest reg-tests:asf-regs-test:bcm-asf-ctl-test
Subtest reg-tests:asf-regs-test:bcm-asf-smbus-in-test
Subtest reg-tests:asf-regs-test:bcm-asf-smbus-out-test
Subtest mac-loopback-tests
Subtest mac-loopback-tests:mltpkt-mac-10mbit-lpbk-test
>> MAC internal loopback test operates at 10 Mbps.
>> Loopback buffer checked out okay.
>> Loopback buffer checked out okay.
>> Loopback buffer checked out okay.
Subtest mac-loopback-tests:mltpkt-mac-100mbit-lpbk-test
>> MAC internal loopback test operates at 100 Mbps.
>> Loopback buffer checked out okay.
>> Loopback buffer checked out okay.
>> Loopback buffer checked out okay.
Subtest mac-loopback-tests:mltpkt-mac-1000mbit-lpbk-test
>> MAC internal loopback test operates at 1000 Mbps.
>> Loopback buffer checked out okay.
>> Loopback buffer checked out okay.
>> Loopback buffer checked out okay.
Subtest mltpkt-phy-gmii-lpbk-test

```

```
Disabling Autonegotiation
>> Ethernet device set up to perform PHY internal loopback.
>> Loopback buffer checked out okay.
>> Loopback buffer checked out okay.
>> Loopback buffer checked out okay.
>> External loopback tests are not run. Include "loopback" in TEST-ARGS and
>> connect an RJ-45 termination connector to ethernet ports.
Selftest at /pci@1f,700000/network@2 ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:7
```

### 8.2.6.7 parallel@0,378 Test

The following is an example of a successful parallel@0,378 test:

```
obdiag> test 7
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/isa@7/dma@0,0/parallel@0,378
>> Parallel Passive Loopback Test not run. To run the test include
>> "loopback" in TEST-ARGS & connect external loopback to parallel port.
Selftest at /pci@1e,600000/isa@7/dma@0,0/parallel@0,378 ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:0
```

### 8.2.6.8 pmu@6 Test

The following is an example of a successful pmu@6 test:

```
obdiag> test 8
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/pmu@6
Subtest pmu-reg-test
Selftest at /pci@1e,600000/pmu@6 ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:0
```

### 8.2.6.9 rtc@0,70 Test

The following is an example of a successful rtc@0,70 test:

```
obdiag> test 9
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/isa@7/rtc@0,70
Subtest rtc-tick-test
Selftest at /pci@1e,600000/isa@7/rtc@0,70 ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:1
```

### 8.2.6.10 serial@0,2e8 Test

The following is an example of a successful serial@0,2e8 test:

```
obdiag> test 10
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/isa@7/serial@0,2e8
Subtest internal-loopback
BAUDRATE=115200
>> External Loopback Test not run. To run the test include
>> "loopback" in TEST-ARGS and connect external loopback to the device port.
Selftest at /pci@1e,600000/isa@7/serial@0,2e8 ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:0
```

### 8.2.6.11 serial@0,3f8 Test

The following is an example of a successful serial@0,3f8 test:

```
obdiag> test 11
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/isa@7/serial@0,3f8
>> Port is not tested because it is in use as a console device.
Selftest at /pci@1e,600000/isa@7/serial@0,3f8 ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:0
```

## 8.2.6.12 sound@8 Test

The following is an example of a successful sound@8 test:

```
obdiag> test 12
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/sound@8
Subtest dc97-probe
>> Audio controller detected
Subtest dc97-pci-reg-test
Subtest dc97-reg-test
Subtest dc97-reg-test:dc97-dmar0-1-2-3-reg-test
Subtest dc97-reg-test:dc97-dmar4-5-6-7-reg-test
Subtest dc97-reg-test:dc97-mpur2-reg-test
Subtest dc97-reg-test:dc97-acrdwr-reg-reg-test
Subtest dc97-reg-test:dc97-acgpio-reg-test
Subtest dc97-reg-test:dc97-cir-gc-reg-test
Subtest dc97-reg-test:dc97-global-ctrl-reg-test
Subtest dc97-init
Subtest ac97-probe
>> AC-97 detected
Subtest ac97-reg-test
Subtest ac97-reg-test:ac97-general-purpose-reg-test
Subtest ac97-reg-test:ac97-misc-ctrl-bits-reg-test
Selftest at /pci@1e,600000/sound@8 ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:1
```

To check for audio output, you must enable loopback for the test. Type:

```
obdiag> setenv test-args loopback
```

The sound@8 test now sends audio out to the speaker, the headphone jack, and the audio-out jack simultaneously. The test also displays errors as the loopback signal is not returned. These errors can be ignored.

You need to reconfigure the test arguments before performing any other tests. See [Step 3 in “Configuring OpenBoot Diagnostics” on page 8-7](#).

## 8.2.6.13 usb@a Test

The following is an example of a successful usb@a test:

```
obdiag> test 13
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/usb@a
Subtest usb-pci-reg-test
Subtest usb-pci-reg-test:vendor-id-test
Subtest usb-pci-reg-test:device-id-test
Subtest usb-pci-reg-test:programmer-intf-test
Subtest usb-pci-reg-test:sub-class-code-test
Subtest usb-pci-reg-test:class-code-test
Subtest usb-pci-reg-test:header-type-test
Subtest usb-pci-reg-test:bist-test
Subtest usb-pci-reg-test:status-reg-test
Subtest usb-pci-reg-test:pin-test
Subtest usb-pci-reg-test:cache-line-size-walk1
Subtest usb-pci-reg-test:latency-timer-walk1
Subtest usb-pci-reg-test:interrupt-line-walk1
Subtest usb-pci-reg-test:min-gnt-test
Subtest usb-pci-reg-test:max-lat-test
Subtest usb-ohci-reg-test
Subtest usb-ohci-reg-test:usb-ohci-hccnt-sft-rst-test
>> The USB host controller is in suspended state
Subtest usb-ohci-reg-test:usb-ohci-cnt-reg-test
Subtest usb-ohci-reg-test:usb-ohci-cmdsta-reg-test
Subtest usb-ohci-reg-test:usb-ohci-intsta-reg-test
Subtest usb-ohci-reg-test:usb-ohci-intena-reg-walk1
Subtest usb-ohci-reg-test:usb-ohci-hccntapt-reg-test
Subtest usb-ohci-reg-test:usb-ohci-prdcur-reg-res-test
Subtest usb-ohci-reg-test:usb-ohci-cnt-hd-reg-test
Subtest usb-ohci-reg-test:usb-ohci-cnt-cur-reg-test
Subtest usb-ohci-reg-test:usb-ohci-blk-hd-reg-test
Subtest usb-ohci-reg-test:usb-ohci-blk-cur-reg-test
Subtest usb-ohci-reg-test:usb-ohci-done-hd-reg-res-test
Subtest usb-ohci-reg-test:usb-ohci-frm-int-reg-test
Subtest usb-ohci-reg-test:usb-ohci-frm-num-reg-test
Subtest usb-ohci-reg-test:usb-ohci-prd-strt-reg-test
Subtest usb-ohci-reg-test:usb-ohci-lspd-thre-reg-test
Selftest at /pci@1e,600000/usb@a ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:2
```

## 8.2.6.14 usb@b Test

The following is an example of a successful usb@b test:

```
obdiag> test 14
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/usb@b
Subtest usb-pci-reg-test
Subtest usb-pci-reg-test:vendor-id-test
Subtest usb-pci-reg-test:device-id-test
Subtest usb-pci-reg-test:programmer-intf-test
Subtest usb-pci-reg-test:sub-class-code-test
Subtest usb-pci-reg-test:class-code-test
Subtest usb-pci-reg-test:header-type-test
Subtest usb-pci-reg-test:bist-test
Subtest usb-pci-reg-test:status-reg-test
Subtest usb-pci-reg-test:pin-test
Subtest usb-pci-reg-test:cache-line-size-walk1
Subtest usb-pci-reg-test:latency-timer-walk1
Subtest usb-pci-reg-test:interrupt-line-walk1
Subtest usb-pci-reg-test:min-gnt-test
Subtest usb-pci-reg-test:max-lat-test
Subtest usb-ohci-reg-test
Subtest usb-ohci-reg-test:usb-ohci-hccnt-sft-rst-test
>> The USB host controller is in suspended state
Subtest usb-ohci-reg-test:usb-ohci-cnt-reg-test
Subtest usb-ohci-reg-test:usb-ohci-cmdsta-reg-test
Subtest usb-ohci-reg-test:usb-ohci-intsta-reg-test
Subtest usb-ohci-reg-test:usb-ohci-intena-reg-walk1
Subtest usb-ohci-reg-test:usb-ohci-hccntapt-reg-test
Subtest usb-ohci-reg-test:usb-ohci-prdcur-reg-res-test
Subtest usb-ohci-reg-test:usb-ohci-cnt-hd-reg-test
Subtest usb-ohci-reg-test:usb-ohci-cnt-cur-reg-test
Subtest usb-ohci-reg-test:usb-ohci-blk-hd-reg-test
Subtest usb-ohci-reg-test:usb-ohci-blk-cur-reg-test
Subtest usb-ohci-reg-test:usb-ohci-done-hd-reg-res-test
Subtest usb-ohci-reg-test:usb-ohci-frm-int-reg-test
Subtest usb-ohci-reg-test:usb-ohci-frm-num-reg-test
Subtest usb-ohci-reg-test:usb-ohci-prd-strrt-reg-test
Subtest usb-ohci-reg-test:usb-ohci-lspd-thre-reg-test
Selftest at /pci@1e,600000/usb@b ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:2
```





# SunVTS

---

This chapter describes using the SunVTS software to troubleshoot problems with the Sun Blade 1500 workstation. Topics include:

- “Installing SunVTS” on page 9-1
- “Exercising System Components Using SunVTS Software” on page 9-1
- “Further SunVTS Testing” on page 9-10

---

## 9.1 Installing SunVTS

The SunVTS software is preinstalled on your Sun Blade 1500 workstation hard drive. Use only version 5.1PS5+ or later, which is for the Sun Blade 1500 workstation.

You can find the latest revisions of SunVTS software on the web at:

<http://www.sun.com/oem/products/vts/>

The web site can also provide you with installation instructions.

---

## 9.2 Exercising System Components Using SunVTS Software

The SunVTS software has numerous modes of operation. The two simplest modes are described here.

- “Connection Mode” on page 9-2
- “Functional Mode” on page 9-6

## 9.2.1 Connection Mode

When configured for connection mode, the SunVTS software makes a single testing pass, checking for the existence of the item under test. Regardless of the test result, output messages are displayed.

If a component fails a test in connection mode, check the connections of the component. For example, if the DVD/CD-RW drive test (`c0t2d0s2(cddvdrwtest)`) displays an error, check the cable connections on the DVD/CD-RW drive and where those cables connect to the motherboard.

## 9.2.2 Connection Mode Component Testing

To test a specific component in connection mode, follow this procedure. Perform steps 1 through 5, then use [TABLE 9-1](#) for step 6 and additional steps. If you want to test more than one component, test one component at a time, then restart the procedure from [Step 4](#) for the second and subsequent components.

---

**Note** – If you are going to test the optical drive, insert a known good optical media disc into the drive before starting SunVTS. If a file manager window opens for the disc, close it.

---

1. As superuser, open a terminal window and start the SunVTS software:

```
# /opt/SUNWvts/bin/sunvts
```

The SunVTS GUI is displayed.

2. From **Select Test Mode**, check **Connection**.
3. From **System Map**, check **Logical**.
4. From **Select Devices**, check **None**.

5. Use [TABLE 9-1](#) for the next steps, depending upon which component you want to test.

**TABLE 9-1** Subsequent Steps to Test Components in Connection Mode

Component	Steps to Take	Successful Test Results
Hard drive	6. Click the plus sign adjacent to IDE - Devices(uata0).	Connection test starting....
	7. Select c0t0d0 (disktest) for HDD0 or c0t1d0 (disktest) for HDD1.	Connection test complete
	8. Click Reset.	08/30/04 14:01:59 dt92-238 SunVTS5.1ps5build3: VTSID 2009 disktest.INFO c0t0d0(/pci@1e,600000/ide@d/dad@0,0: ): Connected <Capacity=30000.35 MB, Mounted=(/), Free=12723.40 MB.>
	9. Click Start.	
Optical drive	6. Click the plus sign adjacent to IDE - Devices(sd0).	Connection test starting....
	7. Select c0t2d0s2 (cddvdrwtest), c0t2d0s2 (cdtest), or c0t2d0s2 (cdrwtest)	Connection test complete
	8. Click Reset.	
	9. Click Start.	
DIMM memory	6. Click the plus sign adjacent to Memory.	Connection test starting....
	7. Select mem (pmemtest)	Memory
	8. Click Reset.	mem
	9. Click Start.	Status: "Connected 1024 MB physical memory has been found
		Connection test complete
Flash PROM	6. Click the plus sign adjacent to Memory.	Connection test starting....
	7. Select Seeprom0 (seepromtest)	Connection test complete
	8. Click Reset.	seeprom0
	9. Click Start.	Status: Connected:  Name - motherboard-fru-prom Size - 0x002000 FullPath - /devices/pci@1e.600000/isa@7/i2c@0.320/motherboard-fru-prom@0.a8
DIMM0 PROM	6. Click the plus sign adjacent to Memory.	Connection test starting....
	7. Select Seeprom1 (seepromtest)	seeprom1
	8. Click Reset.	Status: Connected:
	9. Click Start.	Name - dimm-spd Size - 0x000100 FullPath - /devices/pci@1e.600000/isa@7/i2c@0.320/dimm-spd@0.a0
		Connection test complete

**TABLE 9-1** Subsequent Steps to Test Components in Connection Mode (*Continued*)

Component	Steps to Take	Successful Test Results
DIMM1 PROM	6. Click the plus sign adjacent to Memory. 7. Select Seeprom2 (seepromtest) 8. Click Reset. 9. Click Start.	Connection test starting....  <pre> seeprom2 Status: Connected:  Name - dimm-spd Size - 0x000100 FullPath - /devices/pci@1e.600000/isa@7/ i2c@0.320/dimm-spd@0.a2 </pre> Connection test complete
DIMM2 PROM	6. Click the plus sign adjacent to Memory. 7. Select Seeprom3 (seepromtest) 8. Click Reset. 9. Click Start.	Connection test starting....  <pre> seeprom3 Status: Connected:  Name - dimm-spd Size - 0x000100 FullPath - /devices/pci@1e.600000/isa@7/ i2c@0.320/dimm-spd@0.a4 </pre> Connection test complete
DIMM3 PROM	6. Click the plus sign adjacent to Memory. 7. Select Seeprom4 (seepromtest) 8. Click Reset. 9. Click Start.	Connection test starting....  <pre> seeprom4 Status: Connected:  Name - dimm-spd Size - 0x000100 FullPath - /devices/pci@1e.600000/isa@7/ i2c@0.320/dimm-spd@0.a6 </pre> Connection test complete
Graphics accelerator	6. Select Graphics. 7. Click Reset. 8. Click Start. (The display might flicker during testing.)	Connection test starting....  Connection test complete
Smart card reader	6. Click the plus sign adjacent to Other Devices. 7. Select scmi2c0 (sc2test) 8. Click Reset. 9. Click Start.	Connection test starting....  <pre> OtherDevices scmi2c0 Status: "Connected Device /dev/scmi2c0: Regs read Test passed  scmi2c0 Status: "Connected Device /dev/scmi2c0: Walking 1s Test passed </pre> Connection test complete

**TABLE 9-1** Subsequent Steps to Test Components in Connection Mode (*Continued*)

Component	Steps to Take	Successful Test Results
Network	6. Select Network. 7. Click Reset. 8. Click Start.	Connection test starting....  Connection test complete
Serial ports	6. Select Comm. Ports. 7. Click Reset. 8. Click Start.	Comm.Ports su0  Status: Idle: /dev/term/a: Idle, current baud = 9600, maximum baud = 115200, /dev/term/b:  Connection test complete
Parallel port	6. Click the plus sign adjacent to Other Devices. 7. Select ecpp0 (eccptest). 8. Click Reset. 9. Click Start.	Connection test starting....  OtherDevices ecpp0  Status: Idle: /dev/ecpp0: IEEE 1284 parallel port, Port mode = ECPP_CENTRONICS (non-IEEE 1284 compliant device mode - Centronics only)  Connection test complete
Speaker	6. Click the plus sign adjacent to Other Devices. 7. Select sound0 (audiotest). 8. Click Reset. 9. Click Start.	Connection test starting....  audio: Playing 2 second(s) 1 KHz tone through the speaker port...Connection test complete  done. sound0 Status: Idle: /dev/sound/0: AC97 Codec, 16-bit Stereo, 48 KHz sample rate
System sensors	6. Click the plus sign adjacent to Other Devices. 7. Select adm1031 (env3test). 8. Click Reset. 9. Click Start.	Connection test starting....  adm1031 Status: Found  cpu-fan (fan. 460000053e) intake-fan (fan. 4600000544) outtake-fan (fan. 460000054a) cpu (temperature-sensor. 460000051d) int-amb (temperature-sensor. 4600000528) sys-in (temperature-sensor. 4600000533)  Connection test complete

**TABLE 9-1** Subsequent Steps to Test Components in Connection Mode (*Continued*)

Component	Steps to Take	Successful Test Results
CPU	6. Select Processor(s)	Connection test starting....
	7. Click Reset. 8. Click Start.	<pre>Processor(s) cpu-unit0     Status: Connected     sparcv9 processor operating at frequency 1500 MHz.  08/30/04 14:19:53 dt92-238 SunVTS5.1ps5build3: VTSID 4002 iutest(P0).INFO cpu-unit0: sparcv9 based processor running @ 1500MHz Online  cpu-unit0     Status: "Connected     A sparcv9 processor operating at 1600 MHz.  08/30/04 14:19:54 dt92-238 SunVTS5.1ps5build3: VTSID 2001 l1dcachetest.INFO l1cache: "Connected : CPU (cpu-id = 0 ) Level 1 cache : size 64 Kbytes line 32 bytes associativity 4"  Connection test complete</pre>
USB	6. Select USB	Connection test starting....
	7. Click Reset. 8. Click Start.	Connection test complete

## 9.2.3 Functional Mode

Functional mode allows for multiple passes and thorough configuration of each device test. Such configuration is beyond the scope of this manual. As such, only simplified functional mode tests are described. For more information about SunVTS' functional and exclusive mode testing, refer to the SunVTS documentation described in [“SunVTS Software” on page 5-6](#).

For simplified functional mode tests, output is only displayed upon error.

**Note** – You cannot test system sensors in functional mode.

## 9.2.4 Functional Mode Component Testing

To test a specific component in functional mode, follow this procedure. Perform steps 1 through 7, then use [TABLE 9-2](#) for step 6 and additional steps. If you want to test more than one component, test one component at a time, then restart the procedure from [Step 6](#) for the second and subsequent components.

**Note** – If you are going to test the optical drive, insert a known good optical media disc into the drive before starting SunVTS. If a file manager window opens for the disc, close it.

1. As superuser, open a terminal window and start the SunVTS software:

```
# /opt/SUNWvts/bin/sunvts
```

The SunVTS GUI is displayed.

- 2. From Select Test Mode, check Functional.
- 3. From System Map, check Logical.
- 4. From the Options menu, select Test Execution and set Max Passes to 1.  
To exercise the component more, set for more passes. Use the time for one pass in [TABLE 9-2](#) to determine your total test time.
- 5. Click Apply.
- 6. From Select Devices, check None.

**Note** – If testing a component requires checking Intervention, uncheck the box when you have finished testing that component.

7. Use [TABLE 9-2](#) for the next steps, depending upon which component you want to test.

**TABLE 9-2** Steps to Test Components in Functional Mode

Component	Steps to Take	Approximate Time for 1 Pass
Hard drive	8. Click the plus sign adjacent to IDE - Devices (uata0). 9. Select c0t0d0 (disktest) for HDD0 or c0t1d0 (disktest) for HDD1. 10.Click Reset. 11.Click Start.	600+ seconds Note: This test is stopped by clicking Stop.
Optical drive	8. From Select Devices, check Intervention. 9. Click the plus sign adjacent to IDE - Devices (sd0). 10.Select c0t2d0s2 (cddvdrwtest), c0t2d0s2 (dvdtest), or c0t2d0s2 (cdtest). 11.Click Reset. 12.Click Start.	85 seconds

**TABLE 9-2** Steps to Test Components in Functional Mode (*Continued*)

Component	Steps to Take	Approximate Time for 1 Pass
DIMM memory test1	8. Click the plus sign adjacent to Memory. 9. Select <code>kmem (vmemtest)</code> . 10. Click Reset. 11. Click Start.	12 seconds
DIMM memory test2	8. Click the plus sign adjacent to Memory. 9. Select <code>mem (pmemtest)</code> . 10. Click Reset. 11. Click Start.	10 seconds
Flash PROM	8. Click the plus sign adjacent to Memory. 9. Select <code>seeprom0 (seepromtest)</code> . 10. Click Reset. 11. Click Start.	9 seconds
DIMM0 PROM	8. Click the plus sign adjacent to Memory. 9. Select <code>seeprom1 (seepromtest)</code> . 10. Click Reset. 11. Click Start.	5 seconds
DIMM1 PROM	8. Click the plus sign adjacent to Memory. 9. Select <code>seeprom2 (seepromtest)</code> . 10. Click Reset. 11. Click Start.	5 seconds
DIMM2 PROM	8. Click the plus sign adjacent to Memory. 9. Select <code>seeprom3 (seepromtest)</code> . 10. Click Reset. 11. Click Start.	5 seconds
DIMM3 PROM	8. Click the plus sign adjacent to Memory. 9. Select <code>seeprom4 (seepromtest)</code> . 10. Click Reset. 11. Click Start.	5 seconds
Graphics accelerators	8. Select Graphics. 9. Click Reset. 10. Click Start.  Note: Because the GUI is using the graphics accelerator while SunVTS is testing it, errors might be reported. These errors are ignored.	85 seconds



**TABLE 9-2** Steps to Test Components in Functional Mode (*Continued*)

Component	Steps to Take	Approximate Time for 1 Pass
Smart card reader	8. From Select Devices, check Intervention. 9. Click the plus sign adjacent to Other Devices. 10. Select <code>scmi2c0 (sc2test)</code> 11. Right click, select Test Parameter Options. 12. Click all enable buttons. 13. From Within Instance, select Apply. 14. Insert a known good smart card. 15. Click Reset. 16. Click Start.	7 seconds
Network	8. From Select Devices, check Intervention. 9. Select Network. 10. Click Reset. 11. Click Start.	17 seconds
Serial ports	8. From Select Devices, check Intervention. 9. Click the plus sign adjacent to Comm.Ports. 10. Select <code>su0 (sutest)</code> . 11. Right click, select Test Parameter Options. 12. For Test_Type, select <code>a_b</code> . 13. For Loopback_Type, select <code>Internal_a_to_a__b_to_b</code> . 14. From Within Instance, select Apply. 15. Click Reset. 16. Click Start.	11 seconds
Parallel port	8. Click the plus sign adjacent to Other Devices. 9. Select <code>ecpp0 (ecpptest)</code> . 10. Click Reset. 11. Click Start.	10 seconds
Speaker	8. Click the plus sign adjacent to Other Devices. 9. Select <code>sound0 (audiotest)</code> . 10. Click Reset. 11. Click Start.	45 seconds
System sensors	Testing is not possible in functional mode.	
CPU	8. Select Processor 9. Click Reset. 10. Click Start.	1000+ seconds Note: This test is stopped by clicking Stop.

**TABLE 9-2** Steps to Test Components in Functional Mode *(Continued)*

Component	Steps to Take	Approximate Time for 1 Pass
USB	8. Select USB 9. Click Reset. 10.Click Start.	13 seconds

## 9.3 Further SunVTS Testing

This chapter has provided only a brief overview of using the SunVTS software for diagnosing component failure. For more information about the SunVTS software’s functional and exclusive mode testing, refer to the SunVTS documentation described in [“SunVTS Software” on page 5-6](#).

## Preparing to Replace Components

---

This chapter describes common tasks that are completed prior to performing a remove or install procedure on any Sun Blade 1500 workstation component.

The procedures described in this chapter are written for workstation service providers and system administrators.



---

**Caution** – To prevent equipment damage, review the safety requirements, safety symbols, and safety precautions in this chapter before you perform any replacement procedure.

---

This chapter contains the following topics:

- [“Safety Information” on page 10-1](#)
- [“Required Tools” on page 10-3](#)
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Removing the Bezel” on page 10-14](#)
- [“Positioning the Chassis” on page 10-16](#)
- [“Finding Your Replacement Procedures” on page 10-18](#)

---

### 10.1 Safety Information

This section provides safety precautions to follow when servicing the Sun Blade 1500 workstation.

## 10.1.1 Safety Precautions

For your protection, observe the following safety precautions when setting up your equipment:

- Follow all Sun standard cautions, warnings, and instructions marked on the equipment and described in *Important Safety Information for Sun Hardware Systems*, 816-7190.
- Follow the cautions, warnings, and instructions in the *Sun Blade 1500 Safety and Compliance Guide*, 817-5130. The document is available from:  
<http://www.sun.com/documentation>.
- Make sure 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 might be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock, or damage to your equipment.

## 10.1.2 Safety Symbols

The following symbols might appear in this book, note their meanings:



---

**Caution** – There is a risk of personal injury and equipment damage. To avoid personal injury and equipment damage, follow the instructions.

---



---

**Caution** – Hot surface. Avoid contact. Surfaces are hot and might 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.

---

## 10.1.3 Electrostatic Discharge Safety

Electrostatic discharge (ESD) sensitive devices, such as the motherboard, PCI cards, hard drives, and the NVRAM require special handling.



---

**Caution** – The boards and hard drives contain electronic components that are extremely sensitive to static electricity. Ordinary amounts of static electricity from clothing or the work environment can destroy components. Do not touch the components along their connector edges.

---



---

**Caution** – Wear an antistatic wrist strap and use an antistatic mat when handling components such as drive assemblies, boards, or cards. When servicing or removing workstation components, attach an antistatic strap to your wrist and then to a metal area on the chassis. Then disconnect the power cord from the workstation and the wall receptacle. Following this caution equalizes all electrical potentials with the workstation.

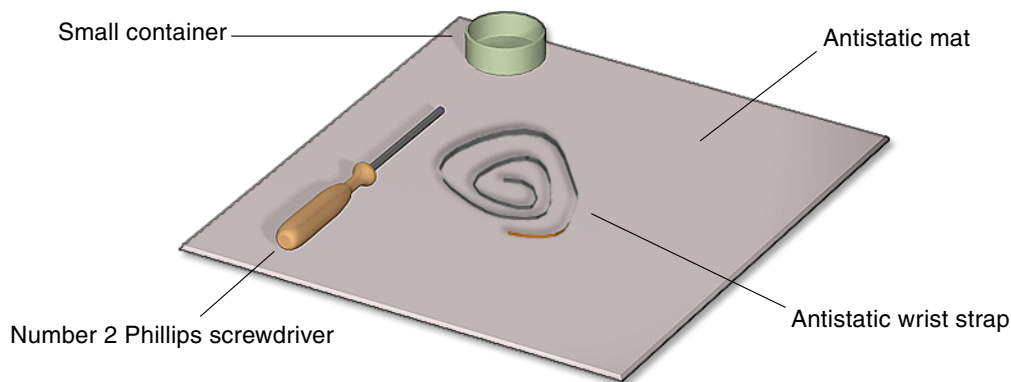
---

## 10.2 Required Tools

The Sun Blade 1500 workstation was designed to be serviced with the following tools:

- Number 2 Phillips screwdriver
- Antistatic wrist strap
- Antistatic mat
- Container for screws

See [FIGURE 10-1](#).



**FIGURE 10-1** Required Tools

Though not required for component replacement, the following tools have proven helpful in certain situations:

- Needle nose pliers, tweezers, or hemostat
- Large jeweller's screwdriver
- Flashlight
- Digital voltage meter (DVM)

Place ESD-sensitive components such as the motherboard, memory, PCI cards, hard drives, and the NVRAM on an antistatic mat. The following items can be used as an antistatic mat:

- Antistatic bag used to wrap a Sun replacement part
- Sun ESD mat, part number 250-1088 (available through your Sun sales representative)
- Disposable ESD mat (shipped with replacement parts or optional system components)

---

## 10.3 Powering Off the Workstation

Prior to performing any installation or replacement procedure, turn off power to the workstation and all peripheral units.



---

**Caution** – Prior to turning off the workstation power, save any open files, and close any active applications. Notify affected users that you are powering off your workstation.

---

This section describes the following:

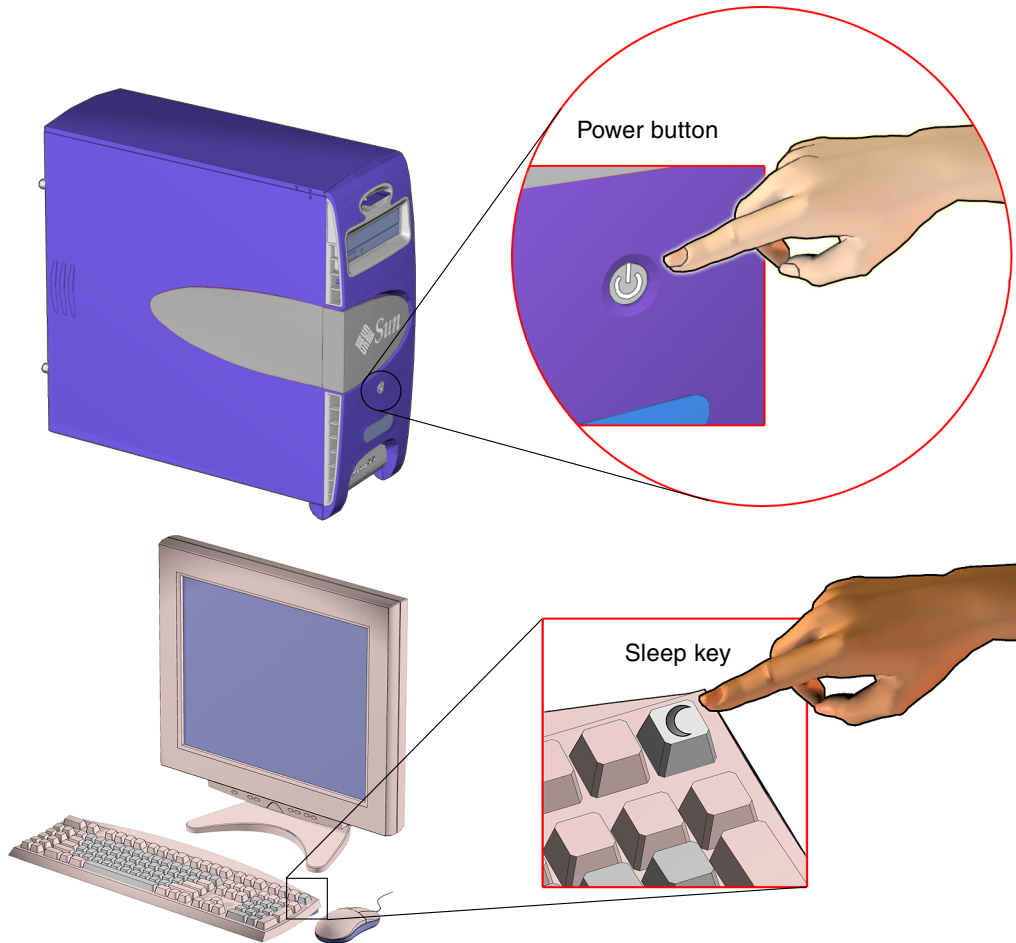
- [“Identifying the Power Button” on page 10-4](#)
- [“Powering Off Methods” on page 10-5](#)



Click this film icon to view an animated version of these instructions.

### 10.3.1 Identifying the Power Button

The Power button is located on the front of the workstation. Alternatively, the keyboard Sleep key is available for power-off sequences. See [FIGURE 10-2](#).



**FIGURE 10-2** Power Button and Sleep Key Location and Identification

## 10.3.2 Powering Off Methods

There are two methods for powering off the workstation.

- **“Shutting Down Gracefully” on page 10-6** - This is the normal shutdown procedure.

You are prompted to save all currently open files and applications prior to shutdown. The shutdown performs all the necessary system processes and checks.

- [“Performing a Forced Shutdown” on page 10-9](#) - Use this only when you cannot shutdown the workstation gracefully.

All open applications and files are closed abruptly without saving any changes. The filesystem might also be corrupted.

### 10.3.2.1 Shutting Down Gracefully

Performing a graceful shutdown makes sure all of your data is saved and the system is ready for restart.

To power off the workstation gracefully:

- 1. Notify affected users.**

Typically, the system administrator sends an electronic notice to all users of the affected equipment using the `write` or `wall` command. Refer to your Solaris system administration documentation for additional information.

- 2. Save any open files and quit all running programs.**

Refer to your application documentation for specific information on these processes. Typically, this means executing application-specific commands through a GUI menu or command line.

- 3. Select a power-off method.**

- Manual
- Command Line

Powering off the system using these any of these methods shuts down all system processes, synchronized the files and powers off the system.

**To power off manually:**

- a. Press and release either the:**

- Power button on the front panel of the workstation
- Sleep key on the keyboard

See [FIGURE 10-2](#).

If a GUI is not running or the login screen is displayed, the system shuts down.

If a GUI is running and you are logged in, the Power Off window is displayed.

- b. Click Shutdown.**

In a moment, the system shuts down.

**To power off using the Command Line:**



- a. As superuser, open a terminal window and at the prompt type either of the following:

```
# shutdown -i S -g 300
```

or

```
# init 5
```

The `shutdown` command provides options for automatically notifying the users of a scheduled shutdown. This example informs users that the system will shut down in 5 minutes and remind them every minute. Refer to the `shutdown` man page for additional information.

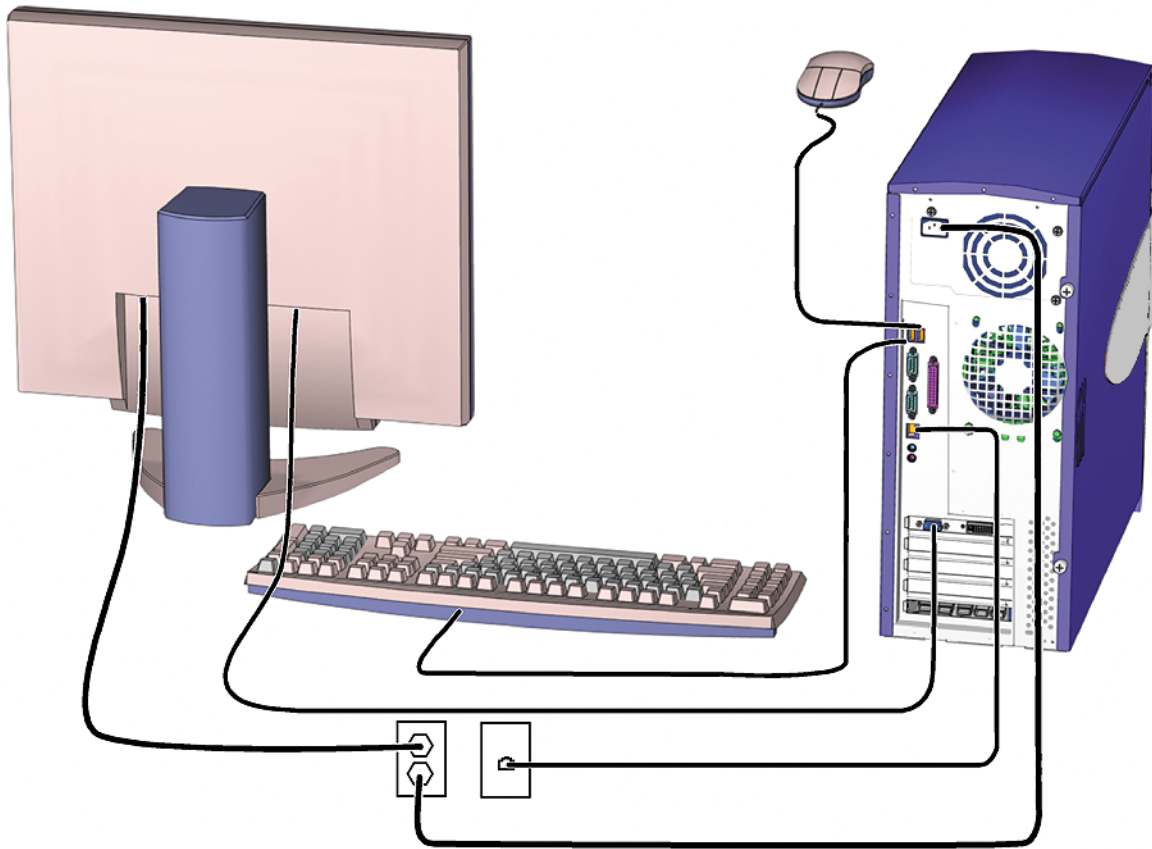
Use the `init` command to invoke specific restart processes. Some processes apply to the currently running instance, others upon next system boot. Refer to [TABLE 10-1](#) for a brief description of the `init` shutdown options. Refer to the `init` man page for descriptions of the state options and `init` syntax.

**TABLE 10-1** Init Command Shutdown Options

Opt	Purpose
0	Brings the system to the firmware level.
1	Reboots the system to system administrator mode. All files are accessible and no users are logged onto the system.
5	Shuts down the system so that it is safe to remove the power.
6	Stops the operating system and reboots to the state specified in the <code>init default</code> entry in the <code>/etc/inittab</code> file.

4. Verify that the power is off and check that the system fans are not spinning.
5. Power off and disconnect the monitor, keyboard, mouse, and network connections.

See [FIGURE 10-3](#).



**FIGURE 10-3** Disconnecting the Keyboard, Mouse, Monitor, and Network Connections

Though you have powered off your workstation, you have not removed all power from your workstation.



---

**Caution** – Pressing the Power button does not remove all power from the system. Standby power remains until the power cord is removed.

---

**6. Remove all power to the workstation.**

Disconnect the power cord from the system to reduce risk of electric shock.

When the power cord is disconnected, it is safe to open the workstation to gain access to internal components.

**7. Proceed to [“Removing the Access Panel” on page 10-12.](#)**

### 10.3.2.2 Performing a Forced Shutdown

Only use a forced shutdown when you cannot perform a graceful shutdown. If at any point in these procedures your system becomes able to take direction, return to the graceful shutdown procedure.



---

**Caution** – If you use the forced shutdown method, all unsaved data changes are lost.

---

To force the workstation to power down:

**1. Identify hung processes, if needed.**

- a. **If needed, use the `rlogin` or `telnet` commands to access the hung system from another system.**
- b. **From the command line in a terminal window, execute a `ps` command to identify the process id number for the hung process.**

Refer to the respective command man pages for syntax information.

**2. Terminate a hung process, if needed.**

The shutdown commands described here are used to close a system shell or stop an application or process. They do not take the workstation to a powered down state.

Execute these commands from the command line in a terminal window. Refer to the command man page for syntax information.

- **System Exit** - Use the `exit` command to stop all processes in a specified shell and close out the shell. Use this method when an application or process is frozen in the shell and you have decided to force the shell to stop action and release the system. This typically exits any child processing initiated through this shell, but background processes might continue to run. It might be necessary to execute this command from another workstation or another terminal window. If you are in a GUI, click the close box on the terminal window.
- **Process Kill** - Use the `kill` command to shut down a single process. Use this command when an application or process is frozen and you have decided to force an it to quit and release the system. It might be necessary to execute this command from another workstation or another terminal window.

If either of these commands releases your system return to the graceful shutdown procedure. Refer to [“Shutting Down Gracefully” on page 10-6](#).

### 3. Manually synchronize the system.

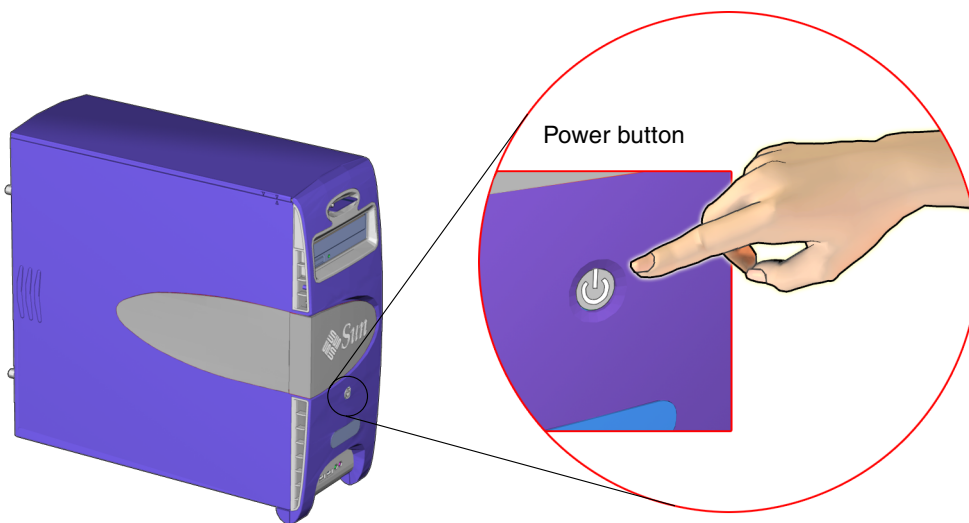
As superuser at a terminal window, type:

```
# sync
```

Use the `sync` command when powering off a workstation to maintain file system integrity. The command flushes all previously unwritten system buffers out to the drive. Refer to the `sync` man page for additional information.

### 4. Press and hold the Power button for five seconds.

See [FIGURE 10-4](#).



**FIGURE 10-4** Pressing the Power Button

This abruptly stops all applications, tools, system processes. All unsaved data changes are lost. The workstation is powered off.



---

**Caution** – A forced shutdown can corrupt your data and system files if it is performed before the system is synchronized.

---

### 5. Verify that the power is off.

Check that the system fans are not spinning.

## 6. Power off and disconnect all attached external peripherals.

See [FIGURE 10-3](#).

Though you have powered off your workstation, you have not removed all power from your workstation.



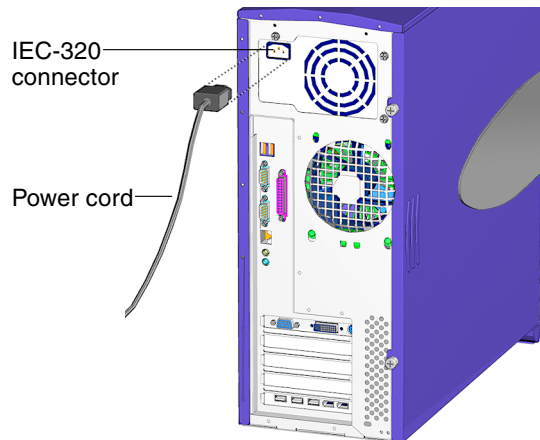
---

**Caution** – Pressing the Power button does not remove all power from the system. Standby power remains until the power cord is removed.

---

## 7. Remove all power to the workstation.

Disconnect the power cord from the system to reduce risk of electric shock. See [FIGURE 10-5](#).



**FIGURE 10-5** Removing the Power Cord

When the system is powered off, then it is safe to open the workstation to gain access to internal components.

Proceed to [“Removing the Access Panel”](#) on page 10-12.

---

## 10.4 Removing the Access Panel

### 1. Power off the workstation.

If you have not already done so, complete the procedure in [“Powering Off the Workstation” on page 10-4](#).

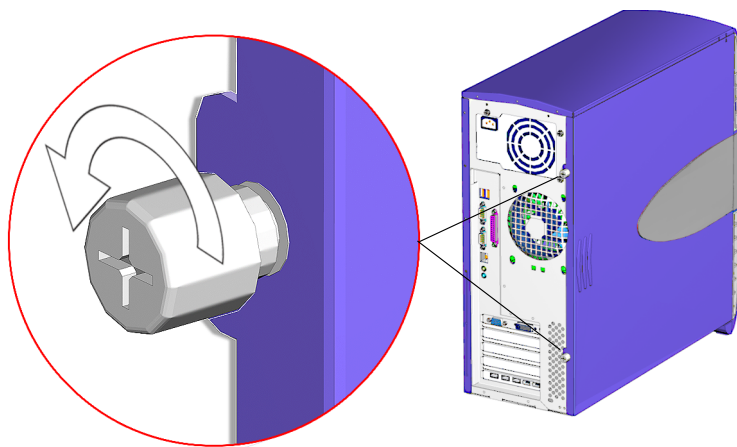
After the system is powered off and the power cord has been removed, it is safe to remove the access panel to gain access to internal components.

### 2. Locate the access panel.

Facing the workstation bezel, the access panel is on the left side of the chassis.

### 3. Turn the captive thumbscrews, located at the rear of the system, counter-clockwise to loosen them.

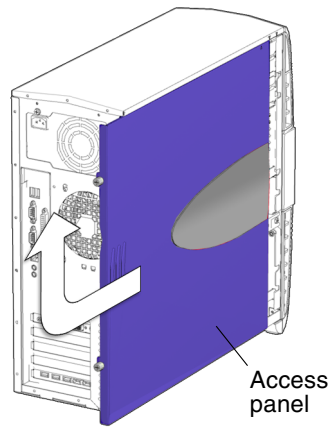
See [FIGURE 10-6](#). If the thumbscrews are very tight, use a No. 2 Phillips screwdriver to loosen them.



**FIGURE 10-6** Loosening the Screws

### 4. Slide the access panel toward the rear of the system chassis about an inch (2.5 cm), then lift the access panel from the chassis and set it aside.

See [FIGURE 10-7](#).



**FIGURE 10-7** Removing the Access Panel

The inside surface of the access panel has a service label. The label provides guidelines and briefly outlines some service procedures.

**5. Attach the antistatic wrist strap.**



---

**Caution** – Some components inside the system, such as drive assemblies, boards, or cards, are sensitive to ESD. To prevent damage when servicing or removing workstation components, attach an antistatic strap to your wrist and then to a metal area on the chassis. Also use an antistatic mat as your work surface.

---

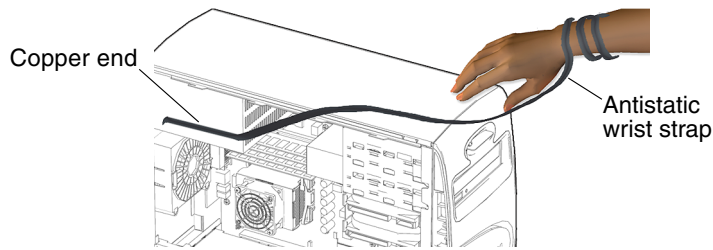
- a. Unwrap the first two folds of the antistatic wrist strap and wrap the adhesive side firmly against your wrist.**

See [FIGURE 10-8](#). This is the end of the antistatic strap that does not have a copper strip.

- b. Peel the liner from the copper foil at the opposite end of the antistatic wrist strap.**

- c. Attach the copper end of the strap to a metal portion of the system chassis.**

See [FIGURE 10-8](#).



**FIGURE 10-8** Attaching the Antistatic Wrist Strap

- d. Make sure the strap does not fall off and that the contact location is out of the way of your replacement procedure.**

A suggested location is the inside surface of the rear panel, under the rear fan.

You have completed the process of powering off, opening, and preparing to service internal components of the workstation.

---

## 10.5 Removing the Bezel

This section describes how to remove the bezel. Most replacement procedures do not require bezel removal. Please refer to the section that describes your replacement procedure before proceeding here.

For installing the bezel, refer to [“Installing the Bezel” on page 15-2](#).

Removing the bezel provides access to the chassis front panel.

- 1. Power off the system and open the chassis.**

See the following sections:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

- 2. Locate the bezel.**

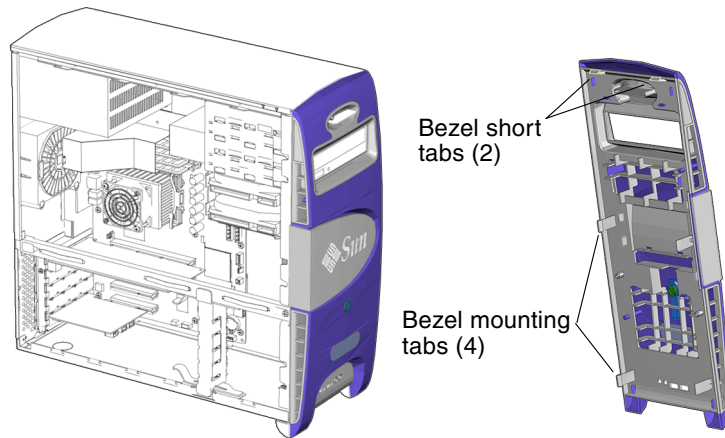
See [FIGURE 10-9](#).

---

**Note** – While you are removing the bezel, keep the workstation in its vertical position.

---

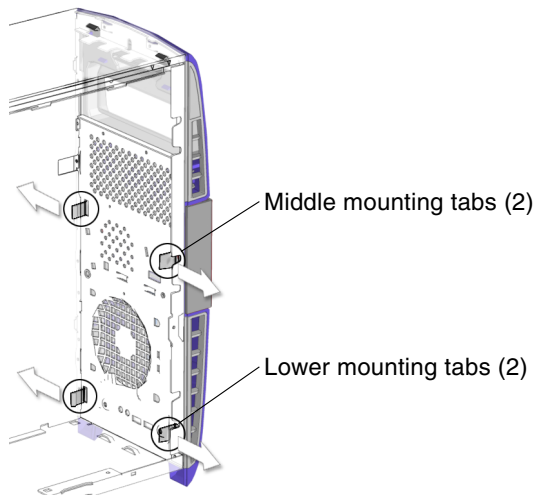




**FIGURE 10-9** Bezel Location and Identification

3. Carefully move the lower pair of mounting tabs apart, and then push them forward slightly.

See [FIGURE 10-10](#).



**FIGURE 10-10** Releasing the Bezel Mounting Tabs

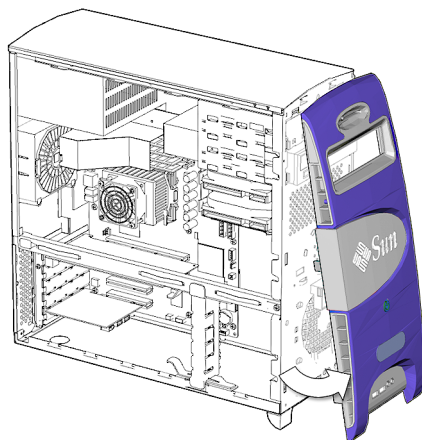
As you do this, you should see the bottom of the bezel move slightly away from the chassis.

4. Carefully move the middle pair of mounting tabs apart, and then push them forward slightly.

See [FIGURE 10-10](#). As you do this, you should see the bottom of the bezel move further away from the chassis.

5. Grasp the bezel from the front near the bottom, and pull it down and away from the chassis.

See [FIGURE 10-11](#).



**FIGURE 10-11** Removing the Bezel

6. Set the bezel aside.

---

## 10.6 Positioning the Chassis

Before removing the motherboard or one of its components, lay the chassis on its side. You may choose to keep the chassis in its upright position for other removal and installation procedures. Take care that you do not tip over the chassis.

---

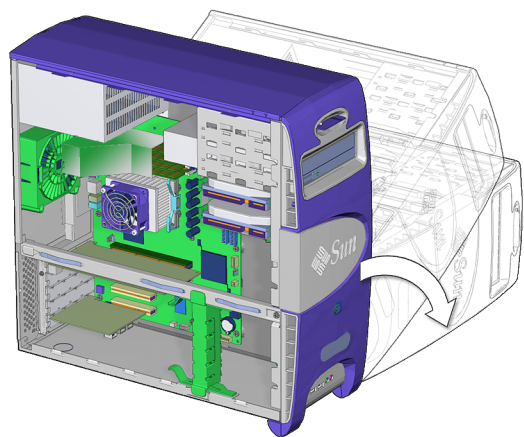
**Note** – Make sure that your working area is flat, has an antistatic mat, is large enough to accommodate working on the chassis, and is clear of debris and dust.

---

1. If you have not already done so, complete the procedure in [“Removing the Access Panel” on page 10-12](#).

2. Using both hands, gently set the system chassis on its side, with the opening facing up. See [FIGURE 10-12](#).

**Note** – *Do not* use the chassis cross brace as a handle.



**FIGURE 10-12** Positioning the Chassis

3. **Orient the chassis for ease of servicing.**

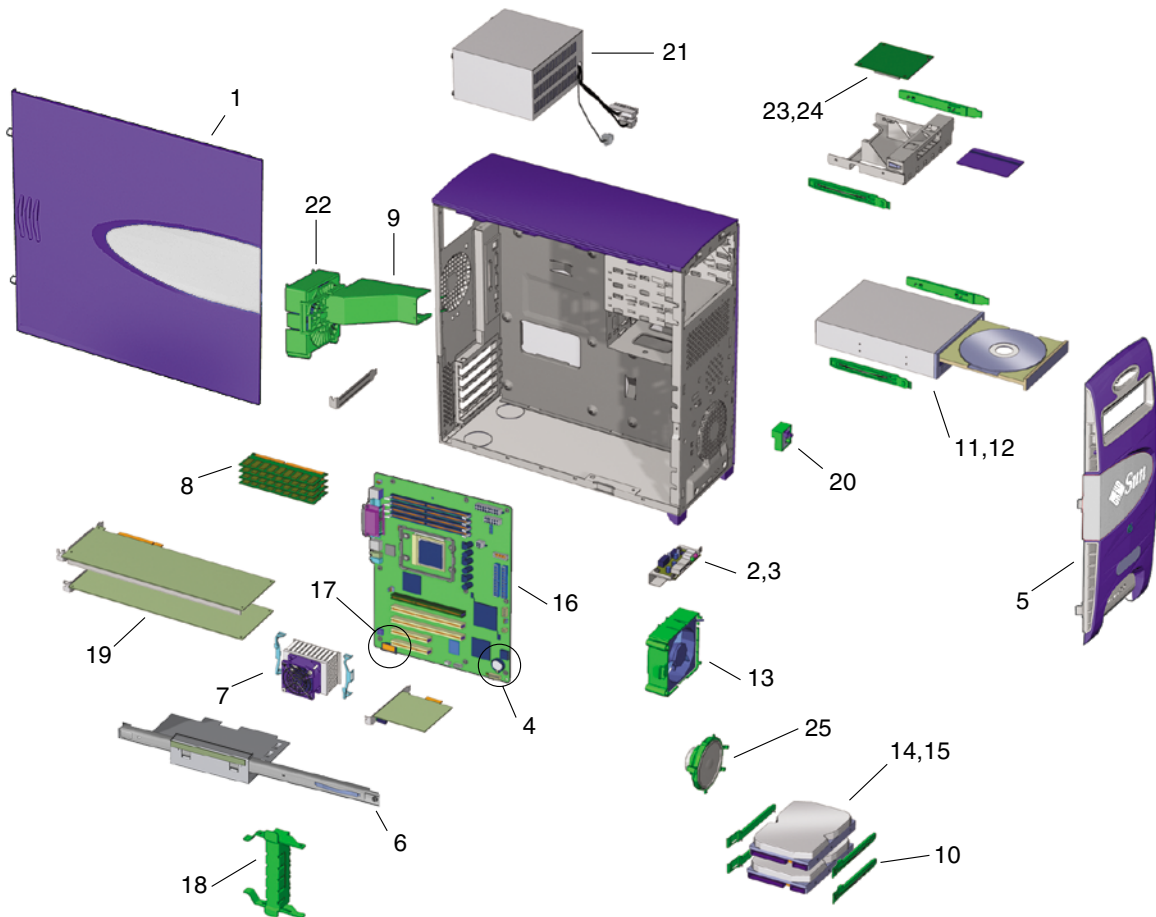
To help with replacement procedures, references to location are relative to the placement of the chassis. Directional terms are described in [TABLE 10-2](#).

**TABLE 10-2** Workstation Chassis Directional Terms

Direction	Chassis Orientation
Bottom	Side with the chassis feet
Top	Side opposite the chassis feet
Rear	Side with PCI card ports and power cord connector
Front	Side with the Power button, removable media drives, and Sun logo
Left	Side with access panel
Right	Side opposite the access panel

## 10.7 Finding Your Replacement Procedures

After troubleshooting the problem and determining the component at fault, identify the component in [FIGURE 10-13](#) and refer to [TABLE 10-3](#) to find the replacement procedure.



**FIGURE 10-13** Replaceable Components

**TABLE 10-3** Component Replacement Procedures

Number	Component	Procedure
1	Access Panel	<a href="#">“Removing the Access Panel” on page 10-12</a> and <a href="#">“Installing the Access Panel” on page 15-5</a>
2	Audio/USB board	<a href="#">“Replacing the Audio USB Board” on page 13-30</a>
3	Audio/USB board cables	<a href="#">“Replacing the Audio USB Board Cables” on page 14-23</a>
4	Battery	<a href="#">“Replacing the Battery” on page 11-22</a>
5	Bezel	<a href="#">“Removing the Bezel” on page 10-14</a> and <a href="#">“Installing the Bezel” on page 15-2</a>
6	Chassis cross brace	<a href="#">“Replacing the Chassis Cross Brace” on page 13-49</a>
7	CPU fan and heat sink assembly	<a href="#">“Replacing the CPU Fan and Heat Sink Assembly” on page 11-13</a>
8	DIMMs (Memory)	<a href="#">“Replacing the DIMMs” on page 11-2</a>
9	DIMM cooling duct	<a href="#">“Replacing the DIMM Cooling Duct” on page 13-22</a>
10	Drive rails	<a href="#">“Replacing the Drive Rails” on page 13-59</a>
11	Optical drive (removable media drive)	<a href="#">“Replacing the Optical Drive” on page 12-9</a>
12	Optical drive cables	<a href="#">“Replacing the Optical Drive Interface Cable” on page 14-6</a> <a href="#">“Replacing the IDE Power Cable” on page 14-13</a>
13	Front fan	<a href="#">“Replacing the Front Fan” on page 13-8</a>
14	Hard drive	<a href="#">“Replacing a Hard Drive” on page 12-2</a>
15	Hard drive cables	<a href="#">“Replacing the Hard Drive Interface Cable” on page 14-10</a> <a href="#">“Replacing the IDE Power Cable” on page 14-13</a>
16	Motherboard and CPU assembly	<a href="#">“Replacing the Motherboard” on page 11-43</a>
17	NVRAM	<a href="#">“Replacing the NVRAM” on page 11-25</a>
18	PCI card support	<a href="#">“Replacing the PCI Card Support” on page 13-45</a>
19	PCI cards	<a href="#">“Replacing the PCI Cards” on page 11-28</a>
20	Power switch assembly	<a href="#">“Replacing the Power Switch Assembly” on page 14-17</a>
21	Power supply	<a href="#">“Replacing the Power Supply” on page 13-2</a>
22	Rear fan	<a href="#">“Replacing the Rear Fan” on page 13-15</a>
23	Smart card reader	<a href="#">“Replacing the Smart Card Reader” on page 12-15</a>
24	Smart card reader cables	<a href="#">“Replacing the Smart Card Reader Cable” on page 14-3</a>

**TABLE 10-3** Component Replacement Procedures *(Continued)*

Number	Component	Procedure
25	Speaker assembly	<a href="#">“Replacing the Speaker” on page 13-39</a>

# Replacing the Motherboard and Associated Components

---

This chapter describes the remove and install procedures for the Sun Blade 1500 motherboard and associated components.

The procedures described in this chapter are written for workstation service providers and system administrators.

---

**Note** – Only Sun authorized service providers should perform the procedures described in [“Replacing the Motherboard” on page 11-43](#).

---

This chapter contains the following topics:

- [“Replacing the DIMMs” on page 11-2](#)
- [“Replacing the CPU Fan and Heat Sink Assembly” on page 11-13](#)
- [“Replacing the Battery” on page 11-22](#)
- [“Replacing the NVRAM” on page 11-25](#)
- [“Replacing the PCI Cards” on page 11-28](#)
- [“Replacing the Motherboard” on page 11-43](#)



---

**Caution** – To prevent equipment damage, review the safety requirements, safety symbols, and safety precautions in [“Preparing to Replace Components” on page 10-1](#) before you perform any replacement procedure. Additional cautions, warnings, and instructions are provided in the *Sun Blade 1500 Safety and Compliance Guide*, 817-5130. The document is available from:  
<http://www.sun.com/documentation>.

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**Caution** – The procedures in this chapter are performed with the workstation chassis laying on its side. If you perform any of the procedures in this chapter with the chassis in its upright position, use care so you do not tip over the chassis.

---



---

**Caution** – When servicing or removing workstation components, attach an antistatic strap to your wrist and then to a metal area on the chassis. Then disconnect the power cord from the workstation and the wall receptacle. Following this caution equalizes all electrical potentials with the workstation.

---

## 11.1 Replacing the DIMMs

This section describes removal and installation of the memory modules. Topics include:

- [“Identifying the DIMMs” on page 11-2](#)
- [“Removing DIMMs” on page 11-3](#)
- [“Installing DIMMs” on page 11-7](#)
- [“OpenBoot PROM Memory Message” on page 11-12](#)



Click this film icon to view an animated version of these instructions.



---

**Caution** – DIMM memory is installed in pairs. However, if you replace a single DIMM, the installed part must be identical to the one removed.

---



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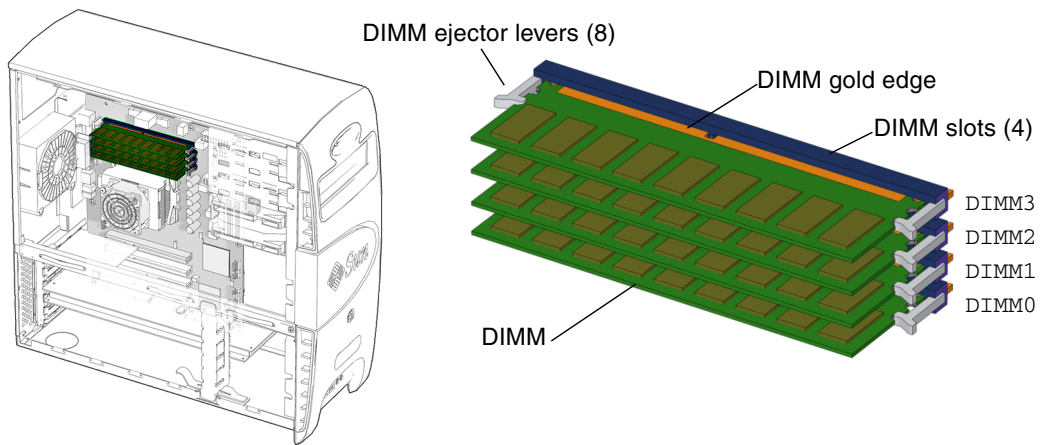
**Caution** – Handle the DIMMs along the outside edges. *Do not* handle the DIMM along the gold contact edge. Do not touch DIMM components or other metal parts. Always wear a antistatic wrist strap when handling DIMMs.

---

### 11.1.1 Identifying the DIMMs

Sun Blade 1500 workstation memory is installed as matched pairs of dual inline memory modules (DIMMs). The DIMMs are installed on the motherboard in consecutive slots. The workstation requires a minimum of one pair of matching DIMMs, installed in DIMM0 and DIMM1. An additional pair of DIMMs can be installed in DIMM2 and DIMM3. [FIGURE 11-1](#) shows the location and identifies the DIMMs.





**FIGURE 11-1** DIMM Location and Identification

Depending upon the configuration of your workstation, you can either add or replace memory. In either case, the new DIMMs must meet the Sun workstation requirements. [TABLE 11-1](#) lists the acceptable DIMM pair configurations.

**TABLE 11-1** DIMM Pair Configurations

DIMM Pair Total Memory	Installed DIMM Pairs	Configuration
1 GB memory	2 x 512 MB DIMMs	Standard
2 GB memory	2 x 1 GB DIMMs	Optional

See the *Sun Blade 1500 Product Notes*, 817-5131, for more information about memory configurations and conditions.

If you are not removing an existing DIMM, proceed to [“Installing DIMMs” on page 11-7](#).

## 11.1.2 Removing DIMMs

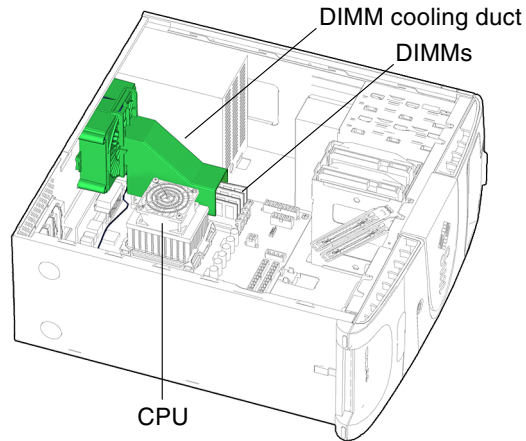
### 1. Power off the system, open and position the chassis.

Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Positioning the Chassis” on page 10-16](#)

## 2. Locate the DIMM slots.

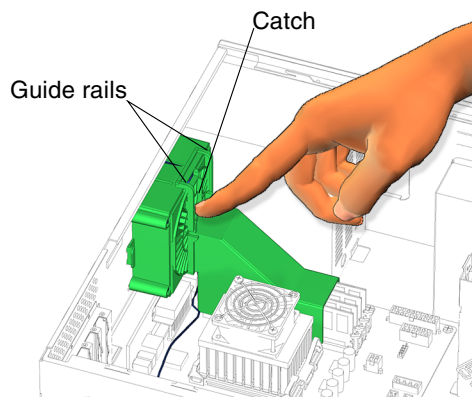
The DIMM slots are organized in a set of four slots. The slots are located on the motherboard above the CPU and underneath the DIMM cooling duct. See [FIGURE 11-1](#) and [FIGURE 11-2](#).



**FIGURE 11-2** Location of DIMMs Under Cooling Duct

## 3. Press the catch on the rear fan bracket and begin to slide the DIMM cooling duct up along the guide rails.

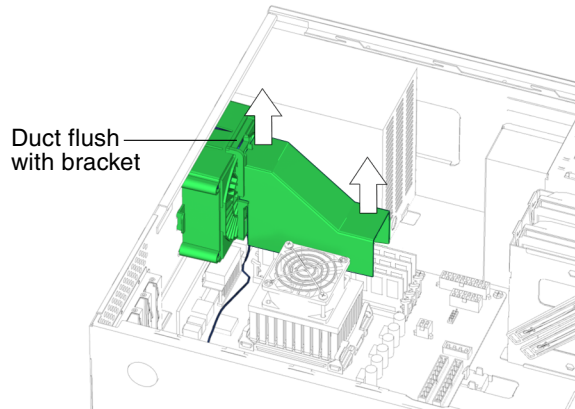
See [FIGURE 11-3](#).



**FIGURE 11-3** Pressing the Catch on the Rear Fan Bracket

4. Slide the duct up until it is flush with the edge of the rear fan bracket.

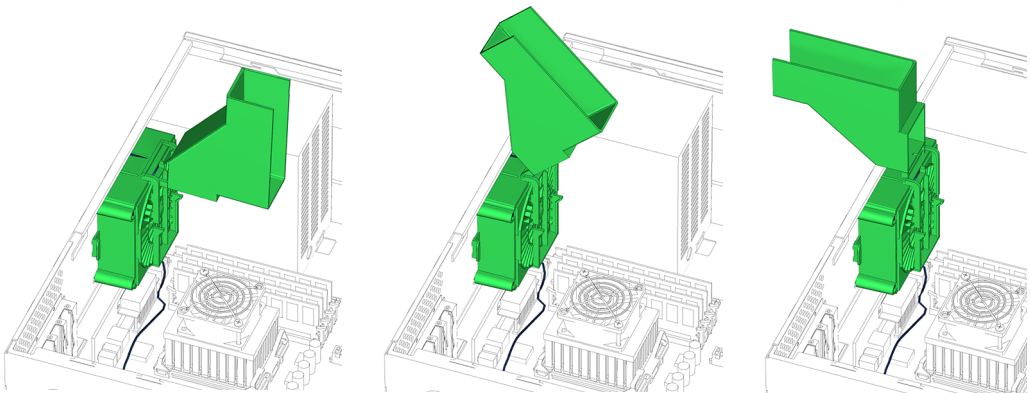
See [FIGURE 11-4](#).



**FIGURE 11-4** Sliding the Duct Up

5. Flip the duct up and over to the rear of the chassis, so that it is 180 degrees opposite of its original position.

See [FIGURE 11-5](#).



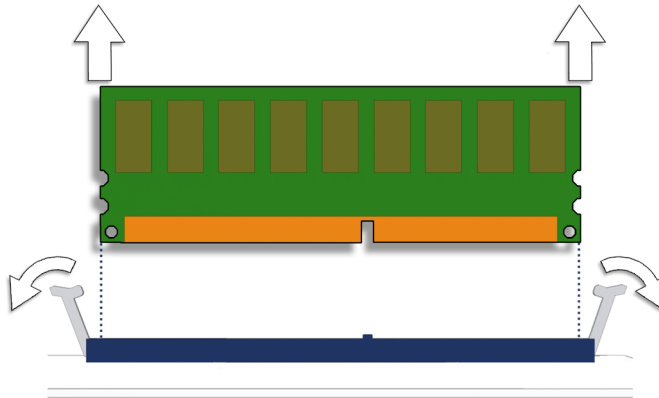
**FIGURE 11-5** Flipping the Duct Over

6. Choose your next step:

- If you lifted the DIMM cooling duct prior to installing DIMMs, return to [Step 4](#) of “Installing DIMMs” on page 11-7.
- If you lifted the DIMM cooling duct prior to removing the CPU fan and heat sink assembly, return to [Step 6](#) of “Replacing the CPU Fan and Heat Sink Assembly” on page 11-13.
- If you lifted the DIMM cooling duct prior to installing the CPU fan and heat sink assembly, return to [Step 4](#) of “Installing the CPU Fan and Heat Sink Assembly” on page 11-18.
- Otherwise, continue to [Step 7](#).

## 7. Release the desired DIMM.

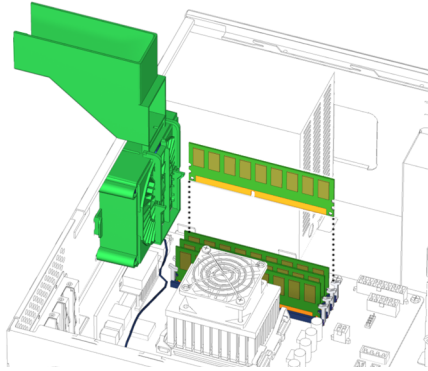
Simultaneously press down on both ejector levers at the ends of the DIMM to unlock the DIMM from the DIMM slot. See [FIGURE 11-6](#).



**FIGURE 11-6** Removing the DIMM

## 8. Lift the DIMM straight out of the DIMM slot.

See [FIGURE 11-7](#).



**FIGURE 11-7** Lifting the DIMM Out of the Slot



---

**Caution** – Handle the DIMMs along the outside edges. Do not handle the DIMM along the gold edge. Do not touch DIMM components or other metal parts. Always wear a antistatic wrist strap when handling DIMMs.

---



---

**Caution** – Do not lift the DIMM out at an angle as it might damage the DIMM slot.

---

9. Set the DIMM aside on an antistatic mat.

10. Repeat [Step 7](#) through [Step 9](#) until you have removed all relevant DIMMs.

11. Choose your next step:

- If you removed a DIMM to replace it, proceed to [“Installing DIMMs” on page 11-7](#).
- If you removed DIMMs prior to removing the motherboard, return to [Step 6](#) in [“Removing the Motherboard” on page 11-46](#).
- If you removed a DIMM and will not replace it at this time, continue with [Step 8](#) of [“Installing DIMMs” on page 11-7](#), to finish the procedure.

## 11.1.3 Installing DIMMs

---

**Note** – If you are installing additional memory, it must be installed in matched pairs of DIMMs according to the specification in [“Identifying the DIMMs” on page 11-2](#).

---



---

**Caution** – Use proper ESD grounding techniques when handling components. Wear an antistatic wrist strap and use an antistatic mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

---



---

**Caution** – Do not remove any DIMM from its antistatic container until you are ready to install it on the motherboard.

---

**1. Power off the system, open and position the chassis.**

Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Positioning the Chassis” on page 10-16](#)

**2. Locate the DIMM slots.**

See [FIGURE 11-1](#) and [FIGURE 11-2](#).

---

**Note** – DIMMs are installed in consecutive pairs: DIMM0 and DIMM1 or DIMM2 and DIMM3. Do not distribute a single pair of DIMMs across the two sets of slots.

---

Check placement of the DIMMs.

**3. If you have not already done so, lift the DIMM cooling duct out of the way.**

See [Step 3](#) through [Step 5](#) of [“Removing DIMMs” on page 11-3](#).

**4. Remove the new DIMM from its antistatic container.**



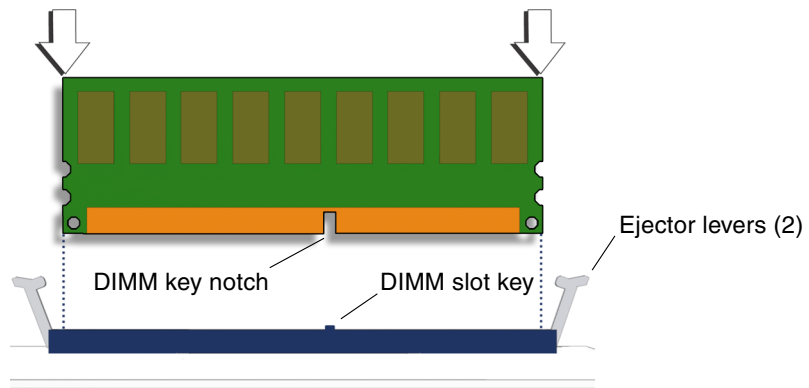
---

**Caution** – Handle the DIMMs along the outside edges. Do not handle the DIMM along the gold edge.

---

**5. Align the DIMM with the slot.**

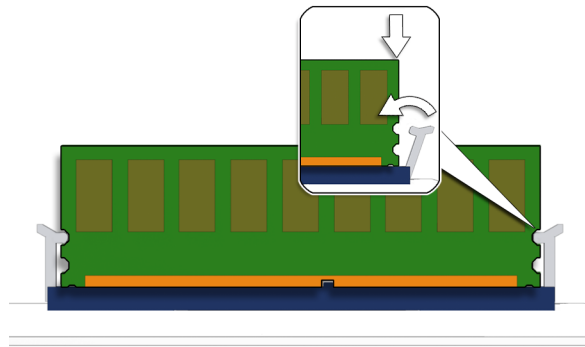
Align the notch in the DIMM to the DIMM slot key. See [FIGURE 11-8](#).



**FIGURE 11-8** Aligning the DIMM

**6. Insert the DIMM into the slot.**

Using both thumbs, press the DIMM straight down into the DIMM slot until both ejector levers click, locking the DIMM in the DIMM slot. See [FIGURE 11-9](#).



**FIGURE 11-9** Securing the DIMM

---

**Note** – The DIMMs must be inserted evenly, straight down along the DIMM slot until locked into place.

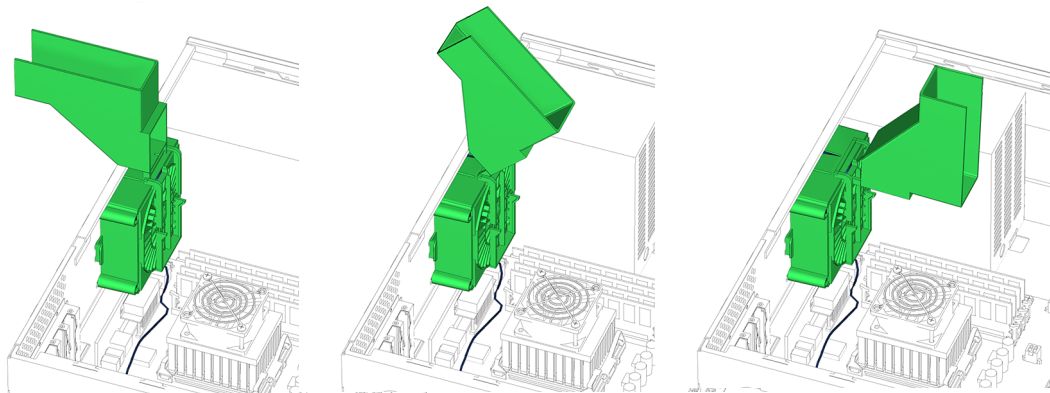
---

The DIMM is seated when you hear a click and the DIMM ejector levers are in the vertical position.

**7. Repeat [Step 4](#) through [Step 6](#) for all DIMMs.**

8. Flip the DIMM cooling duct over toward the front of the chassis, so that the guide rails of the duct are flush with the guide rails of the rear fan bracket.

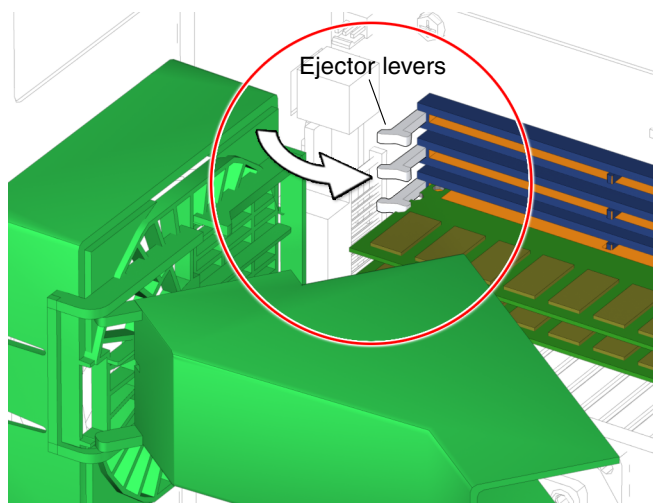
See [FIGURE 11-10](#).



**FIGURE 11-10** Flipping DIMM Cooling Duct Back

9. Ensure that the DIMM ejector levers are in the closed position before sliding the DIMM cooling duct into the locked position.

See [FIGURE 11-11](#).



**FIGURE 11-11** Ejector Levers Closed Position



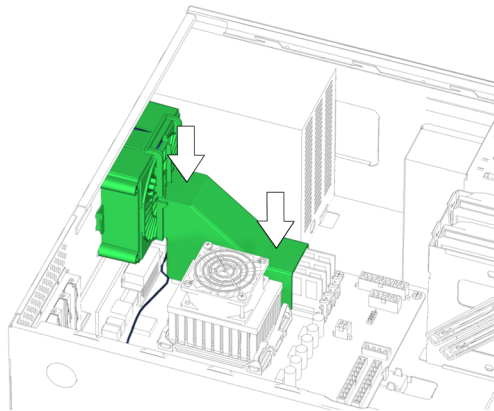
---

**Note** – If the ejector levers are not in the closed position, the DIMM cooling duct binds when slid down.

---

10. While maintaining a light pressure towards the rear fan bracket, slide the duct down.

See [FIGURE 11-12](#).



**FIGURE 11-12** Sliding the Duct Down

11. Press the duct down until the catch clicks it into place.
12. If you returned the DIMM cooling duct to its original position after installing the CPU fan and heat sink assembly, return to [Step 11](#) of “[Installing the CPU Fan and Heat Sink Assembly](#)” on [page 11-18](#).
13. Inspect the DIMM and other component fasteners to verify that:
  - The DIMM ejectors are upright and tight.
  - If removed, verify the rear fan bracket feet are well seated in the chassis.
14. Inspect the DIMM and other component cabling to verify that:
  - The DIMM is fully seated in the slot.
  - If removed, verify the rear fan cable is firmly connected to the motherboard.
15. Choose your next step:
  - If you installed DIMMs after installing the motherboard, return to [Step 16](#) of “[Installing the Motherboard](#)” on [page 11-50](#).

- Otherwise, reposition the chassis, install the access panel, power on the system, and verify the DIMM installation.

Refer to:

- [“Repositioning the Chassis” on page 15-1](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

If you installed unsupported DIMMs, consider the following section.

# 11.1.4 OpenBoot PROM Memory Message

During system start-up, the OpenBoot PROM checks the installed DIMMs for their type and manufacturer. [TABLE 11-2](#) shows the check result and the action taken by the OpenBoot PROM.

**TABLE 11-2** OpenBoot PROM Memory Check Actions

Check Result	Action Taken
Wrong type of DIMM	System beeps three times and powers off.
DIMMs in a pair have different architecture.	System does not use unlike DIMMs. A message is displayed and the system continues to boot.
DIMMs in a pair are from different manufacturers.	System uses DIMMs from different manufacturers. A message is displayed and the system continues to boot.

**Note** – If the newly installed memory is incompatible with the Sun Blade 1500 workstation version of the OpenBoot PROM, the system beeps three times and power off. See [“Identifying the DIMMs” on page 11-2](#).

**Note** – If you only have one DIMM pair installed, and the DIMMs have a different architecture, the system beeps three times and power off. No message is displayed.

The Sun Blade 1500 workstation has four DIMM slots above the CPU. The two lower slots make up bank0, the two upper slots make up bank2. The OpenBoot PROM references the memory by its bank if a problem is found.

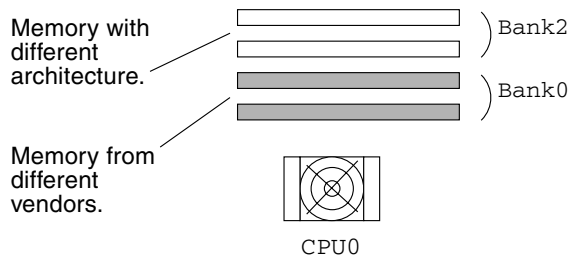
NOTICE - CPU0 Bank0 DIMMs are from different vendors.

This message means that each of the two DIMMs in the lower slots comes from a different manufacturer. The system still uses the DIMMs.

NOTICE - CPU0 Bank2 DIMMs have different architectures and will not be used.

This message means that each of the two DIMMs in the upper slots has a different internal memory layout. The system does not use the DIMMs.

**FIGURE 11-13** identifies the location of the faulty DIMMs in the previous examples.



**FIGURE 11-13** Examples of Faulty DIMM Locations

A system must have at least one functional pair of DIMMs to display a message. A system with more than one pair of DIMMs might display more than one message.

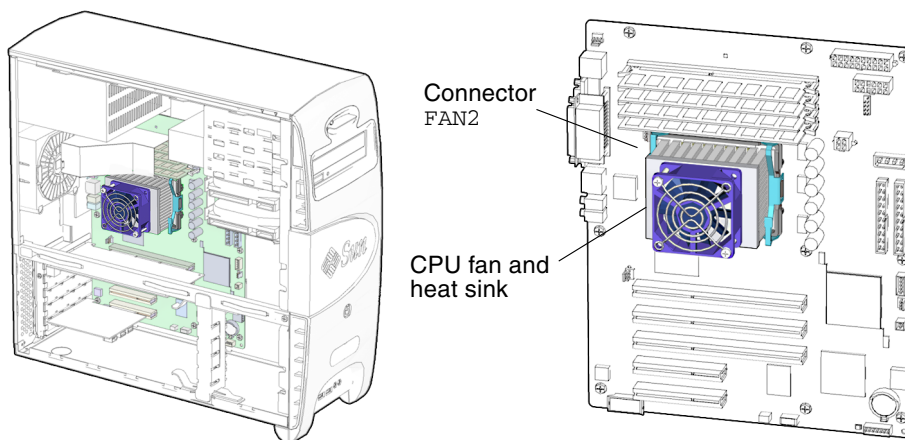
## 11.2 Replacing the CPU Fan and Heat Sink Assembly

This section describes removal and installation of the CPU fan and heat sink assembly. Topics include:

- [“Identifying the CPU Fan and Heat Sink Assembly” on page 11-13](#)
- [“Removing the CPU Fan and Heat Sink Assembly” on page 11-14](#)
- [“Installing the CPU Fan and Heat Sink Assembly” on page 11-18](#)

### 11.2.1 Identifying the CPU Fan and Heat Sink Assembly

The CPU fan and CPU heat sink are attached to each other. Replacing a fan requires replacing the heat sink as well. **FIGURE 11-14** shows the location and identifies the CPU fan and heat sink assembly.



**FIGURE 11-14** CPU Fan and Heat Sink Assembly Location and Identification

The CPU fan and heat sink assembly is fastened to the CPU with two clips. These spring-loaded clips latch to the locking ring which surrounds the CPU and apply a downward force, pressing the CPU fan and heat sink assembly against the CPU.

When the clips are removed or installed one at a time, they have a tendency to rock the CPU fan and heat sink assembly. To prevent the CPU fan and heat sink assembly from rocking, either hold the assembly steady or remove and install both clips at the same time.

[TABLE 11-3](#) lists the CPU fan specifications.

**TABLE 11-3** CPU Fan Specifications

Specification	Value (Maximum)
Voltage	13.8 VDC
Current	0.24 AMPS
Speed	5400 RPM
Flow Rate	27.72 CFM (0.785 m <sup>3</sup> /min)

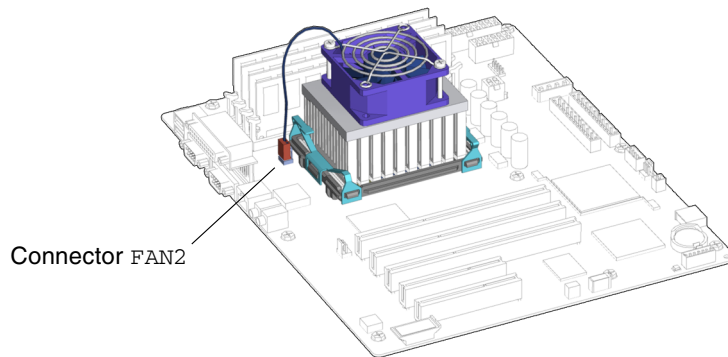
## 11.2.2 Removing the CPU Fan and Heat Sink Assembly

### 1. Power off the system and open the chassis.

Refer to:

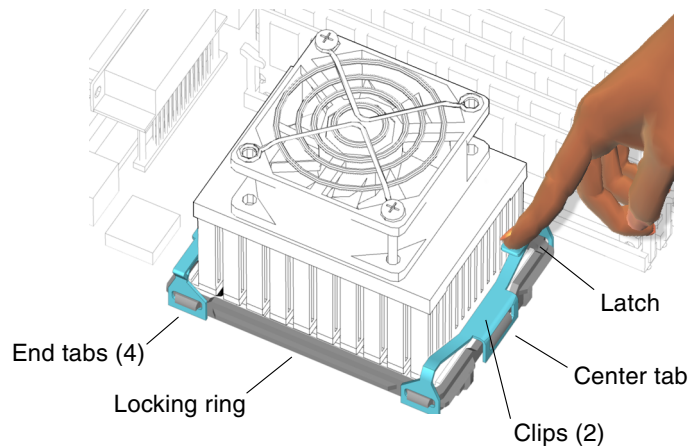
- [“Powering Off the Workstation” on page 10-4](#)

- “Removing the Access Panel” on page 10-12
2. **Locate the CPU fan and heat sink assembly.**  
See [FIGURE 11-14](#).
  3. **(Optional) If the DIMM cooling duct and rear fan are blocking access to the CPU fan and heat sink assembly, remove them.**  
Refer to:
    - “Removing the DIMM Cooling Duct” on page 13-23.
    - “Removing the Rear Fan” on page 13-16.
  4. **Position the chassis.**  
Refer to “Positioning the Chassis” on page 10-16.
  5. **If you have not already removed it, lift the DIMM cooling duct out of the way.**  
Refer to [Step 3](#) of “Removing DIMMs” on page 11-3.
  6. **Disconnect the CPU fan and heat sink assembly cable from the motherboard connector, FAN2.**  
See [FIGURE 11-15](#).



**FIGURE 11-15** Disconnecting the CPU Fan and Heat Sink Assembly Cable

7. **Release the CPU fan and heat sink assembly clips.**
  - a. **Press down on the latch of the clip, unhooking that end of the clip from the locking ring end tab.**  
See [FIGURE 11-16](#).



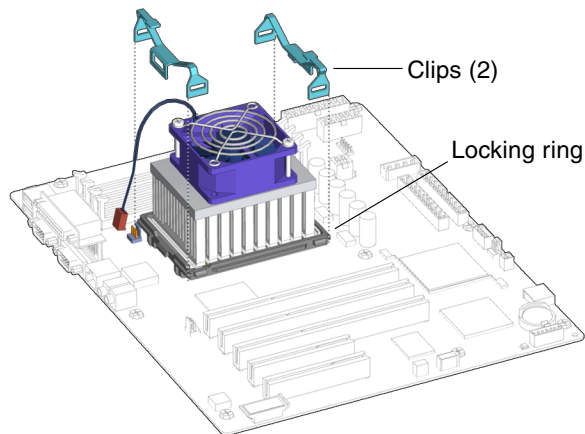
**FIGURE 11-16** Pressing Down on the Clip Latch

**b. Slide the clip to unhook the end opposite the latch.**

This relieves clip pressure. The CPU fan and heat sink assembly might lift up on one side. Hold the assembly down until the other clip is removed.

**c. Rotate the clip away from the CPU fan and heat sink assembly and lift it off the locking ring.**

Set the clip aside. If removing clips separately, repeat from [Step a](#) for the other clip. See [FIGURE 11-17](#).



**FIGURE 11-17** Releasing the CPU Fan and Heat Sink Assembly Clips

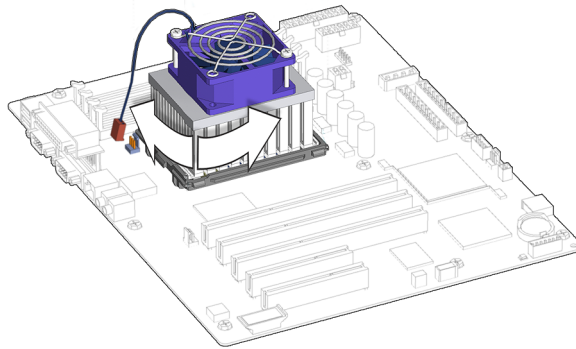
---

**Note** – Use care not to damage electronic components and other sensitive devices around the CPU fan and heat sink assembly.

---

8. Remove the CPU fan and heat sink assembly from of the CPU.
  - a. If there is resistance, rotate the CPU fan and heat sink assembly clockwise/counterclockwise while gently pulling up.

See [FIGURE 11-18](#).



**FIGURE 11-18** Rotating CPU Fan and Heat Sink Assembly

- b. Continue this rocking motion until the CPU fan and heat sink assembly releases from the CPU.

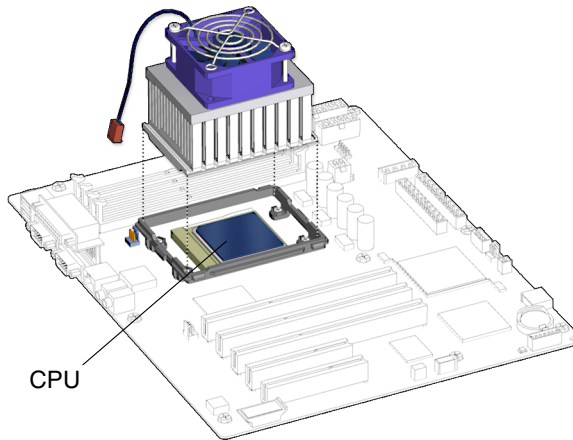
---

**Note** – If the rocking motion is not possible, or if you cannot break the seal between the CPU fan and heat sink assembly and the CPU, replace the motherboard. See [“Replacing the Motherboard” on page 11-43](#)

---

- c. Lift the CPU fan and heat sink assembly off of the CPU.

See [FIGURE 11-19](#).



**FIGURE 11-19** Lifting the CPU Fan and Heat Sink Assembly Away

**d. Set the CPU fan and heat sink assembly on its side.**

**9. Choose your next step:**

- If you removed the CPU fan and heat sink assembly prior to removing the motherboard, return to [Step 6 of “Removing the Motherboard” on page 11-46](#).
- Otherwise, proceed to [“Replacing the CPU Fan and Heat Sink Assembly” on page 11-13](#).



---

**Caution** – Do not power on the system without the CPU fan and heat sink assembly installed.

---

## 11.2.3 Installing the CPU Fan and Heat Sink Assembly



---

**Caution** – The CPU is damaged if the CPU fan and heat sink assembly is not installed upon powering on the workstation. In this situation, immediately power off the workstation.

---

**1. Open and position the chassis.**

Refer to:

- [“Removing the Access Panel” on page 10-12](#)
- [“Positioning the Chassis” on page 10-16](#)



**2. Identify the CPU fan and heat sink assembly location on the motherboard.**

The CPU fan and heat sink assembly centers within the locking ring which surrounds the CPU.

**3. (Optional) If the DIMM cooling duct is blocking access to install the CPU fan and heat sink assembly, refer to [Step 3](#) of “[Removing DIMMs](#)” on [page 11-3](#).**

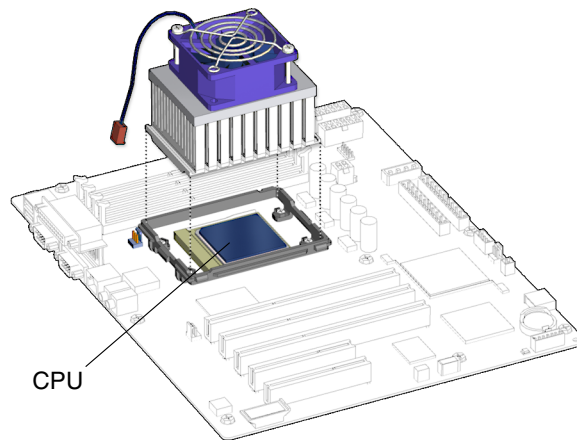
**4. Remove the CPU fan and heat sink assembly and clips from the packaging.**

**5. Clean the top surface of the CPU with an appropriate cleaner so that it is smooth.**

**6. Remove any covers or shields protecting the thermal pad of the replacement CPU fan and heat sink assembly.**

**7. Arrange the CPU fan and heat sink assembly over the CPU so that the cable is toward the rear of the chassis.**

See [FIGURE 11-20](#).



**FIGURE 11-20** Setting the CPU Fan and Heat Sink Assembly on the CPU

**8. Attach the CPU fan and heat sink assembly clips onto the locking ring.**

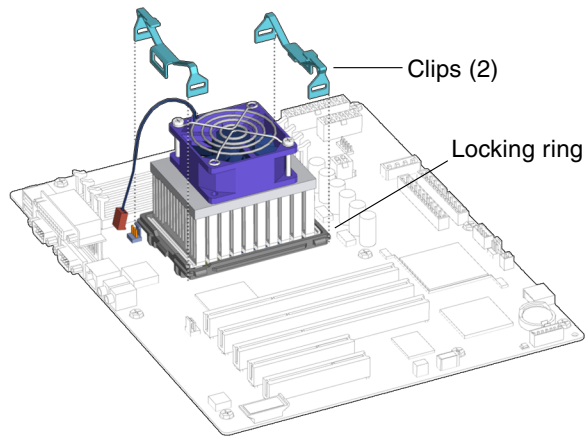
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**Note** – To prevent the heat sink from tilting out of the locking ring, maintain a consistent downward force to the heat sink while attaching the clips.

---

**a. Align the clip over the CPU locking ring.**

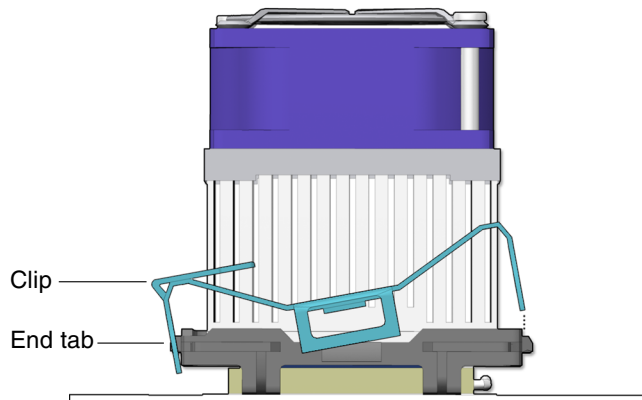
See [FIGURE 11-21](#).



**FIGURE 11-21** Aligning the Clips Over the Locking Ring

- b. Rotate the clip in toward the CPU fan and heat sink assembly to secure it over the center tab.**
- c. Press down on the latch-end of the clip and hook the end over the tab on the locking ring.**

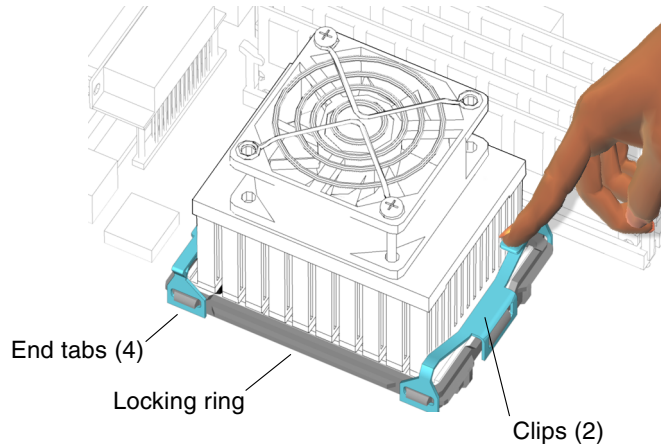
See [FIGURE 11-22](#).



**FIGURE 11-22** Hooking Clip Over End Tab

- d. Press down on the opposite end of the clip, hooking it over the end tab, and securing it to the locking ring.

See [FIGURE 11-23](#).

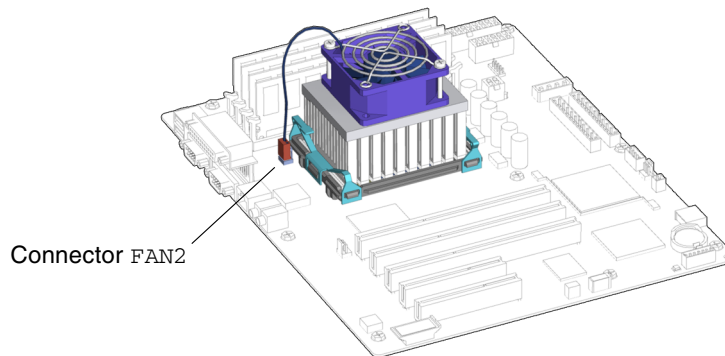


**FIGURE 11-23** Securing the Clip to the Locking Ring

The clip clicks into place. If installed separately, repeat from [Step a](#) for the other clip.

9. Attach the CPU fan and heat sink assembly cable to the FAN2 connector on the motherboard.

See [FIGURE 11-24](#). Press until it is snug.



**FIGURE 11-24** Connecting the CPU Fan and Heat Sink Assembly Cable

- 10. If you lifted the DIMM cooling duct out of the way prior to installing the CPU fan and heat sink assembly, return the duct to its original position.**

Refer to [Step 8](#) through [Step 11](#) of [“Installing DIMMs” on page 11-7](#).

- 11. Reposition the chassis.**

Refer to [“Repositioning the Chassis” on page 15-1](#).

- 12. If you removed the rear fan and DIMM cooling duct prior to installing the CPU fan and heat sink assembly, install them.**

Refer to:

- [“Installing the Rear Fan” on page 13-18](#)
- [“Installing the DIMM Cooling Duct” on page 13-27](#)

- 13. Inspect the CPU fan and heat sink assembly and other component fasteners to verify that:**

- The CPU fan and heat sink assembly clip latches are down and both clips are locked in place.
- The rear fan bracket feet are well seated in the chassis.

- 14. Inspect the CPU fan and heat sink assembly and other component cabling to verify that:**

- The CPU fan and heat sink assembly cable is connected to the motherboard.
- The rear fan cable is firmly connected to the motherboard.

- 15. Choose your next step:**

- If you installed the CPU fan and heat sink assembly after installing the motherboard, return to [Step 15](#) of [“Installing the Motherboard” on page 11-50](#).
- Otherwise, install the access panel, power on the system, and verify the CPU fan and heat sink assembly installation.

Refer to:

- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

## 11.3 Replacing the Battery

This section describes removal and installation of the battery. Topics include:

- [“Identifying the Battery” on page 11-23](#)
- [“Removing the Battery” on page 11-23](#)
- [“Installing the Battery” on page 11-24](#)

# 11.3.1 Identifying the Battery

FIGURE 11-25 shows the location of and identifies the battery.

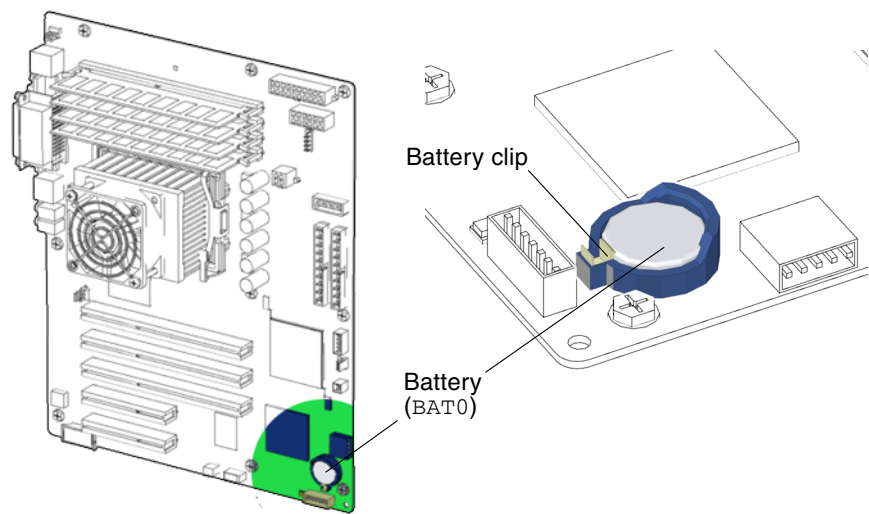


FIGURE 11-25 Battery Location and Identification

TABLE 11-1 lists the battery specifications.

TABLE 11-4 Battery Specifications

Specification	Value
Voltage	3 VDC
Type	CR 2032

# 11.3.2 Removing the Battery

1. Power off the system, open and position the chassis.

Refer to:

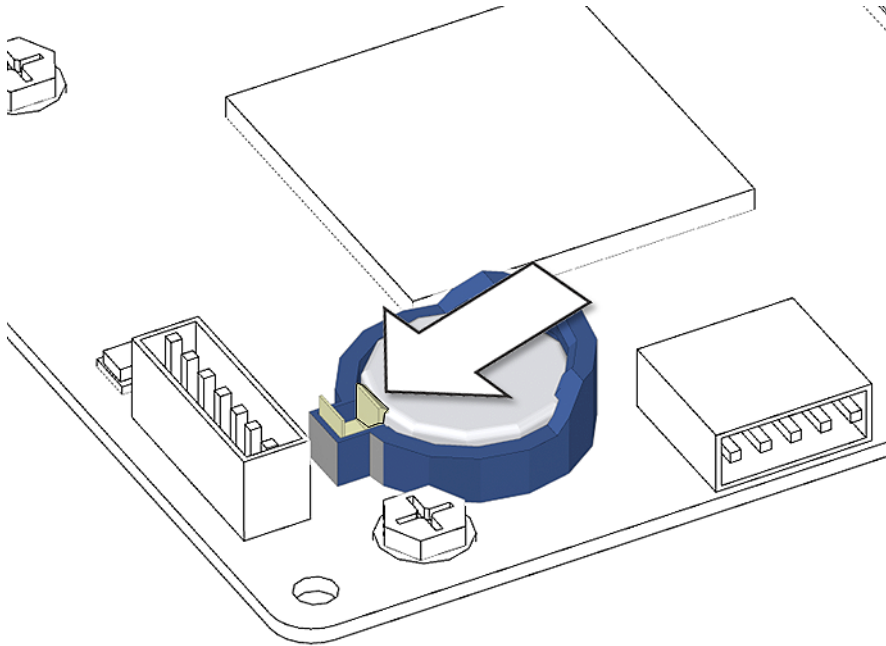
- “Powering Off the Workstation” on page 10-4
- “Removing the Access Panel” on page 10-12
- “Positioning the Chassis” on page 10-16

**2. Locate the battery.**

See [FIGURE 11-25](#).

**3. Release the battery by pressing the battery clip away from the battery until the battery shifts out of the battery socket.**

See [FIGURE 11-26](#). Remove the battery.



**FIGURE 11-26** Releasing the Battery

The workstation does not function without the battery. To install the new battery, proceed to [“Installing the Battery” on page 11-24](#).

## 11.3.3 Installing the Battery

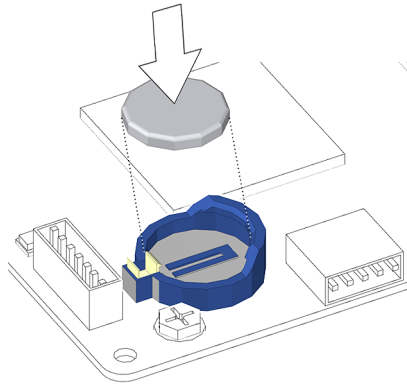
The battery installs directly into a socket on the motherboard. There are no additional fasteners or cables.

**1. Open and position the chassis.**

Refer to:

- [“Removing the Access Panel” on page 10-12](#)

- [“Positioning the Chassis” on page 10-16](#)
- 2. **Identify the battery installation site, BAT0.**  
See [FIGURE 11-25](#).
- 3. **Position the battery over the battery socket with the plus (+) side up.**
- 4. **Press the battery down into the socket until it clicks into place.**  
See [FIGURE 11-27](#).



**FIGURE 11-27** Installing the Battery

- 5. **Make sure the battery is tight in its socket.**
- 6. **Reposition the chassis, install the access panel, power on the system, and verify the battery installation.**

Refer to:

- [“Repositioning the Chassis” on page 15-1](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

## 11.4 Replacing the NVRAM

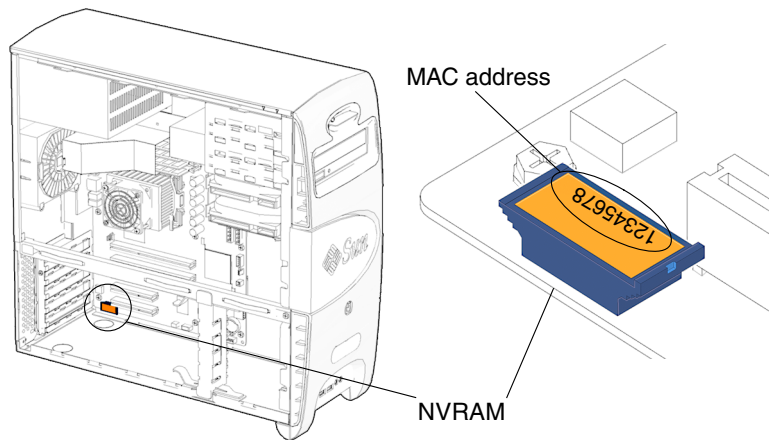
This section describes removal and installation of the nonvolatile random access memory (NVRAM). Topics include:

- [“Identifying the NVRAM” on page 11-26](#)

- [“Removing the NVRAM” on page 11-26](#)
- [“Installing the NVRAM” on page 11-27](#)

## 11.4.1 Identifying the NVRAM

[FIGURE 11-28](#) shows the location of and identifies the NVRAM.



**FIGURE 11-28** NVRAM Location and Identification

## 11.4.2 Removing the NVRAM

1. **Power off the system, open and position the chassis.**

Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Positioning the Chassis” on page 10-16](#)

2. **Locate the NVRAM.**

See [FIGURE 11-28](#).

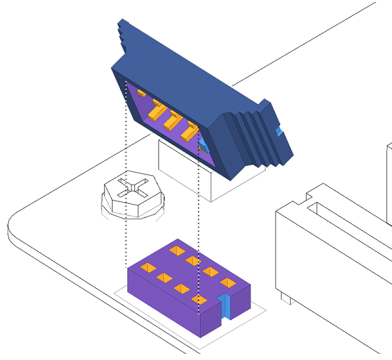
3. (Optional) **If the PCI cards in slots PCI0 and/or PCI1 are blocking access to the NVRAM, remove them.**

Refer to [“Removing a PCI Card” on page 11-30](#).

4. **Pull the NVRAM straight up from the motherboard connector.**

See [FIGURE 11-29](#).





**FIGURE 11-29** Removing the NVRAM

5. Set the NVRAM aside on an antistatic mat.
6. Choose your next step:
  - If you removed the NVRAM prior to removing the motherboard, return to [Step 8](#) of “[Removing the Motherboard](#)” on page 11-46.
  - The workstation does not function without the NVRAM. To install a new NVRAM, proceed to “[Installing the NVRAM](#)” on page 11-27.

## 11.4.3 Installing the NVRAM

The NVRAM installs directly onto the motherboard. There are no additional fasteners or cables.

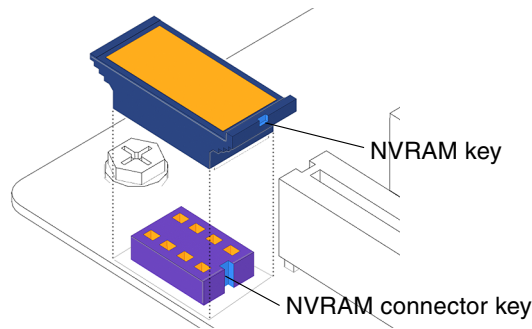
1. **Open and position the chassis.**

Refer to:

  - “[Removing the Access Panel](#)” on page 10-12
  - “[Positioning the Chassis](#)” on page 10-16
2. **Locate the NVRAM connector.**

See [FIGURE 11-28](#).
3. **Align the NVRAM key to the NVRAM connector key on the motherboard.**

See [FIGURE 11-30](#).



**FIGURE 11-30** Installing the NVRAM

4. Press the NVRAM down until snug.
5. Make sure the NVRAM is tight in its connector.
6. If you removed the PCI cards prior to replacing the NVRAM, install the PCI cards.  
Refer to [“Installing a PCI Card” on page 11-38](#).
7. Choose your next step:
  - If you installed the NVRAM after installing a new motherboard, return to [Step 15](#) of [“Installing the Motherboard” on page 11-50](#).
  - Otherwise, reposition the chassis, install the access panel, power on the system, and verify the NVRAM installation.  
Refer to:
    - [“Repositioning the Chassis” on page 15-1](#)
    - [“Installing the Access Panel” on page 15-5](#)
    - [“Powering On the Workstation” on page 15-8](#)
    - [“Verifying an Installation” on page 15-11](#)

## 11.5 Replacing the PCI Cards

This section describes removal and installation of PCI cards in the workstation.

Topics include:

- [“Identifying the PCI Cards” on page 11-29](#)
- [“Removing a PCI Card” on page 11-30](#)
- [“General PCI Card Guidelines” on page 11-33](#)
- [“Special Considerations for Graphics Accelerators” on page 11-34](#)

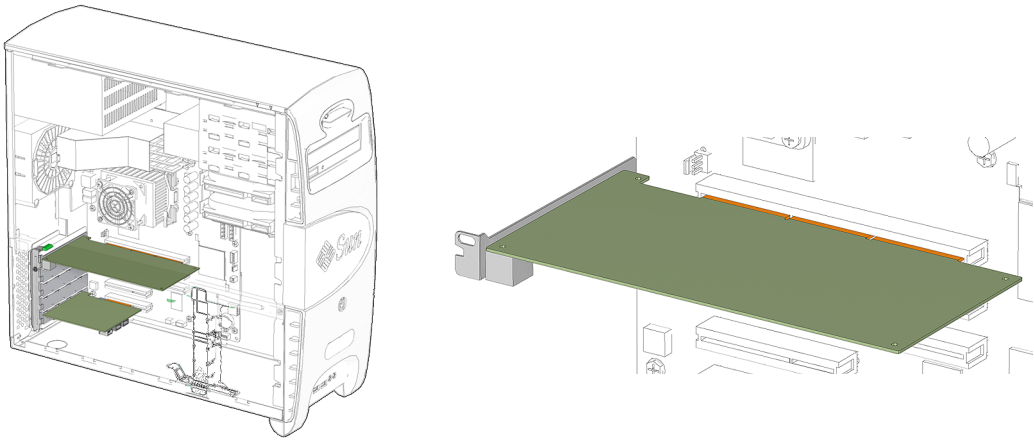
- [“Installing a PCI Card” on page 11-38](#)



Click this film icon to view an animated version of these instructions.

## 11.5.1 Identifying the PCI Cards

PCI cards are supported in the five PCI slots that reside on the system motherboard. See [FIGURE 11-31](#).



**FIGURE 11-31** PCI Card Location and Identification

[TABLE 11-5](#) lists the PCI card slot specifications.

**TABLE 11-5** PCI Card Slot Specifications

PCI Card Slot	Supported Speed
PCI4	66 MHz
PCI0 through PCI3	33 MHz

---

**Note** – If you are installing or upgrading PCI cards, proceed to [“General PCI Card Guidelines” on page 11-33](#).

---

## 11.5.2 Removing a PCI Card

1. Power off the system, open and position the chassis.

Refer to:

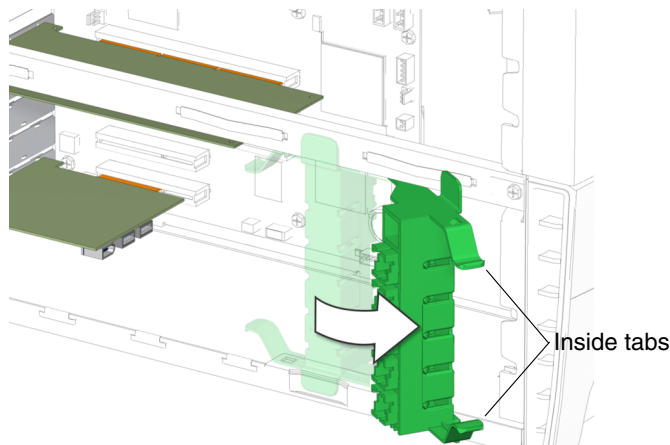
- [“Powering Off the Workstation”](#) on page 10-4
- [“Removing the Access Panel”](#) on page 10-12
- [“Positioning the Chassis”](#) on page 10-16

2. Locate the PCI card you wish to remove.

If the PCI card is located in slot PCI4, remove the chassis cross brace according to the procedure in [“Removing the Chassis Cross Brace”](#) on page 13-51.

3. If necessary, squeeze the inside tabs together and swing the PCI card support out.

See [FIGURE 11-32](#).



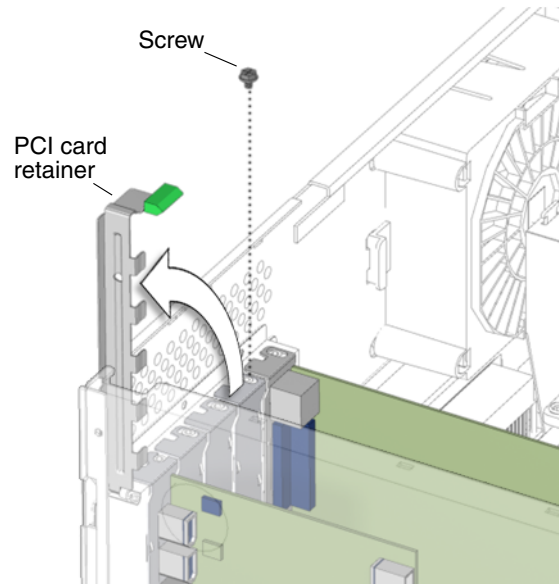
**FIGURE 11-32** Swinging Out the PCI Card Support

4. Using a No. 2 Phillips screwdriver, remove the screw that secures the PCI card retainer to the chassis rear panel.

See [FIGURE 11-33](#). Set the screw aside in a container.

5. Unlatch the PCI card retainer and lift it up.

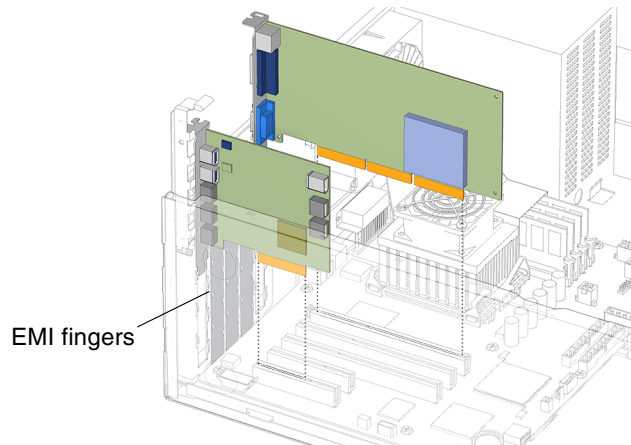
See [FIGURE 11-33](#).



**FIGURE 11-33** Opening the PCI Card Retainer

6. Gently rock the PCI card forward, then lift it straight out of the PCI card slot, and set it aside on an antistatic mat.

See [FIGURE 11-34](#).



**FIGURE 11-34** Removing the PCI Card

---

**Note** – Use care not to damage the EMI fingers around the PCI card slots.

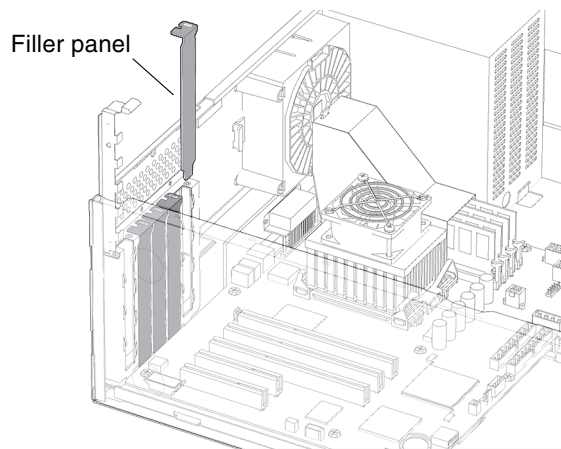
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**7. Choose your next step:**

- If you removed the PCI card to replace it, install the new PCI card. Proceed to [“Installing a PCI Card” on page 11-38](#) to install the new PCI cards.
- If you removed PCI cards prior to removing the NVRAM, return to [Step 4 of “Removing the NVRAM” on page 11-26](#).
- If you removed PCI cards prior to removing the motherboard, return to [Step 7 of “Removing the Motherboard” on page 11-46](#).
- Otherwise, continue with [Step 8](#) to install a filler panel.

**8. Insert a filler panel into the chassis rear panel slot.**

The rear panel slot must be closed with a filler panel to meet system EMI and airflow requirements. See [FIGURE 11-35](#).



**FIGURE 11-35** Installing a PCI Card Filler Panel

**9. Use a No. 2 Phillips screwdriver to fasten the screw that secures the PCI card retainer.**

See [FIGURE 11-40](#).

**10. Install the chassis cross brace (if removed previously), reposition the chassis, install the access panel, and power on the system.**

Refer to:

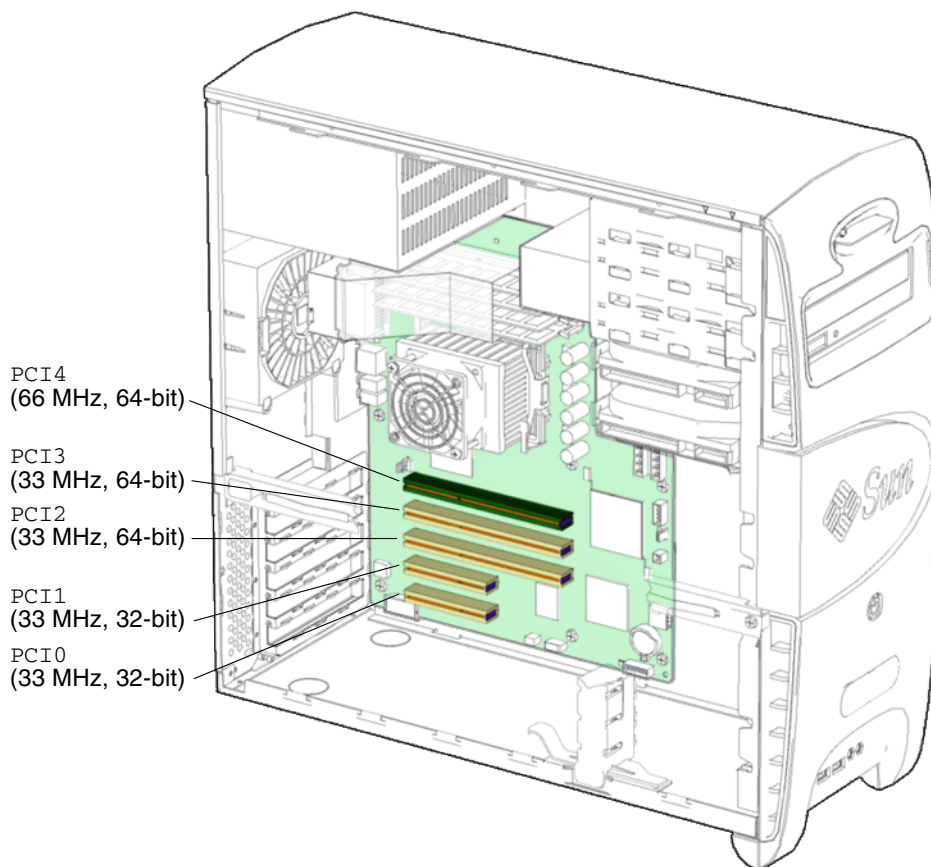
- [“Installing the Chassis Cross Brace” on page 13-53](#)
- [“Repositioning the Chassis” on page 15-1](#)

- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)

### 11.5.3 General PCI Card Guidelines

When adding PCI cards to the Sun Blade 1500 workstation, consider these general guidelines:

- The total power consumption of the installed PCI cards must not exceed 110 Watts.
- The Sun XVR-100, Sun XVR-600, and Sun XVR-1200 graphics accelerators and the SunPCi III Pro co-processor card are considered high-performance PCI cards. Installing more than three high-performance PCI cards affects system resources and is not supported. Also:
  - Installing more than three Sun XVR-100 graphics accelerators is not supported.
  - Installing more than two Sun XVR-600 graphics accelerators is not supported.
  - Installing more than one Sun XVR-1200 graphics accelerator is not supported.
  - Installing more than one SunPCi III Pro co-processor card is not supported.
  - High-performance PCI cards can be installed into any slot. However, for best results, install high performance PCI cards into slot PCI4, the 64-bit 66 MHz slot.
- Use [FIGURE 11-36](#) to help determine where to install your PCI cards.



**FIGURE 11-36** Identifying the PCI Card Slots

## 11.5.4 Special Considerations for Graphics Accelerators

### 11.5.4.1 Visual Inspection

If the firmware does not configure a console display, you can determine the default console display by inspecting the rear panel of the workstation. If a graphics accelerator is installed into the top slot, then that card is the default console display. If there is no graphics accelerator installed into PCI4, consider the following probe order.



# 11.5.4.2 Probe Order

During the boot sequence, device nodes are probed. The PCI slots are probed in the order described in [TABLE 11-6](#):

TABLE 11-6 PCI Card Probe Order

Order	Slot Identifier	Slot Position on Rear Panel	Device Node
1	PCI4	top slot	/devices/pci@1f,700000 device 3
2	PCI0	bottom slot	/devices/pci@1e,600000 device 2
3	PCI1	second slot from the bottom	/devices/pci@1e,600000 device 3
4	PCI2	middle slot	/devices/pci@1e,600000 device 4
5	PCI3	second slot from the top	/devices/pci@1e,600000 device 5

Unless you reconfigure the default, the first graphics accelerator occurring in the probe order is designated the default console display and assigned the aliases screen and /dev/fb.

# 11.5.4.3 Identifying the Default Console Display

The test screen command issued at the ok prompt requests the default console display to execute a self-test, thereby identifying itself. The self-test checks memory and might display color bars on the monitor. If the ok prompt is accessed from an external display device like a serial terminal or TII connection, then test information is output to that connection. For example:

```
ok test screen
Testing screen

Starting XV-500 Selftest
(This will take an estimated
 2-4 minutes for the full test)
. . .
```

This is the beginning of the self-test output for a Sun XVR-600 graphics accelerator. If the device does not have a self-test built in, the following message is displayed.

```
screen device has no selftest method
```

## 11.5.4.4 Changing the Console Display

You can configure the OpenBoot PROM to designate a different graphics accelerator as the console display. Use the `show-displays` utility, the `nvalias` command, and the `output-device` parameter to make this change. For the following example, a Sun XVR-600 graphics accelerator is installed in slot PCI4 and a Sun XVR-100 graphics accelerator is installed in slot PCI1. Initially, the Sun XVR-600 graphics accelerator is the default console display. This example configures the Sun XVR-100 graphics accelerator to be the new console display.

1. Obtain the `ok` prompt.

See [“Obtaining the ok Prompt for Testing” on page 5-2.](#)

2. Display the device nodes for the installed graphics accelerators. For example:

```
ok show-displays
a) /pci@1f,700000/SUNW,XVR-600@3
b) /pci@1e,600000/SUNW,XVR-100@3
q) NO SELECTION
```

3. Select the graphics accelerator to be the new console display by typing its respective letter. For example:

```
Enter Selection, q to quit: b
```

The utility ends and the device node path is loaded into a text buffer.

4. Make an alias for the device node path. For example:

```
ok nvalias newconsoledisplay (Ctrl + Y)
```

Type a space, hold down the Control key, and press the Y key.

5. Configure the `output-device` parameter for the new console display. For example:

```
ok setenv output-device newconsoledisplay
```

## 6. Reset the OpenBoot PROM:

```
ok reset-all
```

The system now uses the Sun XVR-100 graphics accelerator as the new console display.

---

**Note** – The default console display, the first graphics accelerator found in probe order, is still aliased to `screen`. If you wish to check the new console display, type: **test newconsoledisplay**.

---

### 11.5.4.5 Avoiding Colormap Flash

Your Sun Blade 1500 workstation might ship with a Sun XVR-100 graphics accelerator configured to 8-bit color depth.

If you experience colormap flashing (incorrect colors or color changes), your graphics accelerator might be incorrectly configured. Perform one of the following procedures to set 24-bit or 8+24-bit color depth.

#### *Setting 24-bit Color Depth*

1. Using the `fbconfig` command, set the Sun XVR-100 to 24-bit color depth.

```
% fbconfig -dev pfb0 -depth 24
```

2. Log out, then log back in for the change to take effect.

---

**Note** – 24-bit color depth performance might be slower than 8-bit color depth performance.

---

#### *Setting 8+24-bit Color Depth*

---

**Note** – Do not invoke 8+24-bit color depth when two monitors are connected to one XVR-100 graphics accelerator.

---

1. Using the `fbconfig` command, set the Sun XVR-100 to 8+24-bit color depth.

```
% fbconfig -dev pfb0 -fake8 enable
```

---

**Note** – The command `fbconfig -dev pfb0 -fake8 disable` turns off 8+24-bit color depth and returns to the previous color depth.

---

2. Log out, then log back in for the change to take effect.

---

**Note** – 8-bit color depth performance is slower in 8+24-bit color depth mode.

---

## 11.5.5 Installing a PCI Card

1. Power off the system, open and position the chassis.

Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Positioning the Chassis” on page 10-16](#)

2. Locate the available PCI card slots.

Certain PCI cards must be installed in specific PCI card slots in the motherboard. You might have to remove a second chassis filler panel for some PCI cards that use two PCI card slots. Locate the corresponding chassis filler panel slot and PCI card slot.

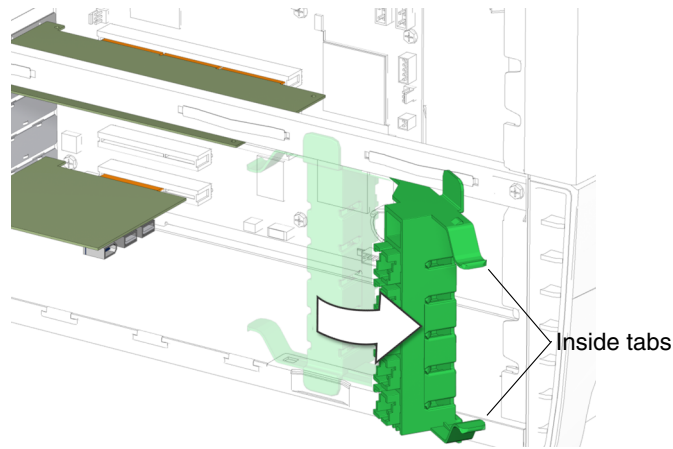
---

**Note** – If you are installing an additional PCI card, check the PCI card documentation to make sure you install the PCI card into an appropriate PCI card slot. See [“General PCI Card Guidelines” on page 11-33](#).

---

3. Squeeze the inside tabs together and swing the PCI card support out.

See [FIGURE 11-37](#).



**FIGURE 11-37** Swinging Out the PCI Card Support

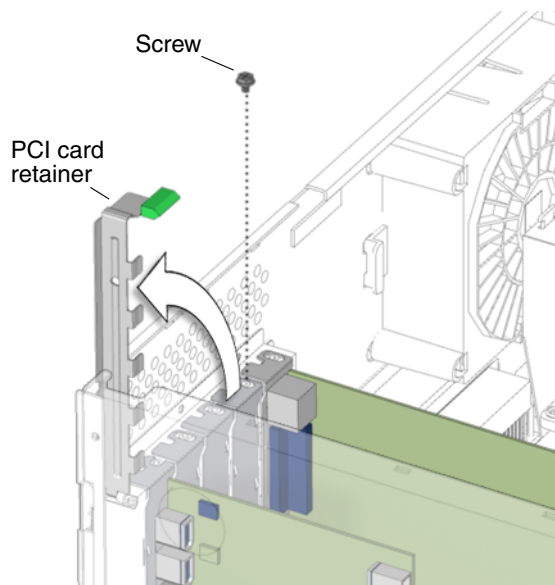
---

**Note** – If you are installing a PCI card into slot PCI4, remove the chassis cross brace according to the procedure in [“Removing the Chassis Cross Brace”](#) on page 13-51.

---

4. Using a No. 2 Phillips screwdriver, remove the screw that secures the card bracket retainer to the chassis rear panel.

See [FIGURE 11-38](#). Set the screw aside in a container.



**FIGURE 11-38** Opening the PCI Card Retainer

5. Unlatch the PCI card retainer and lift it up.

See [FIGURE 11-38](#).

6. Remove the chassis filler panel that corresponds to the PCI card slot you wish to use.

See [FIGURE 11-35](#). Remove an adjacent second filler panel if needed (SunPCI III Pro).

7. Remove the new PCI card from its antistatic container.




---

**Caution** – Handle the PCI card along the outside edges. Do not handle the PCI card along the contact edge.

---

8. Face the PCI card so that the PCI bracket aligns with the chassis rear panel slot and the PCI card edge aligns with the motherboard PCI card slot.

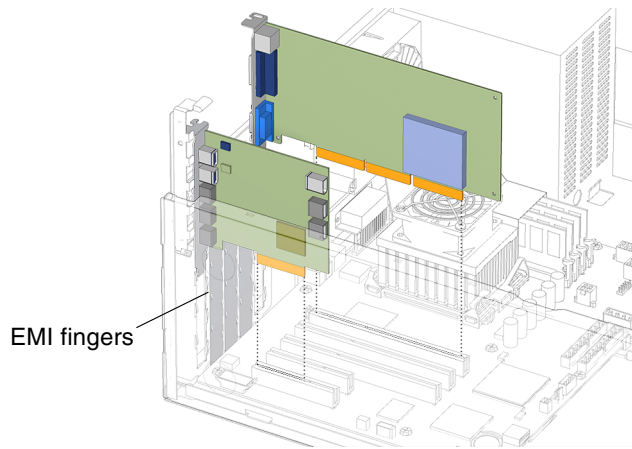
9. Insert the PCI card into the PCI card slot.

See [FIGURE 11-39](#).

---

**Note** – If you chose to keep the chassis in its upright position, use care that you do not tip over the chassis.

---



**FIGURE 11-39** Installing the PCI Card

10. Firmly press the PCI card straight down into the PCI card slot until it is fully seated in the slot.

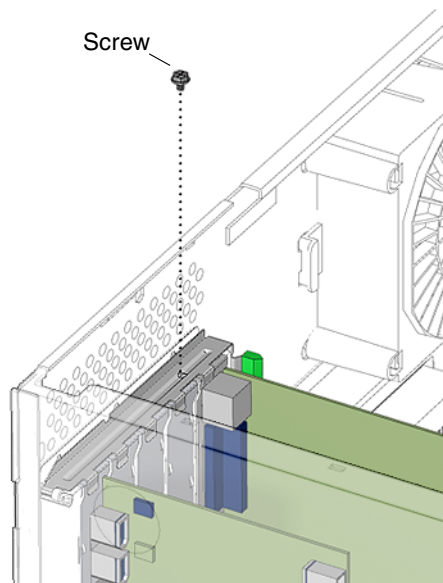
---

**Note** – Use care not to damage the EMI fingers around the PCI card slots.

---

11. Close the PCI card retainer so that it snaps into place.
12. Use a No. 2 Phillips screwdriver to fasten the screw that secures the PCI card retainer.

See [FIGURE 11-40](#).

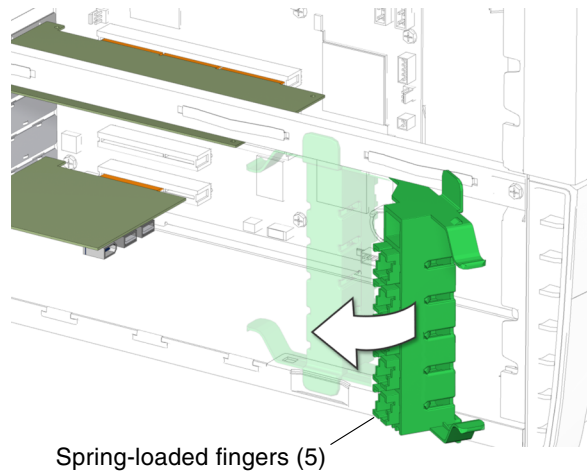


**FIGURE 11-40** Fastening the PCI Card Retainer

13. If you installed a PCI card into slot PCI4, install the chassis cross brace according to the procedure in [“Installing the Chassis Cross Brace” on page 13-53](#).
14. If you installed PCI cards after installing the motherboard, return to [Step 15 of “Installing the Motherboard” on page 11-50](#).
15. Swing the PCI card support back down into the chassis.
16. Align the center of the PCI card support fingers with each PCI card.
17. Press the PCI card support toward the motherboard until it clicks in place, fully closed.

See [FIGURE 11-41](#).





**FIGURE 11-41** Closing the PCI Card Support

**18. Inspect the PCI card fasteners to verify that:**

- The PCI card panel slot screws are tight.
- The PCI cards are well seated in the motherboard.

**19. If you installed PCI cards after installing the NVRAM, return to [Step 7](#) in “Installing the NVRAM” on page 11-27.**

**20. Reposition the chassis, install the access panel, power on the system, and verify the PCI card installation.**

Refer to:

- [“Repositioning the Chassis” on page 15-1](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

**Note** – Remember to either boot or reboot the system with the `-r` option, so that the Solaris operating system can reconfigure itself for the new PCI card.

---

## 11.6 Replacing the Motherboard

This section describes removal and installation of the motherboard. Topics include:

- “Identifying the Motherboard” on page 11-44
- “Removing the Motherboard” on page 11-46
- “Installing the Motherboard” on page 11-50



Click this film icon to view an animated version of these instructions.



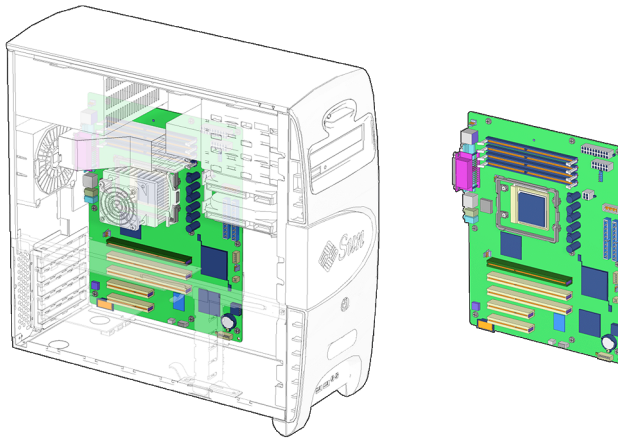
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**Caution** – This procedure is intended for Sun authorized service providers only.

---

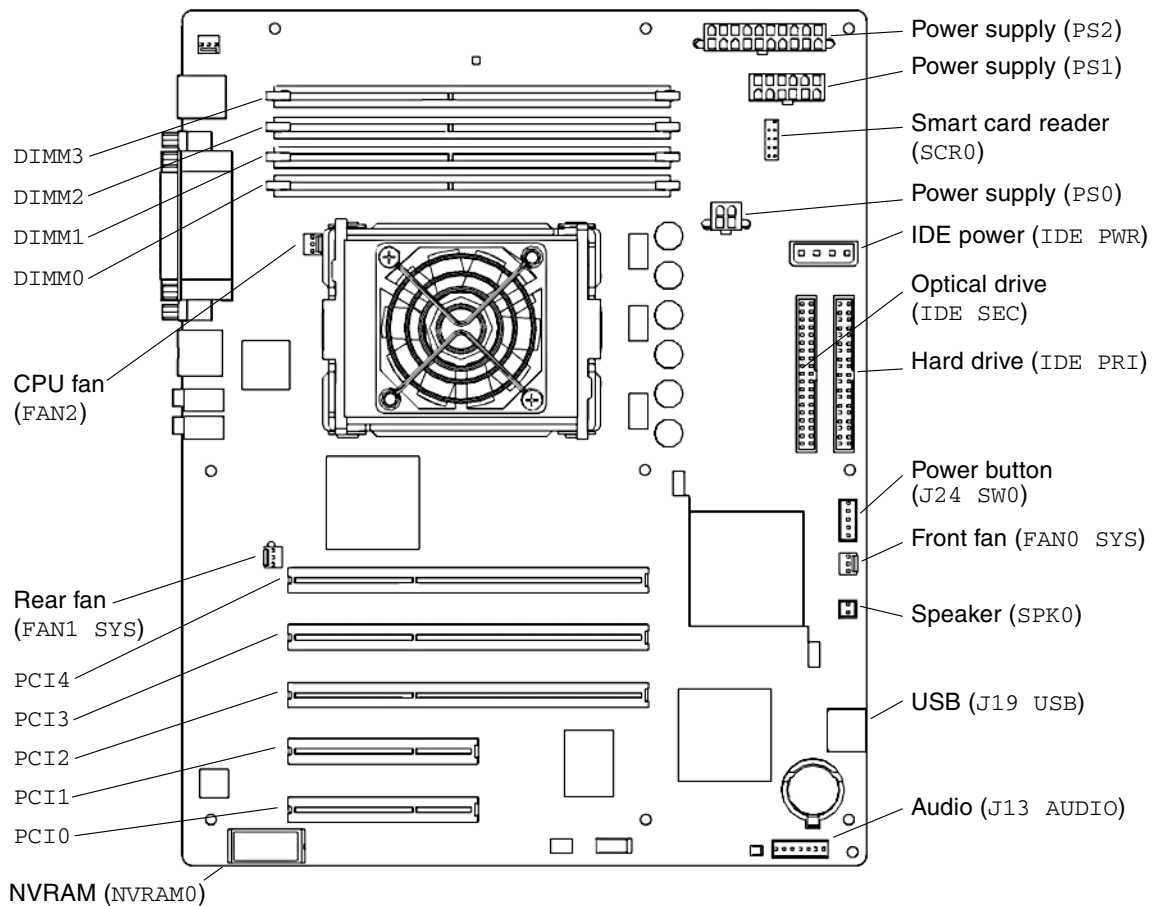
## 11.6.1 Identifying the Motherboard

The motherboard and CPU are a single replaceable unit. See [FIGURE 11-42](#).



**FIGURE 11-42** Motherboard Location and Identification

[FIGURE 11-43](#) shows the connectors and slots on the Sun Blade 1500 motherboard.



**FIGURE 11-43** Motherboard Connector Layout

[TABLE 11-7](#) lists the motherboard connectors and their functions.

**TABLE 11-7** Motherboard Connectors and Descriptions

Location	Description
DIMM0 - DIMM3	DDR 132 pin memory slots
FAN0 SYS	Front fan connection
FAN1 SYS	Rear fan connection
FAN2	CPU fan connection
IDE PRI	Primary IDE connection

**TABLE 11-7** Motherboard Connectors and Descriptions (*Continued*)

Location	Description
IDE PWR	IDE power connection
IDE SEC	Secondary IDE connection
J13 AUDIO	Audio cable connection, front panel
J19 USB	Front panel USB cable connection
J24 SW0	Power switch assembly connection
NVRAM0	Nonvolatile random access memory
PCI0 - PCI4	PCI card slots
PS0	CPU power connection
PS1	Supplemental power connection
PS2	Primary power connection
SCR0	Smart card reader connection
SPK0	Speaker connection

## 11.6.2 Removing the Motherboard

As a guide, be prepared to remove the following items before removing the motherboard:

- Chassis cross brace
- PCI card support
- (Optional) DIMM cooling duct
- (Optional) Rear fan
- DIMMs
- CPU fan and heat sink assembly
- PCI cards
- (Optional) NVRAM
- Power cables
- Signal cables
- Interface cables
- Motherboard fastening screws

### 1. Power off the system and open the chassis.

Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

**2. Locate the motherboard.**

See [FIGURE 11-42](#).

**3. Remove the chassis cross brace and PCI card support.**

---

**Note** – Do not use the chassis cross brace as a handle.

---

Refer to [“Removing the Chassis Cross Brace” on page 13-51](#). When you remove the chassis cross brace, the PCI card support falls off.

**4. (Optional) If the DIMM cooling duct and rear fan are blocking access to the motherboard, remove them.**

Refer to:

- [“Removing the DIMM Cooling Duct” on page 13-23](#)
- [“Removing the Rear Fan” on page 13-16](#)

**5. Position the chassis for component and motherboard removal.**

Refer to [“Positioning the Chassis” on page 10-16](#)

**6. Remove the DIMMs, CPU fan and heat sink assembly, and PCI cards.**

Refer to:

- [“Removing DIMMs” on page 11-3](#)
- [“Removing the CPU Fan and Heat Sink Assembly” on page 11-14](#)
- [“Removing a PCI Card” on page 11-30](#)

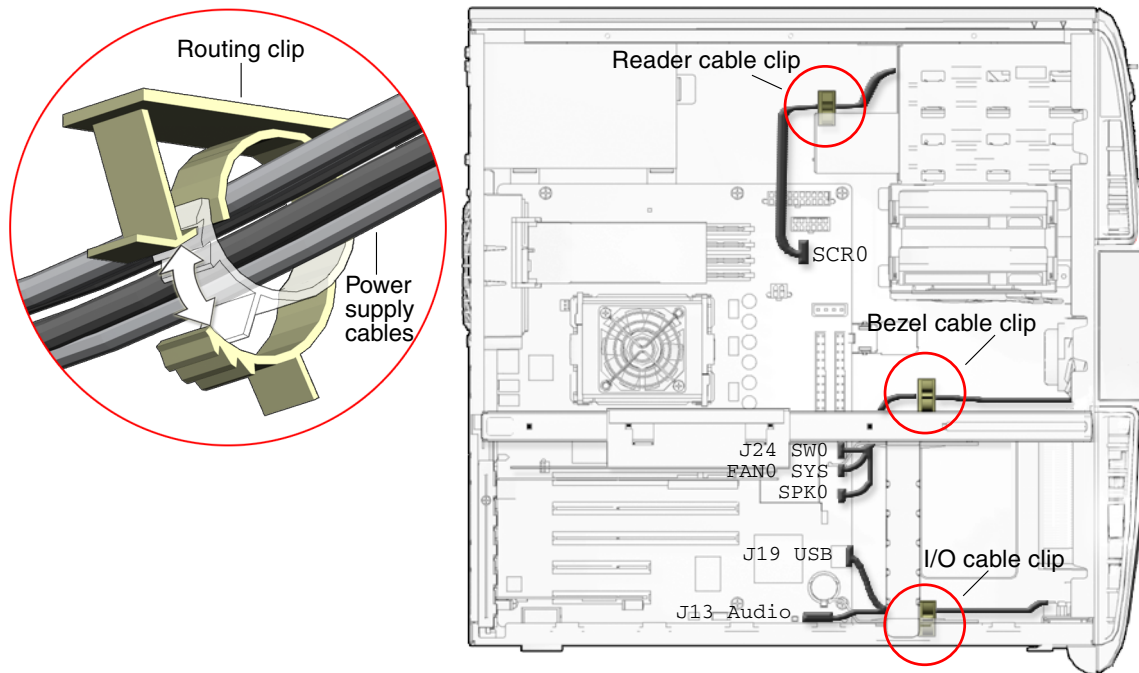
Set these components onto an antistatic mat.

**7. (Optional) If you wish to use the same ethernet address and system ID for the new motherboard, remove the NVRAM.**

Refer to [“Removing the NVRAM” on page 11-26](#). Set the NVRAM on an antistatic mat.

**8. Remove the cables from the cable clips.**

See [FIGURE 11-44](#).



**FIGURE 11-44** Removing Cables From the Clips

**9. Disconnect the following power and signal cables from the corresponding motherboard connectors and set them out of the way of the motherboard.**

See [FIGURE 11-43](#).

- Power supply cables at connectors PS0, PS1, and PS2
- IDE power at connector IDE PWR
- Power button at connector J24 SW0
- Front fan at connector FAN0 SYS
- Rear fan at connector FAN1 SYS (if the rear fan was not removed)
- Front audio at connector J13 AUDIO
- Speaker at connector SPK0

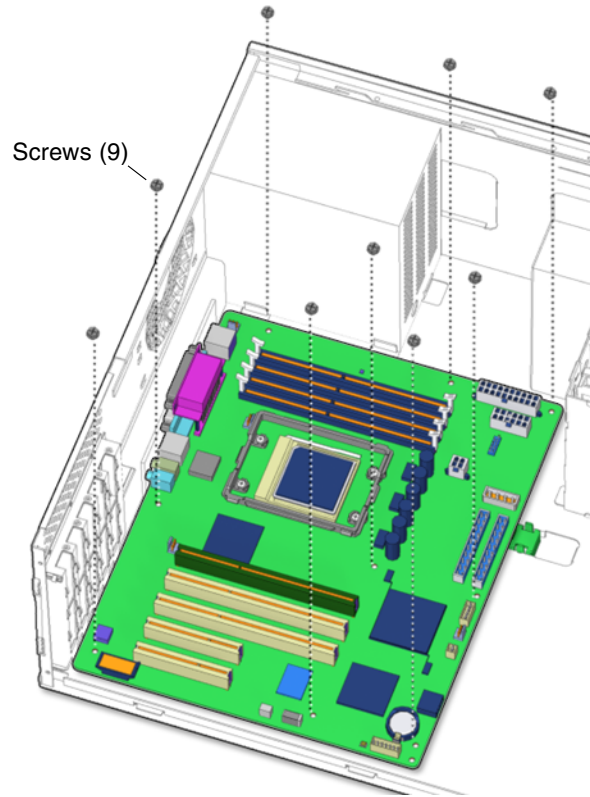
**10. Disconnect the following interface cables from the corresponding motherboard connectors and set them out of the way of the motherboard.**

See [FIGURE 11-43](#).

- Smart card reader at connector SCR0
- Hard drive at connector IDE PRI
- Optical drive at connector IDE SEC
- Front USB at connector J19 USB

11. Use the Phillips screwdriver to remove the nine (9) screws which fasten the motherboard to the chassis.

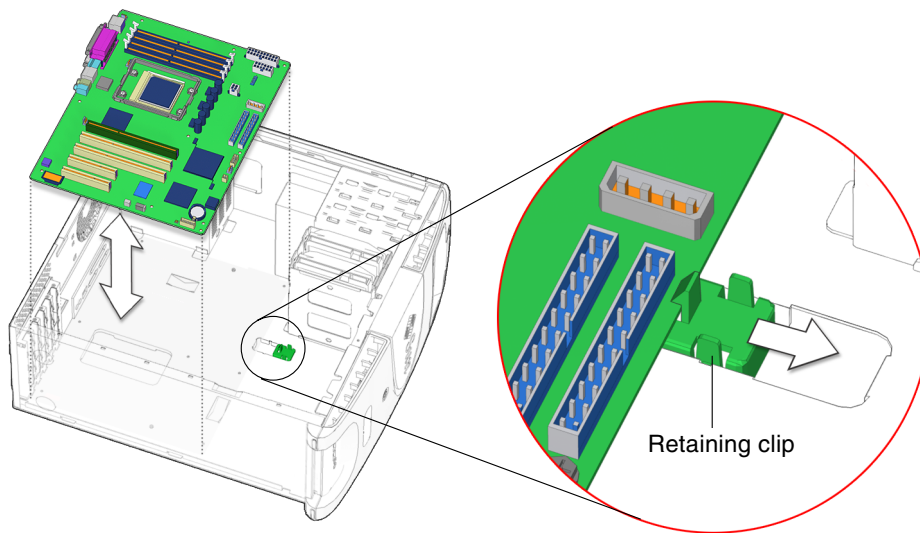
See [FIGURE 11-45](#). Set the screws aside in a container.



**FIGURE 11-45** Removing the Motherboard Fastening Screws

12. Squeeze the motherboard retaining clip and slide it forward.

See [FIGURE 11-46](#).



**FIGURE 11-46** Releasing the Motherboard Retaining Clip

13. Move the cables out of the way.
14. Lift up on the edge of the motherboard nearest the front panel, pull the motherboard away from the rear panel, and then up and out of the system.  
See [FIGURE 11-46](#).
15. Set the motherboard down onto the antistatic mat.

Proceed to [“Installing the Motherboard”](#) on page 11-50 to install the new motherboard.

## 11.6.3 Installing the Motherboard

Install the following items after installing the motherboard:

- Motherboard fastening screws
- Interface cables
- Signal cables
- Power cables
- (Optional) NVRAM
- CPU fan and heat sink assembly
- DIMMs
- PCI cards
- (Optional) Rear fan



- (Optional) DIMM cooling duct
- Chassis cross brace
- PCI card support

**1. Open and position the chassis.**

Refer to:

- [“Removing the Access Panel” on page 10-12](#)
- [“Positioning the Chassis” on page 10-16](#)

**2. Locate where the motherboard is to be installed.**

See [FIGURE 11-42](#).

**3. Remove the new motherboard from its antistatic package and place it on an antistatic mat.**

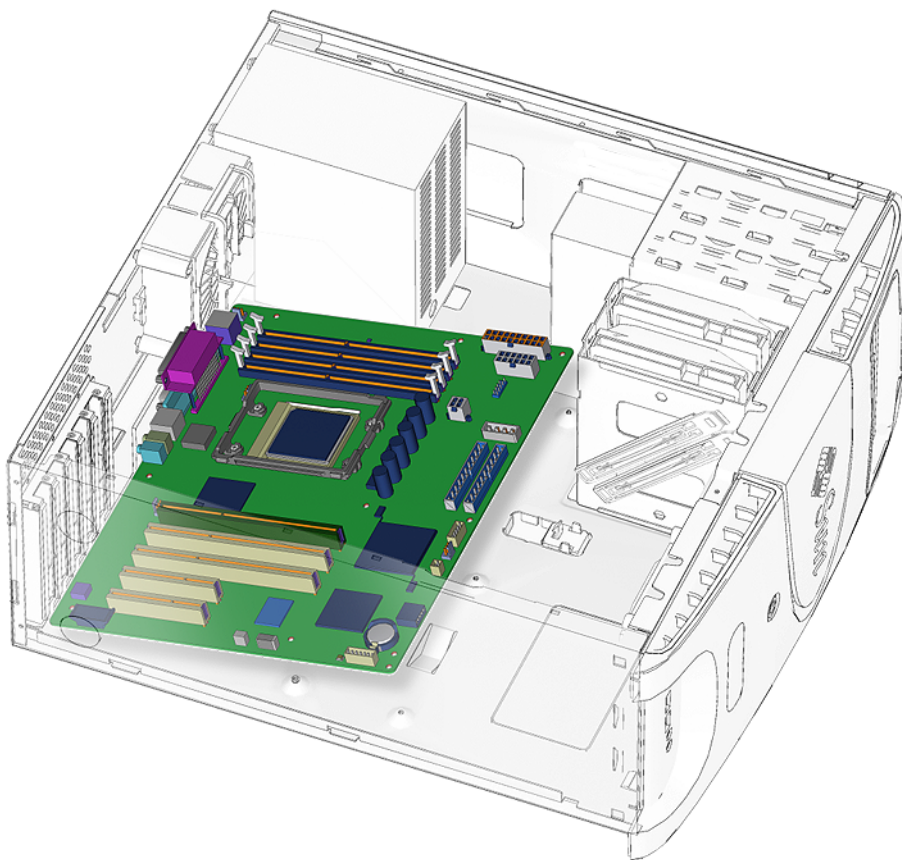
**4. Remove the new CPU fan and heat sink assembly from its packaging and set it aside.**

**5. Move all cables out of the way.**

**6. Align the motherboard rear panel connectors with the matching holes in the rear panel and place the motherboard into the chassis.**

**7. Angle the motherboard down at the rear so that the connectors enter the respective holes in the rear panel, then tilt the front edge of the motherboard down so that it lays flat in the chassis.**

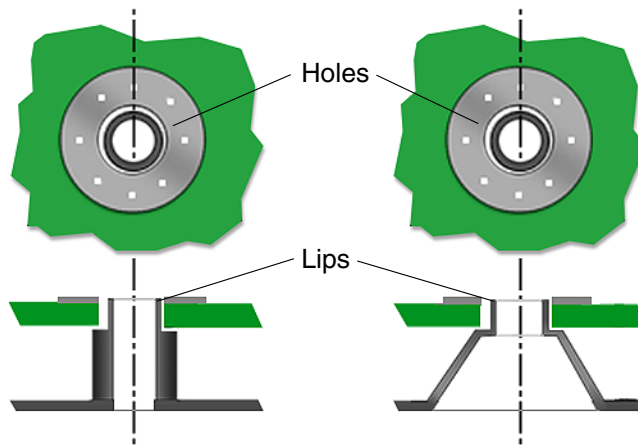
See [FIGURE 11-47](#).



**FIGURE 11-47** Placing the Motherboard Into the System Chassis

8. Align the motherboard so that the standoffs fit into the holes.

The upper center and lower center mounting holes have standoffs with raised lips that fit into the respective holes of the motherboard. See [FIGURE 11-48](#).



**FIGURE 11-48** Aligning the Lips in the Holes

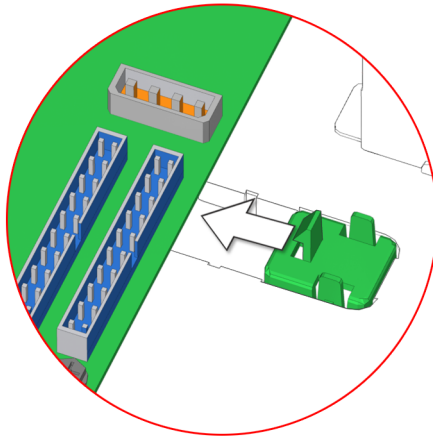
---

**Note** – It is very important to make sure the lips are located in the holes. Improper alignment can damage the motherboard when the mounting screws are tightened.

---

9. Squeeze both tabs of the motherboard retaining clip together and slide the clip toward the rear of the system until it clicks in place, securing the front edge of the motherboard.

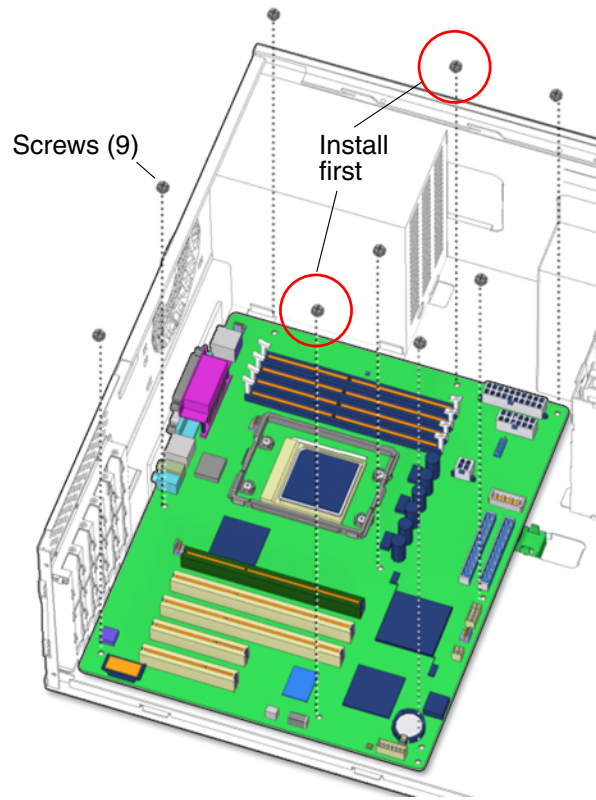
See [FIGURE 11-49](#).



**FIGURE 11-49** Latching the Motherboard Retaining Clip

- 10. While maintaining a downward pressure on the motherboard, use a No. 2 Phillips screwdriver to fasten the upper center and lower center motherboard mounting screws.**

Then fasten the remaining seven screws. See [FIGURE 11-50](#)

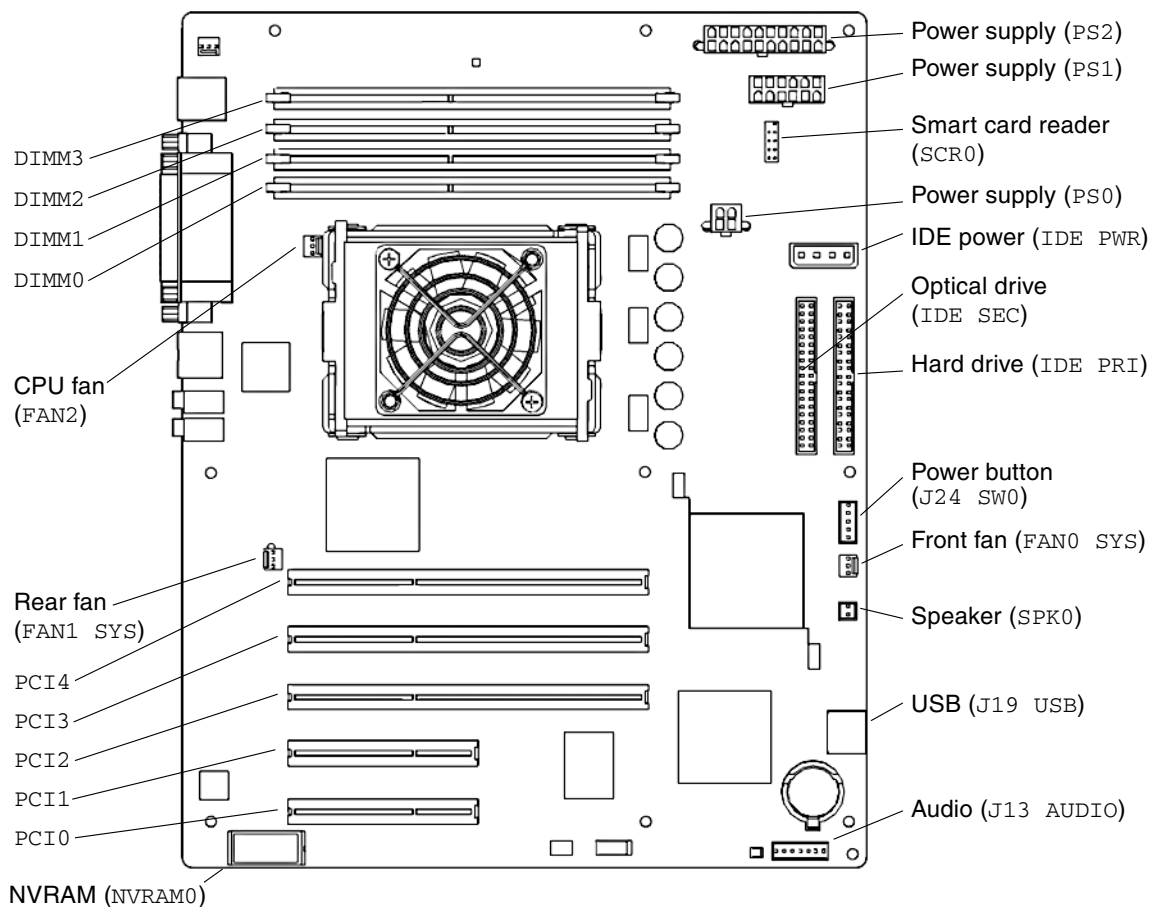


**FIGURE 11-50** Installing the Motherboard Mounting Screws

**11. Connect the interface cables to the corresponding motherboard connectors.**

See [FIGURE 11-51](#).

- Smart card reader at connector SCR0
- Hard drive at connector IDE PRI
- Optical drive at connector IDE SEC
- Front USB at connector J19 USB



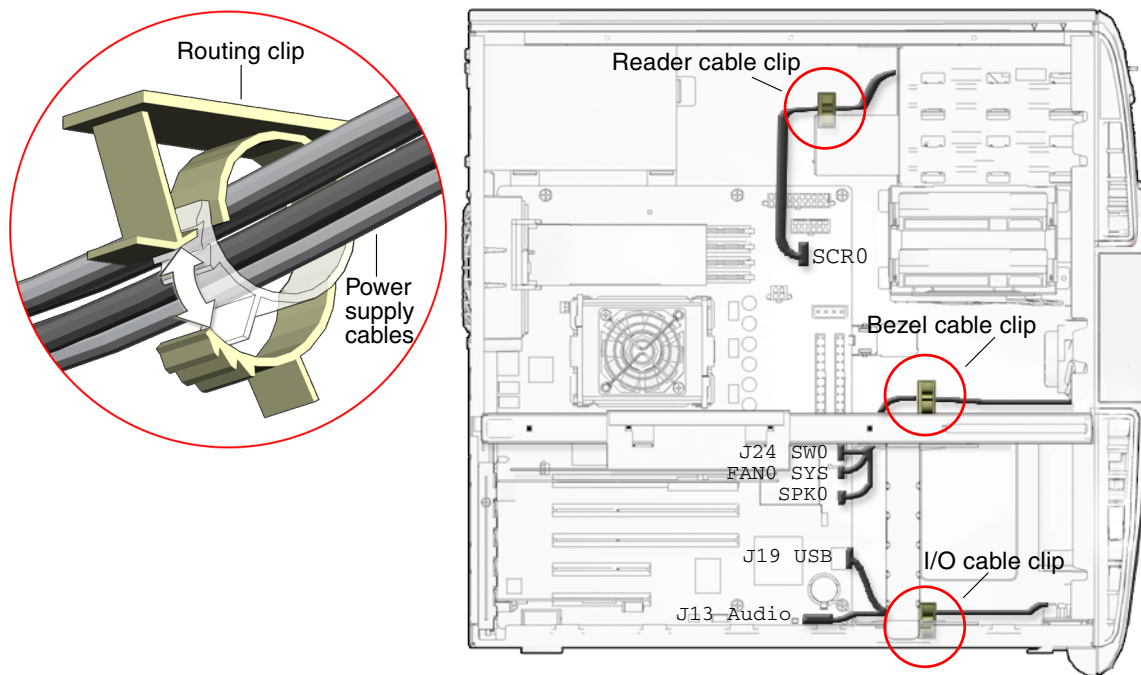
**FIGURE 11-51** Motherboard Connectors

**12. Connect the power and signal cables to the corresponding component connector:**

- Power supply cables at connectors PS0, PS1, and PS2
- IDE power at connector IDE PWR
- Power button at connector J24 SW0
- Front fan at connector FAN0 SYS
- Rear fan at connector FAN1 SYS (if the rear fan was not removed)
- Front audio at connector J13 AUDIO
- Speaker at connector SPK0

**13. Secure the cables into the cable clips.**

See [FIGURE 11-52](#).



**FIGURE 11-52** Securing Cables Into the Clips

14. If you removed the old NVRAM prior to removing the old motherboard, install the old NVRAM onto the new motherboard.  
Refer to [“Replacing the NVRAM” on page 11-25](#).
15. Install the PCI cards, the new CPU fan and heat sink assembly, and the DIMMs.  
Refer to:
  - [“Installing a PCI Card” on page 11-38](#)
  - [“Installing the CPU Fan and Heat Sink Assembly” on page 11-18](#)
  - [“Installing DIMMs” on page 11-7](#)
16. Reposition the chassis.
  - Refer to [“Repositioning the Chassis” on page 15-1](#).
17. If you removed them previously, install the rear fan and DIMM cooling duct.  
Refer to:
  - [“Installing the Rear Fan” on page 13-18](#)
  - [“Installing the DIMM Cooling Duct” on page 13-27](#)
18. Install the chassis cross brace and PCI card support.  
Refer to:

- [“Installing the Chassis Cross Brace” on page 13-53](#)
- [“Installing the PCI Card Support” on page 13-47](#)

**19. Inspect the motherboard and other component fasteners to verify that:**

- The DIMM ejectors are upright and tight.
- The rear fan bracket feet are well seated in the chassis.

**20. Inspect the motherboard cabling to verify that:**

- Smart card reader cable at connector SCR0
- Hard drive interface cable at connector IDE PRI
- Optical drive interface cable at connector IDE SEC
- Front USB cable at connector J19 USB
- Power supply cables at connectors PS0, PS1, and PS2
- IDE power cable at connector IDE PWR
- Power switch cable at connector J24 SW0
- Front fan cable at connector FAN0 SYS
- Rear fan cable at connector FAN1 SYS (if the rear fan was not removed)
- Front audio cable at connector J13 AUDIO
- Speaker cable at connector SPK0
- The cables are secure in the clips.

**21. Install the access panel, power on the system, and verify the motherboard installation.**

Refer to:

- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)



## Replacing Storage Devices

---

This chapter describes the remove and install procedures for the Sun Blade 1500 workstation storage devices.

The procedures described in this chapter are written for workstation service providers and system administrators.

This chapter contains the following topics:

- “Replacing a Hard Drive” on page 12-2
- “Replacing the Optical Drive” on page 12-9
- “Replacing the Smart Card Reader” on page 12-15



---

**Caution** – To prevent equipment damage, review the safety requirements, safety symbols, and safety precautions in “Preparing to Replace Components” on page 10-1 before you perform any replacement procedure. Additional cautions, warnings, and instructions are provided in the *Sun Blade 1500 Safety and Compliance Guide*, 817-5130. The document is available from:  
<http://www.sun.com/documentation>.

---



---

**Caution** – The procedures in this chapter are performed with the workstation chassis in an upright position. Use care that you do not tip over the chassis.

---



---

**Caution** – When servicing or removing workstation components, attach an antistatic strap to your wrist and then to a metal area on the chassis. Then disconnect the power cord from the workstation and the wall receptacle. Following this caution equalizes all electrical potentials with the workstation.

---

---

## 12.1 Replacing a Hard Drive

This section describes removal and installation of the hard drive. Topics include:

- [“Identifying the Hard Drive” on page 12-2](#)
- [“Removing a Hard Drive” on page 12-3](#)
- [“Installing the Hard Drive” on page 12-6](#)



Click this film icon to view an animated version of these instructions.

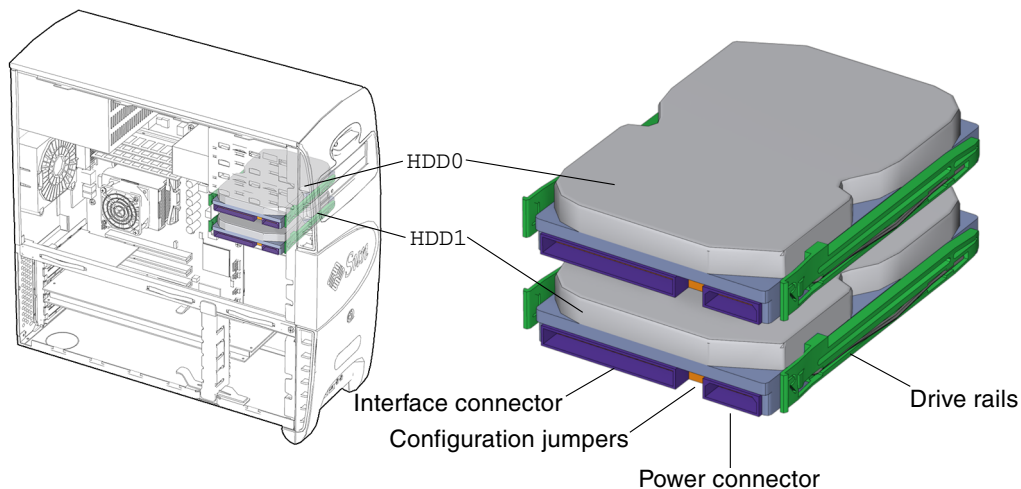
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**Note** – The hard drives of the Sun Blade 1500 workstation share the same IDE controller channel. Therefore, internal drive mirroring is not supported.

---

### 12.1.1 Identifying the Hard Drive

The workstation supports up to two hard drives. The hard drives are installed on drive rails that slide into the hard drive bay. The power and IDE connectors to the motherboard are directly accessible when the access panel is removed. The hard drives are labeled HDD0 and HDD1. HDD0, the hard drive closer to the top of the chassis, is the boot drive. See [FIGURE 12-1](#).



**FIGURE 12-1** Hard Drive Location and Identification

[TABLE 12-1](#) lists the hard drive specifications.

**TABLE 12-1** Hard Drive Specifications

Specification	Value
Capacity	120 GBytes
Speed	7200 RPM
Access Time	9.5 mseconds
Interface	ATA 100

## 12.1.2 Removing a Hard Drive

**Note** – The Sun Blade 1500 workstation can accommodate up to two hard drives. If you are not removing an existing drive, proceed to [“Installing the Hard Drive” on page 12-6](#).

### 1. Power off the system and open the chassis.

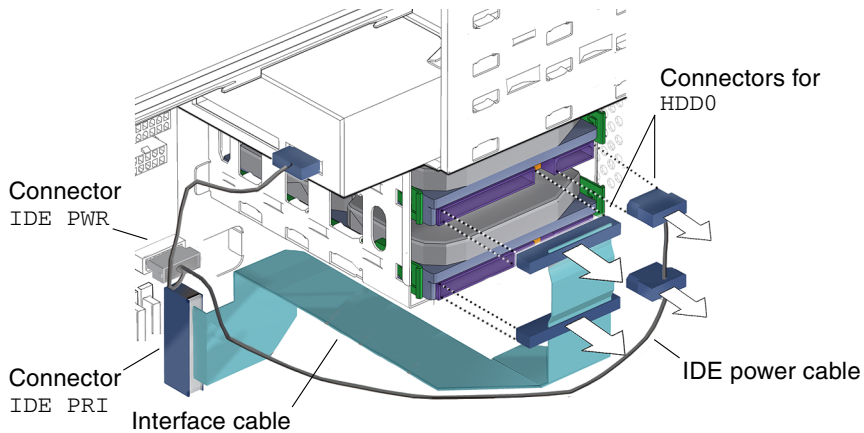
Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

2. Locate the hard drive to be removed.

See [FIGURE 12-1](#).

3. Disconnect the power and interface cables from all installed hard drives. See [FIGURE 12-2](#).

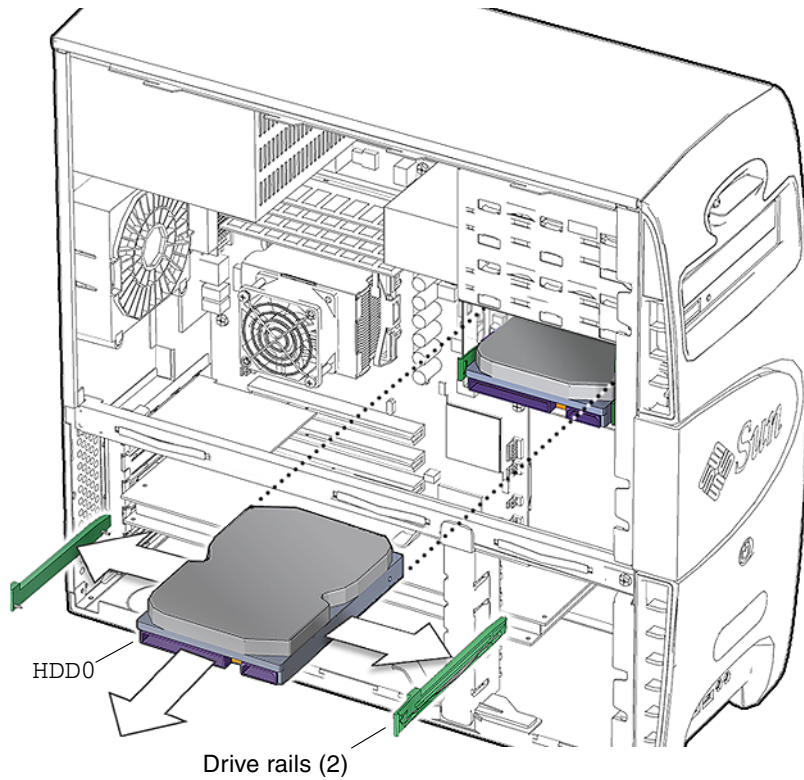


**FIGURE 12-2** Disconnecting the Hard Drive Cables

4. Squeeze the green tabs on both sides of the hard drive to be removed.

5. Pull the hard drive out of the hard drive bracket.

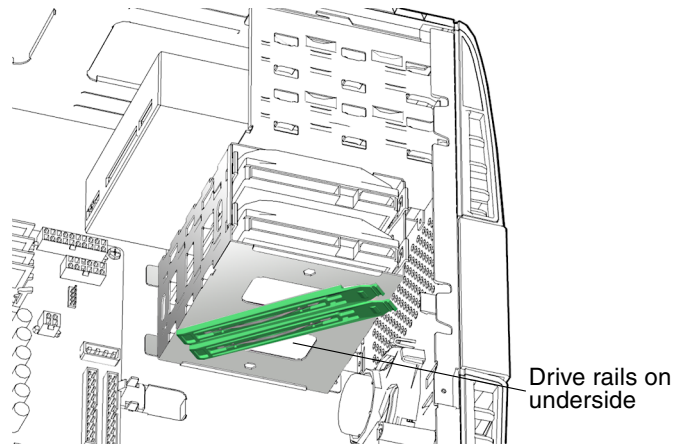
See [FIGURE 12-3](#).



**FIGURE 12-3** Removing the Hard Drive

6. Set the hard drive aside on an antistatic mat.
7. Pull the green plastic drive rails off the sides of the hard drive.

See [FIGURE 12-3](#). If you are not going to immediately replace the hard drive with a new one, store them on the underside of the hard drive bay. See [FIGURE 12-4](#).



**FIGURE 12-4** Storing the Drive Rails

**8. Choose your next step:**

- If you removed the hard drive to replace it, proceed to [“Installing the Hard Drive” on page 12-6](#) to install the new hard drive.
- Otherwise, install the access panel and power on the system. Refer to:
  - [“Installing the Access Panel” on page 15-5](#)
  - [“Powering On the Workstation” on page 15-8](#)

## 12.1.3 Installing the Hard Drive



---

**Caution** – Use proper ESD grounding technique when handling components. Wear an antistatic wrist strap and use an antistatic mat. Store ESD-sensitive components in antistatic bags before placing them on any surface.

---

**1. Power off the system and open the chassis.**

Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

**2. Locate the hard drive bay and hard drive slots.**

See [FIGURE 12-1](#).

---

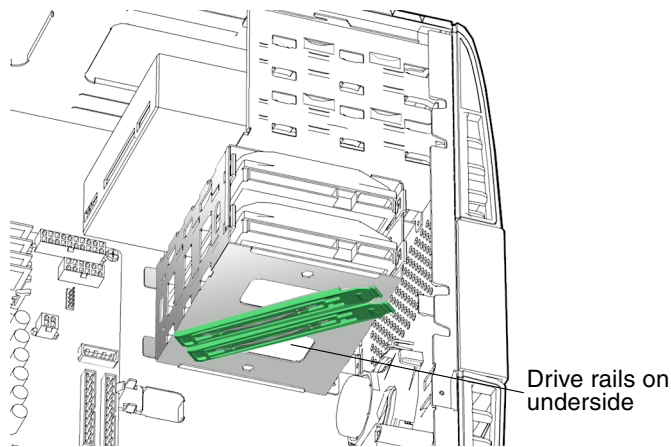
**Note** – If you are installing an additional hard drive, it might be installed in the remaining free slot in the hard drive bracket. The hard drive that you want to use to boot the system must be installed in slot HDD0, the slot closest to the top of the chassis.

---

**3. Remove the new hard drive from its packaging.**

**4. Remove the spare drive rails from their storage position, if needed.**

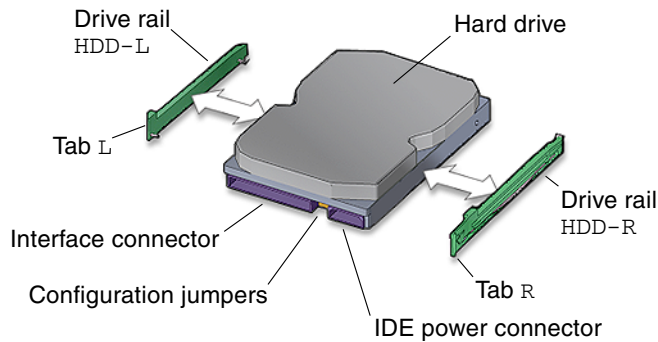
The drive rails are stored on the underside of the hard drive bay. Remove them from their storage location. See [FIGURE 12-5](#).



**FIGURE 12-5** Removing the Drive Rails From Storage

**5. Snap both drive rails into the holes on both sides of the hard drive.**

The lettering on the drive rails (HDD-L and HDD-R) is upright and the drive rail tabs are toward the hard drive power and interface connectors. See [FIGURE 12-6](#).



**FIGURE 12-6** Installing the Drive Rails

**6. Verify that the hard drive configuration jumpers are set to Cable Select or CS.**

Refer to the hard drive documentation for configuration instructions.

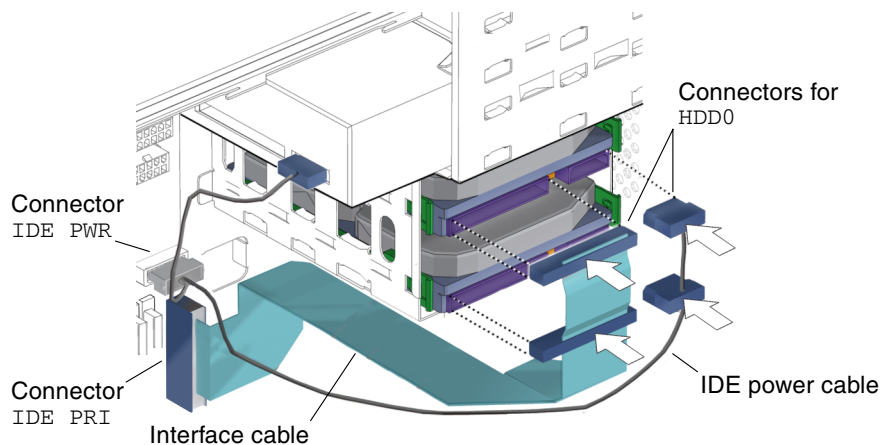
**7. Install the hard drive.**

See [FIGURE 12-3](#). Place the boot drive into the upper drive bay HDD0.

**8. Slide the hard drive into the hard drive bay until the drive rail tabs click.**

**9. Connect the hard drive interface cables to the installed hard drives.**

Connect the boot drive to the connector labeled HDD0 at the end of the interface cable. If a second drive is installed, attach the connector labeled HDD1 to it. See [FIGURE 12-7](#).



**FIGURE 12-7** Installing the Hard Drive Cables



**10. Connect the hard drive power cables to the installed hard drives.**

See [FIGURE 12-7](#).

**11. Inspect the hard drive fasteners to verify that:**

- The hard drive rails are well seated on the hard drive.
- The hard drive is tight in the hard drive bay.

**12. Inspect the hard drive cabling to verify that:**

- The hard drive power cable is firmly connected to the motherboard at IDE PWR.
- The hard drive power cable is firmly connected to (both) hard drive(s).
- The hard drive interface cable is firmly connected to the motherboard at IDE PRI.
- The hard drive interface cable is firmly connected to (both) hard drive(s).

**13. Install the access panel, power on the system, and verify the hard drive installation.**

Refer to:

- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

**Note** – If you installed an additional hard drive, remember to either boot or reboot the system with the `-x` option, so that the Solaris operating system can reconfigure itself for the new hard drive.

---

## 12.2 Replacing the Optical Drive

This section describes removal and installation of the optical drive. The same steps can be used to remove or install other removable media drives, such as a CD-ROM or tape drive. Topics include:

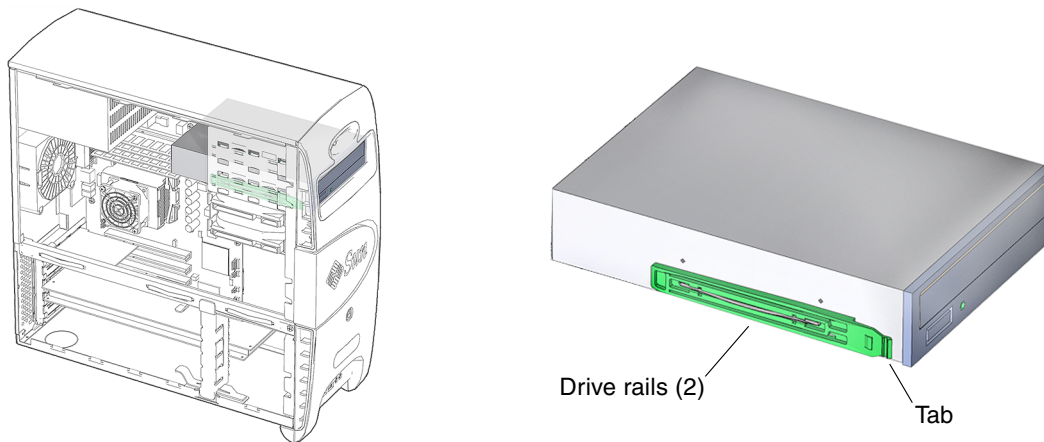
- [“Identifying the Optical Drive” on page 12-10](#)
- [“Removing the Optical Drive” on page 12-10](#)
- [“Installing the Optical Drive” on page 12-12](#)



Click this film icon to view an animated version of these instructions.

## 12.2.1 Identifying the Optical Drive

The workstation supports a single optical drive. The optical drive is installed on drive rails that slide into the removable media bay. The power and interface connectors are accessible when the access panel is removed. The optical drive bay is accessible when the bezel is removed. See [FIGURE 12-8](#).



**FIGURE 12-8** Optical Drive Location and Identification

## 12.2.2 Removing the Optical Drive

---

**Note** – The instructions in this section apply to any removable media drive, such as a CD-ROM, tape, or DVD drive.

---

1. **Power off the system, open the chassis, and remove the bezel.**

Refer to:

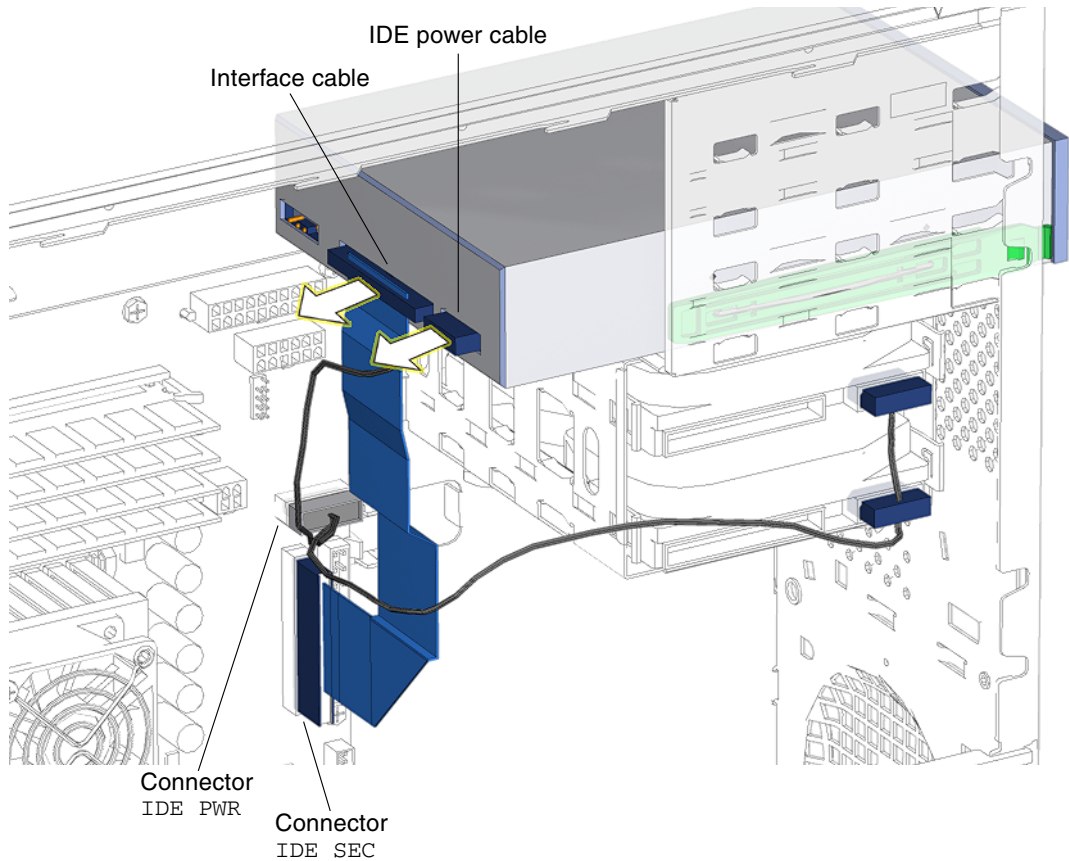
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Removing the Bezel” on page 10-14](#)

2. **Locate the optical drive.**

See [FIGURE 12-8](#).

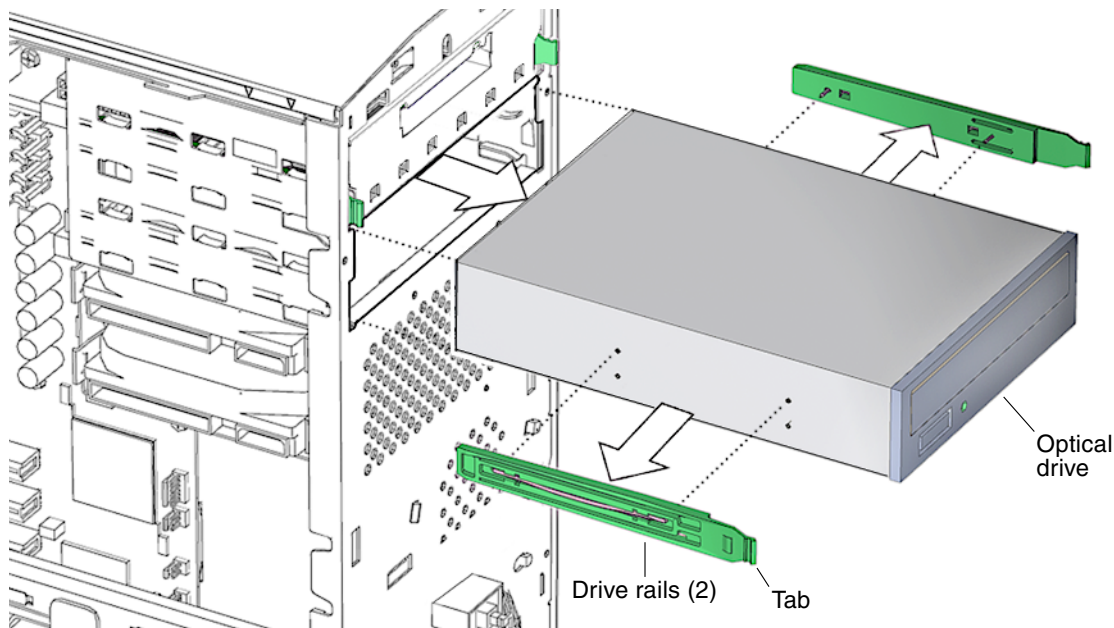
3. **Disconnect the interface cable located at the rear of the optical drive.**

See [FIGURE 12-9](#). Set the cables out of the way.



**FIGURE 12-9** Disconnecting Cables From the Optical Drive

4. **Disconnect the power cable located at the rear of the optical drive.**  
See [FIGURE 12-9](#). Set the cable out of the way.
5. **Facing the front of the chassis, squeeze together the two green plastic tabs on the front sides of the optical drive and pull the optical drive straight out of the removable media bay.**  
See [FIGURE 12-10](#).



**FIGURE 12-10** Removing the Optical Drive

6. Set the optical drive down on an antistatic mat.
7. Pull the green plastic drive rails off the sides of the optical drive.  
See [FIGURE 12-10](#). Set them aside.
8. Choose your next step:
  - If you removed the optical drive to replace it, install the new optical drive. Proceed to [“Installing the Optical Drive” on page 12-12](#).
  - Otherwise, install the bezel, the access panel, and power on the system. Refer to:
    - [“Installing the Bezel” on page 15-2](#)
    - [“Installing the Access Panel” on page 15-5](#)
    - [“Powering On the Workstation” on page 15-8](#)

## 12.2.3 Installing the Optical Drive

1. Power off the system, open the chassis, and remove the bezel.  
Refer to:
  - [“Powering Off the Workstation” on page 10-4](#)
  - [“Removing the Access Panel” on page 10-12](#)

- [“Removing the Bezel” on page 10-14](#)

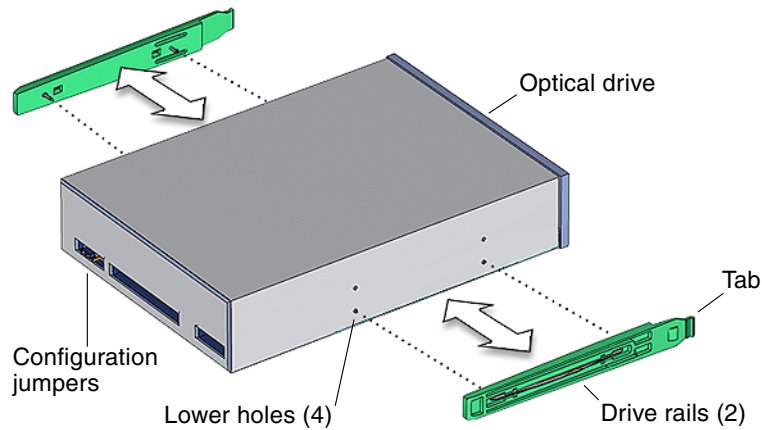
**2. Locate the optical drive bay.**

The optical drive installs into the removable media bay.

**3. Remove the new optical from its packaging.**

**4. Snap the drive rails, removed from the old optical drive, into the lower pair of holes on both sides of the optical drive.**

The drive rail tabs are toward the front of the optical drive media. See [FIGURE 12-11](#).



**FIGURE 12-11** Installing the Drive Rails

**5. Verify that the optical drive configuration jumpers are set to Master or MA.**

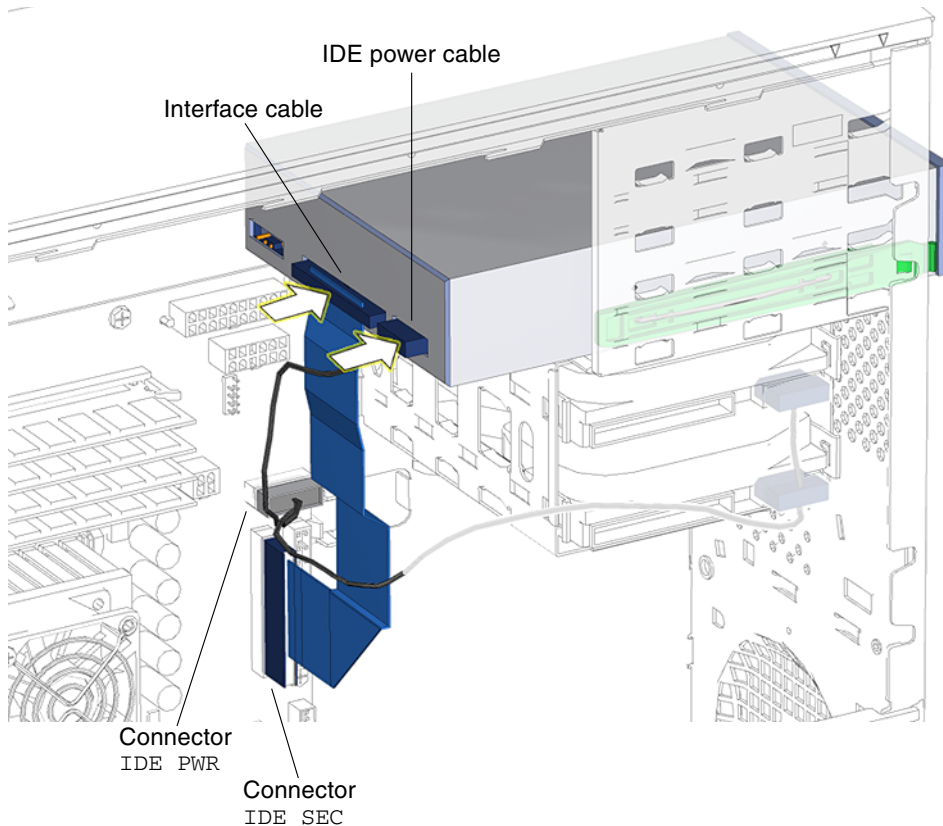
Refer to the optical drive documentation for configuration instructions.

**6. Slide the optical drive into the removable media bay, located below the smart card reader, until the drive rails click.**

See [FIGURE 12-10](#).

**7. Connect the optical drive power cable.**

See [FIGURE 12-12](#).



**FIGURE 12-12** Connecting Cables to the Optical Drive

**8. Connect the optical drive interface cable.**

See [FIGURE 12-12](#).

**9. Inspect the optical drive fasteners to verify that:**

- The optical drive rails are well seated on the optical drive.
- The optical drive is tight in the removable media bay.

**10. Inspect the optical drive cabling to verify that:**

- The optical drive power cable is firmly connected to the motherboard at IDE PWR.
- The optical drive power cable is firmly connected to the optical drive.
- The optical drive interface cable is firmly connected to the motherboard at IDE SEC.
- The optical drive interface cable is firmly connected to optical drive.

11. Install the bezel, the access panel, power on the system, and verify the optical drive installation.

Refer to:

- [“Installing the Bezel” on page 15-2](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

**Note** – If you installed a CD-RW drive, remember to either boot or reboot the system with the `-r` option, so that the Solaris operating system can reconfigure itself for the new CD-RW drive.

---

---

**Note** – If so equipped, do not remove the plastic rivet from the headphone jack of the optical drive. Instead, use the headphone jack at the bottom of the workstation front panel.

---

---

## 12.3 Replacing the Smart Card Reader

This section describes removal and installation of the smart card reader. Topics include:

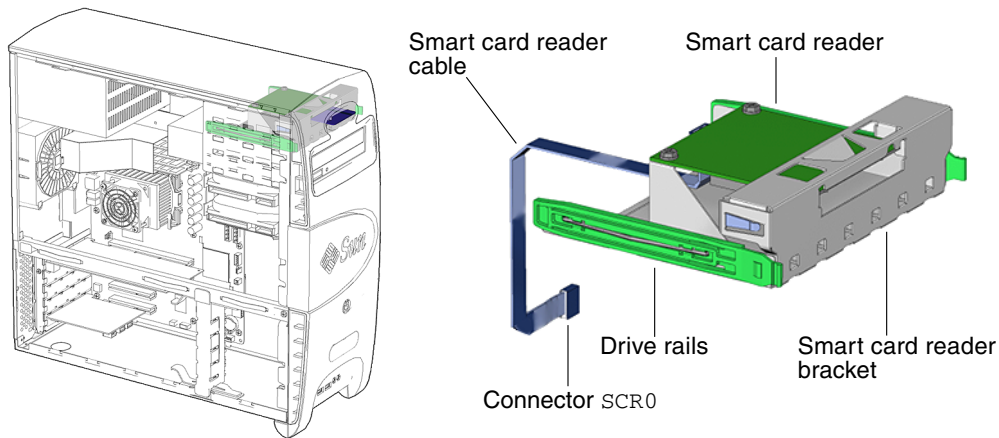
- [“Identifying the Smart Card Reader” on page 12-15](#)
- [“Removing the Smart Card Reader” on page 12-16](#)
- [“Installing the Smart Card Reader” on page 12-20](#)



Click this film icon to view an animated version of these instructions.

### 12.3.1 Identifying the Smart Card Reader

The workstation supports one smart card reader. The smart card reader is installed on the smart card reader bracket. The bracket has drive rails that enable it to slide into the removable media bay. See [FIGURE 12-13](#). The removable media bay is accessible when the front bezel is removed. The smart card reader connector is accessible when the access panel is removed.



**FIGURE 12-13** Smart Card Reader Location and Identification

## 12.3.2 Removing the Smart Card Reader

1. **Power off the system, open the chassis, and remove the bezel.**

Refer to:

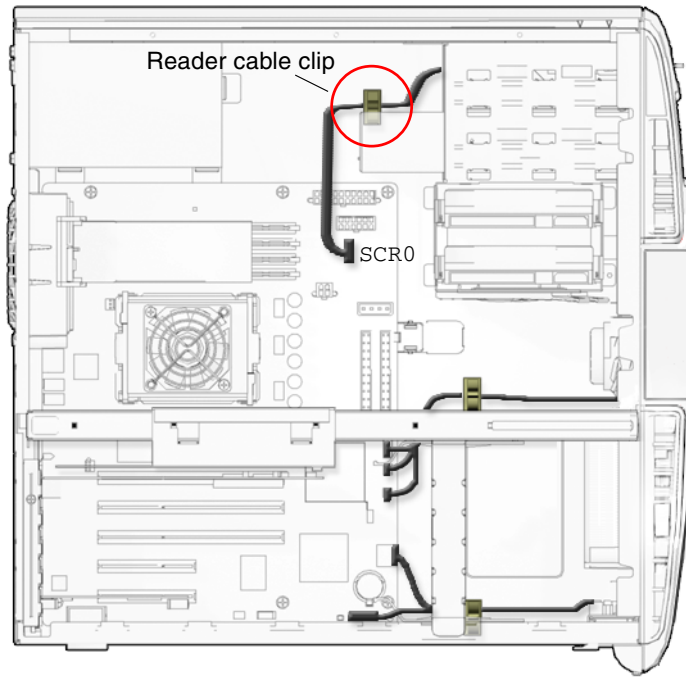
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Removing the Bezel” on page 10-14](#)

2. **Locate the smart card reader.**

The smart card is installed on a smart card reader bracket that fits into the top slot of the removable media bay. See [FIGURE 12-13](#).

3. **Open the reader cable clip at the top of the chassis and remove the smart card reader interface cable from the clip.** See [FIGURE 12-14](#).

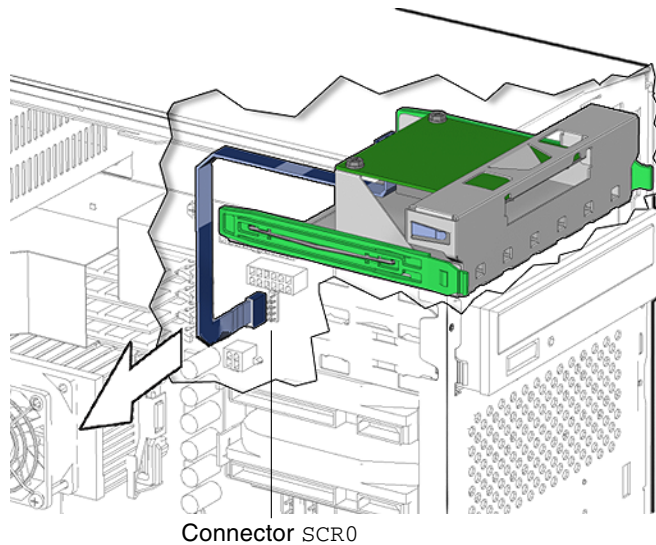




**FIGURE 12-14** Removing the Smart Card Reader Interface Cable From the Reader Cable Clip

**4. Disconnect the interface cable from the motherboard at SCR0.**

See [FIGURE 12-15](#).



**FIGURE 12-15** Disconnecting the Smart Card Reader Interface Cable

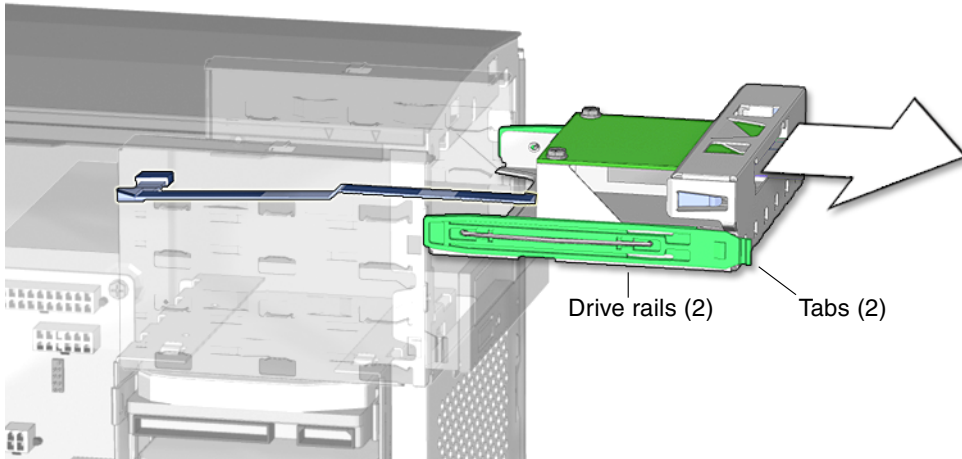
---

**Note** – Do not remove the cable from the rear of the smart card reader.

---

5. Squeeze together the two green plastic tabs of the drive rails and pull the smart card reader bracket, with its cable attached, straight out of the removable media bay.

See [FIGURE 12-16](#). Set the smart card reader bracket down on an antistatic mat.

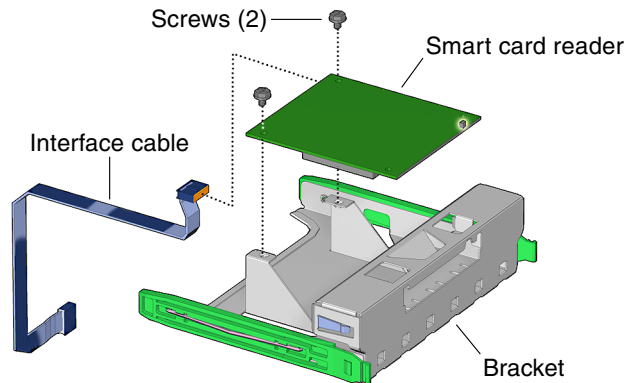


**FIGURE 12-16** Removing the Smart Card Reader

6. If you removed the smart card reader bracket to replace the interface cable, return to [Step 3](#) of “[Removing the Smart Card Reader Cable](#)” on [page 14-4](#).

7. Remove the interface cable from the smart card reader.

See [FIGURE 12-17](#). Set the cable aside.



**FIGURE 12-17** Removing Smart Card Reader Interface Cable

8. Using a No. 2 Phillips screwdriver, remove the two screws that secure the smart card reader to its bracket.

See [FIGURE 12-17](#). Set the screws aside in a container.

**9. Tilt and lift the smart card reader from the bracket.**

See [FIGURE 12-17](#). Set the smart card reader aside.

**10. Choose your next step:**

- If you removed the smart card reader to replace it, install the new smart card reader. Proceed to [“Installing the Smart Card Reader” on page 12-20](#).
- Otherwise, install the bezel, the access panel, and power on the system. Refer to:
  - [“Installing the Bezel” on page 15-2](#)
  - [“Installing the Access Panel” on page 15-5](#)
  - [“Powering On the Workstation” on page 15-8](#)

## 12.3.3 Installing the Smart Card Reader

**1. Power off the system, open the chassis, and remove the bezel.**

Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Removing the Bezel” on page 10-14](#)

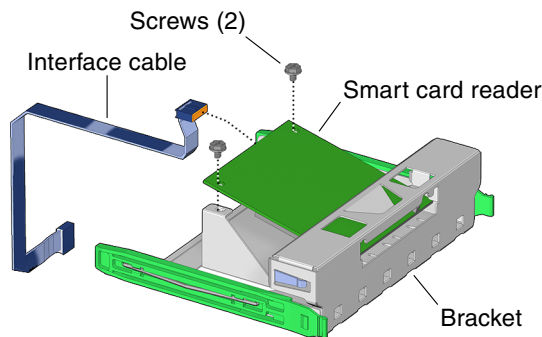
**2. Locate the smart card reader bracket.**

The smart card reader installs into the smart card reader bracket. See [FIGURE 12-13](#).

**3. Remove the new smart card reader from its packaging.**

**4. Tilt the reader, component side down, into the bracket rails and slide in until it stops.**

See [FIGURE 12-18](#).



**FIGURE 12-18** Installing Smart Card Reader Into Bracket

5. Using a No. 2 Phillips screwdriver, install both screws that secure the smart card reader to its bracket.

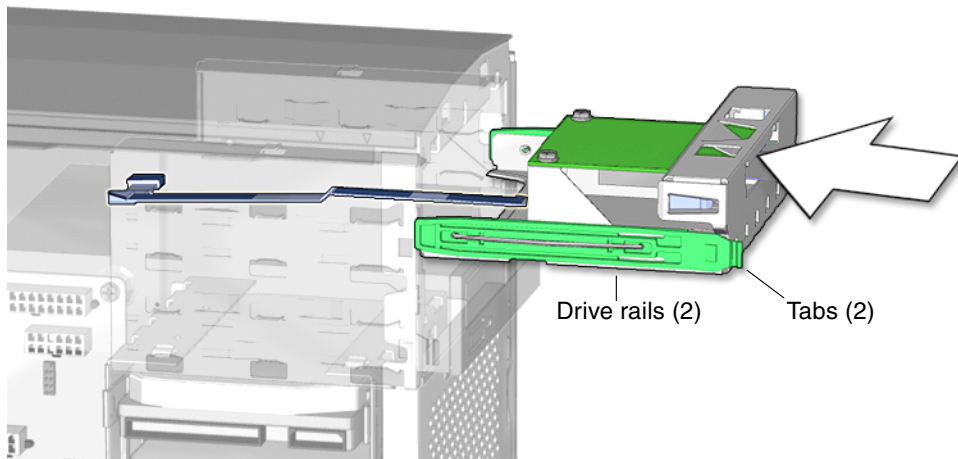
See [FIGURE 12-18](#).

6. Connect the interface cable to the smart card reader.

See [FIGURE 12-18](#).

7. Feed the interface cable into and through the removable media bay.

See [FIGURE 12-19](#).

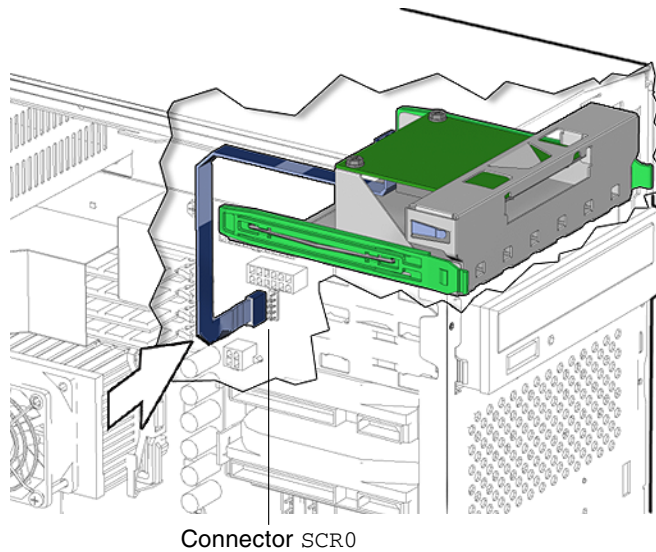


**FIGURE 12-19** Feeding Smart Card Cable Through Chassis

8. Slide the smart card reader bracket into the removable media bay until the drive rails click.

See [FIGURE 12-19](#).

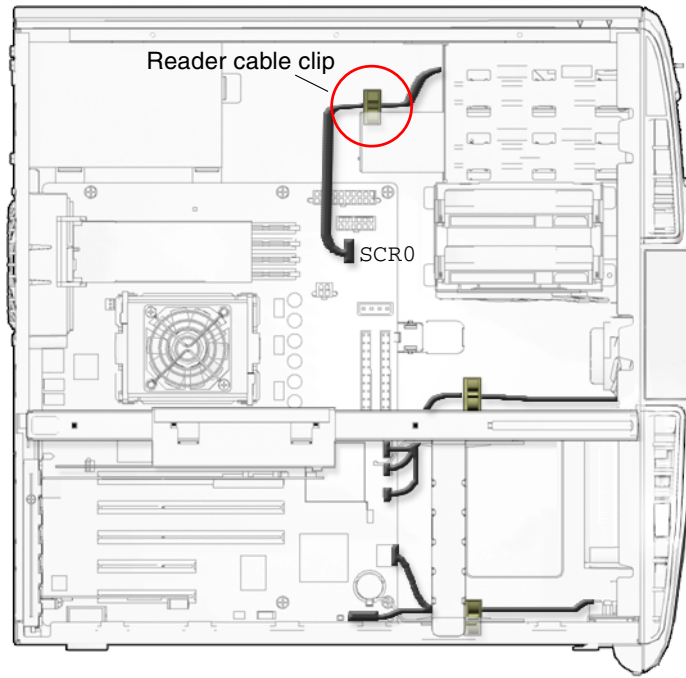
9. Reconnect the smart card reader interface cable to the motherboard at connector SCR0. See [FIGURE 12-20](#).



**FIGURE 12-20** Connecting the Smart Card Reader Interface Cable

10. Guide the smart card reader interface cable into the reader cable clip at the top of the chassis and close the clip.

See [FIGURE 12-21](#).



**FIGURE 12-21** Securing the Smart Card Reader Interface Cable into the Reader Cable Clip

- 11. Inspect the smart card reader bracket fasteners to verify that:**
  - The drive rails are well seated on the smart card reader bracket.
  - The bracket is tight in the removable media bay.
- 12. If you installed the smart card reader bracket after replacing the interface cable, return to [Step 6 of “Installing the Smart Card Reader Cable” on page 14-5](#).**
- 13. Inspect the smart card reader cabling to verify that:**
  - The smart card reader interface cable is firmly connected to the motherboard at SCR0.
  - The interface cable is firmly connected to smart card reader.
  - The interface cable is secure in the reader cable clip
- 14. Install the bezel, the access panel, power on the system, and verify the smart card reader installation.**

Refer to:

- [“Installing the Bezel” on page 15-2](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)

- [“Verifying an Installation” on page 15-11](#)



## Replacing Chassis Components

---

This chapter describes the remove and install procedures for the Sun Blade 1500 workstation chassis components.

The procedures described in this chapter are written for workstation service providers and system administrators.

This chapter contains the following topics:

- “Replacing the Power Supply” on page 13-2
- “Replacing the Front Fan” on page 13-8
- “Replacing the Rear Fan” on page 13-15
- “Replacing the DIMM Cooling Duct” on page 13-22
- “Replacing the Audio USB Board” on page 13-30
- “Replacing the Speaker” on page 13-39
- “Replacing the PCI Card Support” on page 13-45
- “Replacing the Chassis Cross Brace” on page 13-49
- “Replacing the Drive Rails” on page 13-59



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**Caution** – To prevent equipment damage, review the safety requirements, safety symbols, and safety precautions in “Preparing to Replace Components” on page 10-1 before you perform any replacement procedure. Additional cautions, warnings, and instructions are provided in the *Sun Blade 1500 Safety and Compliance Guide*, 817-5130. The document is available from:  
<http://www.sun.com/documentation>.

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**Caution** – Many of the procedures in this chapter are performed with the workstation chassis laying on its side. If you perform any of the procedures in this chapter with the chassis in its upright position, use care that you do not tip over the chassis.

---



---

**Caution** – When servicing or removing workstation components, attach an antistatic strap to your wrist and then to a metal area on the chassis. Then disconnect the power cord from the workstation and the wall receptacle. Following this caution equalizes all electrical potentials with the workstation.

---

## 13.1 Replacing the Power Supply

This section describes removal and installation of the power supply. Topics include:

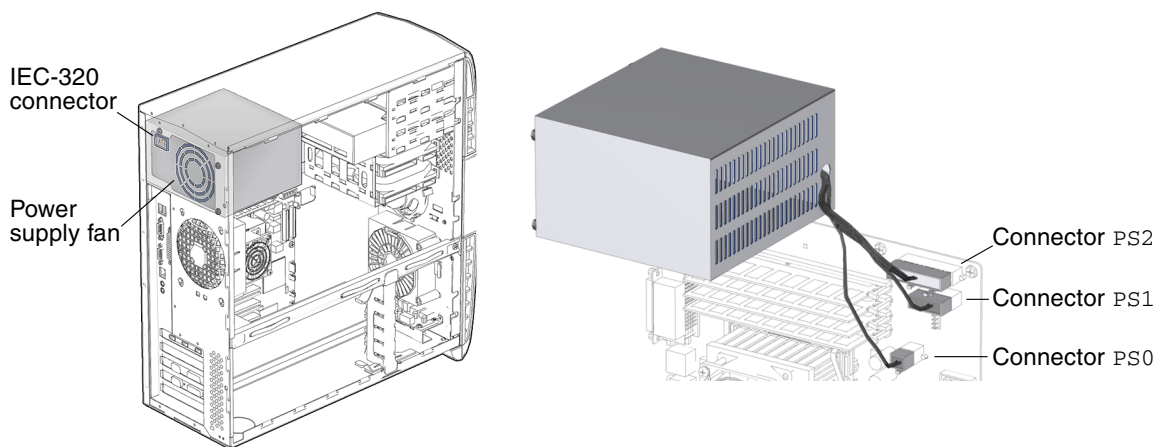
- [“Identifying the Power Supply” on page 13-2](#)
- [“Removing the Power Supply” on page 13-3](#)
- [“Installing the Power Supply” on page 13-5](#)



Click this film icon to view an animated version of these instructions.

### 13.1.1 Identifying the Power Supply

The power supply is required for workstation operation. Power supply cables are directly connected to the motherboard. The power supply provides an IEC-320 power cord connector at the rear of the chassis. See [FIGURE 13-1](#).



**FIGURE 13-1** Power Supply Location and Identification

[TABLE 13-1](#) lists the power supply specifications.

**TABLE 13-1** Power Supply Specifications

Specification	Value
Input Voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Current	8 amp, 4 amp
Wattage	420 W maximum

## 13.1.2 Removing the Power Supply

### 1. Power off the system, open and position the chassis.

Refer to:

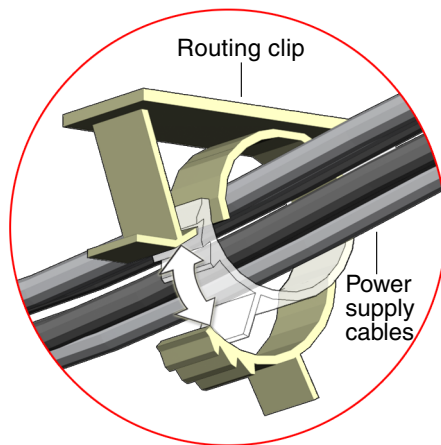
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Positioning the Chassis” on page 10-16](#)

### 2. Locate the power supply.

The power supply is fastened to the rear panel of the workstation chassis. See [FIGURE 13-1](#).

### 3. Release the cables out of the power supply cable routing clips.

See [FIGURE 13-2](#).

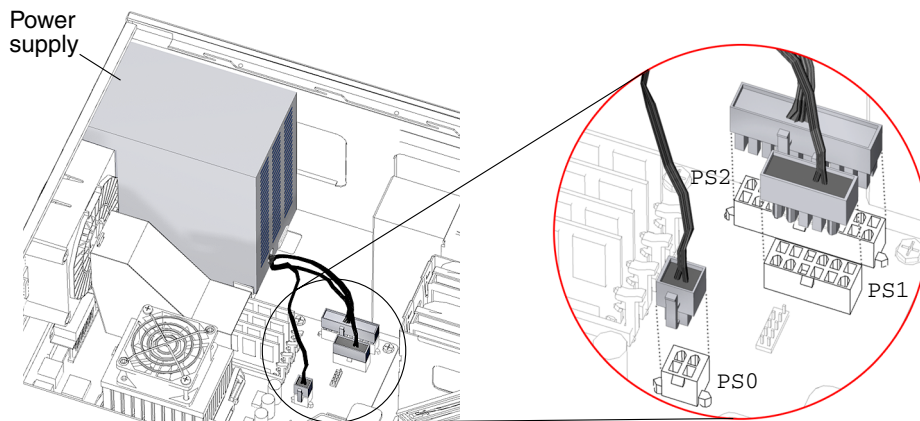


**FIGURE 13-2** Releasing Cable From Routing Clip

4. **Disconnect the three power supply cables from the motherboard power connectors.**

See [FIGURE 13-3](#). The power supply connectors have clips that fasten to the motherboard connectors, PS0, PS1, and PS2.

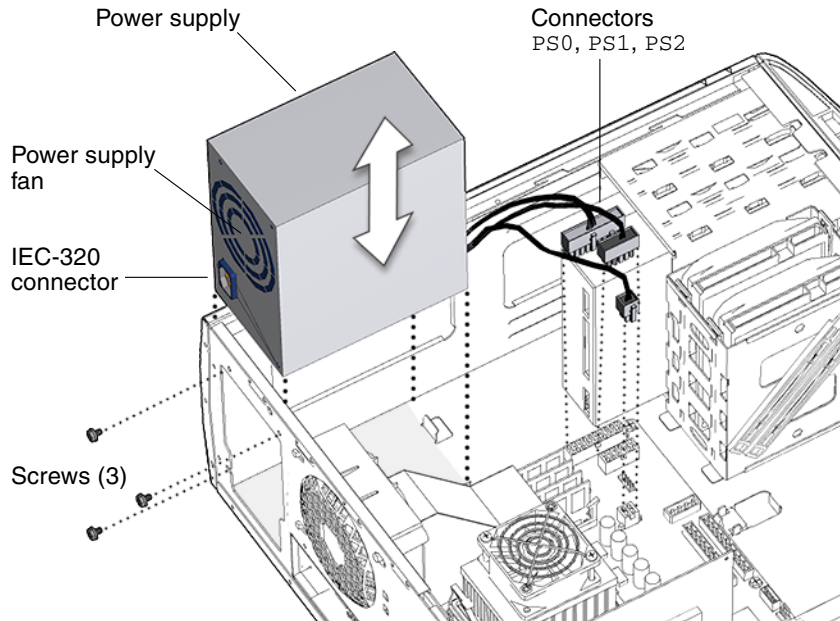
- a. **Squeeze the power supply connector clip and pull the connector from the motherboard to disengage it.**
- b. **Lift the power supply cable up and away from the motherboard.**



**FIGURE 13-3** Power Supply Motherboard Connections

5. Using a No. 2 Phillips screwdriver, remove the three screws that secure the power supply to the rear panel of the chassis.

See [FIGURE 13-4](#). Set the screws aside in a container.



**FIGURE 13-4** Removing Power Supply.

6. Rotate the rear of the power supply slightly outward, then lift the power supply up and out of the chassis.

See [FIGURE 13-4](#). Set the power supply aside on an antistatic mat.

Proceed to [“Installing the Power Supply” on page 13-5](#).

---

**Note** – The workstation cannot operate without the power supply.

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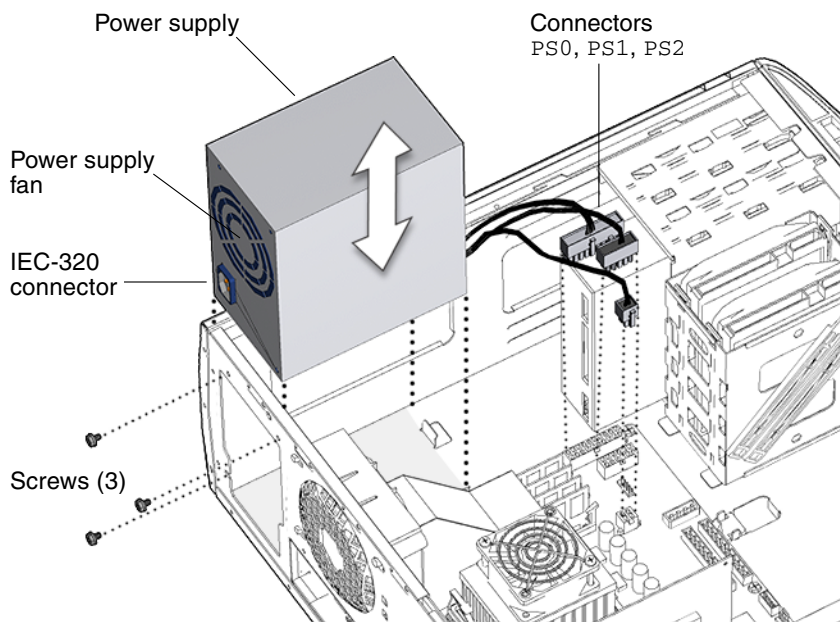
## 13.1.3 Installing the Power Supply

1. Open and position the chassis.

Refer to:

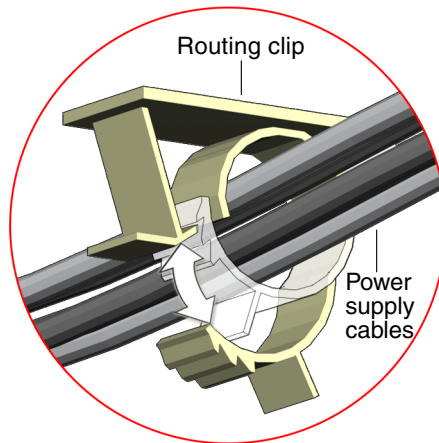
- [“Removing the Access Panel” on page 10-12](#)
- [“Positioning the Chassis” on page 10-16](#)

2. Remove the new power supply from its package.
3. Locate where the power supply is to be installed.  
See [FIGURE 13-1](#).
4. Align the power supply IEC-320 connector (power cord socket) and fan with the chassis rear panel opening.  
See [FIGURE 13-5](#).
5. Position the power supply with the chassis power supply brackets.
6. Rotate the power supply down and into the chassis.  
See [FIGURE 13-5](#).



**FIGURE 13-5** Installing the Power Supply

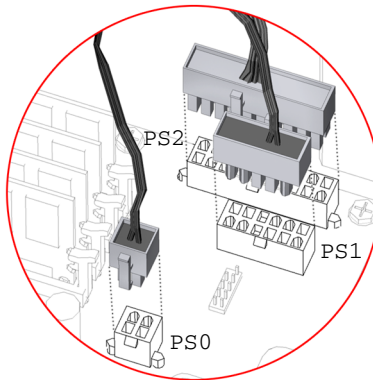
7. Using a No. 2 Phillips screwdriver, fasten the three screws that secure the power supply to the chassis.  
See [FIGURE 13-5](#)
8. Feed the cables through the cable routing clips and close the cable routing clips.  
See [FIGURE 13-6](#).



**FIGURE 13-6** Securing Cables Into Routing Clips

9. **Connect the three power supply cables to the motherboard power connectors PS0, PS1, and PS2.**

See [FIGURE 13-7](#).



**FIGURE 13-7** Attaching Power Supply Connectors

10. **Inspect the power supply fasteners to verify that:**
  - The power supply screws are in place and tight.
  - The power supply is well seated in the chassis guides.
11. **Inspect the power supply cabling to verify that:**

- The three power supply cables are firmly connected to the motherboard at PS0, PS1, and PS2.
  - The power supply cables are routed through and secure in the chassis routing clips.
- 12. Reposition the chassis, install the access panel, power on the system, and verify the power supply installation.**

Refer to:

- [“Repositioning the Chassis” on page 15-1](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

## 13.2 Replacing the Front Fan

This section describes removal and installation of the front fan. Topics include:

- [“Identifying the Front Fan” on page 13-8](#)
- [“Removing the Front Fan” on page 13-9](#)
- [“Installing the Front Fan” on page 13-11](#)

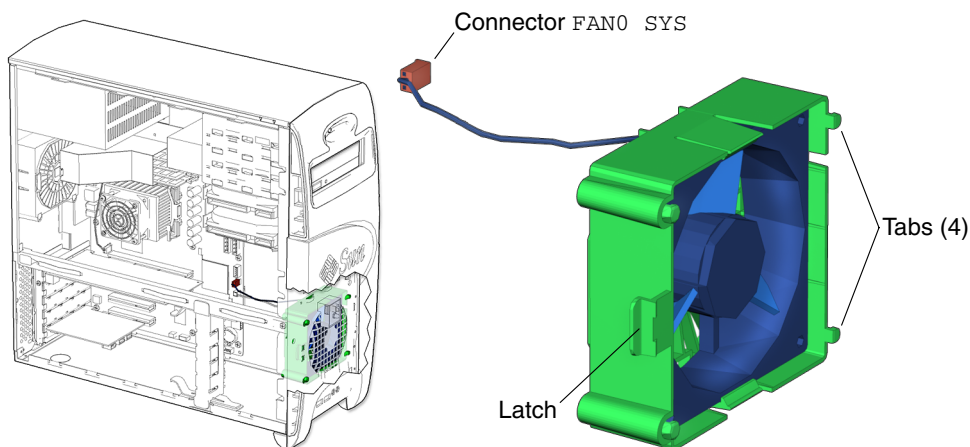


Click this film icon to view an animated version of these instructions.

### 13.2.1 Identifying the Front Fan

The front and rear fans on the Sun Blade 1500 workstation are contained in green brackets. Both fans must be operating to adequately cool the components in a closed chassis. Both fans are connected to the motherboard with a cable that carries power and signal. [FIGURE 13-8](#) shows the location of and identifies the front fan.





**FIGURE 13-8** Front Fan Location and Identification

---

**Note** – Though similar in appearance, the front and rear fan brackets are *not* interchangeable.

---

TABLE 13-2 lists the front fan specifications.

**TABLE 13-2** Front Fan Specifications

Specification	Value (Maximum)
Voltage	12 VDC
Current	0.490 AMPS
Speed	3600 RPM
Flow Rate	66 CFM (1.86 m <sup>3</sup> /min)

## 13.2.2 Removing the Front Fan

### 1. Power off the system and open the chassis.

Refer to:

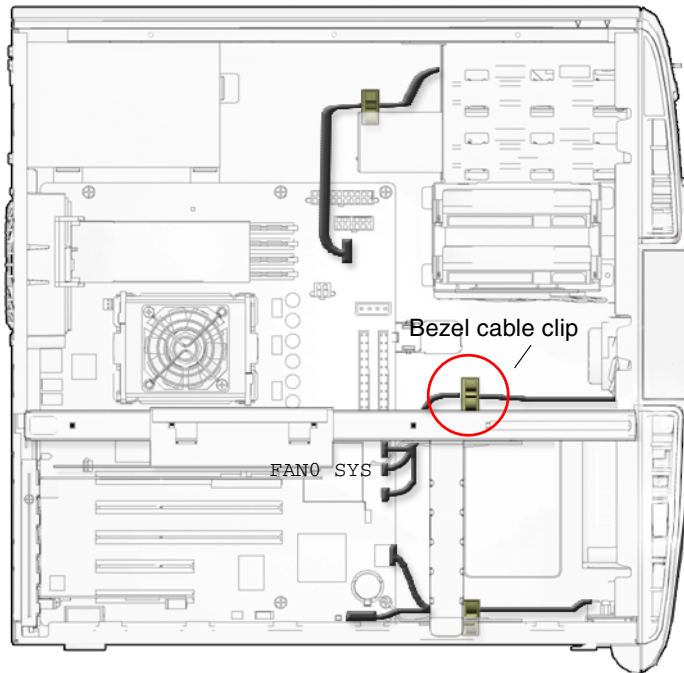
- “Powering Off the Workstation” on page 10-4
- “Removing the Access Panel” on page 10-12

**2. Locate the front fan.**

The front fan is housed in a green plastic rear fan bracket that connects to the workstation chassis. See [FIGURE 13-8](#).

**3. Open the bezel cable clip at the center of the chassis and remove the front fan cable from the clip.**

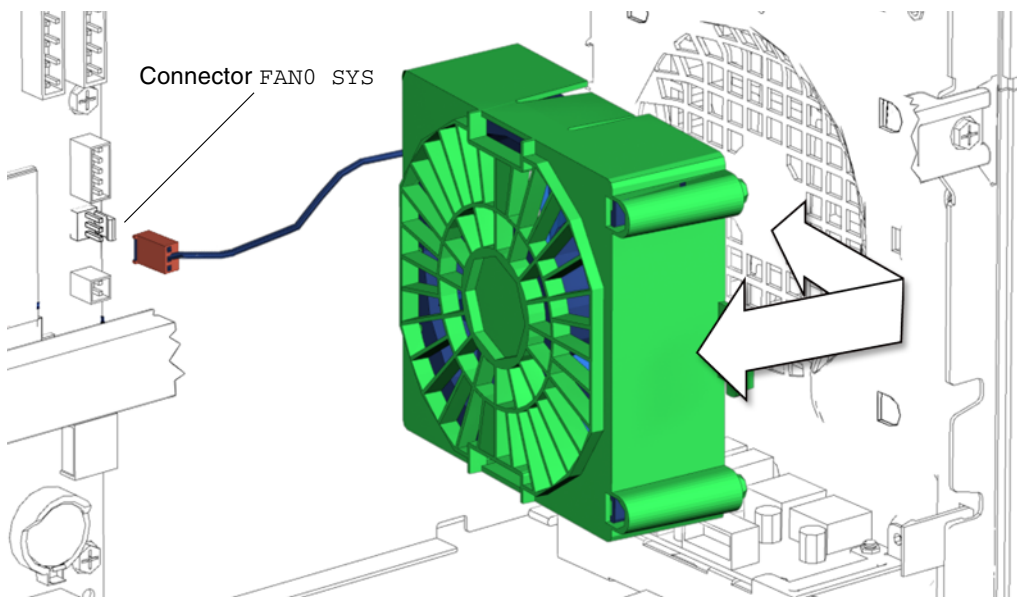
See [FIGURE 13-13](#).



**FIGURE 13-9** Removing the Front Fan Cable From the Bezel Cable Clip

**4. Disconnect the front fan cable from the motherboard front fan connector FAN0 SYS.**

See [FIGURE 13-10](#).



**FIGURE 13-10** Removing the Front Fan Bracket

5. Squeeze the front fan bracket latch, then slide the front fan bracket toward the chassis opening.

See [FIGURE 13-10](#).

6. Lift the front fan bracket out of the system chassis and set it aside.

Proceed to [“Installing the Front Fan” on page 13-11](#).




---

**Caution** – Do not operate the workstation without the front fan.

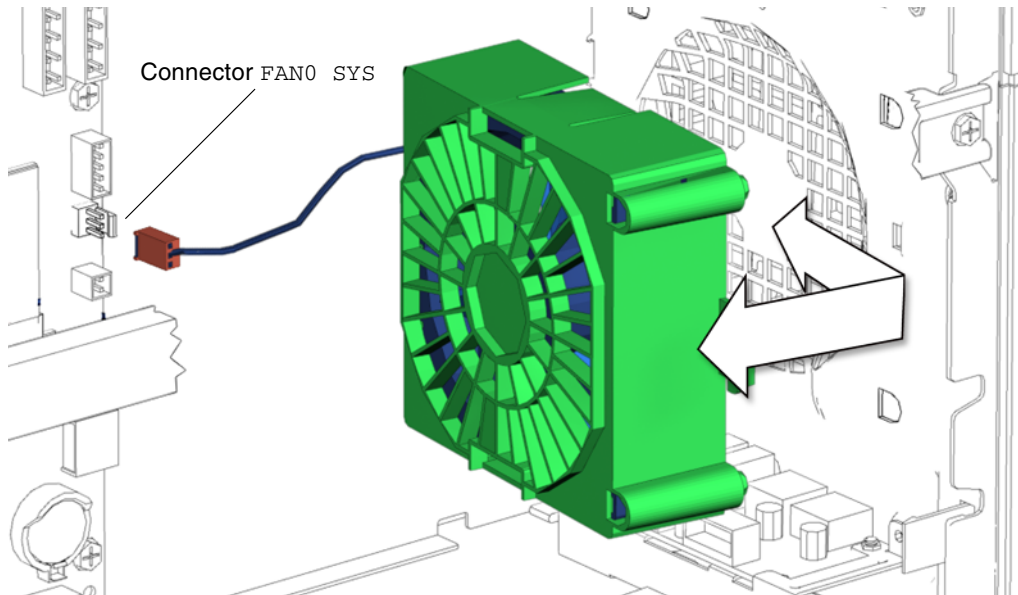
---

## 13.2.3 Installing the Front Fan

1. Open the chassis.  
Refer to [“Removing the Access Panel” on page 10-12](#)
2. Locate where the front fan is to be installed.  
See [FIGURE 13-8](#).
3. Remove the front fan assembly from its packaging.  
The front fan is shipped in its green bracket.

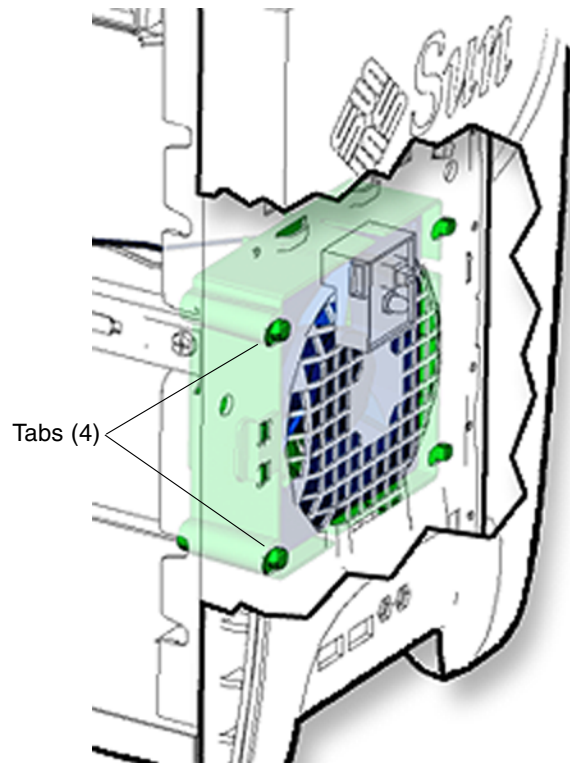
4. Align the four tabs on the open side of the fan bracket with their matching D-shaped holes in the chassis front panel.

See [FIGURE 13-11](#).



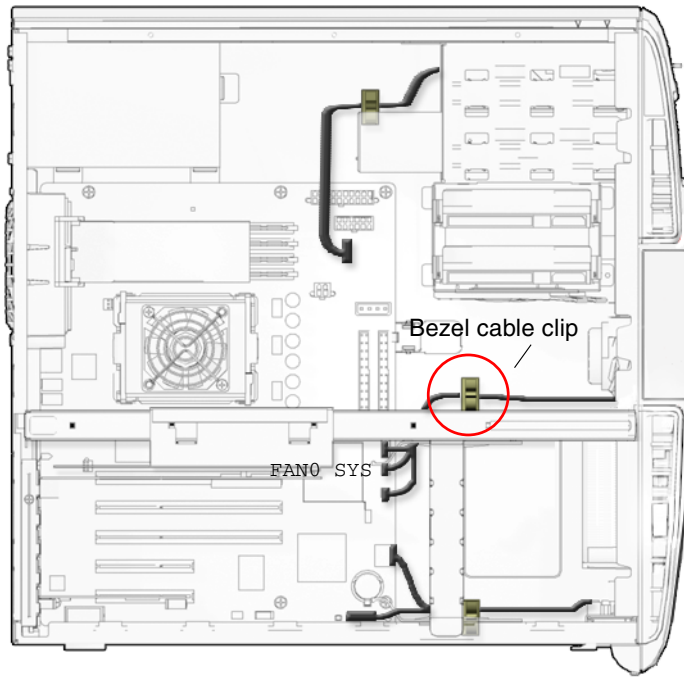
**FIGURE 13-11** Installing the Front Fan Bracket

5. Slide the bracket sideways until the fan bracket latch clicks into place.  
The four tabs on the fan bracket protrude to the outside of the chassis. See [FIGURE 13-12](#).



**FIGURE 13-12** Securing the Front Fan Bracket

6. Connect the front fan power cable to the motherboard connector `FAN0 SYS`.  
See [FIGURE 13-11](#).
7. Guide the front fan cable through the bezel cable clip at the center of the chassis and close the clip.  
See [FIGURE 13-13](#).



**FIGURE 13-13** Securing the Front Fan Cable in the Bezel Cable Clip

**8. Inspect the front fan fasteners to verify that:**

- The fan bracket latch is locked into the chassis.
- The fan bracket tabs are well seated in the chassis.

**9. Inspect the front fan cabling to verify that:**

- The front fan cable is firmly connected to the motherboard at FAN0 SYS.
- The front fan cable is routed through the motherboard cable routing clip.
- The bezel cable clip is closed and locked.

**10. Install the access panel, power on the system, and verify the front fan installation.**

Refer to:

- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

## 13.3 Replacing the Rear Fan

This section describes removal and installation of the rear fan. Topics include:

- [“Identifying the Rear Fan” on page 13-15](#)
- [“Removing the Rear Fan” on page 13-16](#)
- [“Installing the Rear Fan” on page 13-18](#)



Click this film icon to view an animated version of these instructions.

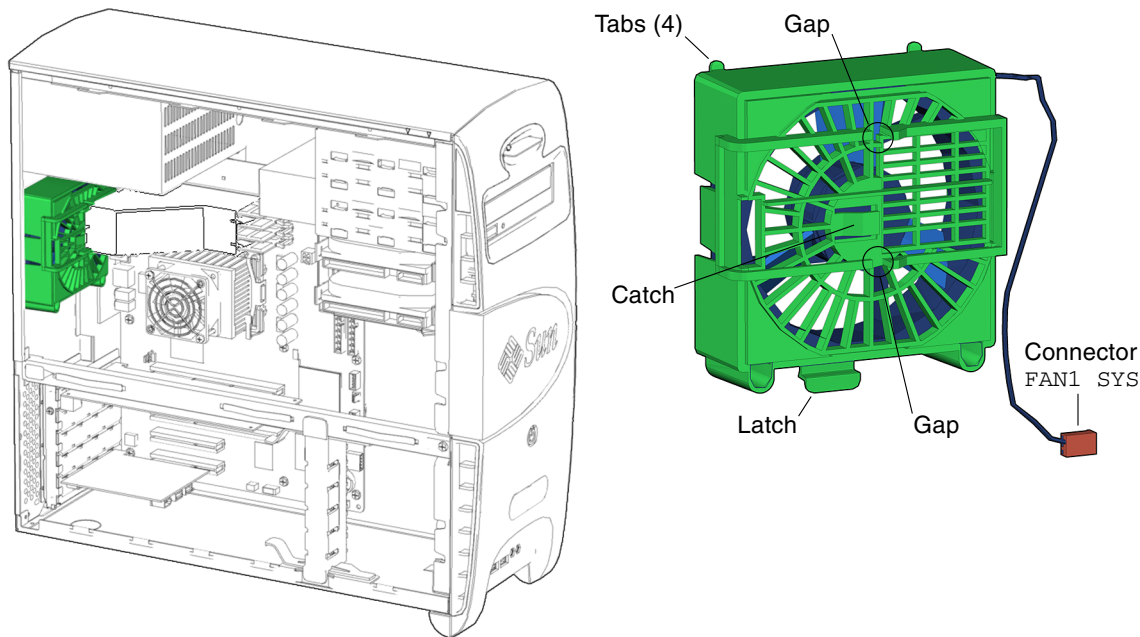
### 13.3.1 Identifying the Rear Fan

The front and rear fans on the Sun Blade 1500 workstation are contained in green brackets. Both fans must be operating to adequately cool the components in a closed chassis. Both fans are connected to the motherboard with a cable that carries power and signal. [FIGURE 13-14](#) shows the location of and identifies the rear fan.

---

**Note** – Though similar in appearance, the front and rear fan brackets are not interchangeable.

---



**FIGURE 13-14** Rear Fan Location and Identification

[TABLE 13-3](#) lists the rear fan specifications.

**TABLE 13-3** Rear Fan Specifications

Specification	Value (Maximum)
Voltage	12 VDC
Current	0.490 AMPS
Speed	3600 RPM
Flow Rate	66 CFM (1.86 m <sup>3</sup> /min)

## 13.3.2 Removing the Rear Fan

### 1. Power off the system and open the chassis.

Refer to:

- [“Powering Off the Workstation”](#) on page 10-4
- [“Removing the Access Panel”](#) on page 10-12



**2. Locate the rear fan.**

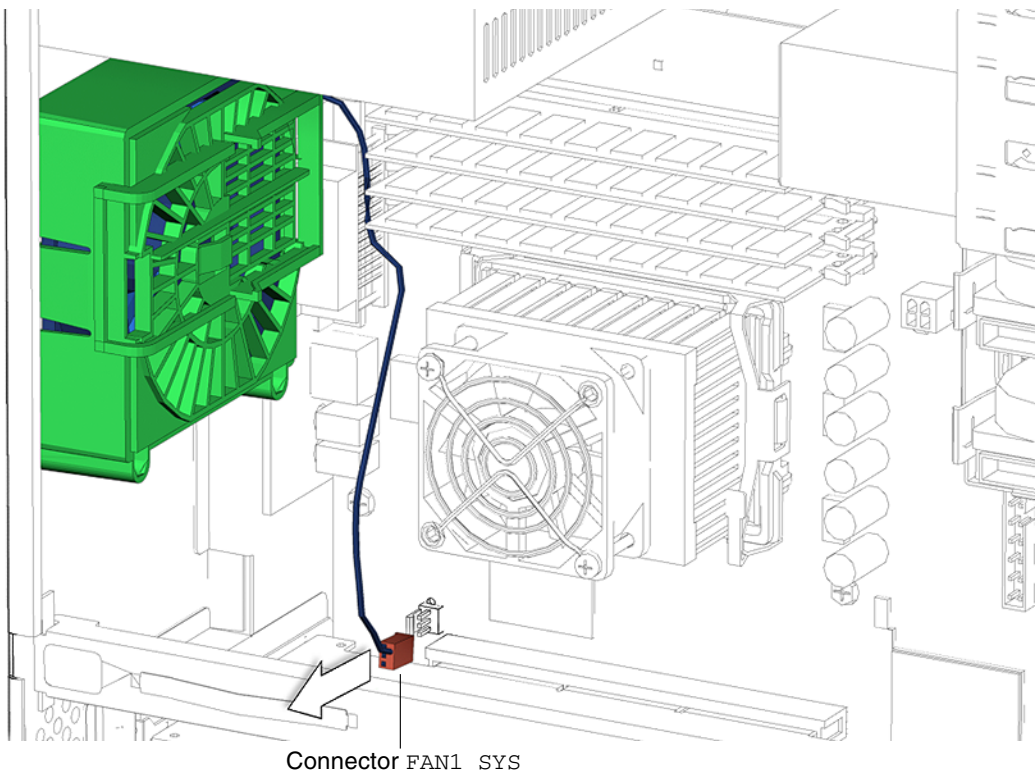
The rear fan is housed in a green plastic bracket that connects to the workstation chassis. See [FIGURE 13-14](#).

**3. Remove the DIMM cooling duct.**

Refer to “[Removing the DIMM Cooling Duct](#)” on page 13-23.

**4. Disconnect the rear fan cable from the motherboard connector FAN1 SYS.**

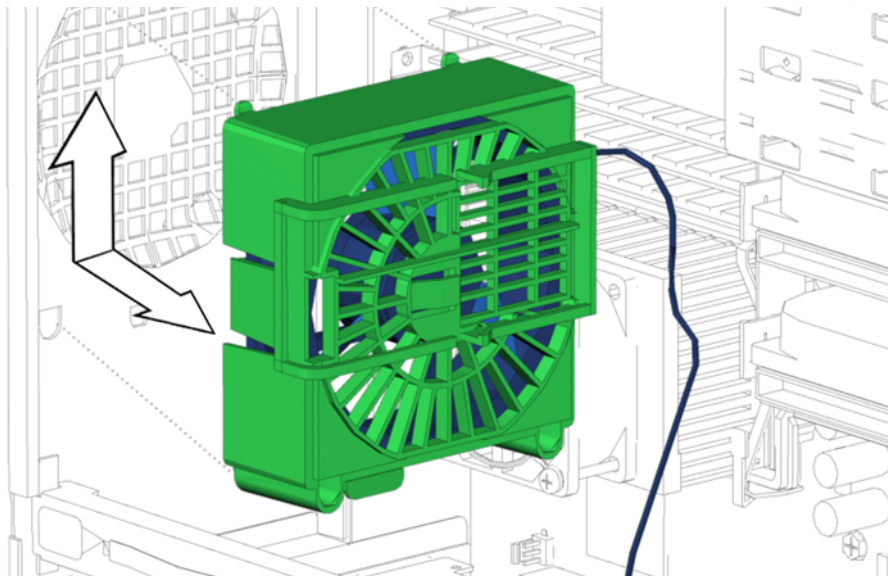
See [FIGURE 13-15](#).



**FIGURE 13-15** Rear Fan Motherboard Connection

**5. Lift the rear fan bracket latch while sliding the fan bracket down the chassis.**

See [FIGURE 13-10](#).



**FIGURE 13-16** Removing the Rear Fan

6. **Lift the rear fan assembly out of the system chassis and set it aside.**
7. **Choose your next step:**
  - If you removed the rear fan prior to removing the motherboard, return to [Step 5](#) of [“Removing the Motherboard”](#) on page 11-46.
  - If you removed the rear fan prior to removing the CPU fan and heat sink assembly, return to [Step 4](#) of [“Removing the CPU Fan and Heat Sink Assembly”](#) on page 11-14.
  - Otherwise, proceed to [“Installing the Rear Fan”](#) on page 13-18.



---

**Caution** – Do not operate the workstation without the rear fan.

---

### 13.3.3 Installing the Rear Fan

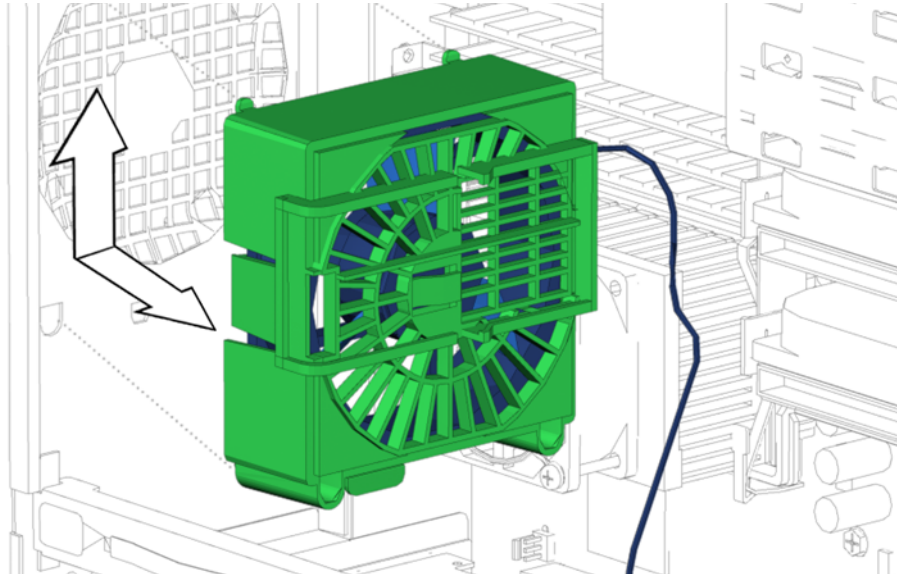
1. **Open the chassis.**  
Refer to [“Removing the Access Panel”](#) on page 10-12
2. **Locate where the rear fan is to be installed.**  
See [FIGURE 13-14](#).

**3. Remove the rear fan assembly from its packaging.**

The rear fan is shipped in its green bracket.

**4. Align the four tabs on the open side of the fan bracket with their matching D-shaped holes in the chassis rear panel.**

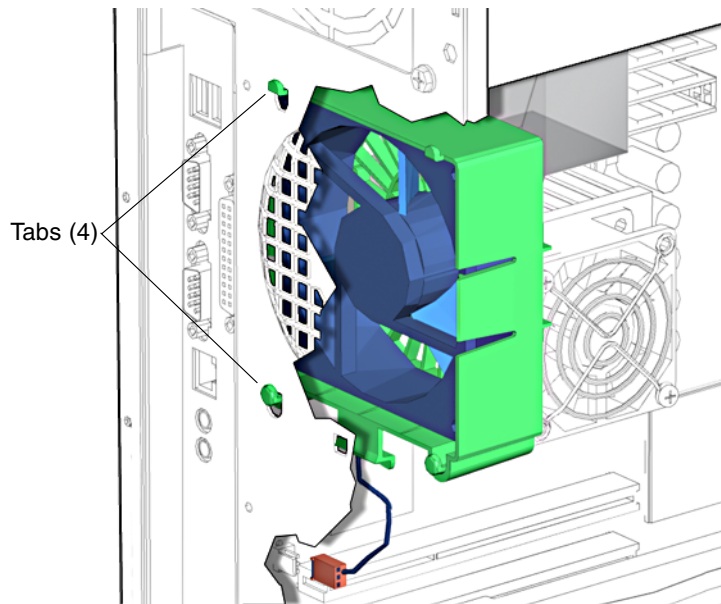
Have the rear fan cable leading down and toward the bottom of the chassis. See [FIGURE 13-17](#).



**FIGURE 13-17** Installing the Rear Fan Bracket

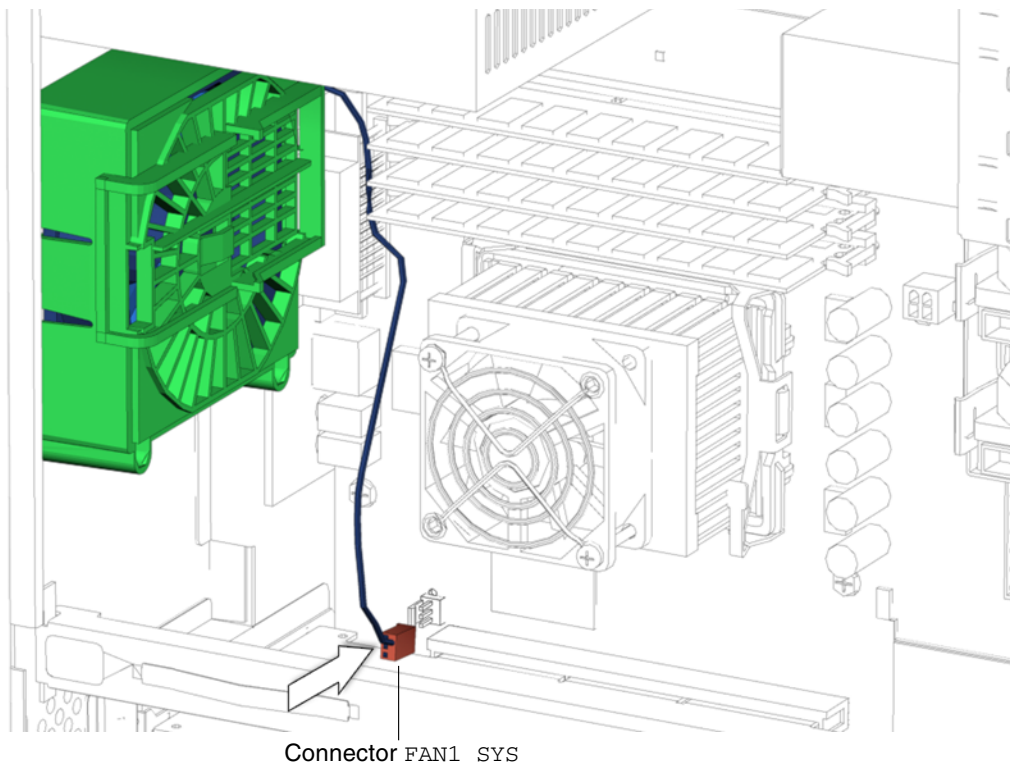
**5. Press the rear fan bracket to the chassis and slide the bracket up toward the power supply until the fan bracket latch clicks into place.**

The tabs on the fan bracket protrude to the outside of the chassis. See [FIGURE 13-18](#).



**FIGURE 13-18** Securing the Rear Fan Bracket

6. Connect the rear fan power cable to the motherboard connector FAN1 SYS.  
See [FIGURE 13-19](#).



**FIGURE 13-19** Connecting the Rear Fan Cable to FAN1 SYS

**7. Install the DIMM cooling duct.**

Refer to [“Installing the DIMM Cooling Duct” on page 13-27.](#)

**8. Inspect the rear fan fasteners to verify that:**

- The rear fan bracket latch is locked into the chassis.
- The rear fan bracket tabs are well seated in the chassis.

**9. Inspect the rear fan cabling to verify that:**

- The rear fan cable is firmly connected to the motherboard at FAN1 SYS.
- The rear fan cable is routed through the motherboard cable routing clip.

**10. Choose your next step:**

- If you installed the rear fan after installing the CPU fan and heat sink assembly, return to [Step 12 of “Installing the CPU Fan and Heat Sink Assembly” on page 11-18.](#)
- If you installed the rear fan after installing the motherboard, return to [Step 17 of “Installing the Motherboard” on page 11-50.](#)

- Otherwise, install the access panel, power on the system, and verify the rear fan installation. Refer to:
  - [“Installing the Access Panel” on page 15-5](#)
  - [“Powering On the Workstation” on page 15-8](#)
  - [“Verifying an Installation” on page 15-11](#)

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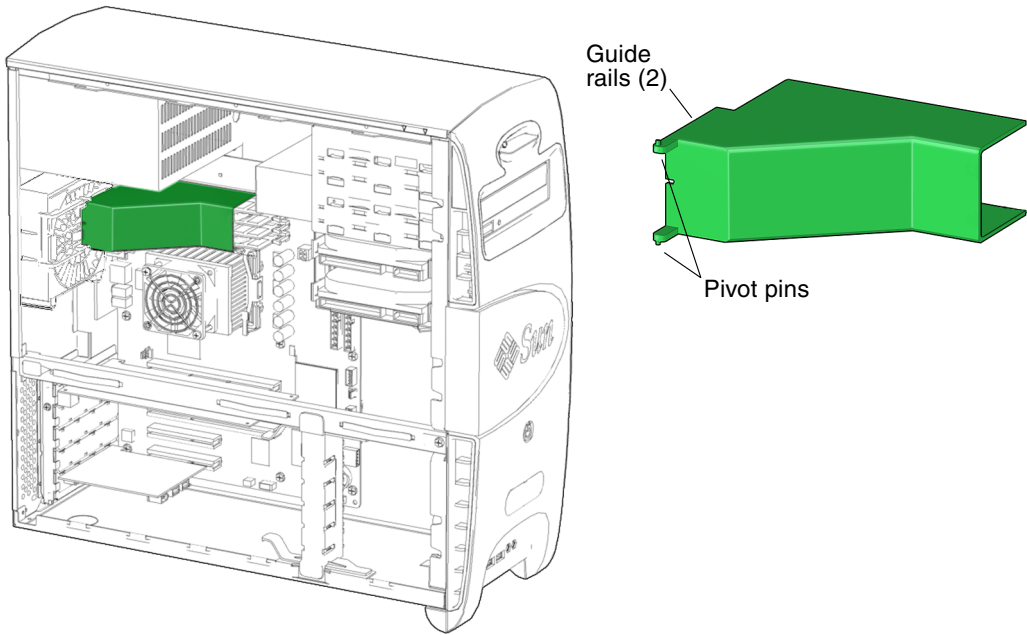
## 13.4 Replacing the DIMM Cooling Duct

This section describes removal and installation of the DIMM cooling duct. Topics include:

- [“Identifying the DIMM Cooling Duct” on page 13-22](#)
- [“Removing the DIMM Cooling Duct” on page 13-23](#)
- [“Installing the DIMM Cooling Duct” on page 13-27](#)

### 13.4.1 Identifying the DIMM Cooling Duct

The DIMM cooling duct is a plastic duct that attaches to the rear fan and covers the DIMMs installed in slots DIMM0 - DIMM3. The duct routes air from the right edge of the DIMMs, across the DIMM's surfaces, through the rear fan, and out the rear panel. See [FIGURE 13-20](#).



**FIGURE 13-20** DIMM Cooling Duct Location and Identification.

## 13.4.2 Removing the DIMM Cooling Duct

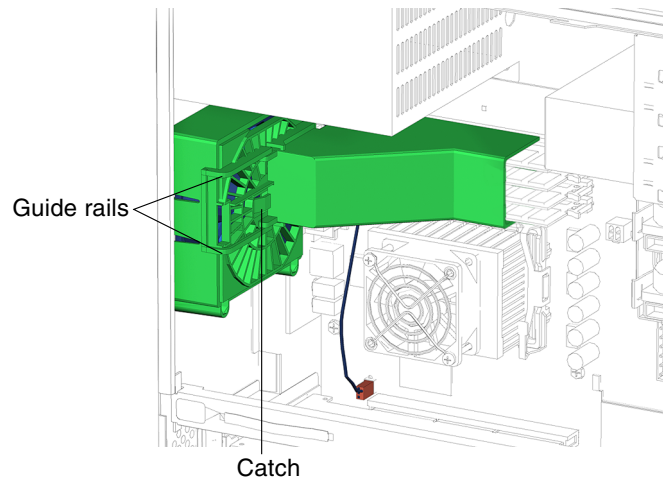
### 1. Power off the system and open the chassis.

Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

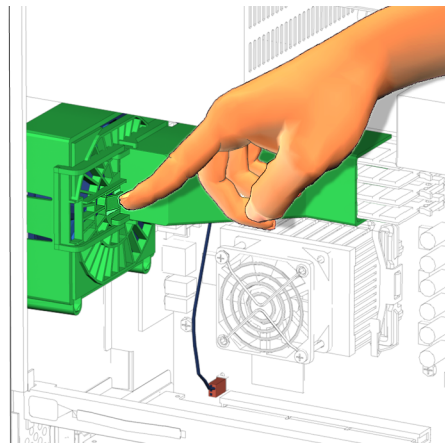
### 2. Locate the DIMM cooling duct.

The DIMM cooling duct is secured to the rear fan bracket by guide rails formed in the rear fan bracket. See [FIGURE 13-20](#) and [FIGURE 13-21](#).



**FIGURE 13-21** DIMM Cooling Duct Attachment to Rear Fan

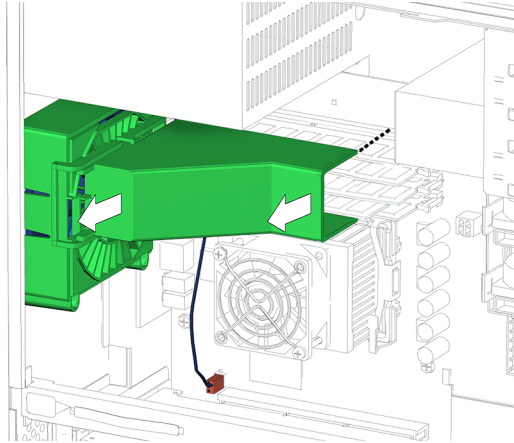
3. Press the catch on the rear fan bracket and begin to slide the duct to the left.  
See [FIGURE 13-22](#).



**FIGURE 13-22** Pressing the Catch on the Rear Fan Bracket

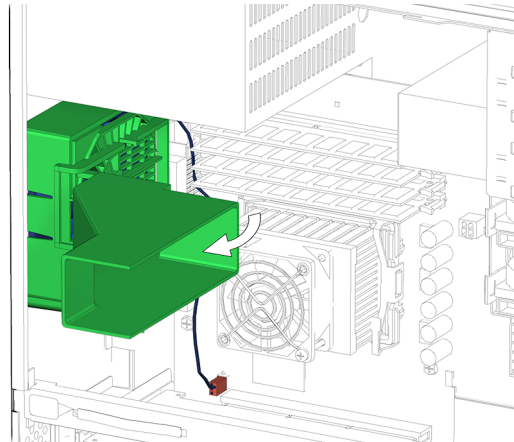
4. Continue to slide the duct to the left, until it is flush with the left side of the rear fan bracket.  
See [FIGURE 13-23](#).





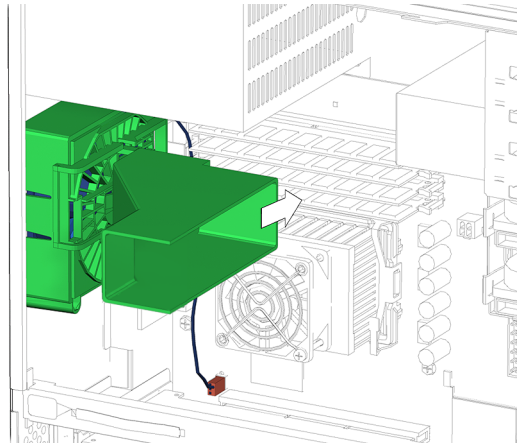
**FIGURE 13-23** Sliding the Duct to the Left

5. Swing the duct out, so that it is perpendicular to its previous position.  
See [FIGURE 13-24](#).



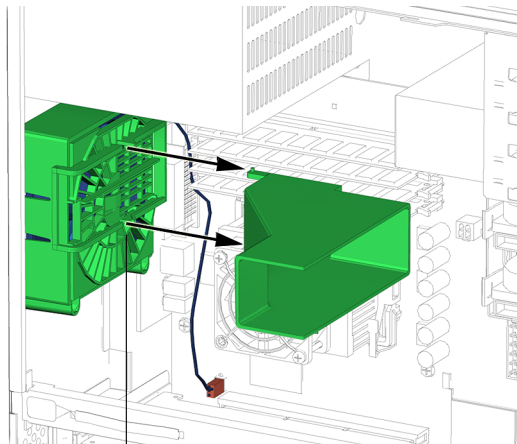
**FIGURE 13-24** Swinging Out the Duct

6. Slide the duct back to the right, while slightly pulling the duct to the front of the chassis.  
See [FIGURE 13-25](#).



**FIGURE 13-25** Sliding Duct Back to the Right

7. When the pivot pins reach the gap in the rear fan's guide rails, the duct pulls free. See [FIGURE 13-26](#). Set the duct aside.



Gap (2)

**FIGURE 13-26** Pulling the Duct Free

**8. Choose your next step:**

- If you removed the DIMM cooling duct prior to removing the motherboard, return to [Step 4](#) of “[Removing the Motherboard](#)” on page 11-46.

- If you removed the DIMM cooling duct prior to removing the rear fan, return to [Step 4 of “Removing the Rear Fan” on page 13-16](#).
- Otherwise, proceed to [“Installing the DIMM Cooling Duct” on page 13-27](#).

---

**Note** – For ideal DIMM cooling, do not operate the Sun Blade 1500 workstation without the DIMM cooling duct in place.

---

### 13.4.3 Installing the DIMM Cooling Duct

**1. Power off the system and open the chassis.**

Refer to:

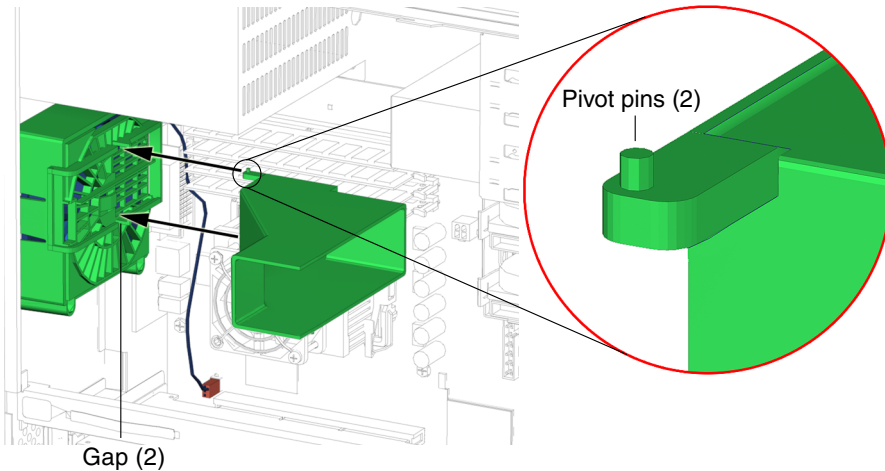
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

**2. Locate where the DIMM cooling duct is to be installed.**

The DIMM cooling duct attaches to the rear fan assembly. See [FIGURE 13-20](#). Make sure no cables interfere with the installation.

**3. Align the pivot pins of the duct into the gaps in the rear fan bracket’s guide rails.**

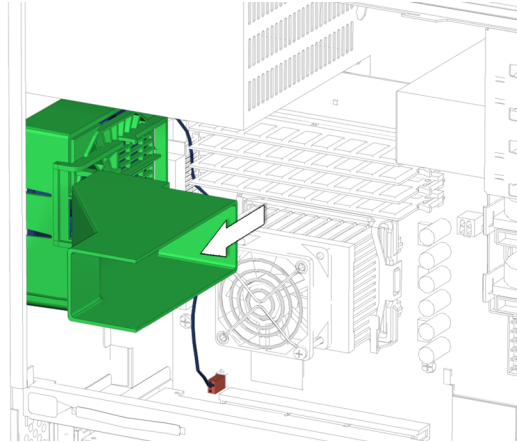
See [FIGURE 13-27](#).



**FIGURE 13-27** Aligning the Pivot Pins With the Gap

4. While maintaining a light pressure towards the rear fan bracket, move the duct to the left.

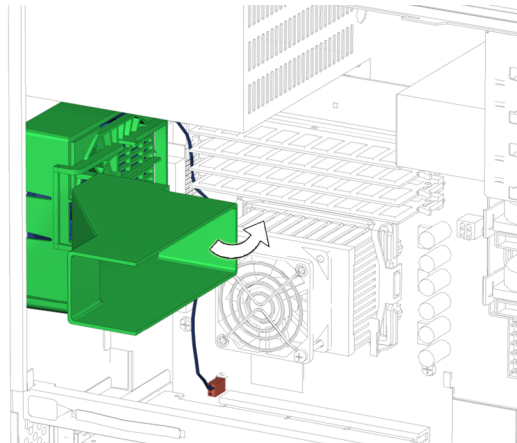
See [FIGURE 13-28](#).



**FIGURE 13-28** Moving the Duct to the Left

5. Swing the duct in, so that the guide rails of the duct are flush with the guide rails of the rear fan bracket.

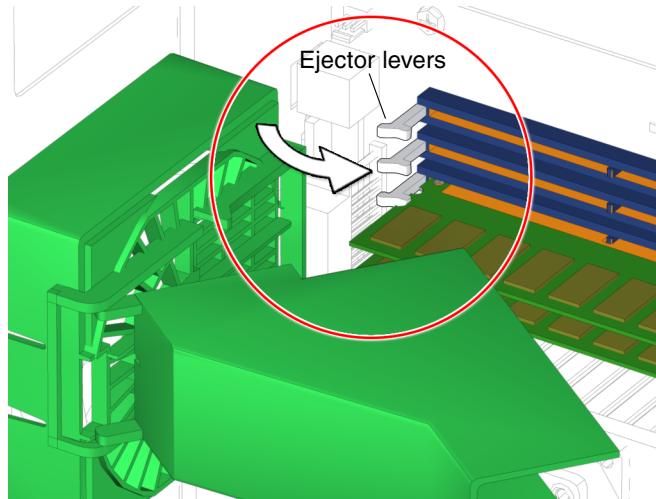
See [FIGURE 13-29](#).



**FIGURE 13-29** Swinging the Duct In

6. Ensure that the DIMM ejector levers are in the closed position before sliding the DIMM cooling duct into the locked position.

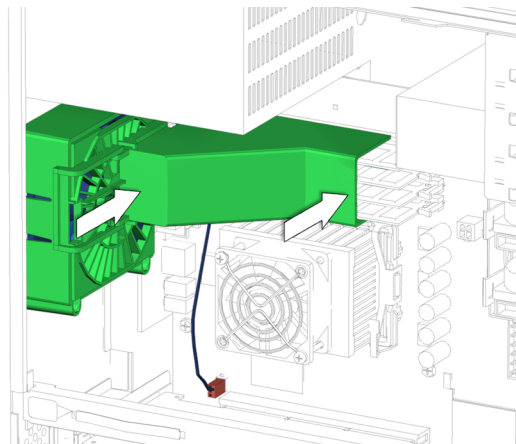
See [FIGURE 13-30](#).



**FIGURE 13-30** Ejector Levers Closed Position

7. While maintaining a light pressure towards the rear fan bracket, slide the duct to the right.

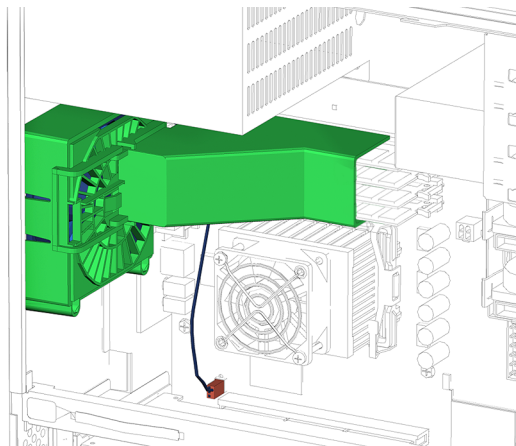
See [FIGURE 13-31](#).



**FIGURE 13-31** Sliding the Duct to the Right

8. Continue to slide the duct to the right until the catch on the rear fan bracket clicks.

See [FIGURE 13-32](#).



**FIGURE 13-32** Duct Clicks Into Place

**9. Inspect the DIMM cooling duct to verify that:**

- The duct covers the DIMMs and is not in a bind with the DIMMs.
- The guide rails of the duct are matched with the guide rails of the rear fan bracket.

**10. Choose your next step:**

- If you installed the DIMM cooling duct after installing the rear fan, return to [Step 8](#) of [“Installing the Rear Fan”](#) on page 13-18.
- If you installed the DIMM cooling duct after installing the motherboard, return to [Step 18](#) of [“Installing the Motherboard”](#) on page 11-50.
- Otherwise, install the access panel and power on the system. Refer to:
  - [“Installing the Access Panel”](#) on page 15-5
  - [“Powering On the Workstation”](#) on page 15-8

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## 13.5 Replacing the Audio USB Board

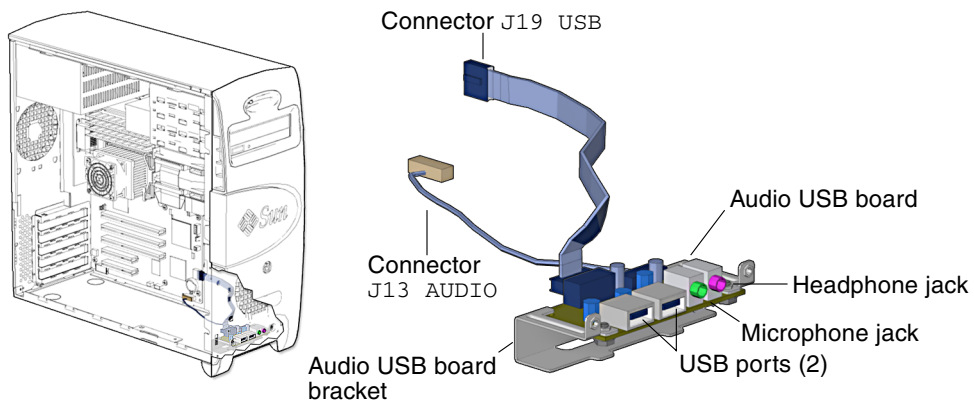
This section describes removal and installation of the audio and USB card. Topics include:

- [“Identifying the Audio USB Board” on page 13-31](#)
- [“Removing the Audio USB Board” on page 13-31](#)
- [“Installing the Audio USB Board” on page 13-35](#)

## 13.5.1 Identifying the Audio USB Board

The audio USB board is installed on the audio USB bracket that is attached to the front of the chassis. Two cables provide audio and USB signals. The chassis access panel and the front bezel must be removed to access the audio USB board.

[FIGURE 13-33](#) shows the location of and identifies the audio USB board.



**FIGURE 13-33** Audio USB board Location and Identification

## 13.5.2 Removing the Audio USB Board

1. **Power off the system, open the chassis, and remove the bezel.**

Refer to:

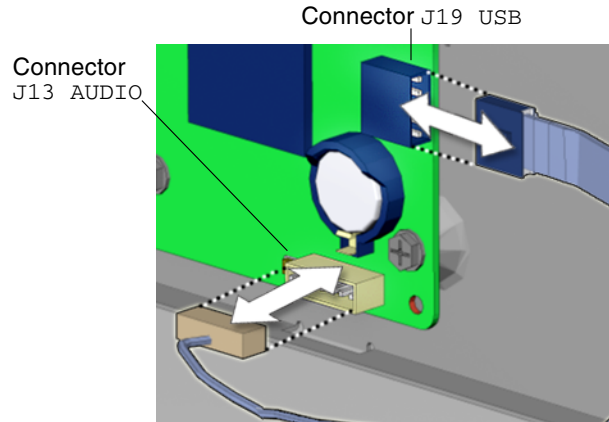
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Removing the Bezel” on page 10-14](#)

2. **Locate the audio USB board.**

The audio USB board is installed on the audio USB bracket that is fastened to the workstation chassis. See [FIGURE 13-33](#).

3. **Disconnect the audio USB board cables from the motherboard at J13 AUDIO and J19 USB.**

See [FIGURE 13-34](#).

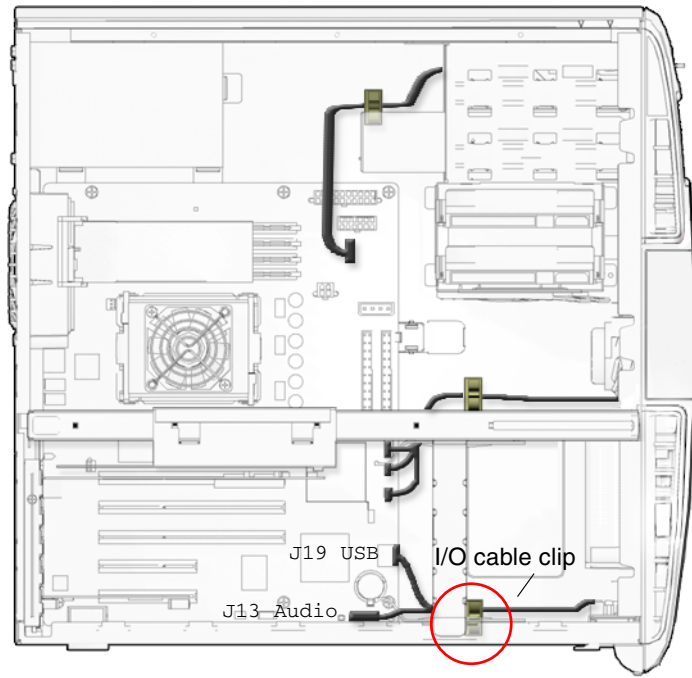


**FIGURE 13-34** Disconnecting the Cables From the Motherboard

4. **Open the I/O cable clip at the bottom of the chassis and remove the audio USB board cables from the clip.**

See [FIGURE 13-35](#).

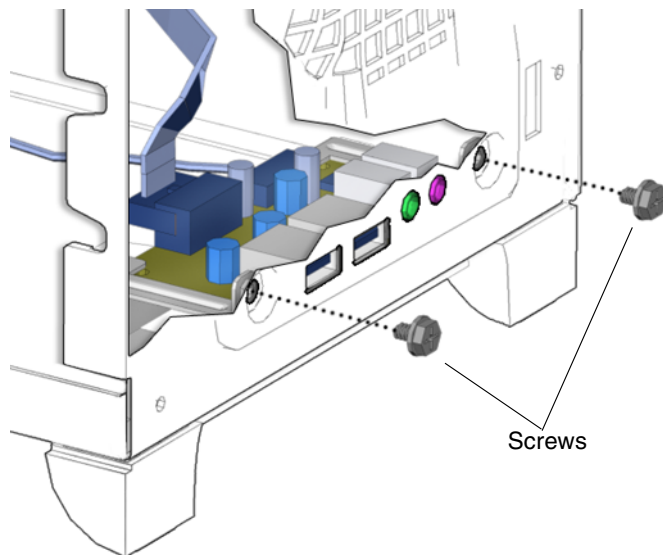




**FIGURE 13-35** Removing the Audio USB Cables From the I/O Cable Clip

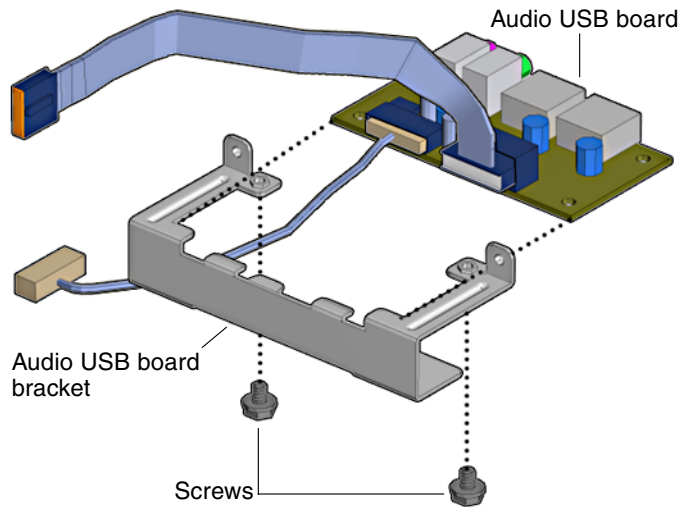
5. Using a No. 2 Phillips screwdriver, remove the two screws that secure the audio USB assembly to the inside front of the chassis.

See [FIGURE 13-36](#). Set the screws aside in a container.



**FIGURE 13-36** Unfastening the Audio USB Assembly

6. Lift the audio USB assembly from the chassis. Set it aside on an antistatic mat.
7. Using a No. 2 Phillips screwdriver, remove the two screws that secure the audio USB board to the audio USB bracket.  
See [FIGURE 13-37](#). Set the screws aside in a container.



**FIGURE 13-37** Removing the Audio USB Board From the Bracket

8. Set the audio USB board on an antistatic mat. Set the bracket aside.

Proceed to [“Installing the Audio USB Board” on page 13-35](#).

---

**Note** – Do not operate the workstation without the audio USB board installed.

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### 13.5.3 Installing the Audio USB Board

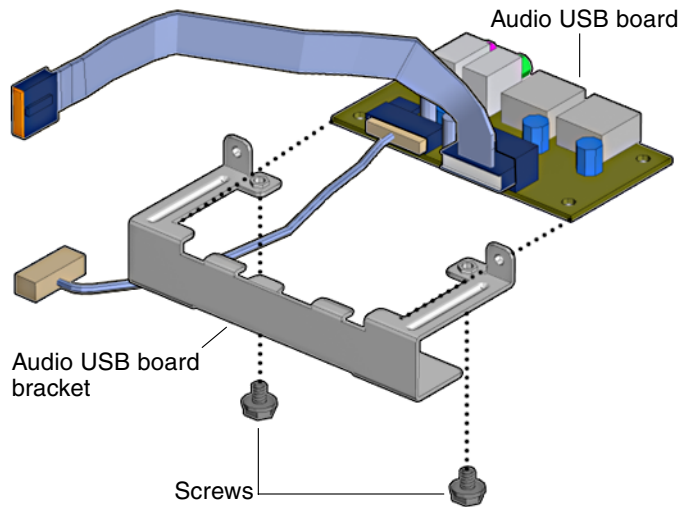
1. Open the chassis and remove the bezel.

Refer to:

- [“Removing the Access Panel” on page 10-12](#)
- [“Removing the Bezel” on page 10-14](#)

2. Position the bracket on an antistatic mat with the two arms facing up.
3. Remove the audio USB board from its packaging.
4. Slide the audio USB board into the audio USB board bracket with components facing up.

See [FIGURE 13-38](#).

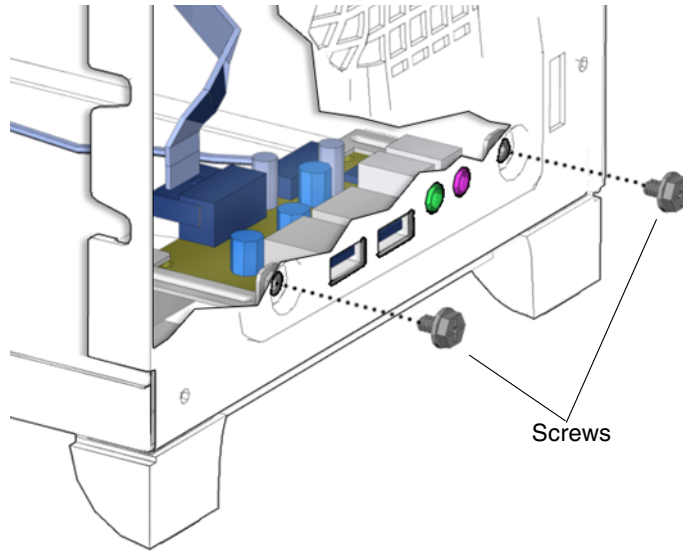


**FIGURE 13-38** Installing the Audio USB Board Into the Bracket

5. Using a No. 2 Phillips screwdriver, fasten the two screws that secure the audio USB board to the audio USB bracket.  
See [FIGURE 13-38](#).
6. Position the audio USB board assembly so that all the ports fit through the designated chassis holes.

7. Using a No. 2 Phillips screwdriver, fasten the two screws that secure the audio USB board to the inside front of the chassis.

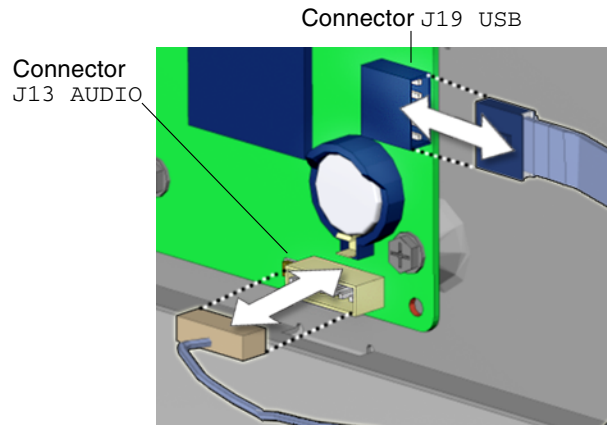
See [FIGURE 13-39](#).



**FIGURE 13-39** Securing the Audio USB Assembly

8. Reconnect the audio and USB cables to the connectors on the motherboard at J19 USB and J13 AUDIO.

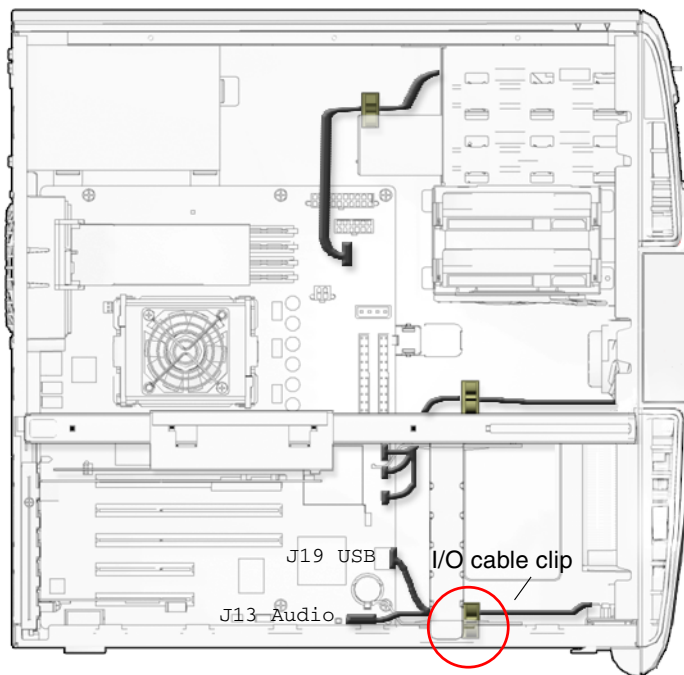
See [FIGURE 13-40](#).



**FIGURE 13-40** Reconnecting the Cables to the Motherboard

9. Guide the audio USB board cables through the I/O cable clip at the bottom of the chassis and close the clip.

See [FIGURE 13-41](#).



**FIGURE 13-41** Securing the Audio USB Cables in the I/O Cable Clip

10. **Inspect the audio USB board fasteners to verify that:**

- The audio USB board to bracket screws are tight
- The audio USB assembly to chassis screws are tight.

11. **Inspect the audio USB board cabling to verify that:**

- The audio cable is firmly connected to the audio USB board and to the motherboard at J13 AUDIO.
- The USB cable is firmly connected to the audio USB board and to the motherboard at J19 USB.
- The I/O cable clip is closed and locked.

12. **Install the bezel, the access panel, power on the system, and verify the audio USB board installation.**

Refer to:

- “Installing the Bezel” on page 15-2
- “Installing the Access Panel” on page 15-5
- “Powering On the Workstation” on page 15-8
- “Verifying an Installation” on page 15-11

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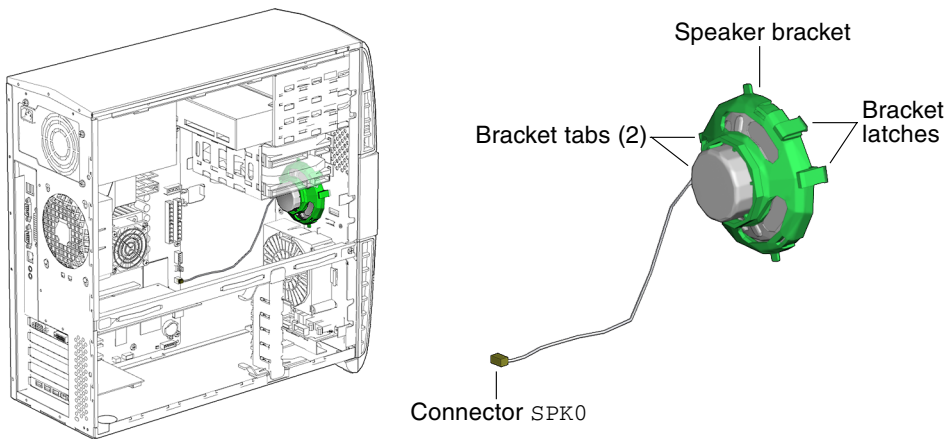
## 13.6 Replacing the Speaker

This section describes removal and installation of the speaker. Topics include:

- “Identifying the Speaker” on page 13-39
- “Removing the Speaker” on page 13-40
- “Installing the Speaker” on page 13-42

### 13.6.1 Identifying the Speaker

The speaker is installed in the front of the chassis. The speaker cable is connected to the motherboard at SPK0. See [FIGURE 13-42](#).



**FIGURE 13-42** Speaker Location and Identification

[TABLE 13-4](#) lists the speaker specifications.

**TABLE 13-4** Speaker Specifications

Specification	Value
Impedance	8 Ohms
Wattage	3.5 W

## 13.6.2 Removing the Speaker

1. **Power off the system, open the chassis, and remove the bezel.**

Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Removing the Bezel” on page 10-14](#)

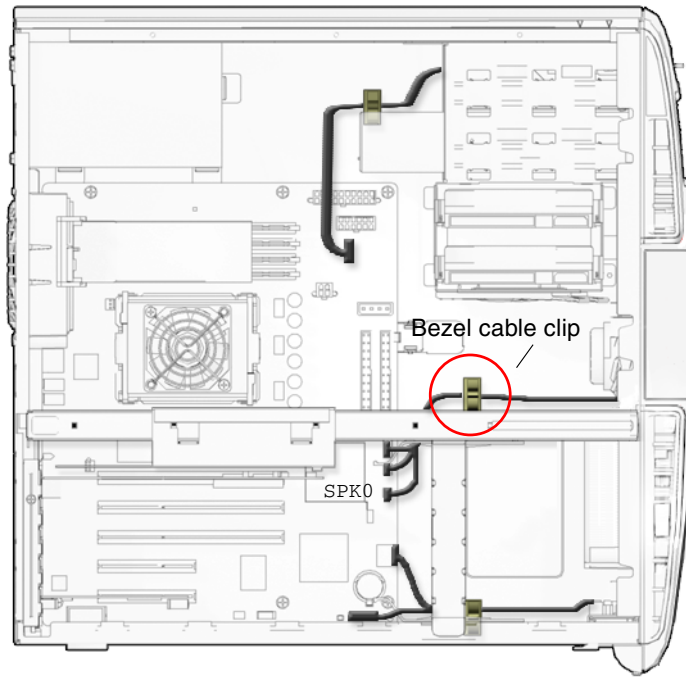
2. **Locate the speaker bracket.**

The speaker is housed in a green plastic bracket that attaches to the workstation chassis. See [FIGURE 13-42](#).

3. **Open the bezel cable clip at the center of the chassis and remove the speaker cable from the clip.**

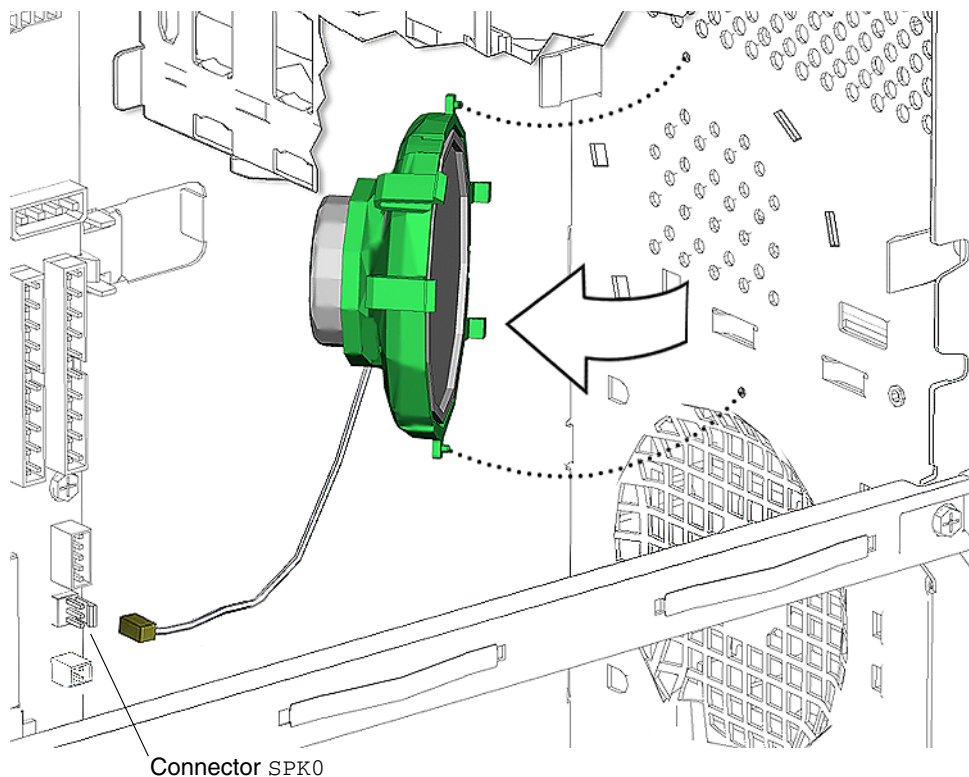
See [FIGURE 13-43](#).





**FIGURE 13-43** Removing the Speaker Cable From the Bezel Cable Clip

4. **Disconnect the speaker cable from the motherboard at connector SPK0.**  
See [FIGURE 13-44](#).



**FIGURE 13-44** Removing the Speaker

5. Press both speaker bracket latches and swing the speaker bracket away from the chassis.

See [FIGURE 13-44](#).

6. Lift the speaker bracket out of the chassis and set it down on a flat surface, speaker facing down.

Proceed to [“Installing the Speaker”](#) on page 13-42.

### 13.6.3 Installing the Speaker

1. Open the chassis.

Refer to:

- [“Powering Off the Workstation”](#) on page 10-4
- [“Removing the Access Panel”](#) on page 10-12

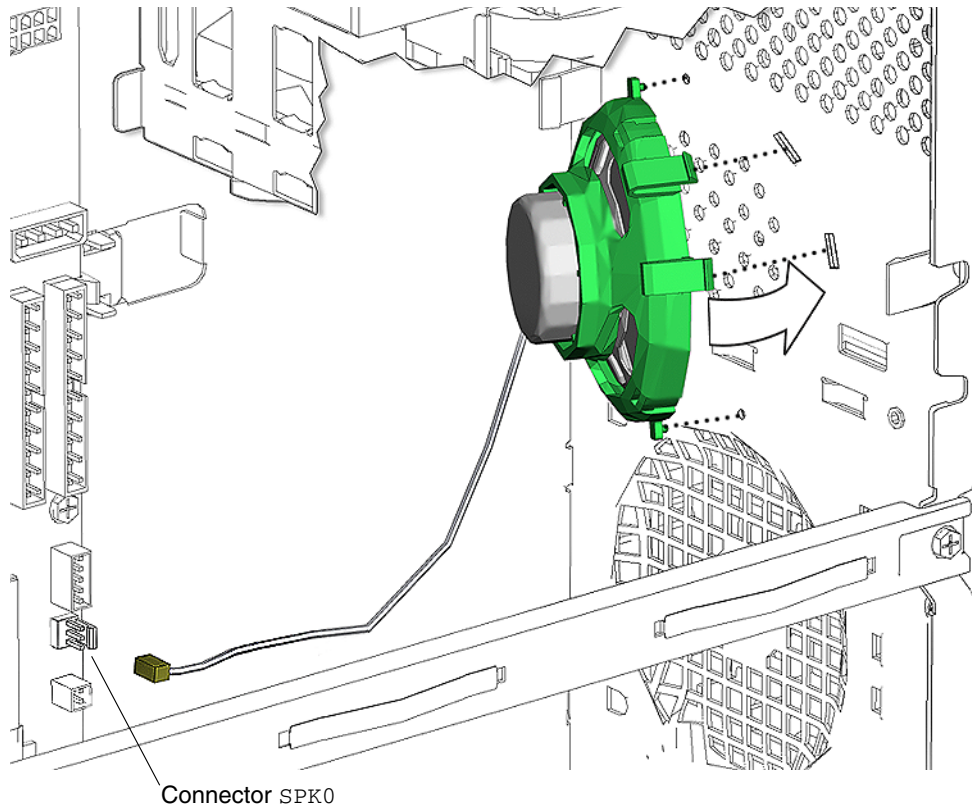
2. Locate where the speaker is to be installed.

See [FIGURE 13-42](#).

3. Remove the speaker assembly from its packaging.

4. Align the speaker bracket tabs to the D-shaped holes on the inside of the chassis front panel.

See [FIGURE 13-45](#).



**FIGURE 13-45** Installing the Speaker

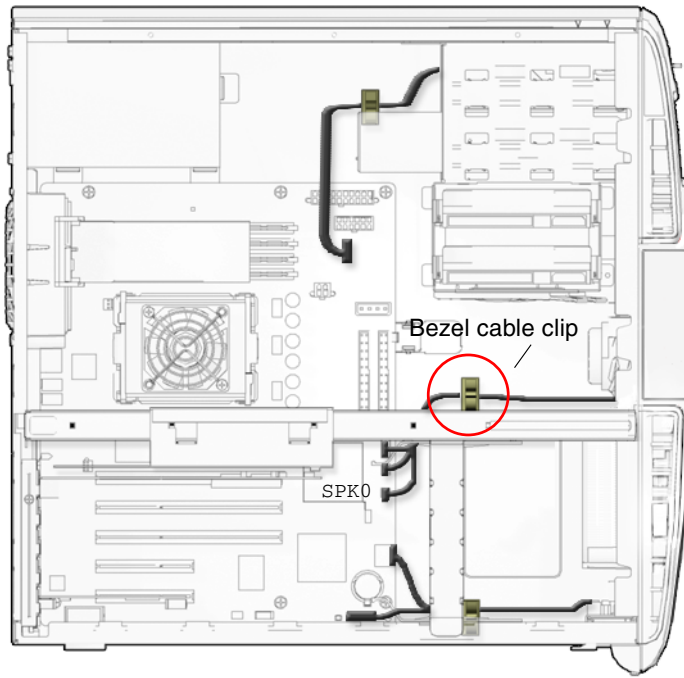
5. Press both speaker bracket latches into the chassis front until they click in place.

6. Press the speaker cable connector into connector `SPK0` on the motherboard.

See [FIGURE 13-45](#).

7. Guide the speaker cable through the bezel cable clip at the center of the chassis and close the clip.

See [FIGURE 13-46](#).



**FIGURE 13-46** Securing the Speaker Cable in the Bezel Cable Clip

**8. Inspect the speaker fasteners to verify that:**

- The speaker is secure in the bracket.
- The speaker bracket tabs are well seated in the chassis.

**9. Inspect the speaker cabling to verify that:**

- The speaker cable is firmly connected to the motherboard at SPK0.
- The speaker cable is routed through the bezel cable clip.
- The bezel cable clip is closed and locked.

**10. Install the bezel, the access panel, power on the system, and verify the speaker installation.**

Refer to:

- [“Installing the Bezel” on page 15-2](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

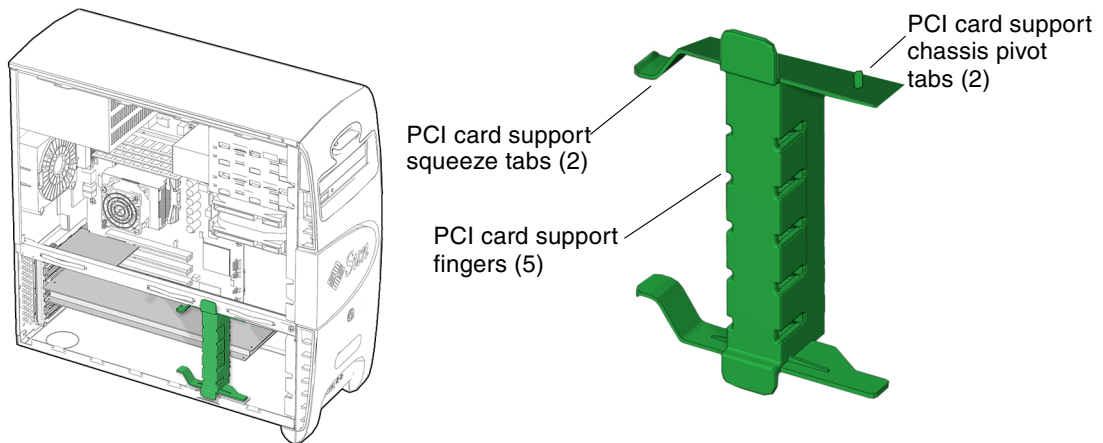
## 13.7 Replacing the PCI Card Support

This section describes removal and installation of the PCI card support. Topics include:

- [“Identifying the PCI Card Support” on page 13-45](#)
- [“Removing the PCI Card Support” on page 13-45](#)
- [“Installing the PCI Card Support” on page 13-47](#)

### 13.7.1 Identifying the PCI Card Support

The PCI card support provides shock and vibration protection for long PCI cards. It supports the PCI cards with spring-loaded fingers, one for each card. The PCI card support is held in place between the chassis cross brace and the bottom of the chassis. See [FIGURE 13-47](#).



**FIGURE 13-47** PCI Card Support Location and Identification

### 13.7.2 Removing the PCI Card Support

1. **Power off the system and open the chassis.**

Refer to:

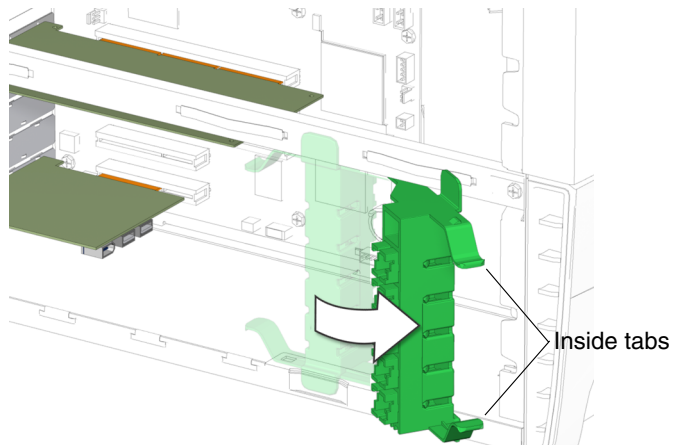
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

**2. Locate the PCI card support.**

The PCI card support is a green bracket that fits between the chassis cross brace and the bottom of the chassis. See [FIGURE 13-47](#).

**3. Compress the inside tabs together and swing the PCI card support out.**

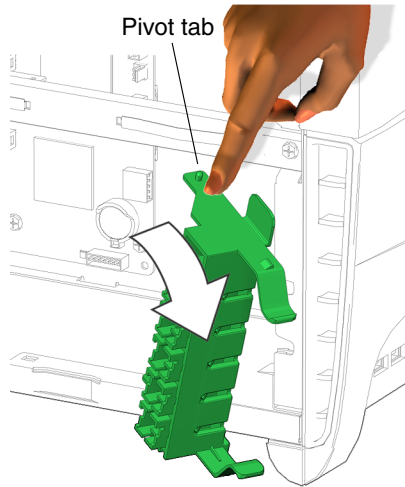
See [FIGURE 13-48](#).



**FIGURE 13-48** Swinging Out the PCI Card Support

**4. Slightly depress the upper pivot tab and tilt the PCI card support out to separate the tab from the chassis cross brace.**

See [FIGURE 13-49](#).



**FIGURE 13-49** Removing the PCI Card Support

**5. Lift the PCI card support up and out.**

Set it aside.

---

**Note** – Do not use the chassis cross brace as a handle.

---

Proceed to [“Installing the PCI Card Support” on page 13-47.](#)

---

**Note** – Do not operate the workstation without the PCI card support installed.

---

## 13.7.3 Installing the PCI Card Support

**1. Open the chassis.**

Refer to [“Removing the Access Panel” on page 10-12](#)

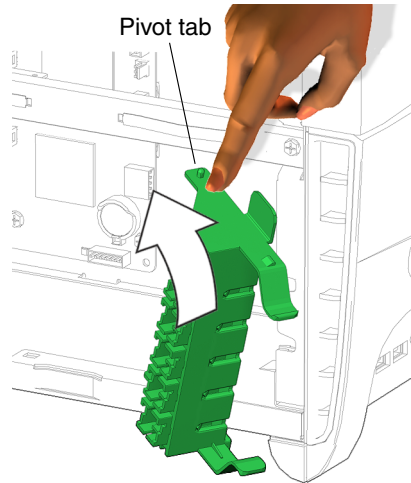
**2. Identify where the PCI card support is to be installed.**

See [FIGURE 13-47.](#)

**3. Align the lower pivot tab of the PCI card support with the hole in the chassis bottom.**

4. Slightly depress the upper pivot tab and slide it under the cross brace so that it clicks into place.

See [FIGURE 13-50](#).



**FIGURE 13-50** Installing the PCI Card Support

---

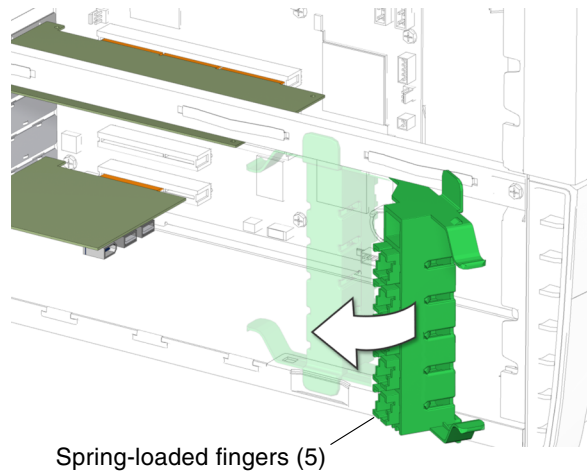
**Note** – *Do not* use the chassis cross brace as a handle.

---

5. Swing the PCI card support to the left until it clicks into position.

See [FIGURE 13-51](#). For each PCI card installed, make sure the spring-loaded finger centers upon the edge of the PCI card.





**FIGURE 13-51** Closing the PCI Card Support

**6. Inspect the PCI card support fasteners to verify that:**

- The PCI card support is snug between the chassis cross brace and the chassis.
- The chassis cross brace is fastened tight to the chassis.
- The PCI card support fingers are snug against each respective PCI card.

**7. Choose your next step:**

- If you installed the PCI card support after installing the motherboard, return to [Step 19 of “Installing the Motherboard” on page 11-50](#).
- Otherwise, install the access panel and power on the system. Refer to:
  - [“Installing the Access Panel” on page 15-5](#)
  - [“Powering On the Workstation” on page 15-8](#)

---

## 13.8 Replacing the Chassis Cross Brace

This section describes removal and installation of the chassis cross brace. Topics include:

- [“Identifying the Chassis Cross Brace” on page 13-50](#)
- [“Removing the Chassis Cross Brace” on page 13-51](#)
- [“Installing the Chassis Cross Brace” on page 13-53](#)

## 13.8.1 Identifying the Chassis Cross Brace

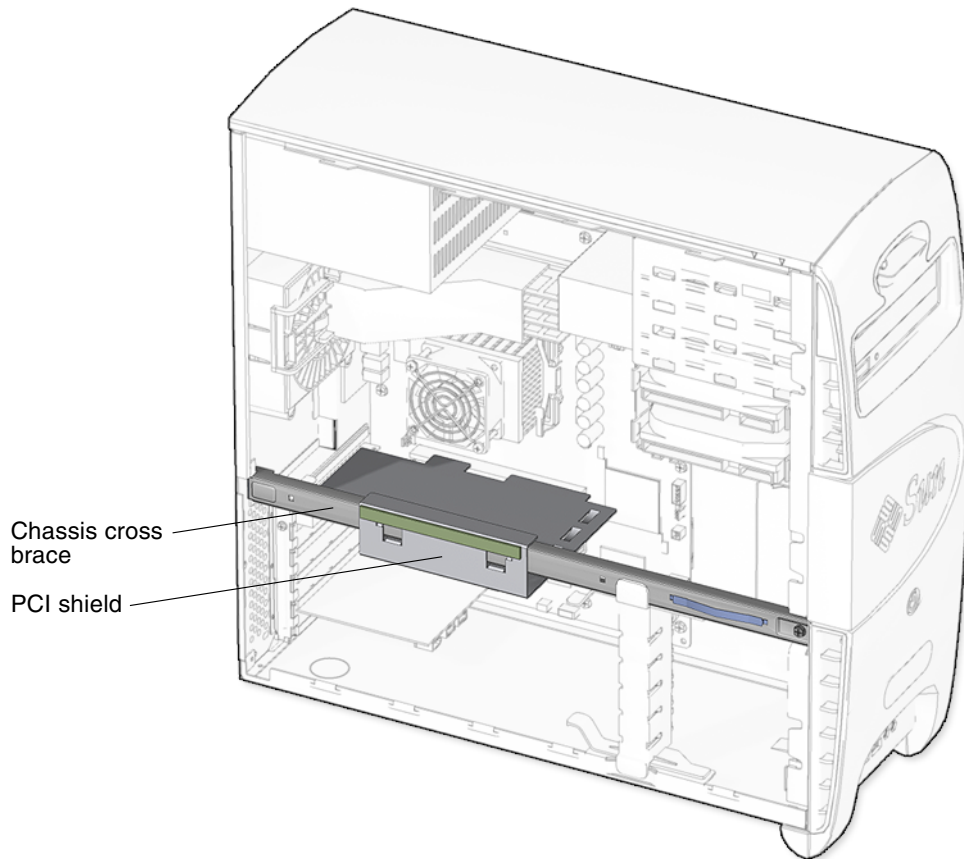
The chassis cross brace provides structural support to the chassis and holds the PCI card support in place. Attached to the chassis cross brace is the PCI shield.

[FIGURE 13-52](#) shows the location of and identifies the chassis cross brace.

---

**Note** – *Do not* use the chassis cross brace as a handle.

---



**FIGURE 13-52** Chassis Cross Brace Location and Identification

## 13.8.2 Removing the Chassis Cross Brace

### 1. Power off the system and open the chassis.

Refer to:

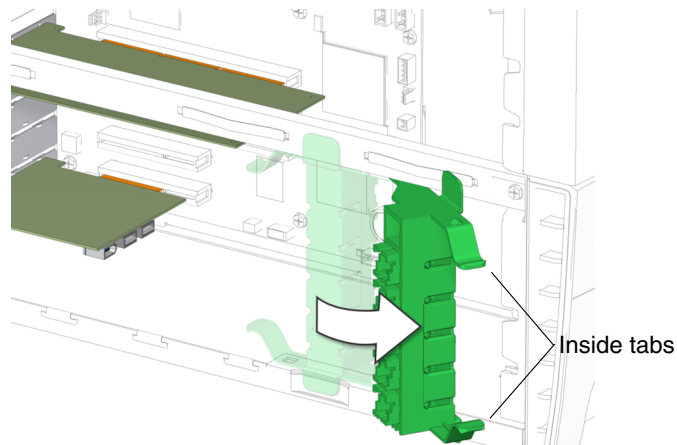
- “Powering Off the Workstation” on page 10-4
- “Removing the Access Panel” on page 10-12

### 2. Locate the cross brace.

The cross brace is the long metal bar that extends the width of the chassis. It is engaged in a slot on the chassis rear panel and it fastened to the chassis front panel with a screw. See [FIGURE 13-52](#).

### 3. Compress the inside tabs together and swing the PCI card support out.

See [FIGURE 13-53](#).



**FIGURE 13-53** Swinging out the PCI Card Support

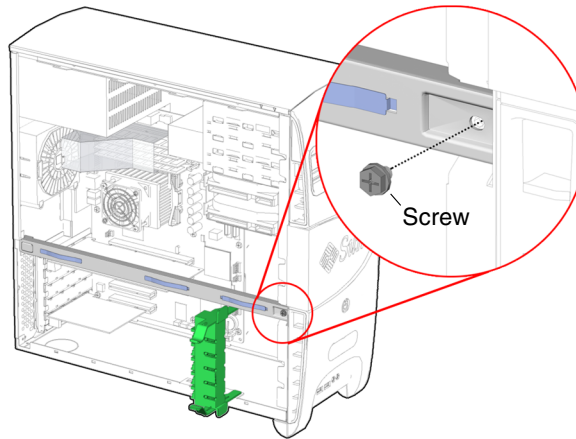
---

**Note** – *Do not* use the chassis cross brace as a handle.

---

### 4. Using a No. 2 Phillips screwdriver, remove the screw that secures the chassis cross brace to the chassis.

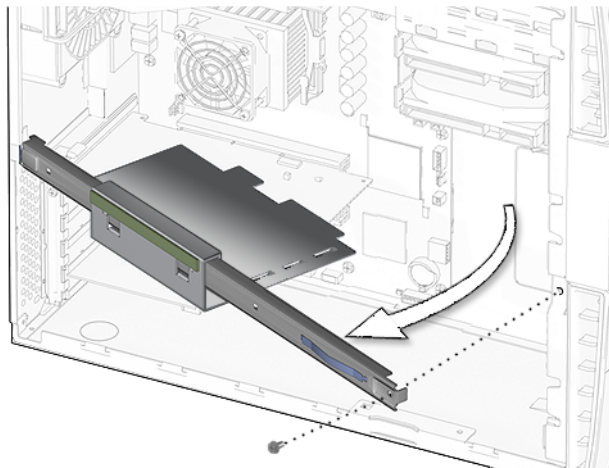
See [FIGURE 13-54](#). Set the screw aside in a container.



**FIGURE 13-54** Removing the Cross Brace Screw

5. Angle the cross brace 6 inches (300 mm) away from where you removed the screw and gently pull the rear end of the cross brace away from the rear panel.

See [FIGURE 13-55](#).



**FIGURE 13-55** Removing the Chassis Cross Brace

The PCI card support falls free from the chassis. Set the cross brace and PCI card support aside.

6. Choose your next step:

- If you removed the chassis cross brace prior to removing the motherboard, return to [Step 4 of “Removing the Motherboard” on page 11-46](#).
- Otherwise, proceed to [“Installing the Chassis Cross Brace” on page 13-53](#).

---

**Note** – Do not operate the workstation without the cross brace installed.

---

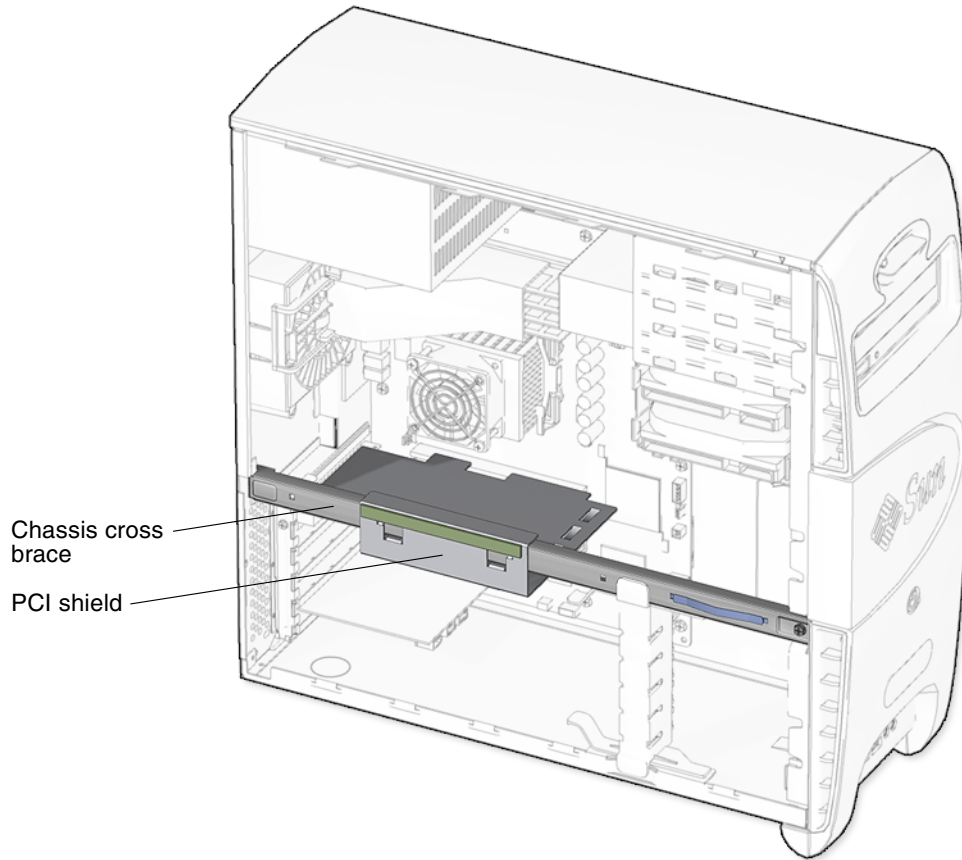
### 13.8.3 Installing the Chassis Cross Brace

1. **Open the chassis.**

Refer to [“Removing the Access Panel” on page 10-12](#).

2. **Locate where the cross brace is installed.**

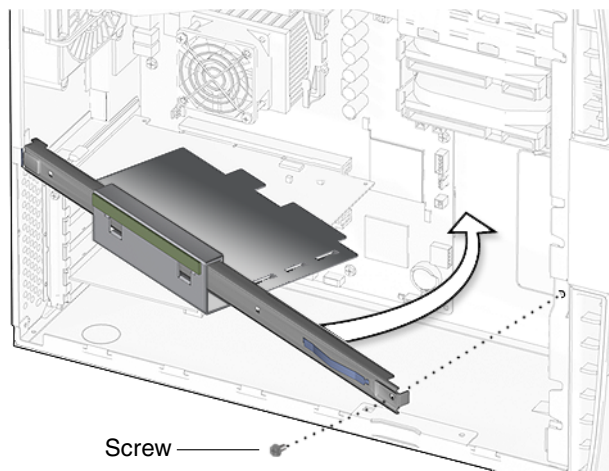
See [FIGURE 13-56](#).



**FIGURE 13-56** PCI Shield on Chassis Cross Brace

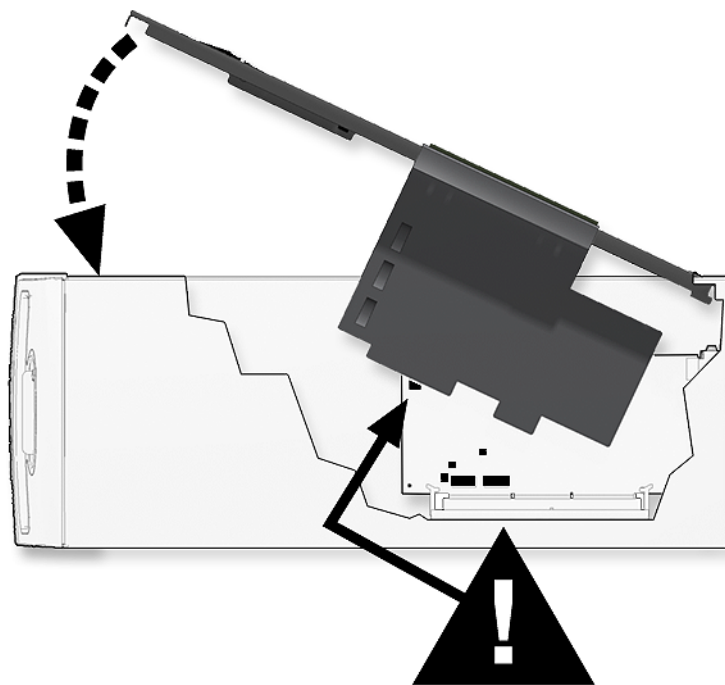
3. Insert the tab at the rear end of the cross brace into the slot on the rear panel of the chassis.

See [FIGURE 13-57](#).



**FIGURE 13-57** Swinging Chassis Cross Brace Into Position

4. Swing the front end of the cross brace toward the edge of the front panel.  
See [FIGURE 13-57](#).
5. As you swing the chassis cross brace into position, check that the edge of the PCI shield does not strike components on the rear of the PCI card in slot `PCI4`.  
See [FIGURE 13-58](#).

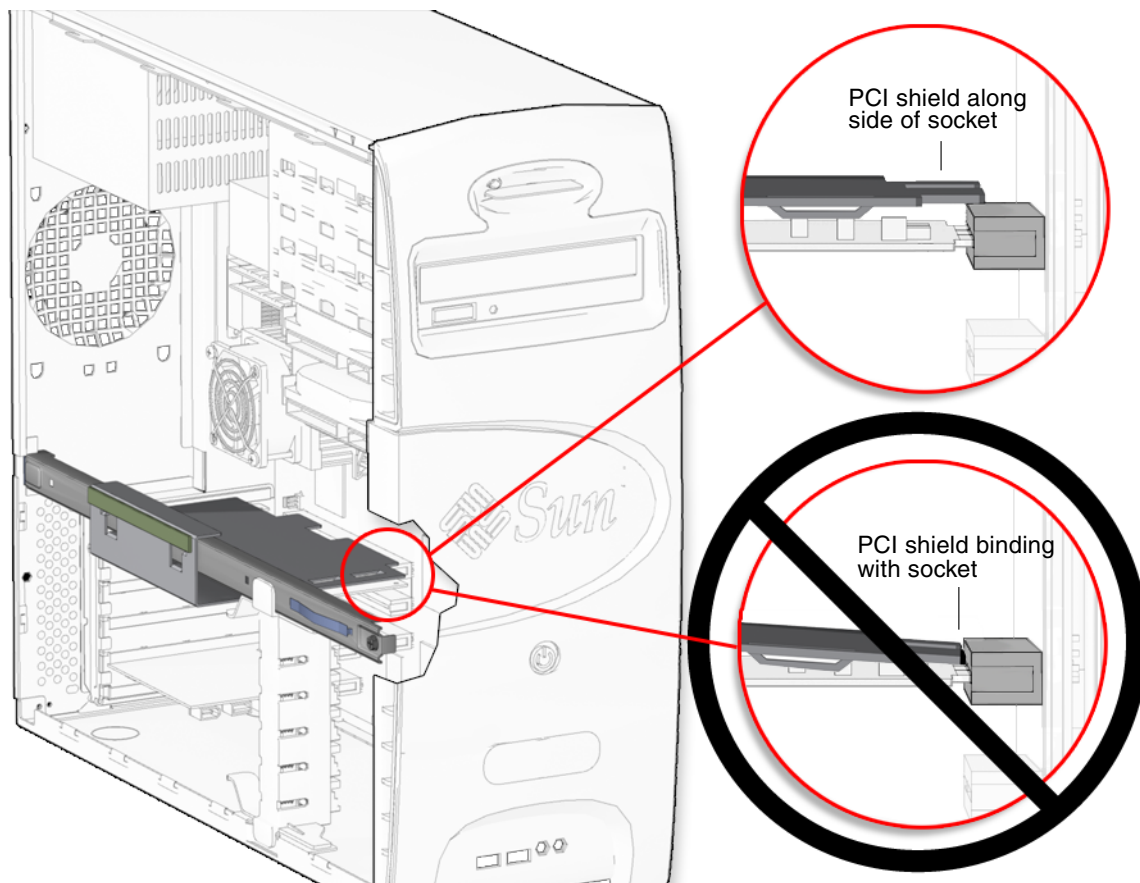


**FIGURE 13-58** Preventing PCI Shield From Striking Components

6. As the cross brace screw hole aligns with the respective hole in the chassis, ensure that the PCI shield is not binding on the socket of slot `PCI4`.

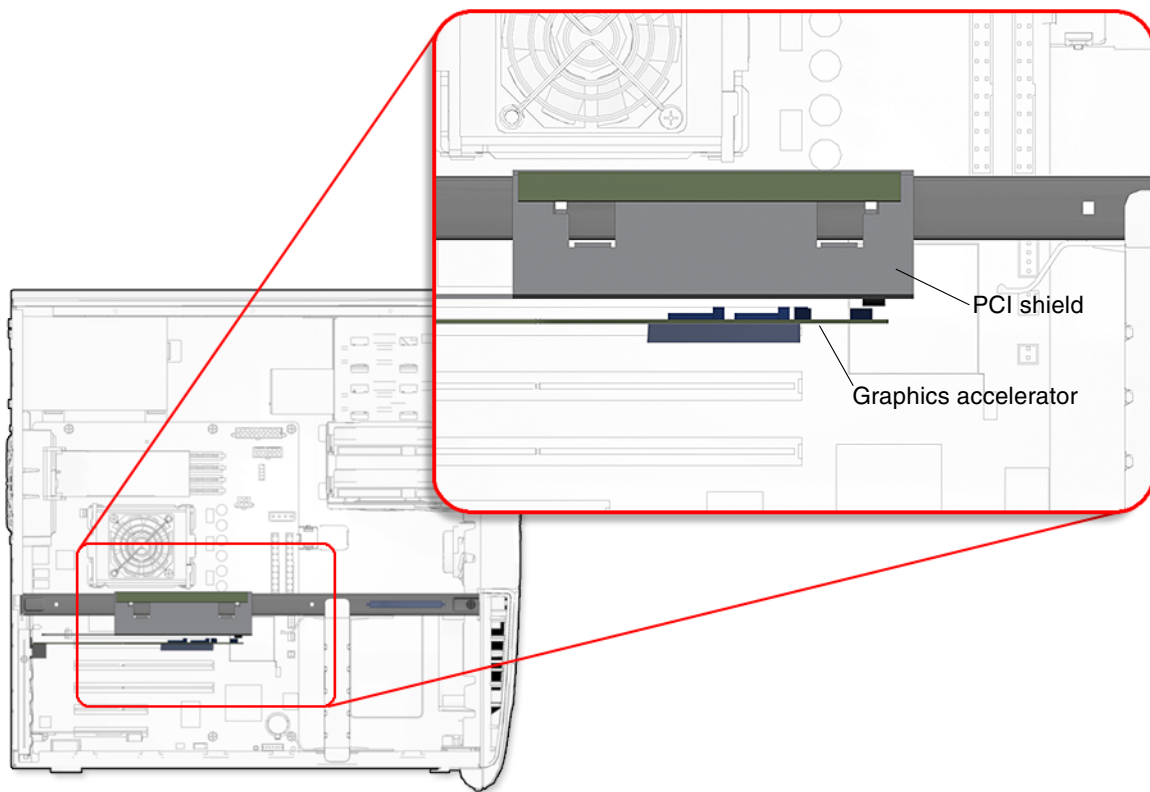
See [FIGURE 13-59](#).





**FIGURE 13-59** Preventing PCI Shield From Binding With Socket

When properly installed, the PCI shield fits flat against the back side of the PCI card installed in slot PCI4. See [FIGURE 13-60](#).



**FIGURE 13-60** PCI Shield Fit to PCI Card in Slot PCI4

7. Using a No. 2 Phillips screwdriver, fasten the screw to secure the cross brace to the chassis.

8. Choose your next step:

- If you installed the chassis cross brace after installing the motherboard, return to [Step 18 of “Installing the Motherboard” on page 11-50](#).
- Otherwise, install the PCI card support, the access panel, and power on the system.

Refer to:

- [“Installing the PCI Card Support” on page 13-47](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)

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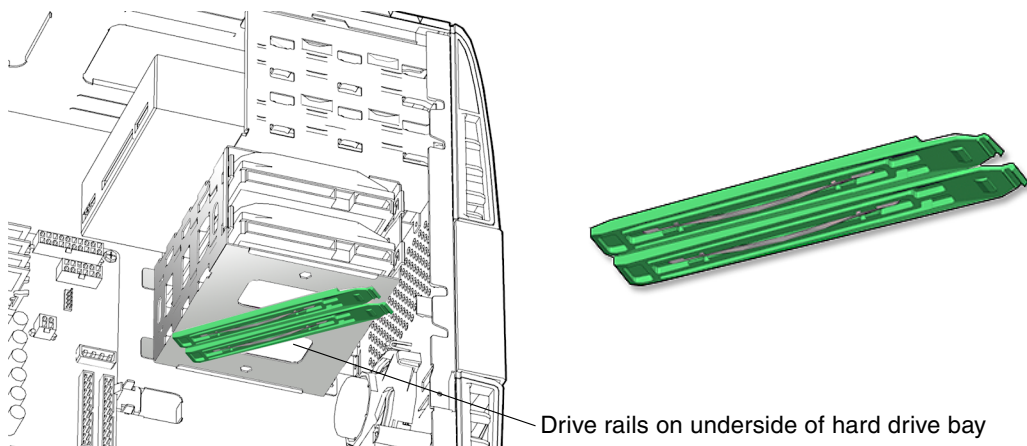
## 13.9 Replacing the Drive Rails

This section describes removal and installation of the drive rails. Topics include:

- [“Identifying the Drive Rails” on page 13-59](#)
- [“Removing the Drive Rails” on page 13-59](#)
- [“Installing the Drive Rails” on page 13-61](#)

### 13.9.1 Identifying the Drive Rails

The Sun Blade 1500 workstation drive rails guide the hard drives into the hard drive bay. The Sun Blade 1500 workstation supports up to two hard drives. When you are not using the second hard drive, the corresponding drive rails are stored on the underside of the hard drive bay. See [FIGURE 13-61](#).



**FIGURE 13-61** Drive Rails Location and Identification

### 13.9.2 Removing the Drive Rails

1. **Power off the system and open the chassis.**

Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

**2. Remove the hard drive.**

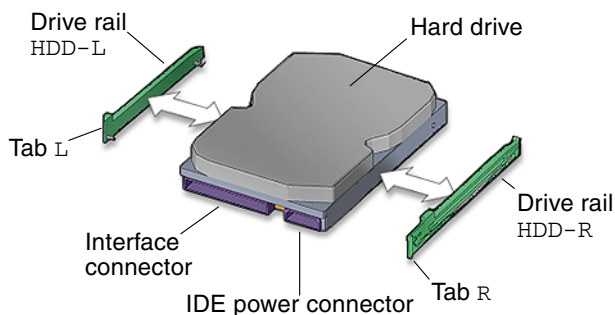
- If you are replacing an existing hard drive, refer to [“Replacing a Hard Drive” on page 12-2.](#)
- If you are installing a new hard drive and not replacing an existing hard drive, proceed to [“Installing the Drive Rails” on page 13-61.](#)

**3. Locate the drive rails.**

The drive rails are on the side of each hard drive.

**4. Pull the green plastic drive rails off the sides of the hard drive.**

See [FIGURE 13-62](#). Set them aside.



**FIGURE 13-62** Removing the Drive Rails From the Hard Drive

**5. Choose your next step:**

- If you are going to replace the hard drive, proceed to [“Installing the Drive Rails” on page 13-61.](#)
- Otherwise, continue to [Step 6.](#)

**6. Store the drive rails on the underside of the hard drive bay.**

See [FIGURE 13-61](#).

**7. Install the access panel, and power on the system.**

Refer to:

- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)

## 13.9.3 Installing the Drive Rails

### 1. Power off the system and open the chassis.

Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

### 2. Remove the spare drive rails from their storage position, if needed.

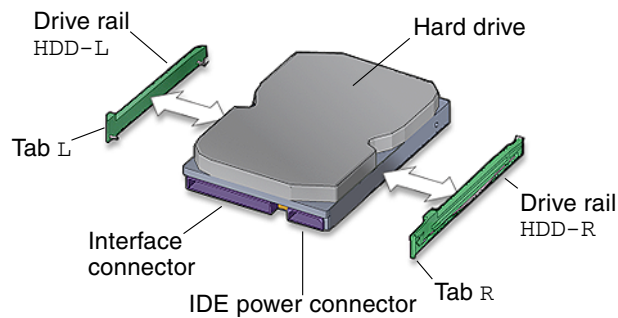
The drive rails are stored on the underside of the hard drive bay. Unsnap them from their storage location. See [FIGURE 13-61](#).

### 3. Locate the hard drive.

Whether you are replacing an existing hard drive or installing a new second hard drive, refer to [“Replacing a Hard Drive” on page 12-2](#).

### 4. Snap both drive rails into the holes on both sides of the hard drive.

The lettering on the drive rails (HDD-L and HDD-R) is upright and the drive rail tabs are toward the hard drive power and interface connectors. See [FIGURE 13-63](#).



**FIGURE 13-63** Installing the Drive Rails to the Hard Drive

Proceed to and complete [“Replacing a Hard Drive” on page 12-2](#).



## Replacing Internal Cables

---

Components in the Sun Blade 1500 workstation are connected to the motherboard through a collection of interface, signal, and power cables. Interface cables, for the smart card reader, optical drive, hard drives, and the audio USB board are of a ribbon style. This chapter describes the remove and installation procedures for the Sun Blade 1500 workstation internal cabling.

The procedures described in this chapter are written for workstation service providers and system administrators.

This chapter contains the following topics:

- “Replacing the Smart Card Reader Cable” on page 14-3
- “Replacing the Optical Drive Interface Cable” on page 14-6
- “Replacing the Hard Drive Interface Cable” on page 14-10
- “Replacing the IDE Power Cable” on page 14-13
- “Replacing the Power Switch Assembly” on page 14-17
- “Replacing the Audio USB Board Cables” on page 14-23



---

**Caution** – To prevent equipment damage, review the safety requirements, safety symbols, and safety precautions in “Preparing to Replace Components” on page 10-1 before you perform any replacement procedure. Additional cautions, warnings, and instructions are provided in the *Sun Blade 1500 Safety and Compliance Guide*, 817-5130. The document is available from:  
<http://www.sun.com/documentation>.

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**Caution** – The procedures in this chapter are performed with the workstation chassis in an upright position. If you perform any of the procedures in this chapter with the chassis in its upright position, use care that you do not tip over the chassis.

---



---

**Caution** – When servicing or removing workstation components, attach an antistatic strap to your wrist and then to a metal area on the chassis. Then disconnect the power cord from the workstation and the wall receptacle. Following this caution equalizes all electrical potentials with the workstation.

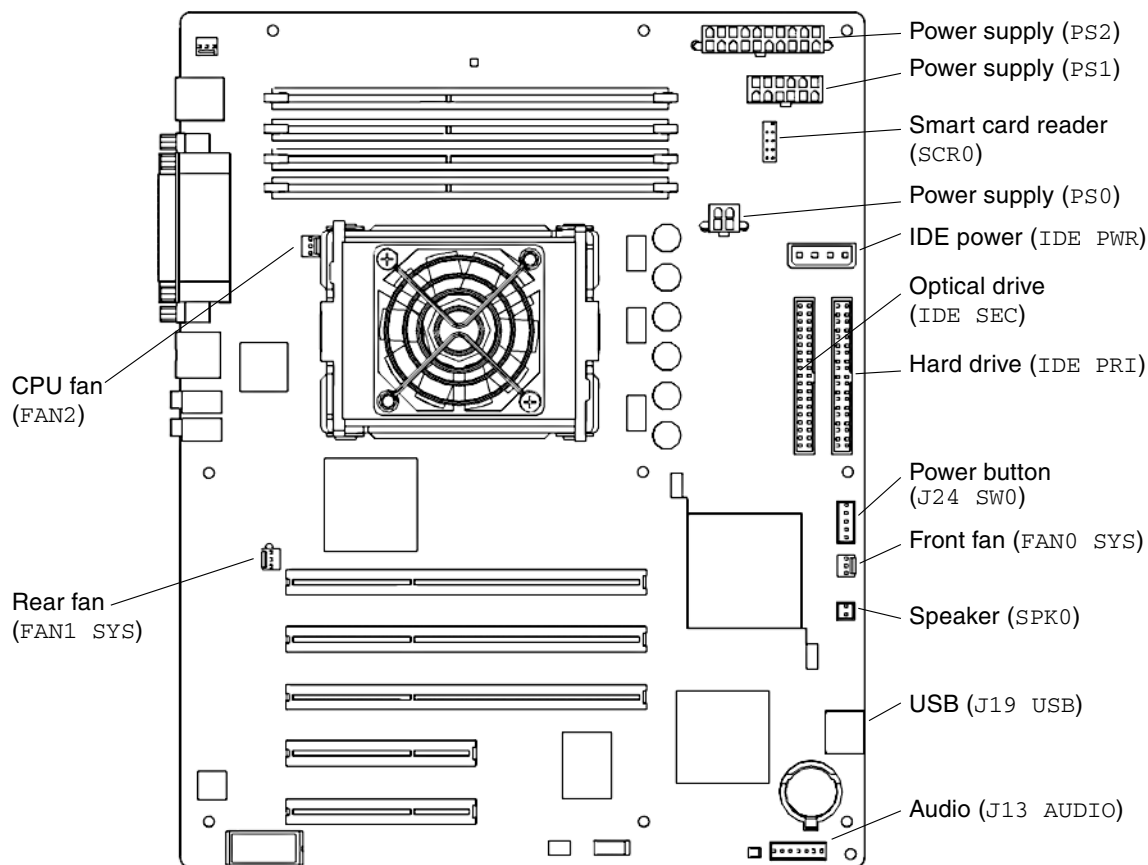
---

The Sun Blade 1500 workstation replaceable cables come as a set that includes:

- Smart card reader cable
- Removable media interface cable
- Hard drive interface cable
- IDE power cable
- Power switch assembly
- Audio USB board cables (two)

FIGURE 14-1 shows cable connectors and slots for the Sun Blade 1500 motherboard.





**FIGURE 14-1** Sun Blade 1500 Motherboard Cable Connections

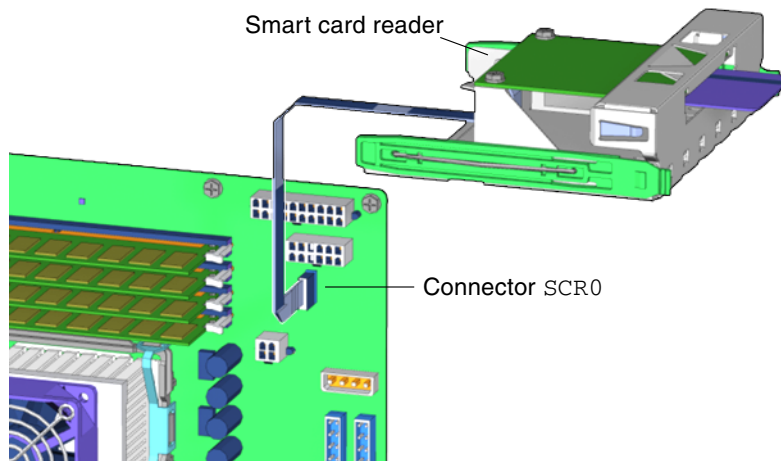
## 14.1 Replacing the Smart Card Reader Cable

This section describes removal and installation of the smart card reader cable. Topics include:

- [“Identifying the Smart Card Reader Cable” on page 14-4](#)
- [“Removing the Smart Card Reader Cable” on page 14-4](#)
- [“Installing the Smart Card Reader Cable” on page 14-5](#)

## 14.1.1 Identifying the Smart Card Reader Cable

The smart card cable connects the smart card reader to the motherboard at SCR0. It is a 10-conductor ribbon cable. [FIGURE 14-2](#) shows the smart card reader cable connections.



**FIGURE 14-2** Smart Card Reader Cable Connection

## 14.1.2 Removing the Smart Card Reader Cable

1. **Power off the system, open the chassis, and remove the bezel.**

Refer to:

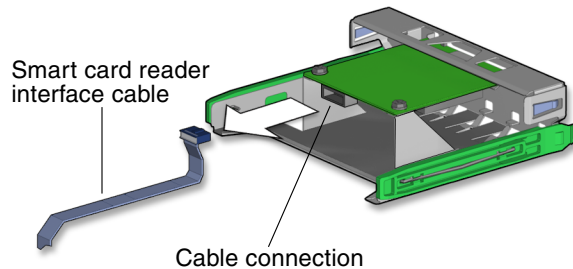
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Removing the Bezel” on page 10-14](#)

2. **Remove the smart card reader bracket.**

Refer to [“Removing the Smart Card Reader” on page 12-16](#). Do not remove the smart card reader from the bracket.

3. **Pull the interface cable from the connector on the smart card reader.**

See [FIGURE 14-3](#). Set the cable aside.



**FIGURE 14-3** Disconnecting the Cable From the Smart Card Reader

Proceed to [“Installing the Smart Card Reader Cable” on page 14-5](#).

---

**Note** – The smart card reader does not operate without the interface cable.

---

## 14.1.3 Installing the Smart Card Reader Cable

### 1. Open the chassis and remove the bezel.

Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Removing the Bezel” on page 10-14](#)

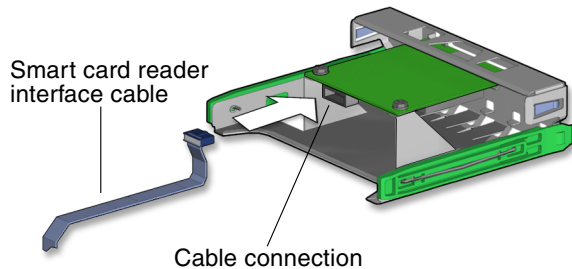
### 2. Locate where the smart card reader cable is to be installed.

The cable connects to the smart card reader and to the motherboard at SCR0. See [FIGURE 14-1](#) and [FIGURE 14-2](#).

### 3. Remove the smart card reader cable from its packaging.

### 4. With the smart card reader bracket on an antistatic mat, connect the interface cable to the smart card reader.

See [FIGURE 14-4](#).



**FIGURE 14-4** Connecting the Cable to the Smart Card Reader

**5. Install the smart card reader bracket.**

Refer to [Step 7 of “Installing the Smart Card Reader” on page 12-20](#).

**6. Inspect the cabling to verify that:**

- The interface cable is routed correctly through the reader cable clip, with a minimum of kinks.
- The interface cable is secure in the smart card reader connector.
- The interface cable is secure in the motherboard connector SCR0.

**7. Install the bezel, the access panel, power on the system, and verify the smart card reader cable installation.**

Refer to:

- [“Installing the Bezel” on page 15-2](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

## 14.2 Replacing the Optical Drive Interface Cable

This section describes removal and installation of the optical drive interface cables. Topics include:

- [“Identifying the Optical Drive Interface Cable” on page 14-7](#)
- [“Removing the Optical Drive Interface Cable” on page 14-7](#)
- [“Installing the Optical Drive Interface Cable” on page 14-8](#)

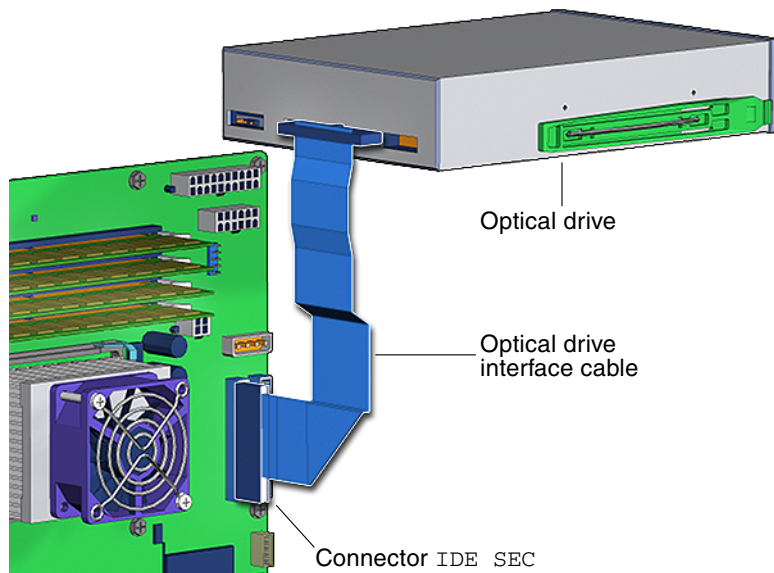
## 14.2.1 Identifying the Optical Drive Interface Cable

The optical has separate power and interface cables. The power cable is a Y cable that connects to the motherboard at IDE PWR and the other ends to the hard drives and optical drive. The interface cable connects the optical drive to the motherboard at IDE SEC. The interface cable is a 40-conductor ribbon cable that is routed through the chassis. [FIGURE 14-5](#) shows the optical drive interface cable connections.

---

**Note** – The instructions in this section apply to any removable media drive, such as a CD-ROM, tape, or DVD-ROM drive.

---



**FIGURE 14-5** Optical Drive Interface Cable Connection

## 14.2.2 Removing the Optical Drive Interface Cable

1. **Power off the system and open the chassis.**

Refer to:

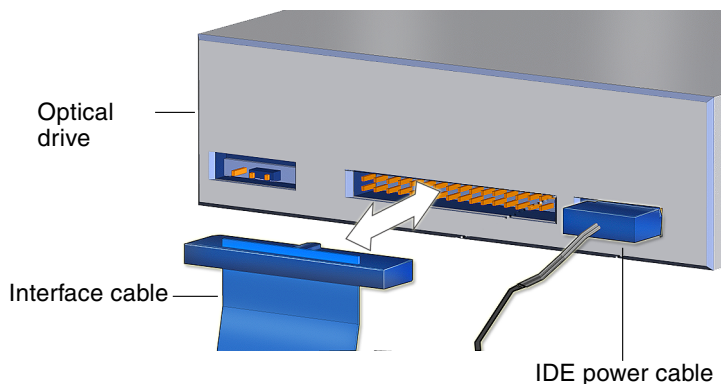
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

**2. Locate the optical drive interface cable.**

The optical drive is located in the upper portion of the chassis. The optical drive cable is located to the rear of the optical drive. See [FIGURE 14-5](#).

**3. Disconnect the optical drive interface cable from the optical drive.**

See [FIGURE 14-6](#).



**FIGURE 14-6** Disconnecting the Interface Cable From the Optical Drive

**4. Disconnect the optical drive interface cable from the motherboard at IDE SEC.**

See [FIGURE 14-1](#) and [FIGURE 14-5](#).

Proceed to [“Installing the Optical Drive Interface Cable” on page 14-8](#).

---

**Note** – The optical drive does not operate without the interface cable.

---

## 14.2.3 Installing the Optical Drive Interface Cable

**1. Open the chassis.**

Refer to:

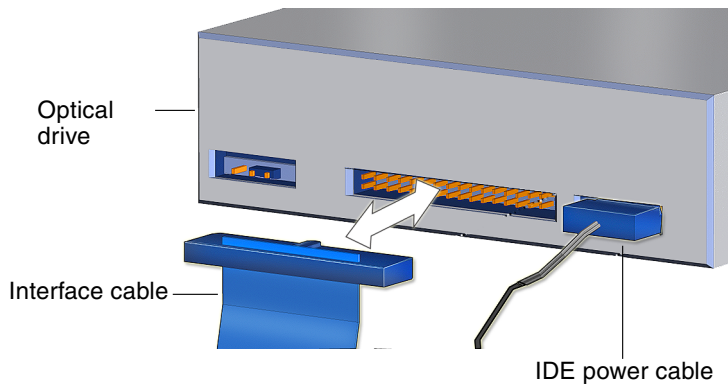
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

**2. Locate where the optical drive interface cable is to be installed.**

See [FIGURE 14-5](#).

**3. Connect the interface cable into the optical drive interface connector.**

See [FIGURE 14-7](#).



**FIGURE 14-7** Connecting the Interface Cable to the Optical Drive

**4. Route the interface cable through the chassis.**

---

**Note** – The interface cable is a flat cable and can be bent to fit. Use caution not to fold the cable too much as it can be damaged.

---

**5. Connect the interface cable into the motherboard at IDE SEC.**

See [FIGURE 14-1](#) and [FIGURE 14-5](#).

**6. Inspect the cabling to verify that:**

- The interface cable is secure in the optical drive connector.
- The interface cable is secure in the motherboard connector IDE SEC.

**7. Install the access panel, power on the system, and verify the optical drive interface cable installation.**

Refer to:

- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

## 14.3 Replacing the Hard Drive Interface Cable

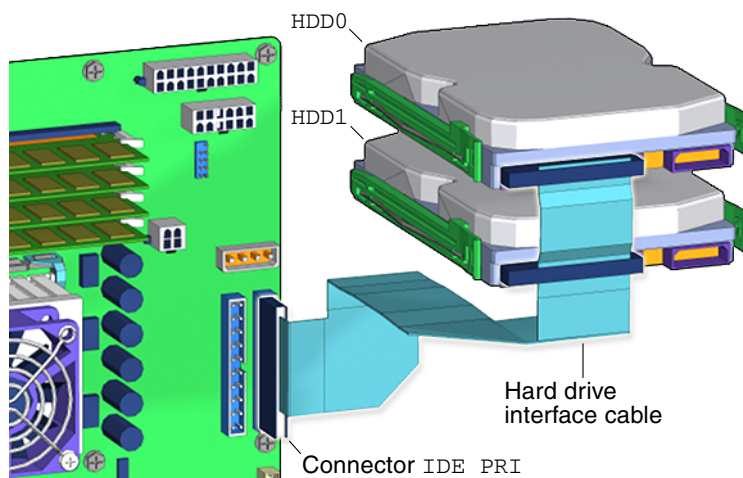
This section describes removal and installation of the hard drive interface cables. Topics include:

- [“Identifying the Hard Drive Interface Cable” on page 14-10](#)
- [“Removing the Hard Drive Interface Cable” on page 14-11](#)
- [“Installing the Hard Drive Interface Cable” on page 14-12](#)

### 14.3.1 Identifying the Hard Drive Interface Cable

The hard drives have separate power and interface cables. Both cables have two inline connectors to support up to two drives. The power cable is a Y cable that connects to the motherboard at IDE PWR and the other ends to the hard drives and optical drive. The interface cable connects the hard drives to the motherboard. The interface cable is an 80-conductor ribbon cable that is routed through the chassis.

[FIGURE 14-8](#) shows the hard drive interface cable connections.



**FIGURE 14-8** Hard Drive Interface Cable Connection



## 14.3.2 Removing the Hard Drive Interface Cable

### 1. Power off the system and open the chassis.

Refer to:

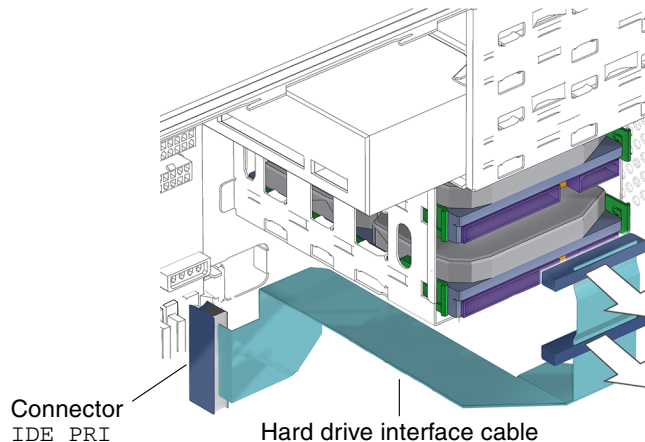
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

### 2. Locate the hard drive interface cable.

The hard drive is located in the mid-front portion of the chassis. The hard drive cables are easily accessible. See [FIGURE 14-8](#).

### 3. Disconnect the hard drive interface cable from the upper hard drive.

See [FIGURE 14-9](#).



**FIGURE 14-9** Disconnecting the Interface Cable From the Hard Drive(s)

### 4. Disconnect the interface cable from the lower hard drive (if installed).

See [FIGURE 14-9](#).

### 5. Disconnect the hard drive interface cable from the motherboard at IDE PRI.

See [FIGURE 14-1](#) and [FIGURE 14-9](#).

Proceed to [“Installing the Hard Drive Interface Cable” on page 14-12](#).

---

**Note** – The hard drive does not operate without the interface cable.

---

## 14.3.3 Installing the Hard Drive Interface Cable

### 1. Open the chassis.

Refer to:

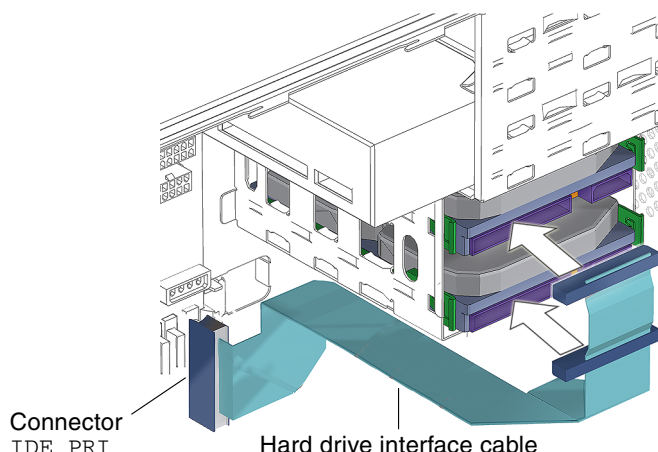
- “Powering Off the Workstation” on page 10-4
- “Removing the Access Panel” on page 10-12

### 2. Locate where the hard drive interface cable is to be installed.

See [FIGURE 14-8](#).

### 3. Connect the end of the interface cable labeled HDD0 into the upper hard drive interface connector.

See [FIGURE 14-10](#).



**FIGURE 14-10** Connecting the Interface Cable to the Hard Drive(s)

### 4. If you have two hard drives, connect the lower drive using the interface cables's inline connector HDD1.

### 5. Route the interface cable through the chassis.

---

**Note** – The interface cable is a flat cable and can be bent to fit. Use caution not to fold the cable too much as it can be damaged.

---

### 6. Connect the interface cable into the motherboard at IDE PRI.

See [FIGURE 14-1](#) and [FIGURE 14-10](#).

### 7. Inspect the cabling to verify that:

- The interface cable is secure in the hard drive connector.
  - The interface cable is secure in the motherboard connector IDE PRI.
8. **Install the access panel, power on the system, and verify the hard drive interface cable installation.**

Refer to:

- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

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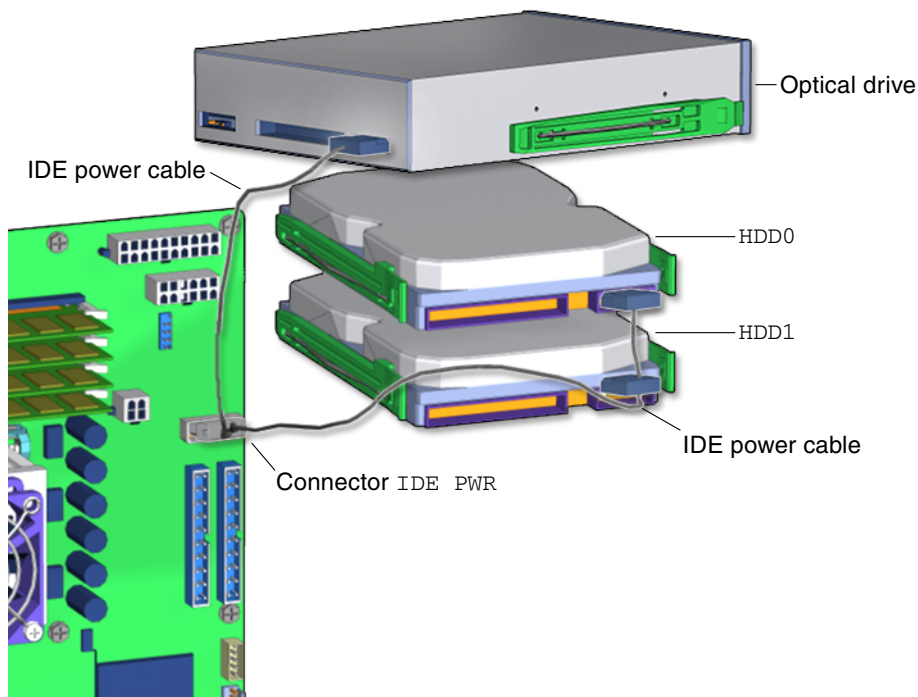
## 14.4 Replacing the IDE Power Cable

This section describes the removal and installation of the IDE power cable. Topics include:

- [“Identifying the IDE Power Cable” on page 14-13](#)
- [“Removing the IDE Power Cable” on page 14-14](#)
- [“Installing the IDE Power Cable” on page 14-16](#)

### 14.4.1 Identifying the IDE Power Cable

The IDE power cable is a Y cable that attaches to the motherboard at IDE PWR. One branch of the cable goes to the power connector on the rear of the optical drive. The other branch has two connectors and attaches to the hard drives; the end connector attaches to HDD0, the other connector to HDD1. [FIGURE 14-11](#) shows the IDE power cable connections.



**FIGURE 14-11** IDE Power Cable Connections

## 14.4.2 Removing the IDE Power Cable

---

**Note** – IDE power connectors fit tightly. Disconnect the cable by wiggling the connector side to side while pulling it away from the drive or motherboard.

---

1. **Power off the system and open the chassis.**

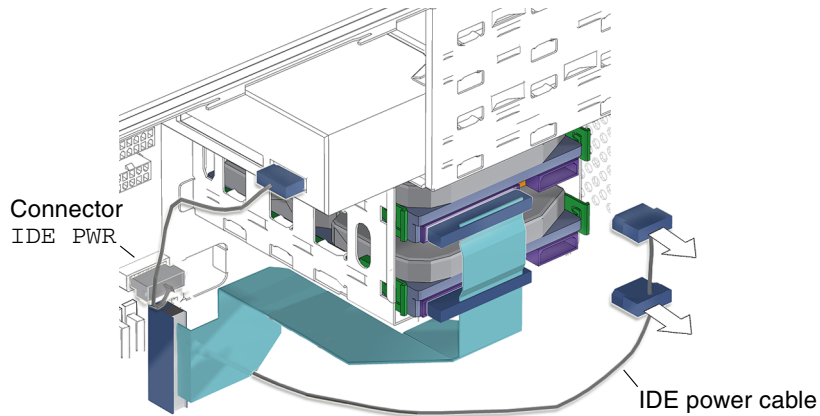
Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

2. **Locate the IDE power cable.**

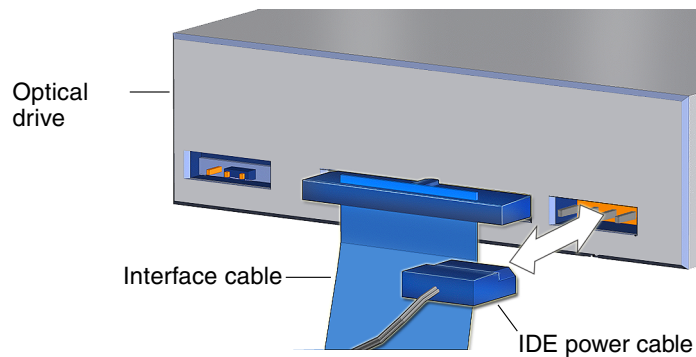
The IDE power cable is located in the upper portion of the chassis. It connects to the optical drive, the hard drive(s), and the motherboard. See [FIGURE 14-11](#).

3. **Disconnect the IDE power cables from the upper hard drive HDD0.**  
See [FIGURE 14-12](#).



**FIGURE 14-12** Disconnecting the IDE Power Cable From the Hard Drive(s)

4. **If installed, disconnect the IDE power cable from the lower hard drive HDD1.**  
See [FIGURE 14-12](#).
5. **Disconnect the IDE power cable from the optical drive.**  
See [FIGURE 14-13](#).



**FIGURE 14-13** Disconnecting the IDE Power Cable From the Optical Drive

6. **Disconnect the IDE power cable from the motherboard at IDE PWR.**  
See [FIGURE 14-1](#) and [FIGURE 14-12](#).

Proceed to [“Installing the IDE Power Cable”](#) on page 14-16.

---

**Note** – The optical drive and hard drive(s) do not operate without the IDE power cable.

---

### 14.4.3 Installing the IDE Power Cable

**1. Power off the system and open the chassis.**

Refer to:

- [“Powering Off the Workstation”](#) on page 10-4
- [“Removing the Access Panel”](#) on page 10-12

**2. Locate where the IDE power cable is to be installed.**

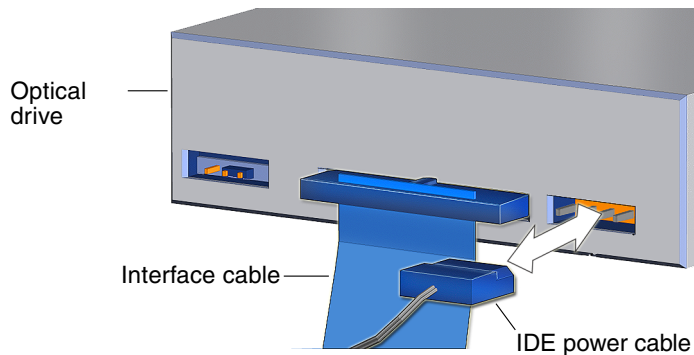
See [FIGURE 14-11](#).

**3. Connect the center connector of the IDE power cable to the motherboard at IDE PWR.**

The center connector is at the vertex of the Y. See [FIGURE 14-1](#) and [FIGURE 14-15](#).

**4. Connect the branch of the IDE power cable with the solitary connector to the optical drive.**

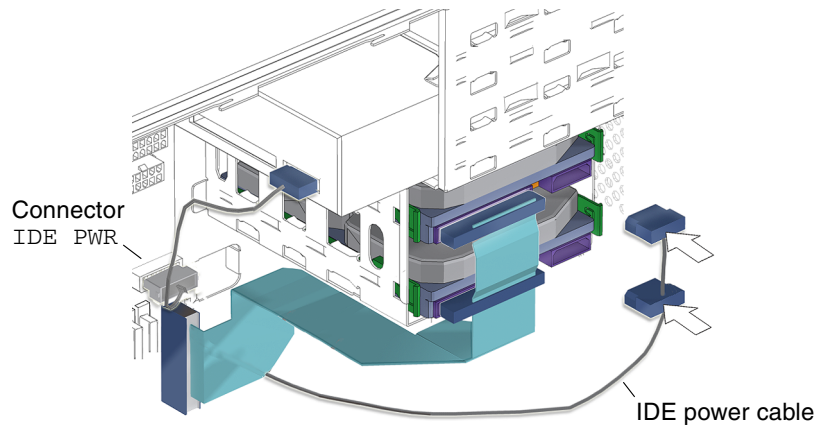
See [FIGURE 14-14](#).



**FIGURE 14-14** Connecting the IDE Power Cable to the Optical Drive

**5. Attach the other branch end connector to the upper hard drive HDD0.**

See [FIGURE 14-15](#).



**FIGURE 14-15** Connecting the IDE Power Cable to the Hard Drive(s)

6. If installed, attach the remaining connector to the lower hard drive HDD1.

See [FIGURE 14-15](#).

7. Inspect the cabling to verify that:

- The IDE power cable is secure in the optical drive connector.
- The IDE power cable is secure in the hard drive connector(s).
- The IDE power cable is secure in the motherboard connector IDE PWR.

8. Install the access panel, power on the system, and verify the IDE power cable installation.

Refer to:

- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

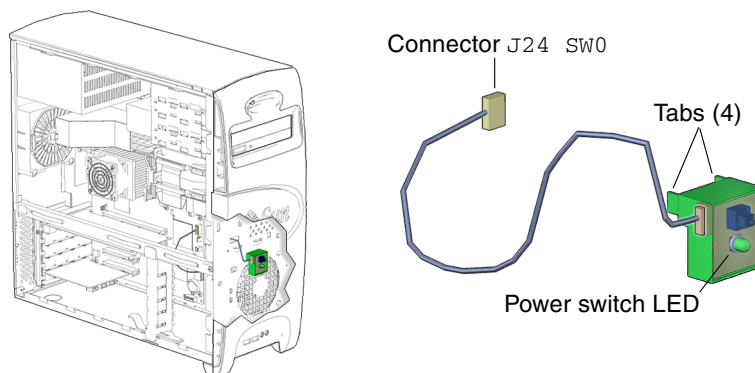
## 14.5 Replacing the Power Switch Assembly

This section describes removal and installation of the power switch assembly. Topics include:

- [“Identifying the Power Switch Assembly” on page 14-18](#)
- [“Removing the Power Switch Assembly” on page 14-18](#)
- [“Installing the Power Switch Assembly” on page 14-21](#)

## 14.5.1 Identifying the Power Switch Assembly

The power switch assembly signals the workstation to power up or power down. It has a single LED light to indicate power-on status. Signal and power is provided through a cable connected to the motherboard at J24 SW0. [FIGURE 14-16](#) shows the location of and identifies the power switch assembly.



**FIGURE 14-16** Power Switch Assembly Location and Identification

[TABLE 14-1](#) lists the power switch assembly specifications.

**TABLE 14-1** Power Switch Assembly Specifications

Specification	Value
Voltage	1-20 Volts
Current	5 Amps
Type	SPST intermittent

## 14.5.2 Removing the Power Switch Assembly

1. **Power off the system, open the chassis, and remove the bezel.**

Refer to:

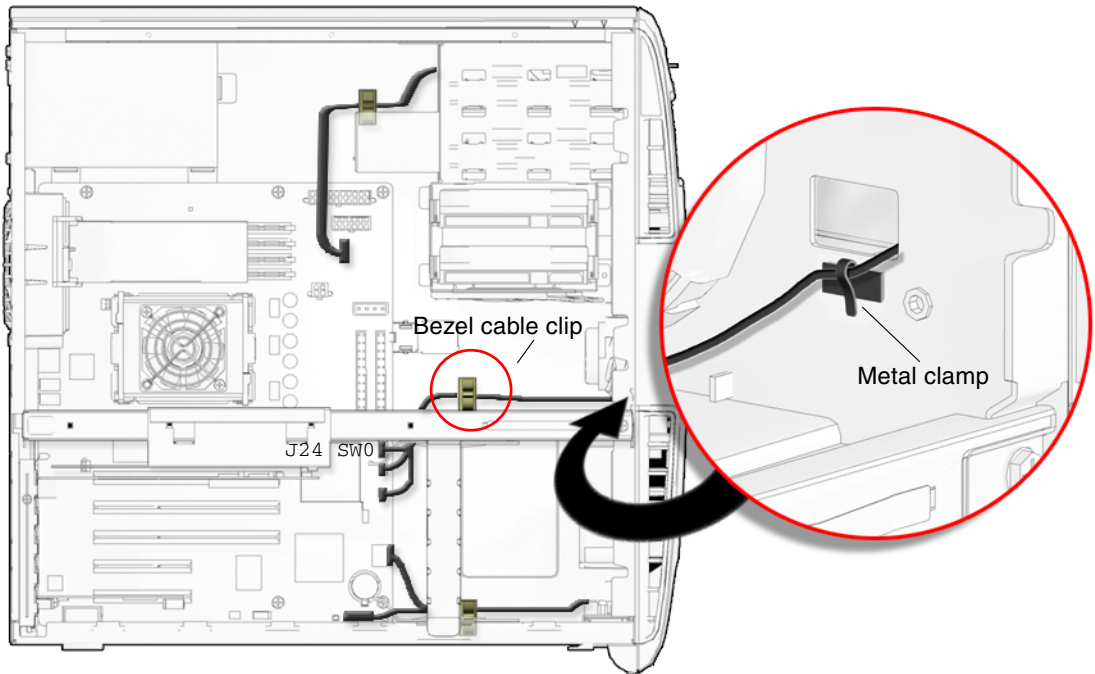
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Removing the Bezel” on page 10-14](#)



**2. Locate the power switch assembly.**

The power switch assembly cable is fed through the front of the chassis, just above the front fan, and is fastened to the chassis with a small green bracket. See [FIGURE 14-16](#).

**3. Open the bezel cable clip in the center of the chassis and remove the power switch assembly cable from the clip. See [FIGURE 14-17](#).**

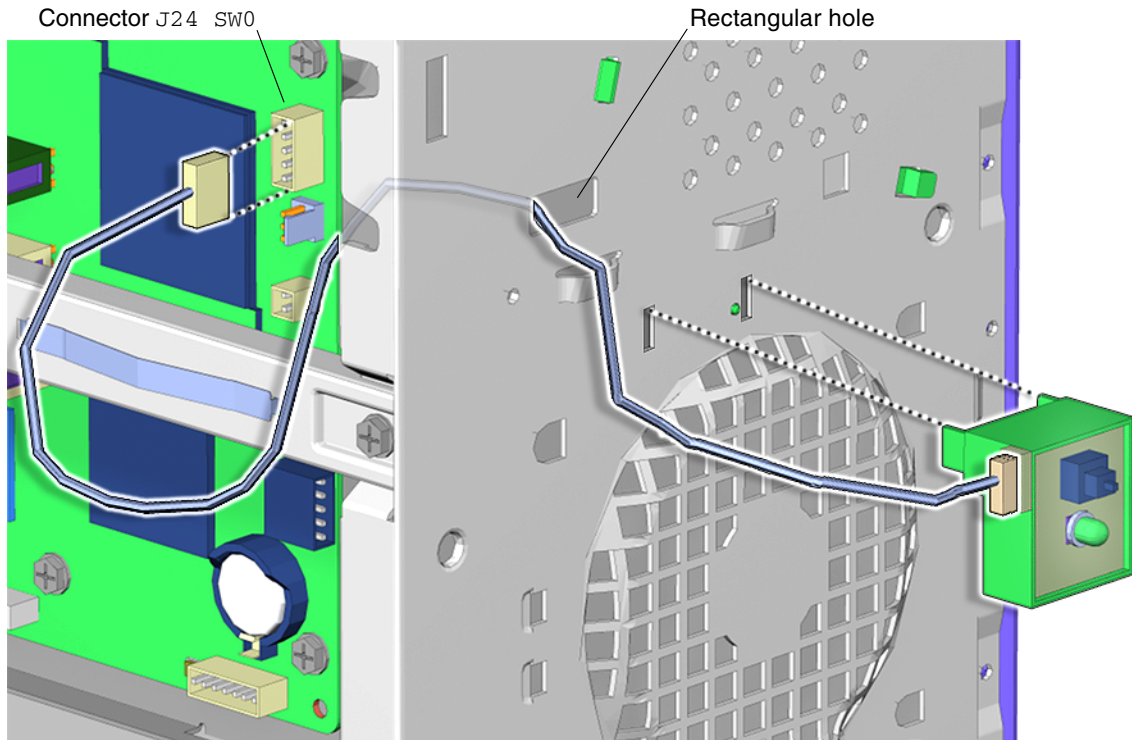


**FIGURE 14-17** Removing the Power Switch Assembly Cable From the Bezel Cable Clip and Metal Clamp

**4. Open the metal clamp and remove the power switch assembly cable. See [FIGURE 14-17](#).**

**5. Disconnect the power switch assembly cable from the motherboard at connector J24 SW0.**

See [FIGURE 14-18](#).



**FIGURE 14-18** Removing the Power Switch Assembly

6. Squeeze the tabs on either side of the power switch assembly and tilt it out and away from the front panel.

See [FIGURE 14-18](#).

7. Lift the power switch assembly up and away from the chassis.

8. Feed the power switch assembly cable through the opening in the front panel as you lift away the power switch assembly.

See [FIGURE 14-18](#).

Proceed to [“Installing the Power Switch Assembly”](#) on page 14-21.

---

**Note** – The workstation does not operate without the power switch assembly.

---

## 14.5.3 Installing the Power Switch Assembly

1. Open the chassis and remove the bezel.

Refer to:

- “Removing the Access Panel” on page 10-12
- “Removing the Bezel” on page 10-14

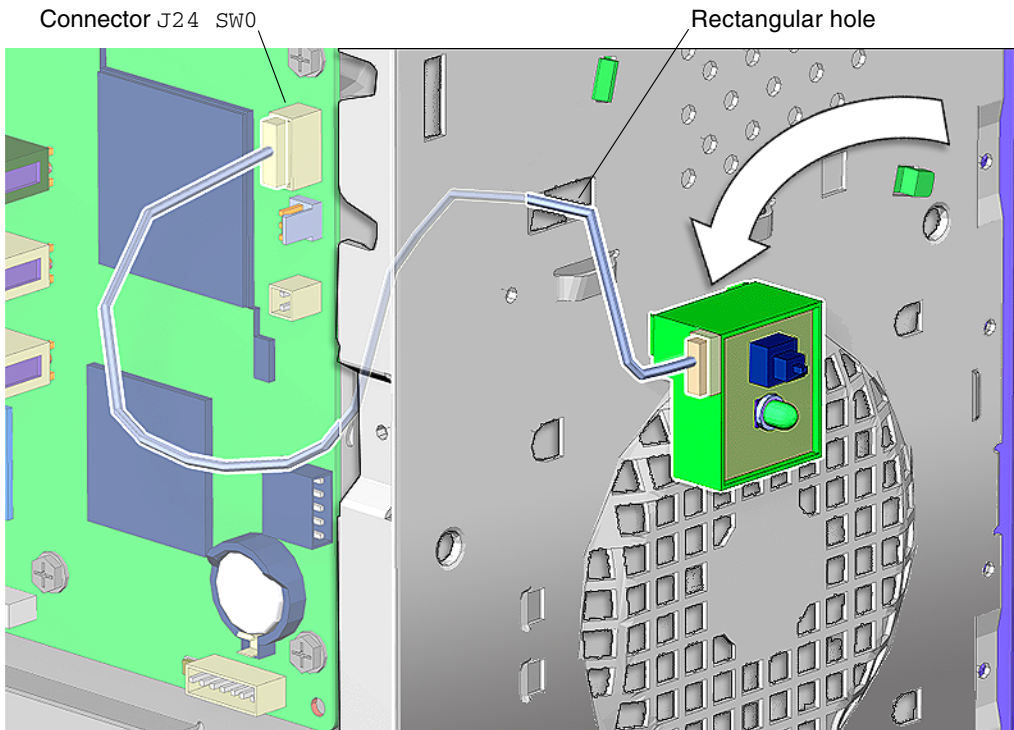
2. Locate where the power switch assembly is to be installed.

The power switch assembly mounts to the chassis front panel. It attaches to the front fan grille and to the four holes above the grille. See [FIGURE 14-16](#).

3. Remove the new power switch assembly from its packaging.

4. Route the power switch assembly cable routes through the rectangular hole in the chassis front panel above the front fan, through the metal clamp, and through the bezel cable clip.

See [FIGURE 14-19](#) and [FIGURE 14-20](#).



**FIGURE 14-19** Routing the Power Switch Assembly Cable

5. Connect the cable to the motherboard at J24 SW0.

See [FIGURE 14-19](#) and [FIGURE 14-20](#).

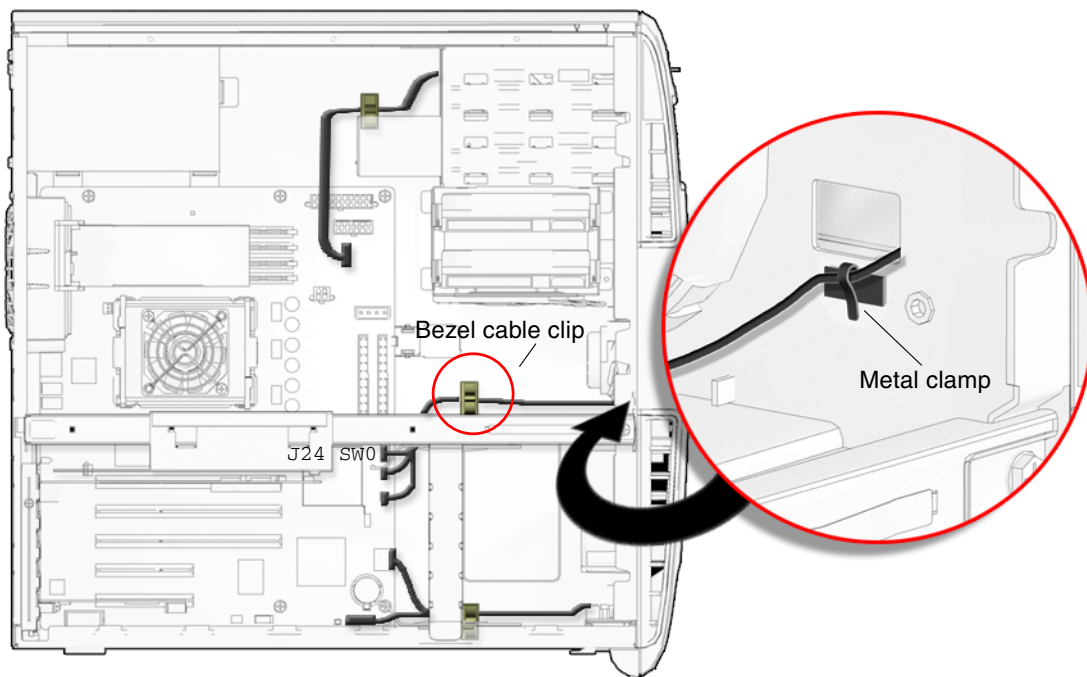
6. Hook the two lower feet of the power switch assembly into the third and fourth holes in the second row of the front fan grille.

7. Rock the power switch assembly back to snap the two upper feet and tabs into the four holes.

Make sure the power switch assembly is fully seated against the chassis front panel.  
See [FIGURE 14-19](#).

8. Secure the power switch assembly cable to the metal clamp and bezel cable clip.

See [FIGURE 14-20](#).



**FIGURE 14-20** Securing the Power Switch Assembly Cable to the Bezel Cable Clip and Metal Clamp

9. Check that the power switch assembly bracket feet are well seated in the chassis.

10. Inspect the power switch assembly cabling to verify that:

- The power switch assembly cable is firmly connected to the motherboard at J24 SW0.

- The power switch assembly cable is secure in the metal clamp and bezel cable clip.
- 11. Install the bezel, the access panel, power on the system, and verify the power switch assembly installation.**

Refer to:

- [“Installing the Bezel” on page 15-2](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

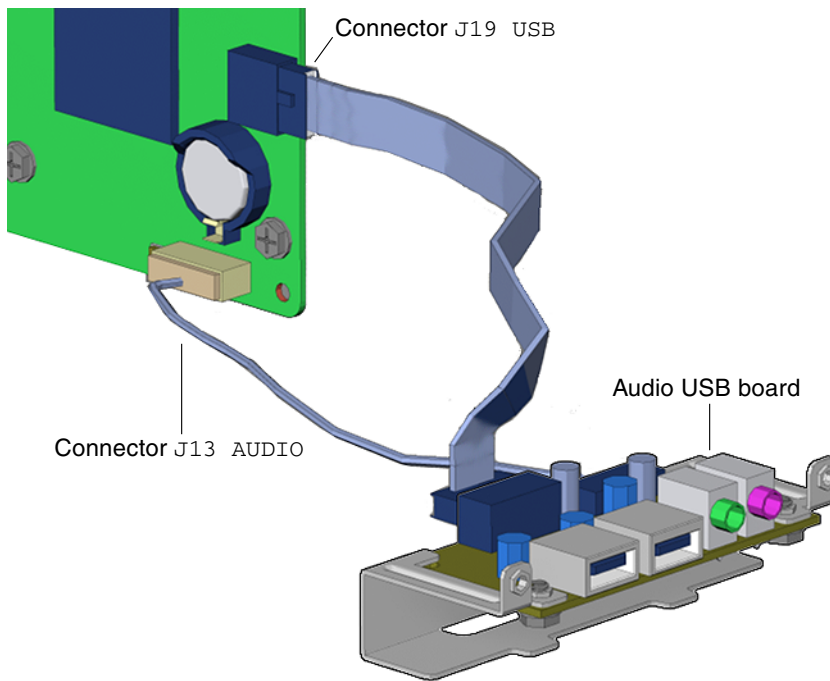
## 14.6 Replacing the Audio USB Board Cables

This section describes removal and installation of the audio USB board interface cables. Topics include:

- [“Identifying the Audio USB Board Cables” on page 14-23](#)
- [“Removing the Audio USB Board Cables” on page 14-24](#)
- [“Installing the Audio USB Board Cables” on page 14-27](#)

### 14.6.1 Identifying the Audio USB Board Cables

The audio USB board has two separate cable sets, one for audio and one for USB. The audio signals are carried by three shielded multi-conductor cables connecting to the motherboard at J13 AUDIO. The USB interface cable is a 10-conductor ribbon cable connecting at J19 USB. [FIGURE 14-21](#) shows the audio USB board cable connections.



**FIGURE 14-21** Audio USB Board Cable Connections

## 14.6.2 Removing the Audio USB Board Cables

1. **Power off the system and open the chassis.**

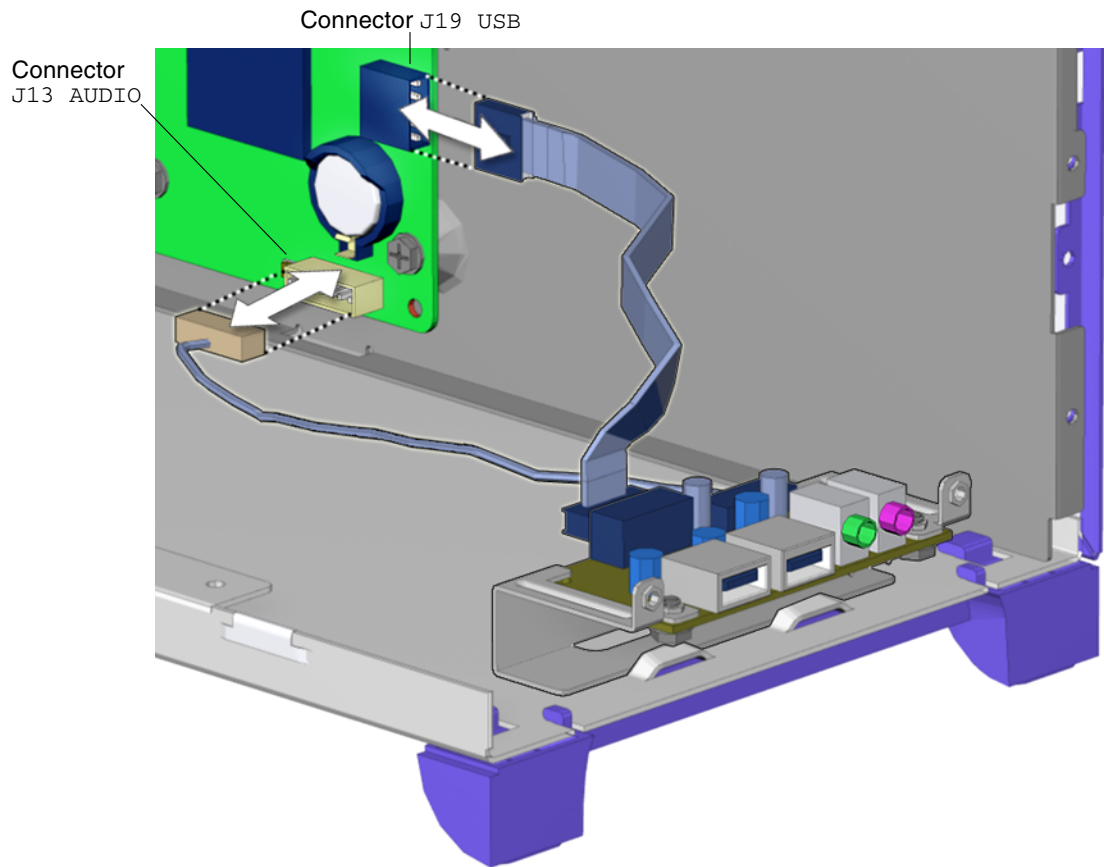
Refer to:

- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

2. **Locate the audio USB board cables.**

The audio USB board is located in the lower front portion of the chassis. The audio USB board cables are located on the rear of the audio USB board. See [FIGURE 14-21](#).

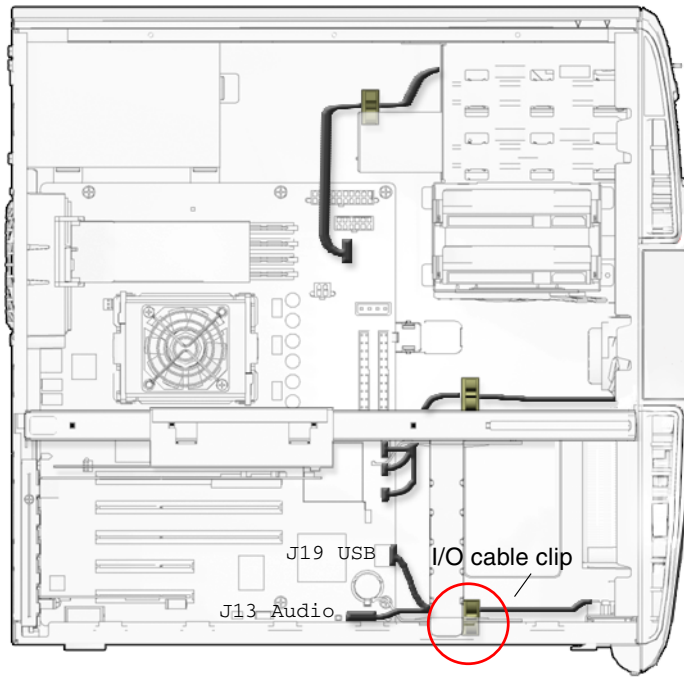
3. **Disconnect the audio USB board cables from the motherboard at J13 AUDIO and J19 USB.**
4. See [FIGURE 14-22](#).



**FIGURE 14-22** Removing Audio and USB Cables From the Motherboard

5. Open the I/O cable clip at the bottom of the chassis and remove the audio USB board cables from the clip.

See [FIGURE 14-23](#).

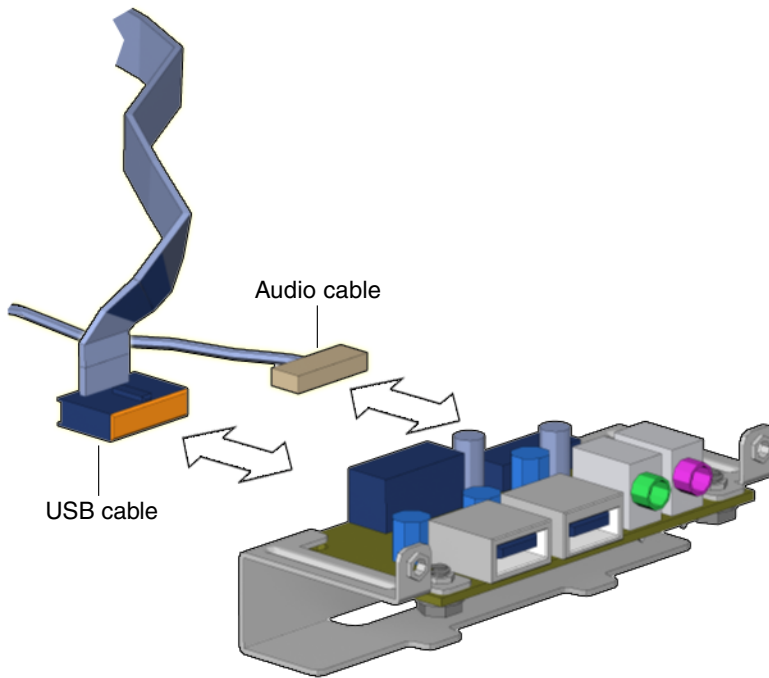


**FIGURE 14-23** Removing the Audio USB Cables From the I/O Cable Clip

- 6. Disconnect the cables from both the audio and the USB connectors on the audio USB board.**

See [FIGURE 14-24](#).





**FIGURE 14-24** Disconnecting Cables From the Audio USB Board

Proceed to [“Installing the Audio USB Board Cables” on page 14-27](#).

---

**Note** – The audio USB board does not operate without the cables.

---

## 14.6.3 Installing the Audio USB Board Cables

### 1. Open the chassis.

Refer to:

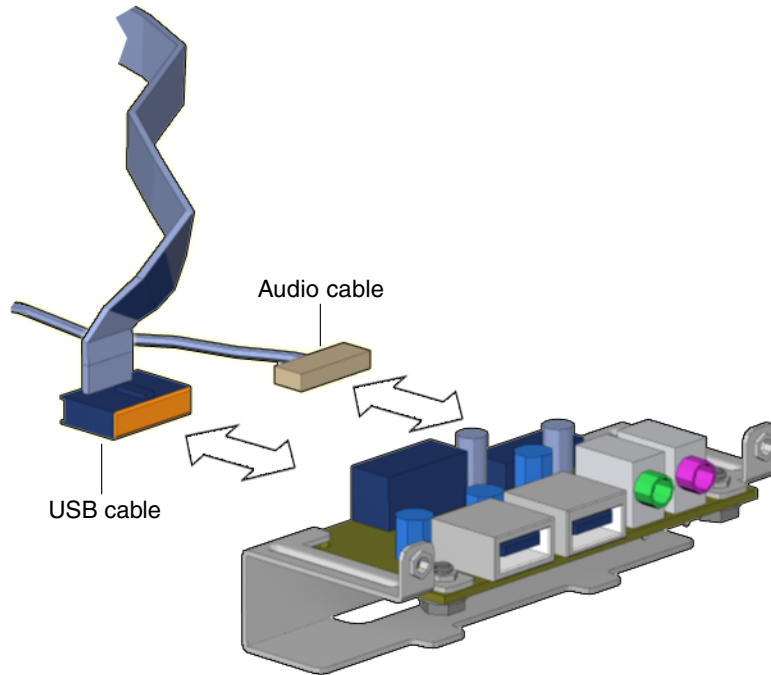
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

### 2. Locate where the audio USB board interface cables are to be installed.

The audio USB board has two cables: the audio signal cable and the USB interface cable. See [FIGURE 14-21](#).

3. Connect the cables to both the audio and the USB connectors on the audio USB board.

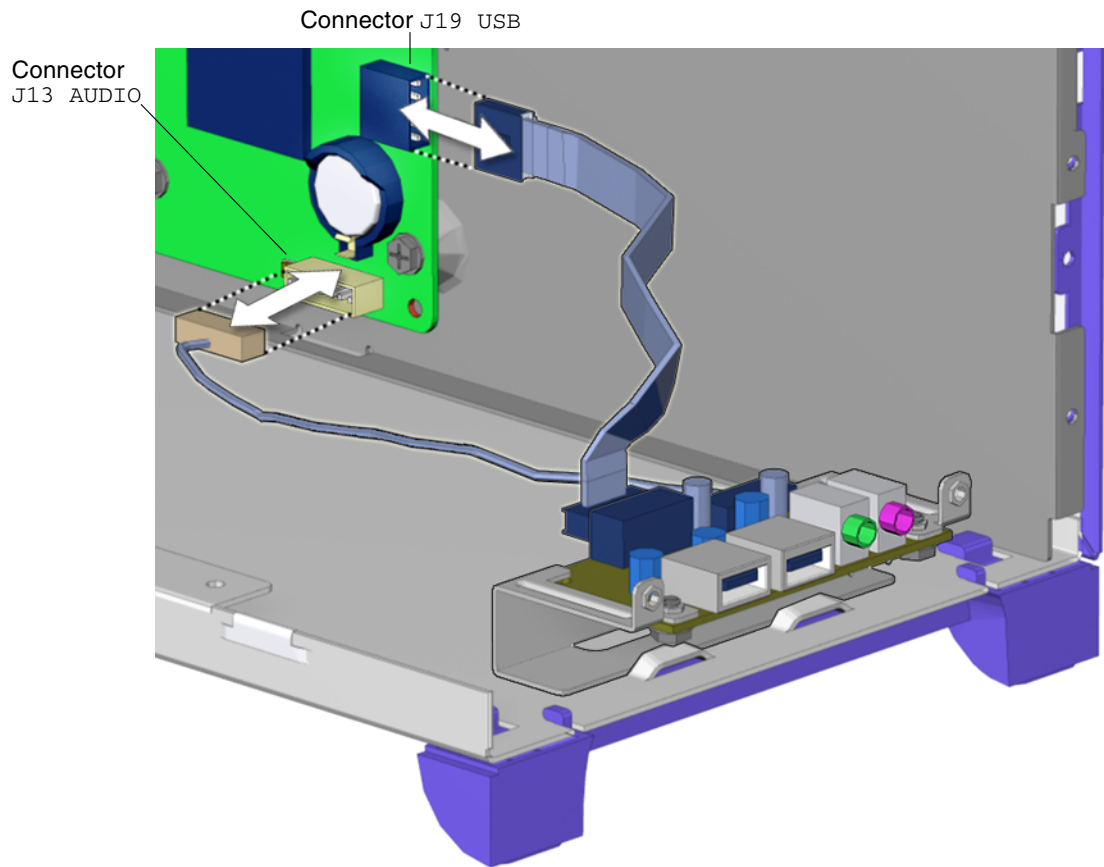
See [FIGURE 14-25](#).



**FIGURE 14-25** Connecting Cables to the Audio USB Board

4. Connect the audio and USB cables to the connectors on the motherboard at J19 USB and J13 AUDIO.

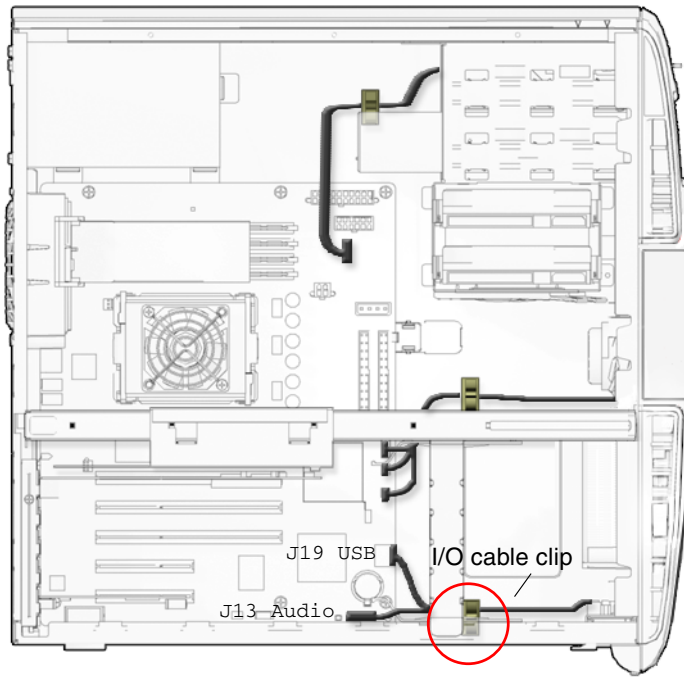
See [FIGURE 14-22](#).



**FIGURE 14-26** Connecting the Audio and USB Cables to the Motherboard

5. Guide the audio USB board cables through the I/O cable clip at the bottom of the chassis and close the clip.

See [FIGURE 14-27](#).



**FIGURE 14-27** Securing the Audio USB Cables to the I/O Cable Clip

**6. Inspect the cabling to verify that:**

- The audio signal cable is secure in the audio USB board connector.
- The audio signal cable is secure in the motherboard connector at J13 AUDIO.
- The USB interface cable is secure in the audio USB board connector.
- The USB interface cable is secure in the motherboard connector at J19 USB.
- The I/O cable clip is closed and locked.

**7. Install the access panel, power on the system, and verify the audio and USB cable installations.**

Refer to:

- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

## Finishing Component Replacement

---

This chapter describes how to finish the replacement of internal workstation replaceable components, close the system and prepare it for operation.

The procedures described in this chapter are written for workstation service providers and system administrators.

This chapter contains the following topics:

- [“Repositioning the Chassis” on page 15-1](#)
- [“Installing the Bezel” on page 15-2](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

### 15.1 Repositioning the Chassis

After completing any procedures that required the chassis to be on its side, reposition the chassis to its normal upright stance.

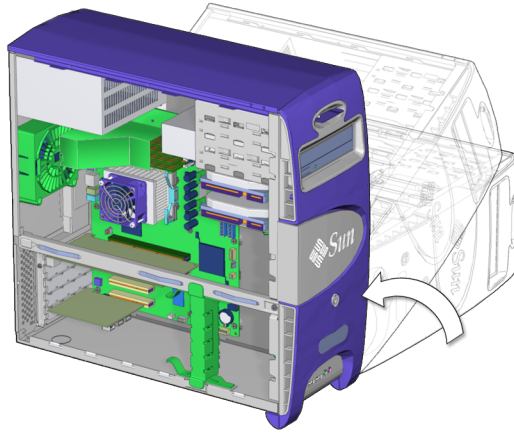
- **Set the chassis upright.**

Using both hands, lift the system chassis from its side, with the opening facing out. See [FIGURE 15-1](#).

---

**Note** – *Do not* use the chassis cross brace as a handle.

---



**FIGURE 15-1** Positioning the Chassis Upright

---

## 15.2 Installing the Bezel

1. **Place the chassis into its upright position.**

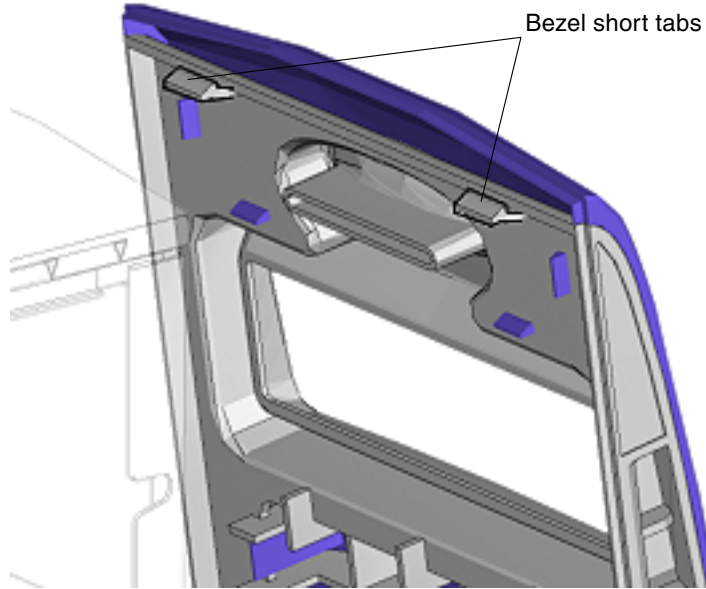
Refer to [“Repositioning the Chassis” on page 15-1](#).

2. **Locate where the bezel is to be installed.**

The bezel installs at the front face of the chassis, Sun logo upright.

3. **Align the short tabs on the top of the bezel align with the matching rectangular slots at the top front of the chassis.**

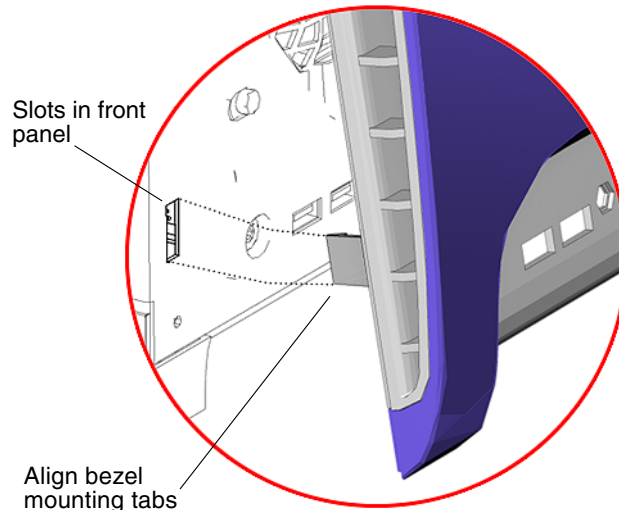
See [FIGURE 15-2](#).



**FIGURE 15-2** Locating Bezel Short Tabs

**4. Align the bezel mounting tabs with the slots in the front panel.**

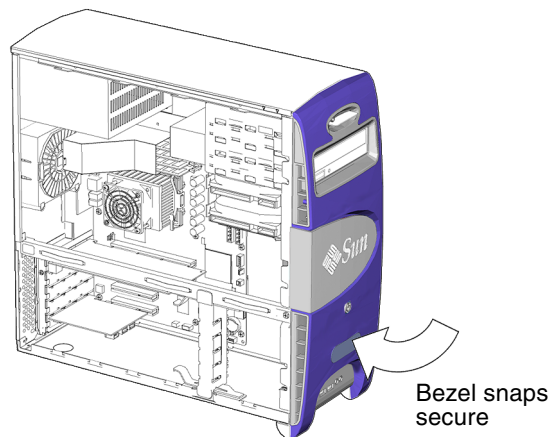
The bottom edge of the bezel is about two inches (5cm) out from the bottom edge of the chassis. See [FIGURE 15-3](#).



**FIGURE 15-3** Aligning the Bezel

5. Carefully press the middle and bottom of the bezel into the chassis front panel until the mounting tabs click.

See [FIGURE 15-4](#).



**FIGURE 15-4** Securing the Bezel

6. Inspect the bezel fasteners to verify that:

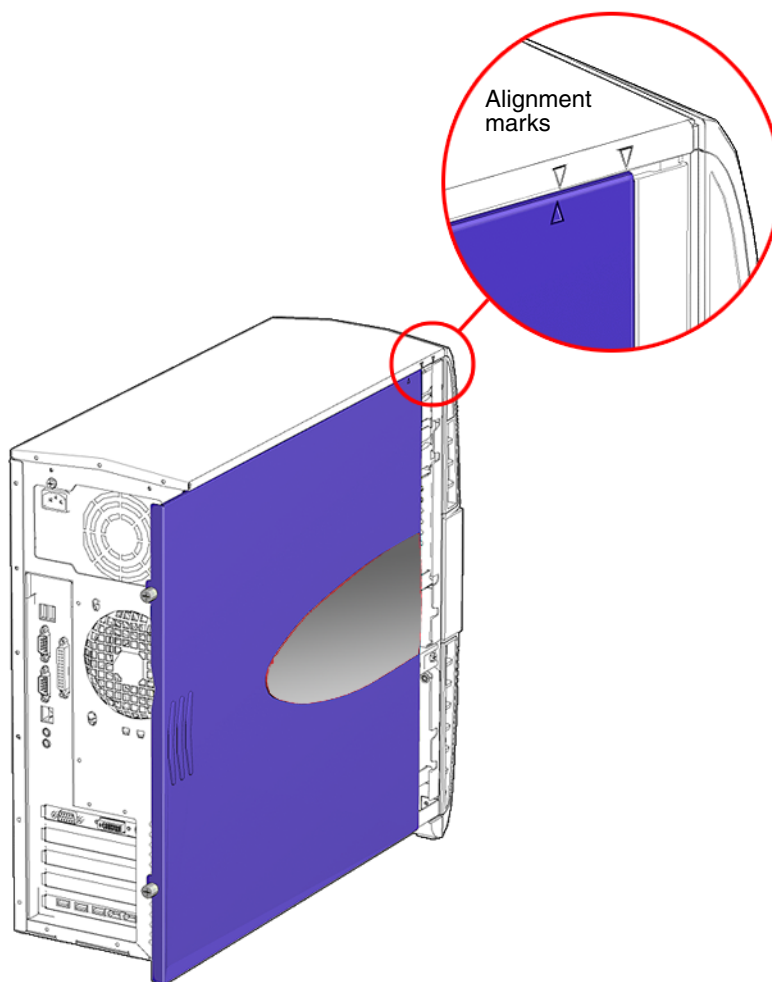


- The left and right side tabs are tight against the chassis.
- The bezel and chassis sides align.

---

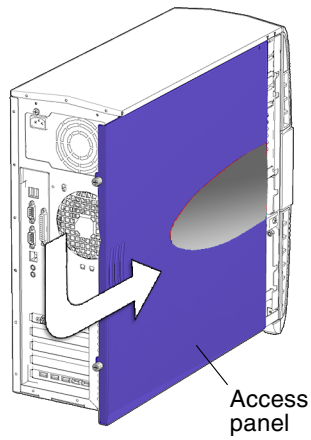
## 15.3 Installing the Access Panel

1. **Place the chassis into its upright position.**  
Refer to [“Repositioning the Chassis” on page 15-1](#).
2. **Verify that you have not left any tools, loose screws, or loose components inside the system.**
3. **Peel the copper foil end of the antistatic wrist strap from the system chassis.**
4. **Unwrap the strap from your wrist.**
5. **Discard the wrist strap and the antistatic mat.**
6. **Align the bottom of the access panel with the chassis.**
7. **Tilt the access panel so that it fits into the bottom groove of the chassis.**  
An arrow on the top edge of the chassis indicates where the edge of the access panel should be. See [FIGURE 15-5](#).



**FIGURE 15-5** Aligning the Access Panel

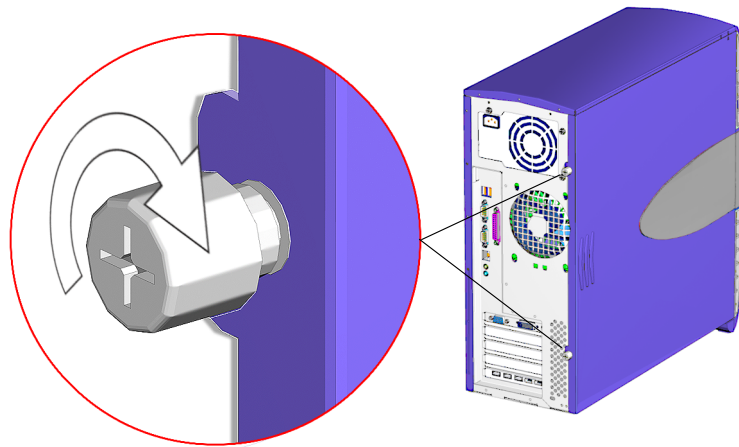
8. Align the arrows on the access panel with the arrows on the chassis.  
See [FIGURE 15-5](#).
9. Slide the access panel toward the front of the system chassis until it stops.  
See [FIGURE 15-6](#).



**FIGURE 15-6** Closing the Access Panel

**10. Tighten the access panel thumbscrews.**

See [FIGURE 15-7](#).



**FIGURE 15-7** Tightening the Access Panel Thumbscrews

---

**Note** – Do not use a screwdriver to tighten the thumbscrews. Tighten the thumbscrews only finger tight.

---

---

## 15.4 Powering On the Workstation

This section describes powering on the workstation after finishing a service procedure. Topics include:

- [“Reconnecting Power and External Peripherals” on page 15-8](#)
- [“Choosing the Boot Mode” on page 15-10](#)



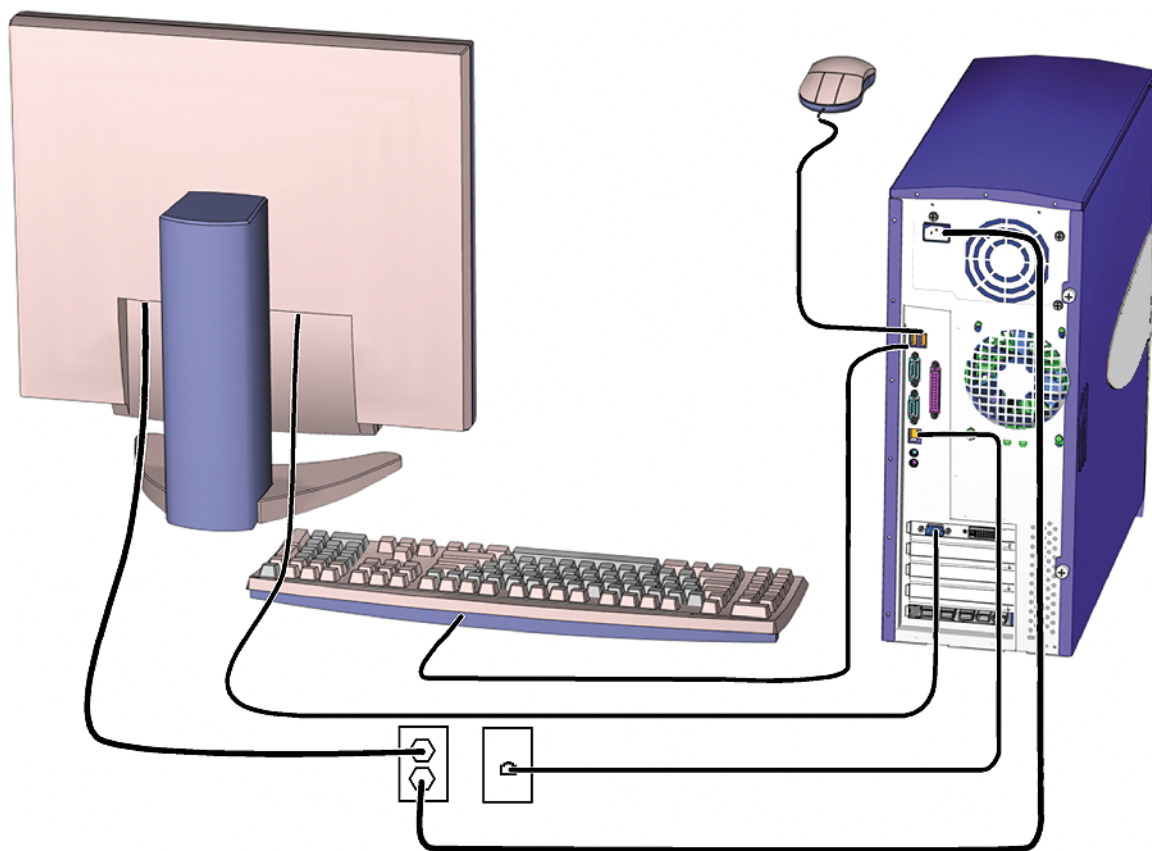
Click this film icon to view an animated version of these instructions.

### 15.4.1 Reconnecting Power and External Peripherals

After completing any replacement procedure, the external cabling must be installed.

- 1. Reconnect the keyboard, mouse, monitor, and network connections.**

See [FIGURE 15-8](#).



**FIGURE 15-8** Reconnecting the Keyboard, Mouse, Monitor, and Network Connections

2. Reconnect any other external peripherals.
3. Power on those peripherals.

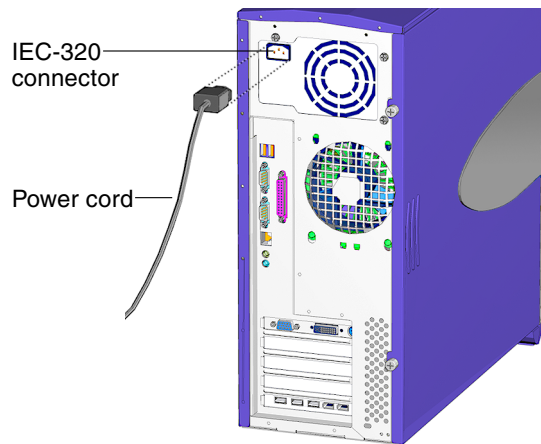
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**Note** – The monitor must be powered on before the system so that the monitor can communicate with the graphics accelerator when the system powers on.

---

4. Reconnect the power cord between the power source and the system power supply connector.

See [FIGURE 15-9](#).



**FIGURE 15-9** Reconnecting the Power Cord

## 15.4.2 Choosing the Boot Mode

When the workstation is powered up, the initial action is the boot sequence.

There are several methods for booting the workstation.

- **Booting from the hard drive**

Default when an operating system disc is not in the optical drive.

- **Booting from optical drive**

Default when an operating system disc is in the optical drive.

- **Booting in single-user mode**

Occurs when an `init 1` command was specified during the power down sequence.

- **Booting in multi-user mode**

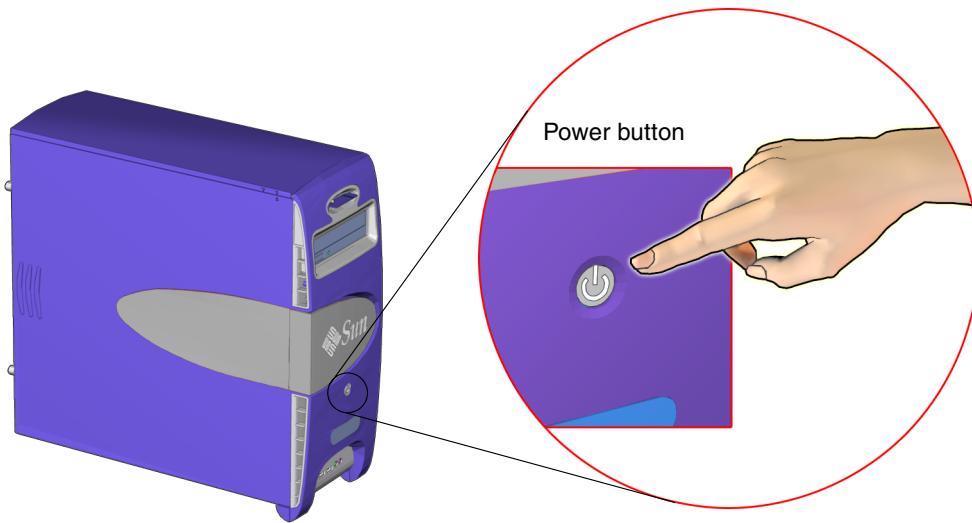
Default mode when the workstation was shut down gracefully.

1. **Select the boot source:**

- If from a optical media disc, insert an operating system disc in the optical drive.
- If from the hard drive, make sure there is no operating system disc in the optical drive.

2. **Press and release the Power button.**

The Power button is located on the bezel of the workstation. See [FIGURE 15-10](#). You should hear the internal fans or the hard drive spin up.



**FIGURE 15-10** Powering Up the Workstation

The system proceeds with its power-on sequence until the operating system shell displays or the CDE environment is started, as specified in the `init_default` files.

3. If you installed a hard drive, PCI card, or CD-RW drive, become superuser and reboot the system with the `-r` option. For example:

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

This forces the system to recognize newly installed hardware.

---

## 15.5 Verifying an Installation

You can verify the functionality of the component you replaced or installed using the following procedure.

1. **Power on the system.**  
Refer to [“Powering On the Workstation” on page 15-8](#).
2. **Follow the power-on flowchart.**  
Refer to [“Power-On Flowchart” on page 4-2](#).

### 3. Monitor the boot messages.

If any warning messages are found, refer to [“Displayed Messages” on page 3-5](#) for information on interpreting messages and possible corrective action.

### 4. If you are uncertain that the problem has been resolved, refer to [“Troubleshooting Flowcharts” on page 4-1](#), or consider these alternatives:

- Use the `post` command to perform the Power-On Self-Test (POST).  
Refer to [“Power-On Self-Test” on page 7-1](#) for information on POST output and interpreting the response. This might require rebooting the workstation.
- Run selected OpenBoot Diagnostics tests.  
Refer to [“OpenBoot PROM” on page 8-1](#) for information on availability and implementation of tests.
- Run the SunVTS (Validation Test Suite) software.  
Refer to [“SunVTS” on page 9-1](#) for information on running the SunVTS software and interpreting the results.



# Customizing Your System

---

This chapter describes optional PCI card and component upgrades to customize your Sun Blade 1500 workstation.

Topics include:

- [“Optional PCI Cards” on page 16-1](#)
- [“Internal Component Upgrades” on page 16-4](#)
- [“External Peripherals” on page 16-5](#)

---

## 16.1 Optional PCI Cards

In its standard configuration, the Sun Blade 1500 workstation has three 33 MHz PCI slots available. PCI1 is 32-bit, PCI2 and PCI3 are 64-bit.

The top slot, PCI4, is preconfigured with the Sun XVR-600, Sun XVR-100, or Sun XVR-1200 graphics accelerator. Removing this card provides a 66 MHz 64-bit slot.

The bottom slot, PCI0, is preconfigured with the IEEE 1394/USB combination card. Removing this card provides an additional 33 MHz 32-bit slot.

Sun Microsystems provides many optional PCI cards that are supported by the Sun Blade 1500 workstation. [TABLE 16-1](#) lists the supported cards and conditions to their installation and use.

**TABLE 16-1** Conditions for Installing Optional PCI Cards

Card Type	Product	Conditions for Installation
Graphics accelerators	Sun XVR-600	There are no special conditions for basic installation.
	Sun XVR-100	<b>To configure for 24-bit color depth:</b>
	Sun XVR-1200	<p>1. Create this directory:</p> <pre>% mkdir /etc/dt/config</pre> <p>2. Copy the Xservers file</p> <pre>% cp /usr/dt/config/Xservers /etc/dt/config</pre> <p>3. Edit /etc/dt/config/Xservers to have this line:</p> <pre>:0 Local local_uid@console root /usr/openwin/bin/Xsun</pre> <p>4. Edit /etc/dt/config/Xservers to have the following line respective of the graphics accelerator:</p> <pre>:0 -nobanner -dev /dev/fbs/jfb0 defdepth 24 (XVR-600) :0 -nobanner -dev /dev/fbs/pfb0 defdepth 24 (XVR-100) :0 -nobanner -dev /dev/fbs/jfb0 defdepth 24 (XVR-1200)</pre> <p>5. Save the file.</p> <p>6. Log out then log in again.</p>
SCSI host adapters	Sun StorEdge™ PCI Dual Ultra3 SCSI Adapter	<p>Install the following packages:</p> <ul style="list-style-type: none"> <li>• SUNWqus</li> <li>• SUNWqusu</li> <li>• SUNWqusux</li> <li>• SUNWqusx</li> </ul> <p>Install the following qpatches:</p> <ul style="list-style-type: none"> <li>• Q905806</li> <li>• Q905807</li> </ul>
	Dual-Channel Differential Ultra/Wide SCSI PCI adapter	These devices have no Fcode, so they are not recognized by the OpenBoot PROM and cannot be used as bootable host adapters for hard drives or removable media drives. These devices are not supported or reported by the <code>probe-scsi</code> command.
	Dual-Channel Single Ended Ultra/Wide SCSI PCI adapter	
	Single-Ended Ultra/Wide SCSI PCI adapter	
	Dual FastEthernet and Dual SCSI PCI Adapter SunSwift™ PCI	<p>When used with Sun StorEdge Multipacks containing Fujitsu drives having MAA/MAB series identifiers, read/write errors might occur.</p> <p>The SunSwift PCI card might not fit properly upon first insertion into the PCI slot. Recheck installation before powering on.</p>

**TABLE 16-1** Conditions for Installing Optional PCI Cards (*Continued*)

Card Type	Product	Conditions for Installation
Fibre channel host adapters	Single-Loop PCI FC-AL Host Adapter Dual-Loop PCI FC-AL Host Adapter	There are no special conditions for basic installation.
	2GB PCI Single Fiber Channel Network Host Bus Adapter 2GB PCI Dual Fiber Channel Network Host Bus Adapter	Install the following packages: <ul style="list-style-type: none"> <li>• SUNWsan</li> <li>• SUNWcfcpl</li> <li>• SUNWcfcplx</li> </ul> Install the following qpatches: <ul style="list-style-type: none"> <li>• Q958611</li> <li>• Q958612</li> </ul>
Communication interfaces	SunHSI/P™ High Speed Serial Interface - 4 port 2.0	The SunHSI/P card does not fit into the 66 MHz slot, PCI4. Install the following packages from the supplemental software CD-ROM: <ul style="list-style-type: none"> <li>• SUNWhsip</li> <li>• SUNWhsipm</li> <li>• SUNWhsipu</li> </ul>
	SunSAI/P Serial Asynchronous Interface - 8 port 3.0	Installing more than one card requires additional considerations and running the saipconfig configuration script. Refer to the <i>SunSAI/P User's Guide</i> , 806-4206, for more information. Install the following packages: <ul style="list-style-type: none"> <li>• SUNWsaip</li> <li>• SUNWsaipu</li> </ul>
Ethernet interfaces	GigaSwift Ethernet Gigabit Ethernet 3.0 SunFastEthernet™	There are no special conditions for basic installation.
	Sun Quad FastEthernet™	PCI card to Sun Blade 1500 chassis tolerances are tight. Connecting some network cables might require additional effort. Install only in slot PCI4.
Sun PCi co-processor	SunPCi III Pro	Optional installation of the USB/Firewire® backplate and/or serial/parallel port backplate occupies adjacent PCI slots. Install the following packages: <ul style="list-style-type: none"> <li>• SUNWspci3</li> <li>• SUNWspvn3</li> </ul> For Microsoft Windows functionality, a licensed version of Windows must be installed.

**TABLE 16-1** Conditions for Installing Optional PCI Cards (Continued)

Card Type	Product	Conditions for Installation
Cryptographic	Sun Crypto Accelerator 1000	Install the following packages from the supplemental software CD-ROM: <ul style="list-style-type: none"><li>• SUNWcryptm</li><li>• SUNWcryptr</li><li>• SUNWcryptu</li><li>• SUNWcrys1</li><li>• SUNWcrys2</li><li>• SUNWdcamn</li><li>• SUNWdcar</li><li>• SUNWdcav</li></ul>

**Note** – The SunPCi III Pro coprocessor card can be installed in any slot. However, when the card is installed in the 33 MHz slots (PCI0 - PCI3), SunPCi III video and disk drive operations have degraded performance.

**Note** – If a Fibre Channel interface card is *not* installed, the following message *might* appear in the /var/adm/messages file:  
WARNING: fcsn: \_init: Transport Layer driver 'fp' load failed  
There is no action necessary and you may ignore this message.

Instructions for replacing, removing, or installing PCI cards are provided in [“Replacing the PCI Cards” on page 11-28](#).

## 16.2 Internal Component Upgrades

You can customize the Sun Blade 1500 workstation with additional memory and drives. [TABLE 16-2](#) lists upgrades, conditions for installation, and where to find the installation instructions.

**TABLE 16-2** Sun Blade 1500 Internal Component Upgrades

Component	Conditions for Installation	Procedure
2 GB DIMM	Install in pairs (DIMM0 and DIMM1, DIMM2 and DIMM3).	<a href="#">“Installing DIMMs” on page 11-7</a>
1 GB DIMM	Install in pairs (DIMM0 and DIMM1, DIMM2 and DIMM3).	<a href="#">“Installing DIMMs” on page 11-7</a>

**TABLE 16-2** Sun Blade 1500 Internal Component Upgrades (*Continued*)

Component	Conditions for Installation	Procedure
512 MB DIMM	Install in pairs(DIMM0 and DIMM1, DIMM2 and DIMM3).	<a href="#">“Installing DIMMs” on page 11-7</a>
120 GB hard drive	First drive installs in HDD0 (upper bay), second drive installs in HDD1 (lower bay). Drives are set as “Cable Select.” Note: Internal drive mirroring is not supported.	<a href="#">“Installing the Hard Drive” on page 12-6</a>
DVD-+RW drive	Removable media drive is installed into lower bay and replaces optical drive. Drive is set as “Master.”	<a href="#">“Replacing the Optical Drive” on page 12-9</a>
DDS-4 tape drive	Tape drive is installed into lower bay and replaces optical drive. Internal SCSI connection to SCSI host adapter. Configuration checked with Single-Ended Ultra/Wide SCSI PCI adapter. See condition in <a href="#">TABLE 16-1</a> .	<a href="#">“Replacing the Optical Drive” on page 12-9</a>

## 16.3 External Peripherals

The Sun Blade 1500 workstation supports external Sun peripherals. [TABLE 16-3](#) lists peripherals and their conditions of use.

**TABLE 16-3** Conditions for Attaching External Peripherals

Peripheral	Product	Conditions for Use
Fibre channel hard drives	Sun StorEdge T3 Array	There are no special conditions for use.
	Sun Multipack FC-AL	Only supported with the Dual Loop PCI FC-AL Host Adapter. Loop with Multipack FC-AL is Multipack FC-AL exclusive.
	Sun StorEdge A5x00	Only supported with the Dual Loop PCI FC-AL Host Adapter. Loop with Sun StorEdge A5x00 is Sun StorEdge A5x00 exclusive.
SCSI hard drives	Sun Multipack SCSI	SunSwift PCI host adapters used in conjunction with Multipack SCSI units containing Fujitsu drives having MAA/MAB series identifiers might cause read/write errors.
	Sun StorEdge A1000	There are no special conditions for use.
	Sun StorEdge D1000	Sun StorEdge D1000 drive assemblies cannot be daisy-chained.

**TABLE 16-3** Conditions for Attaching External Peripherals (*Continued*)

Peripheral	Product	Conditions for Use
SCSI tape drives	Sun StorEdge L1000	There are no special conditions for use.
	Sun StorEdge L11000	
	DAT drive	There are no special conditions for use.
	SPARCstorage® DLT™ drive	There are no special conditions for use.
IEEE 1394 devices	Sun Digital Video Camera	Running concurrent instances of the bundled Demo program might cause lines to be displayed in video window.
USB devices	ZIP drive	Removable media drives require the volume manager vold to run.
	Optical drive	There are no special conditions for use.
Network printers	HP	There are no special conditions for use.
	Texas Instruments	
Smart cards	payflex	There are no special conditions for use.
	cyberflex	

# Product Specifications

This appendix discusses the various specifications of the Sun Blade 1500 workstation. Topics covered are:

- “Physical Specifications” on page A-1
- “Electrical Specifications” on page A-2
- “Acoustic Specifications” on page A-2
- “Environmental Requirements” on page A-2
- “Shock and Vibration Specifications” on page A-3

## A.1 Physical Specifications

TABLE A-1 lists the physical specifications of the Sun Blade 1500 workstation.

**TABLE A-1** Sun Blade 1500 Physical Specifications

Length	Width	Height	Weight
18.3 in. (465.1 mm)	6.89 in. (175.0 mm)	18.1 in. (459.9 mm)	33 lbs (15 kgs)

If the Sun Blade 1500 workstation is to be enclosed, allow adequate airflow from front to rear. The enclosure interior dimensions should be no less than those in TABLE A-2.

**TABLE A-2** Enclosure Interior Dimensions for Sun Blade 1500 Workstation

Length	Width	Height
25.2 in. (640 mm)	13.8 in. (350 mm)	18.9 in. (480 mm)

## A.2 Electrical Specifications

TABLE A-3 lists electrical specifications for the Sun Blade 1500 workstation.

TABLE A-3 Sun Blade 1500 Electrical Specifications

Specification	Value
Voltage	100 - 240 VAC
Current	8 / 4 Amps
Wattage	420 Watts (maximum)
Frequency	50 / 60 Hz

## A.3 Acoustic Specifications

TABLE A-4 lists acoustic specifications for the Sun Blade 1500 workstation.

TABLE A-4 Sun Blade 1500 Acoustic Specifications

Specification	Value
Sound pressure	< 42 dBA operating, < 38 dBA Idling at 19.7 in (50 cm)
Sound power	< 5.0 Bels operating, < 4.5 Bels idling

## A.4 Environmental Requirements

TABLE A-5 lists environmental requirements for the Sun Blade 1500 workstation.

TABLE A-5 Sun Blade 1500 Environmental Requirements

Specification	Value
Temperature	41 - 104 F (5 - 40 C) operating -26 - 149 F (-32 - 65 C) nonoperating
Humidity	10 - 93% RH (noncondensing) operating 93% RH (noncondensing) nonoperating



**TABLE A-5** Sun Blade 1500 Environmental Requirements *(Continued)*

Specification	Value
Pressure	9.43 PSI (65 KPa), 95 F (35 C) operating 3.62 PSI (25 KPa), 77 F (25 C) nonoperating

# A.5 Shock and Vibration Specifications

[TABLE A-6](#) lists vibration specifications for the Sun Blade 1500 workstation.

**TABLE A-6** Sun Blade 1500 Shock and Vibration Values

Constraint	Operating	Nonoperating
Shock	6 G, 11 msec	20 G, 11 msec
Vibration	0.001 G <sup>2</sup> /Hz random, 5 to 500 Hz (0.70 Grms)	0.0025 G <sup>2</sup> /Hz random, 5 to 500 Hz (1.11 Grms)
Drop	N/A	1.97 in. (50 mm)



## Signal Descriptions

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This appendix provides pinouts for certain Sun Blade 1500 workstation internal and external connectors.

External:

- [“Audio Jacks” on page B-2](#)
- [“IEEE 1394 Ports” on page B-2](#)
- [“Parallel Port” on page B-3](#)
- [“Serial Ports” on page B-4](#)
- [“Twisted-Pair Ethernet Port” on page B-5](#)
- [“USB Ports” on page B-6](#)
- [“Video Ports” on page B-7](#)

Internal:

- [“Fan Connectors” on page B-11](#)
- [“Front Audio Connector” on page B-12](#)
- [“Front USB Connector” on page B-12](#)
- [“IDE Interface Connectors” on page B-13](#)
- [“IDE Power Connector” on page B-15](#)
- [“Power Supply Connectors” on page B-15](#)
- [“Power Switch Connector” on page B-18](#)
- [“Smart Card Reader Connector” on page B-18](#)
- [“Speaker Connector” on page B-19](#)

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**Note** – Information in this chapter is referenced to the connectors on the motherboard, audio USB board, or combination card. Is is not referenced from a cable.

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# B.1 External Connectors

## B.1.1 Audio Jacks

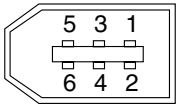
There are four audio connections called “jacks”. They are the headphone jack and microphone jack on the bezel, and the audio-in jack and audio-out jack on the rear panel. [TABLE B-1](#) lists the pinouts of these four jacks.

**TABLE B-1** Audio Jack Pinouts

Pin	Headphones	Microphone	Audio-In	Audio-Out
Tip	Left channel	Left channel	Left channel	Left channel
Ring (center)	Right channel	Right channel	Right channel	Right channel
Shield	Ground	Ground	Ground	Ground

## B.1.2 IEEE 1394 Ports

There are two IEEE 1394A ports on the IEEE 1394/USB 2 combination card. [FIGURE B-1](#) identifies a IEEE 1394A port.



**FIGURE B-1** IEEE 1394A Port

[TABLE B-2](#) lists the pinouts for these ports.

**TABLE B-2** IEEE 1394A Port Pinouts

Pin	Signal
1	Cable power
2	Ground
3	TPB-
4	TPB+

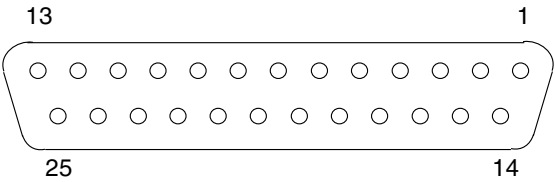
**TABLE B-2** IEEE 1394A Port Pinouts (*Continued*)

Pin	Signal
5	TPA-
6	TPA+

### B.1.3 Parallel Port

Located adjacent to the serial ports, is the parallel port. It uses a DB-25F connector.

[FIGURE B-2](#) identifies the Sun Blade 1500 parallel port.



**FIGURE B-2** Parallel Port

[TABLE B-3](#) lists the pinout of this DB-25F connector.

**TABLE B-3** Parallel Port Pinouts

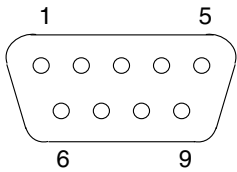
Pin	Signal
1	nstrobe
2	Data0
3	Data1
4	Data2
5	Data3
6	Data4
7	Data5
8	Data6
9	Data7
10	nAck
11	Busy
12	Perror

**TABLE B-3** Parallel Port Pinouts (Continued)

Pin	Signal
13	Select
14	nAutoEd
15	nFault
16	nInit
17	nSelect_in
18	Ground
19	Ground
20	Ground
21	Ground
22	Ground
23	Ground
24	Ground
25	Ground

# B.1.4 Serial Ports

There are two serial ports on the rear panel of the workstation using DB-9M connectors. One serial port is identified in [FIGURE B-3](#).



**FIGURE B-3** Serial Port

Both ports have the same pinouts, as described in [TABLE B-4](#).

**TABLE B-4** Serial Port Pinouts

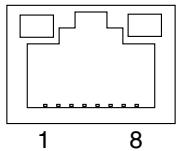
Pin	Signal	Description
1	DCD_	Data Carrier Detect
2	RXD_	Receive Data

**TABLE B-4** Serial Port Pinouts (*Continued*)

Pin	Signal	Description
3	TXD_	Transmit Data
4	DTR_	Data Terminal Ready
5	GND	Ground
6	DSR_	Data Set Ready
7	RTS_	Request To Send
8	RXC_	Receive Clock
9	RI	Ring Indicator

## B.1.5 Twisted-Pair Ethernet Port

The rear panel of the Sun Blade 1500 workstation has an RJ-45 10/100/1000BASE-T TPE port. [FIGURE B-4](#) identifies the TPE connector.



**FIGURE B-4** Twisted-Pair Ethernet Connector

[TABLE B-5](#) lists the pinout of this connector.

**TABLE B-5** Twisted-Pair Ethernet Port Pinouts

Pin	Signal	Description
1	RJ_TXD+	Transmit Data+
2	RJ_TXD-	Transmit Data-
3	RJ_RXD+	Receive Data+
4	RJ_4T_D3P	Filter I/O
5	RJ_4T_D3P	Filter I/O
6	RJ_RXD-	Receive Data-
7	RJ_4T_D4P	Filter I/O
8	RJ_4T_D4P	Filter I/O

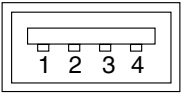
TABLE B-6 describes the behavior of the status LEDs.

**TABLE B-6** Twisted-Pair Ethernet LED Status

LED	Status
Amber - Link	When illuminated, a 10/100/1000 Mbps link exists.
Green - Activity	When flashing, indicates transmit or receive activity.

## B.1.6 USB Ports

There are 7 external USB ports for the Sun Blade 1500 workstation in standard configurations. The two USB ports on the bezel and the two USB ports on the rear panel are USB 1.1 standard. The three USB ports on the IEEE 1394/USB 2 combination card are USB 2.x standard. Though the ports are of different standards, they have the same pinouts. FIGURE B-5 identifies a USB port.



**FIGURE B-5** USB Port

TABLE B-7 lists the pinouts.

**TABLE B-7** USB Port Pinouts

Pin	Signal
1	VCC, 5VDC
2	Data -
3	Data +
4	Ground



# B.1.7 Video Ports

The Sun Blade 1500 workstation is configured with a Sun XVR-600, Sun XVR-100, or Sun XVR-1200 graphics accelerator. [TABLE B-8](#) describes the connectors on the graphics accelerators.

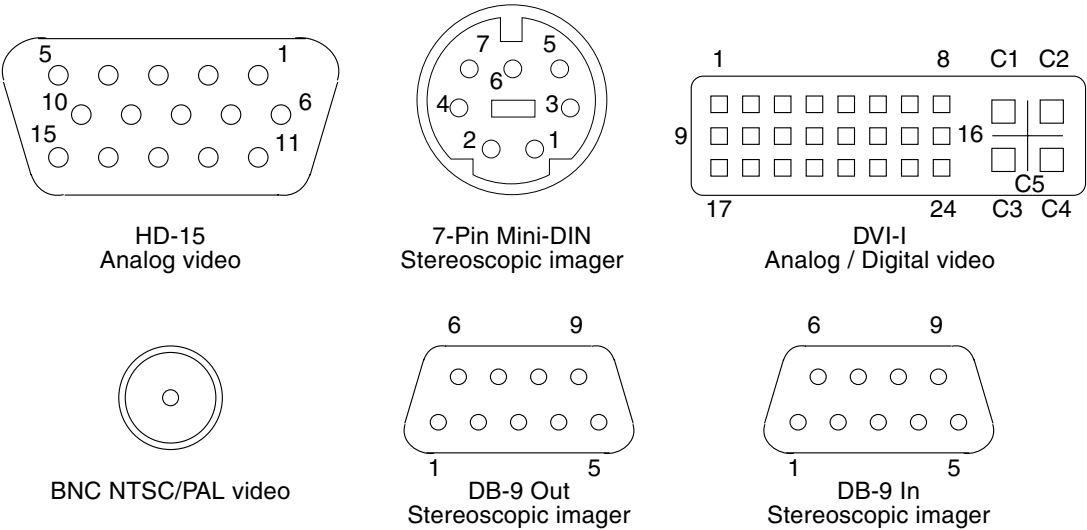
**TABLE B-8** Graphics Accelerator Connectors

Graphics Accelerator	HD-15 Analog	DVI-I Analog/Digital	Mini-DIN7 Stereoscopic	BNC NTSC/PAL Video	DB-9 Stereoscopic
Sun XVR-600	No	Yes	Yes	No	No
Sun XVR-100	Yes	Yes	No	No	No
Sun XVR-1200	Yes	Yes	Yes	Yes	Yes

**Note** – Although the DVI-I connector supports both analog and digital resolutions, you cannot use both simultaneously.

The graphics accelerators provide DDC2 monitor support and Display Power Management Signaling (DPMS).

[FIGURE B-6](#) identifies the Sun XVR-600, Sun XVR-100, and Sun XVR-1200 graphics accelerators’ video output ports.



**FIGURE B-6** Sun XVR-600, Sun XVR-100, and Sun XVR-1200 Graphics Accelerator Ports

TABLE B-9 lists the pinouts of the HD-15 video output port.

**TABLE B-9** HD15 Video Output Port Pinouts

Pin	Signal
1	Red analog video
2	Green analog video
3	Blue analog video
4	No Connect
5	Ground
6	Ground
7	Ground
8	Ground
9	+5V Supply
10	Ground
11	No Connect
12	DDC Bidirectional Data (SDA)
13	Horizontal/Composite Sync
14	Vertical Sync
15	DDC Data Clock (SCL)

TABLE B-10 lists the pinouts of the DVI-I video output port.

**TABLE B-10** DVI-I Video Output Port Pinouts

Pin	Signal
1	TMDS Data2 -
2	TMDS Data2 +
3	TMDS Data2/4 Shield
4	TMDS Data4 - (no connect XVR-600 or XVR-1200)
5	TMDS Data4 + (no connect XVR-600 or XVR-1200)
6	DDC Clock (SCL)
7	DDC Data (SDA)
8	Analog Vertical Sync
9	TMDS Data1 -
10	TMDS Data1 +

**TABLE B-10** DVI-I Video Output Port Pinouts (*Continued*)

Pin	Signal
11	TMDS Data1/3 Shield
12	TMDS Data3 - (no connect XVR-600 or XVR-1200)
13	TMDS Data3 + (no connect XVR-600 or XVR-1200)
14	+5V Power
15	Gnd (+5, Analog V/H Sync)
16	Hot Plug Detect
17	TMDS Data0 -
18	TMDS Data0 +
19	TMDS Data0/5 Shield
20	TMDS Data5 - (no connect XVR-600 or XVR-1200)
21	TMDS Data5 + (no connect XVR-600 or XVR-1200)
22	TMDS Clock Shield
23	TMDS Clock+
24	TMDS Clock-
C1	Analog Red Video
C2	Analog Green Video
C3	Analog Blue Video
C4	Analog Horizontal Sync
C5	Analog Gnd (R, G, and B return)

[TABLE B-11](#) lists the pinouts of the BNC NTSC/PAL video output port.

**TABLE B-11** BNC NTSC/PAL Video Output Port Pinouts

Pin	Signal
center	Signal
shield	Ground

[TABLE B-12](#) lists the pinouts of the Mini-DIN7 stereoscopic imager interface connector

**TABLE B-12** Mini-DIN7 Stereoscopic Imager Interface Connector Pinouts

Pin	Signal
1	Signal ground

**TABLE B-12** Mini-DIN7 Stereoscopic Imager Interface Connector Pinouts *(Continued)*

Pin	Signal
2	5.0V (Fused, provides up to 300mA, limited to 1.0A)
3	12.0V (Fused, provides up to 300mA, limited to 1.0A)
4	Master stereo field Select Out
5	Slave stereo field Select In
6	No connect
7	No connect

[TABLE B-14](#) lists the pinouts of the DB-9 Out stereoscopic imager interface connector

**TABLE B-13** DB-9 Out Stereoscopic Imager Interface Connector Pinouts

Pin	Signal
1	3.3V (Fuse - 0.5A limit)
2	Ground
3	RefClk output
4	RefClk output
5	Ground
6	Release output
7	Pixel align output
8	Ground
9	Done output

[TABLE B-14](#) lists the pinouts of the DB-9 In stereoscopic imager interface connector

**TABLE B-14** DB-9 In Stereoscopic Imager Interface Connector Pinouts

Pin	Signal
1	Slave sense
2	Ground
3	RefClk input
4	RefClk input
5	Ground
6	Release input
7	Pixel align input

**TABLE B-14** DB-9 In Stereoscopic Imager Interface Connector Pinouts (*Continued*)

Pin	Signal
8	Ground
9	Done input

More information about attaching a stereoscopic imager is available in the *Sun XVR-600 Graphics Accelerator Installation and User's Guide*, 817-2195 or the *Sun XVR-1200 Graphics Accelerator Installation and User's Guide*, 816-7386.

## B.2 Internal Connectors

### B.2.1 Fan Connectors

The three fan connectors, FAN0 SYS, FAN1 SYS, and FAN2, have the same pinouts. [FIGURE B-7](#) identifies these fan connectors.



**FIGURE B-7** Fan Connector

[TABLE B-15](#) lists these signals.

**TABLE B-15** Fan Connectors FAN0 SYS, FAN1 SYS, and FAN2 Pinouts

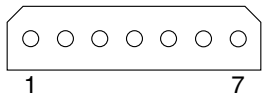
Pin	Signal
1	Ground
2	8 - 12 V
3	Tachometer Signal



**Caution** – Though the connectors have the same pinouts, they are *not* interchangeable. Do *not* connect the CPU fan cable to connector FAN1 SYS. Similarly, do *not* connect the rear fan cable to FAN2. Transposing the cables may result in system overheating and CPU failure.

# B.2.2 Front Audio Connector

The front audio connector, J13 AUDIO, provides audio signals for the audio USB board. [FIGURE B-8](#) identifies the front audio connector.



**FIGURE B-8** Front Audio Connector

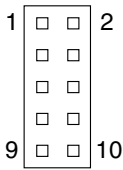
[TABLE B-16](#) lists the pinouts for connector J13 AUDIO.

**TABLE B-16** Front Audio Connector J13 AUDIO Pinouts

Pin	Signal
1	Microphone signal
2	Microphone ground
3	Ground
4	Headphone left channel
5	Headphone ground
6	Headphone right channel
7	+5 V

# B.2.3 Front USB Connector

The front USB connector, J19 USB, provides a USB interface for the audio USB board. [FIGURE B-9](#) identifies the front USB connector.



**FIGURE B-9** Front USB Connector

TABLE B-17 lists the pinouts for connector J19 USB.

TABLE B-17 Front USB Connector J19 USB Pinouts

Pin	Signal
1	Data -, left USB port
2	Data +, left USB port
3	Ground
4	Ground
5	Data +, right USB port
6	Data -, right USB port
7	Ground
8	+5 V, right USB port
9	+5 V, left USB port
10	Shield

## B.2.4 IDE Interface Connectors

The two IDE interface connectors, IDE PRI and IDE SEC have similar pinouts. FIGURE B-10 identifies the IDE interface connector.

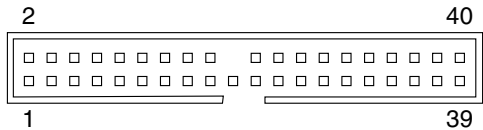


FIGURE B-10 IDE Interface Connector

The connector pinouts are described in TABLE B-18.

TABLE B-18 IDE Interface Connectors IDE PRI and IDE SEC Pinouts

Pin	Signal
1	HDRST#
2	Ground
3	D7
4	D8

**TABLE B-18** IDE Interface Connectors IDE PRI and IDE SEC Pinouts (*Continued*)

Pin	Signal
5	D6
6	D9
7	D5
8	D10
9	D4
10	D11
11	D3
12	D12
13	D2
14	D13
15	D1
16	D14
17	D0
18	D15
19	Ground
20	none
21	DRQ
22	Ground
23	IOW#
24	Ground
25	IOR#
26	Ground
27	IURDY
28	Ground
29	DACK#
30	Ground
31	IRQ
32	none
33	A1
34	CBLID

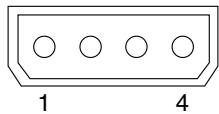


**TABLE B-18** IDE Interface Connectors IDE PRI and IDE SEC Pinouts (Continued)

Pin	Signal
35	A0
36	A2
37	CS1
38	CS3#
39	none
40	Ground

### B.2.5 IDE Power Connector

Power for the hard drive and the optical drive is supplied from the motherboard through connector IDE PWR. [FIGURE B-11](#) identifies the IDE power connector.



**FIGURE B-11** IDE Power Connector

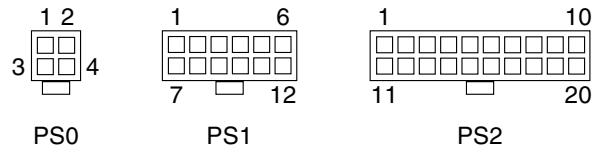
[TABLE B-19](#) lists the pinout for this connector.

**TABLE B-19** IDE Power Connector IDE PWR Pinouts

Pin	Signal
1	+12 V
2	Ground
3	Ground
4	+5 V

### B.2.6 Power Supply Connectors

There are three connectors which attach the power supply to the motherboard: PS0, PS1, and PS2. [FIGURE B-12](#) identifies the three connectors.



**FIGURE B-12** Power Supply Connectors

### B.2.6.1 PS0 Information

Connector PS0 supplies power for the CPU. [TABLE B-20](#) lists the pinout for PS0.

**TABLE B-20** Power Supply Connector PS0 Pinouts

Pin	Signal
1	Ground
2	Ground
3	+12 V
4	+12 V

### B.2.6.2 PS1 Information

Connector PS1 provides supplemental power for the Sun Blade 1500 motherboard. [TABLE B-21](#) lists the pinout for PS1.

**TABLE B-21** Power Supply Connector PS1 Pinouts

Pin	Signal
1	+5 V
2	+5 V
3	Ground
4	+3.3 V
5	Ground
6	Ground
7	+5 V
8	Ground
9	Ground

**TABLE B-21** Power Supply Connector PS1 Pinouts (*Continued*)

Pin	Signal
10	+3.3 V
11	+3.3 V
12	Ground

B.2.6.3 PS2 Information

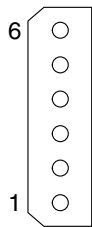
Connector PS2 supplies primary power for the Sun Blade 1500 motherboard. [TABLE B-22](#) lists the pinout for PS2.

**TABLE B-22** Power Supply Connector PS2 Pinouts

Pin	Signal
1	+3.3 V
2	+3.3 V
3	Ground
4	+5 V
5	Ground
6	+5 V
7	Ground
8	P.G.S
9	+5 VSB
10	+12 V
11	+3.3 V
12	-12 V
13	Ground
14	PS-On
15	Ground
16	Ground
17	Ground
18	None
19	+5 V
20	+5 V

# B.2.7 Power Switch Connector

The power switch connector, J24 SW0, provides signal and power for the power LED. It is identified in [FIGURE B-13](#).



**FIGURE B-13** Power Switch Connector

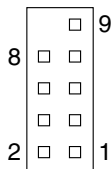
[TABLE B-23](#) lists the pinouts for connector J24 SW0.

**TABLE B-23** Power Switch Connector J24 SW0 Pinouts

Pin	Signal
1	none
2	none
3	LED +
4	LED -
5	Switch signal
6	Switch return

# B.2.8 Smart Card Reader Connector

The smart card reader connector, SCR0, is identified in [FIGURE B-14](#).



**FIGURE B-14** Smart Card Reader Connector

The connector pinouts are described in [TABLE B-24](#).

**TABLE B-24** Smart Card Reader Connector SCR0 Pinouts

Pin	Signal	Description
1	+12 V	+12 VDC power
2	GND	Ground
3	GND	Ground
4	SC_SCL	I <sup>2</sup> C_clock
5	+5 V	+5 VDC power
6	I2C_SDA	I <sup>2</sup> C_data
7	GND	Ground
8	GND	Ground
9	SMCARD_INT#	Interrupt

## B.2.9 Speaker Connector

Connector *SPK0* provides the signal to the speaker. [FIGURE B-15](#) identifies the speaker connector.



**FIGURE B-15** Speaker Connector

[TABLE B-25](#) lists the pinout for this connector.

**TABLE B-25** Speaker Connector SPK0 Pinouts

Pin	Signal
1	Signal
2	Ground



# Functional Description

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This appendix describes the inner workings of the Sun Blade 1500 workstation. Topics include:

- [“Hardware Architecture” on page C-1](#)
- [“Motherboard” on page C-4](#)
- [“CPU and Memory” on page C-9](#)
- [“Internal Interfaces and ASICs” on page C-15](#)
- [“Graphics Accelerators” on page C-21](#)
- [“System Clocks and Interrupts” on page C-28](#)
- [“External Interfaces” on page C-31](#)
- [“System Thermal Management” on page C-36](#)
- [“System Power Management” on page C-38](#)

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## C.1 Hardware Architecture

This section provides an overview of the Sun Blade 1500 workstation.

### C.1.1 Component Overview

The Sun Blade 1500 workstation has four primary motherboard components:

- [“CPU” on page C-2](#)
- [“I/O Bridge Chip” on page C-2](#)
- [“I/O Subsystem” on page C-2](#)
- [“Gigabit Ethernet” on page C-2](#)

### C.1.1.1 CPU

- UltraSPARC IIIi CPU running at 1.5 GHz
- EPIC-7 Cu copper technology
- Integrated L1 caches (data, instruction, prefetch, and write)
- Integrated 1 Mbyte L2 data cache
- System bus — JIO I/O bridge, JBus frequency of up to 200 MHz.
- Integrated DDR-1 memory controller
- Memory — 4 DDR-1 (up to 133/266 MHz) SDRAM DIMMs
- Maximum 8 GB memory supported

### C.1.1.2 I/O Bridge Chip

- Sun Microsystems JIO custom I/O bridge ASIC
- JBus
  - 200 MHz bandwidth
  - 128-bit wide MUX address and data bus
- Dual PCI buses
  - PCI V2.2 compliant
  - 64-bit 66 MHz or 32- and 64-bit 33 MHz capable
  - 8 x 64-byte I/O cache each bus
  - Fully associative I/O memory management unit on each bus
  - Eight external masters with internal arbiters on each bus

### C.1.1.3 I/O Subsystem

- Acer Labs M1535D+
- PCI to ISA bridge
- Super I/O interface
- UltraDMA 100 controller
- AC97 compliant audio interface
- I<sup>2</sup>C interface
- USB 1.1 interface

### C.1.1.4 Gigabit Ethernet

- Broadcom BCM5793
- 10/100/1000BASE-T Ethernet LAN controller
- 3rd-generation technology
- Integrated MAC and PHY



## C.1.2 System Block Diagram

FIGURE C-1 shows the system block diagram.

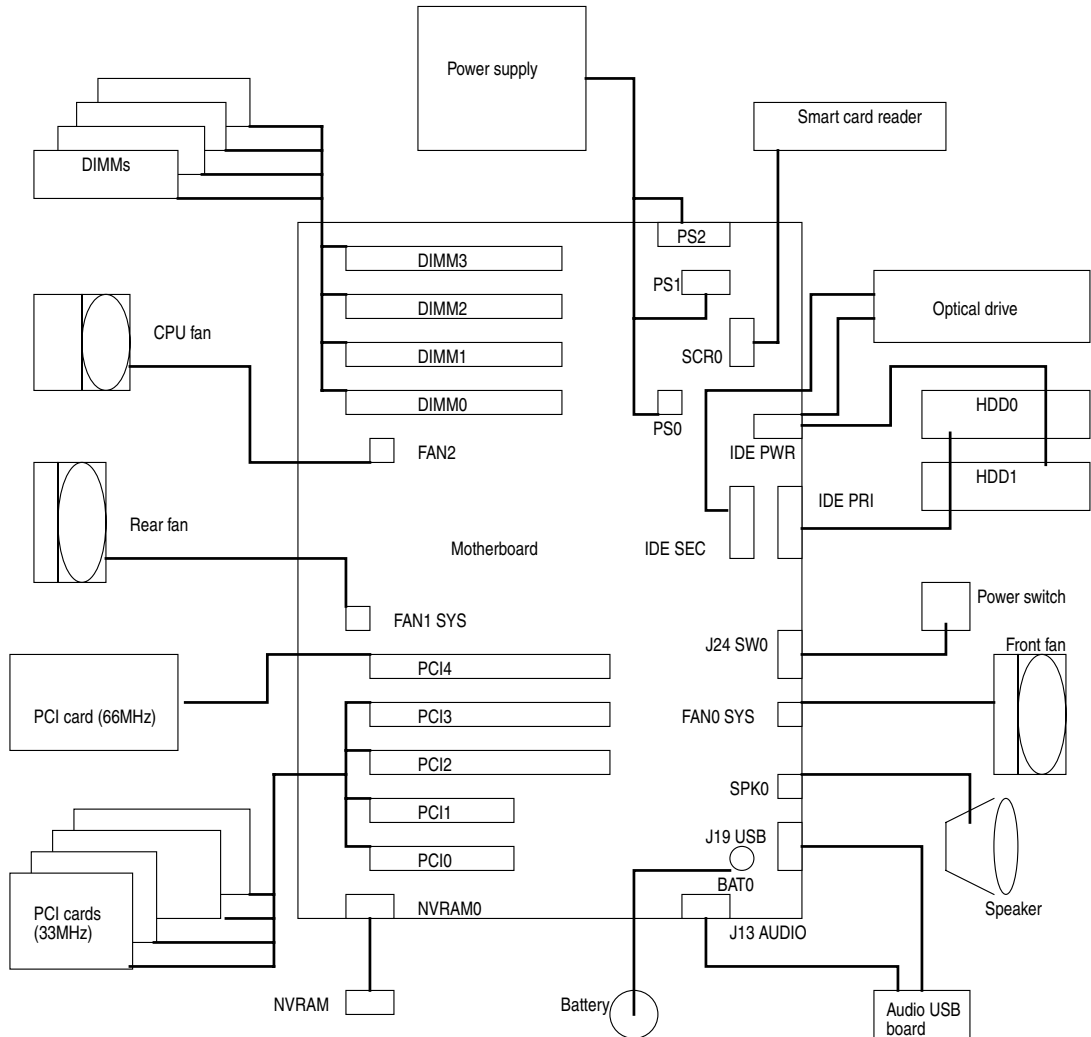


FIGURE C-1 Sun Blade 1500 Block Diagram

## C.1.3 Enclosure

This section describes features of the Sun Blade 1500 workstation.

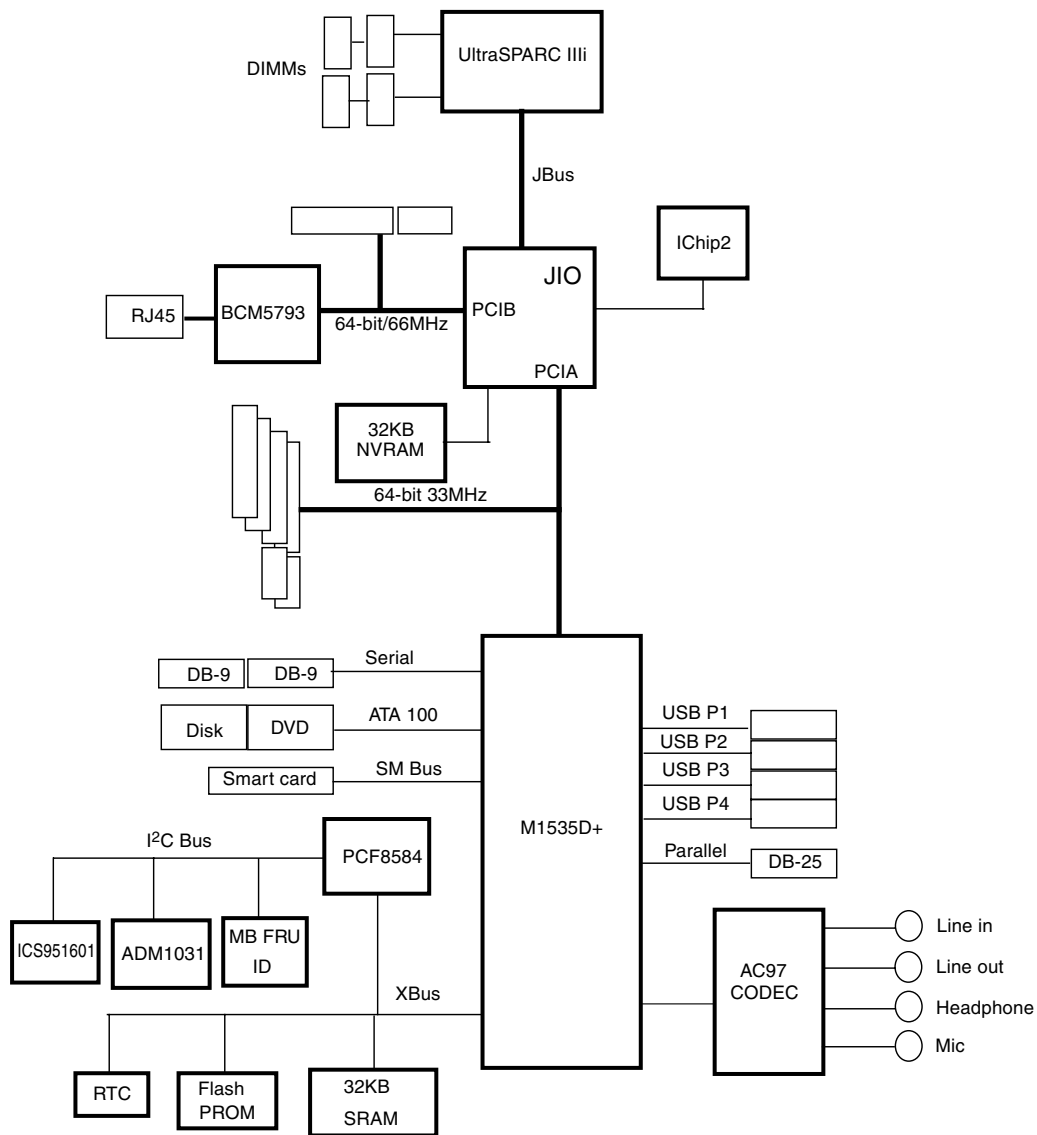
- Chassis
  - ATX form factor tower case
  - ATX compatible power supply
  - Snap-on drive rails for hard drives, optical media drive, and smart card reader bracket
  - Easy swing-out PCI card support
  - Snap-fit chassis fans
  - Single screw PCI card retainer
  - Single tool serviceability
- Motherboard
  - UltraSPARC IIIi 64-bit processor
  - 128-bit JBus
  - Direct interface of CPU to DDR-1 memory
  - Four 144-bit DIMM memory slots
  - Front and rear USB 1.1 compliant ports
  - Two 32-bit 33 MHz PCI slots
  - Two 64-bit 33 MHz PCI slots
  - One 64-bit 66 MHz PCI slot
- Peripherals
  - Support for IEEE 1394 and USB 2.0 high-speed external interfaces
  - Support for Cyberflex and Payflex smart cards
  - Legacy support for parallel and serial external interfaces

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## C.2 Motherboard

### C.2.1 Motherboard Block Diagram

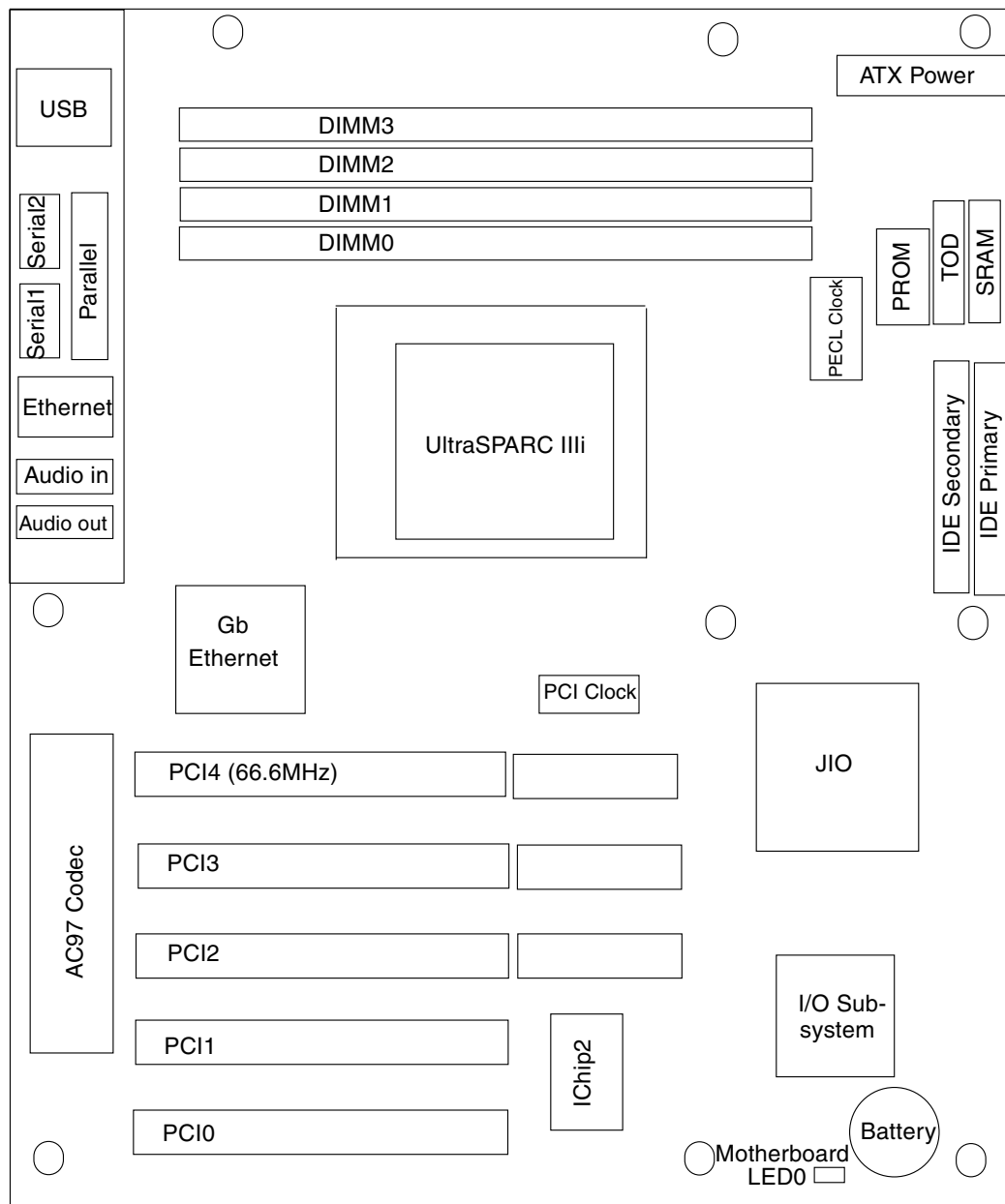
FIGURE C-2 shows the block diagram for the Sun Blade 1500 motherboard.



**FIGURE C-2** Sun Blade 1500 Motherboard Block Diagram

## C.2.2 Motherboard Layout Diagram

**FIGURE C-3** shows the layout of the motherboard, including connector and jumper locations.





**FIGURE C-3** Sun Blade 1500 Motherboard Layout Diagram

The following table lists connector and jumper locations on the Sun Blade 1500 motherboard, and the common terminology for each location.

**TABLE C-1** Sun Blade 1500 Motherboard Locations and Common Terminology

Location	Common Terminology
BAT0	Battery socket
CPU0	UltraSPARC IIIi CPU
DIMM0	Bottom memory slot
DIMM1	Second from bottom memory slot
DIMM2	Second from top memory slot
DIMM3	Top memory slot
FAN0 SYS	Front system fan connector
FAN1 SYS	Rear system fan connector
FAN2	CPU fan connector
IDE PRI	Primary IDE controller for hard drives
IDE SEC	Secondary IDE controller for optical media drive
IDE PWR	Hard drive and optical media drive power connector
J13 AUDIO	Microphone and headphone connector
J19 USB	Front panel USB connector
J24 SW0	Power switch connector
J28 USB	Rear panel USB connector
LED0	Motherboard stand-by power indicator
NVRAM0	Nonvolatile random access memory, boot parameters chip, SEEPROM
PARALLEL0	Parallel port
PCI0	Bottom PCI slot
PCI1	Second from bottom PCI slot
PCI2	Middle PCI slot
PCI3	Second from top PCI slot
PCI4	Top PCI slot
PS0	CPU power connector
PS1	Supplemental power connector
PS2	Primary power connector

**TABLE C-1** Sun Blade 1500 Motherboard Locations and Common Terminology

Location	Common Terminology
SCR0	Smart card reader connector
SERIAL0 TTYA	Serial port A (com1)  1
SERIAL1 TTYB	Serial port B (com2)  2
SPK0	Speaker connector
TPE0	Ethernet connector

### C.2.3 Motherboard Jumpers

The Sun Blade 1500 motherboard has many jumpers which are used for manufacturing and testing purposes. Do not change these jumpers. [TABLE C-2](#) lists the motherboard jumpers and their correct settings.

**TABLE C-2** Correct Motherboard Jumper Settings

Jumper Label	Jumper Block Settings
B SCAN	1-2, 3-4, 5-6
DEBUG ONLY	no connection
J9 JTAG CONNECTOR	no connection
J10 CPU SPEED	5-6
J11	1-2, 3-4, 9-10
J14	1-2
J18	1-2
J21 RESET	no connection
J25 ROMBO CONN-	no connection
J26	1-2
J27	1-2
J29	no connection

---

## C.3 CPU and Memory

### C.3.1 CPU Description

The UltraSPARC IIIi processor is a high-performance, highly integrated superscalar processor. It is capable of sustained execution of four instructions per cycle, even with conditional branches and cache misses. Instructions are issued in program order to multiple functional units, and executed in parallel. Instructions from two basic blocks are issued in the same group to further increase the number of instructions executed per cycle.

The UltraSPARC IIIi CPU supports full implementation of the 64-bit SPARC-V9 architecture, a 64-bit virtual address space, and a 43-bit physical address space. The core instruction set includes graphics instructions that provide the most common operations used for two-dimensional image processing, two and three-dimensional graphics, image compression algorithms, and parallel operations on pixel data with 8 and 16-bit components.

### C.3.2 Caches

#### C.3.2.1 L1 Data Cache

- 64 KBytes
- Four-way set associative
- Write-through
- Nonallocating (no write allocate)
- Virtually indexed (doesn't go through D-TLB), physically tagged (goes through D-TLB)
- Address aliasing as side effect
- 32-byte line size, no sub-lines
- Data and tags are parity protected
- Not included in L2 cache. Is snooped in parallel with L2
- Need to flush if alias is created

### C.3.2.2 L1 Instruction Cache

- 32 KBytes
- Pseudo four-way set associative
- Physically indexed (goes through I-TLB), physically tagged (goes through I-TLB)
- Write invalidate
- 32-byte line size, no sub-lines
- Data and tags are parity protected
- Not included in L2 cache. Is snooped in parallel with L2
- No flushing is required

### C.3.2.3 L1 Prefetch Cache

- Used by software prefetch instruction and autonomous HW prefetch from L2
- 2 KBytes
- Four-way set associative
- Physically indexed (goes through D-TLB), physically tagged (goes through D-TLB)
- Write invalidate
- 64-byte line size, two 32-byte sub lines
- Not included in L2 cache. Is snooped in parallel with L2
- No flushing is required

### C.3.2.4 L2 Data Cache

- 1 MByte
- Four-way set associative
- Physically indexed (goes through D-TLB), physically tagged (goes through D-TLB)
- Write back, allocating
- 64-byte line size
- Data is ECC protected, tag is parity protected
- L2 tag address able to cache 16 GB of local memory
- Required flushing for stable storing



### C.3.2.5 L2 Write Cache

- Used to reduce bandwidth to L2 Cache by coalescing and bursting stores to L2 cache
- 2 KBytes
- Four-way set associative
- 64-byte line size, two 32-byte sub-lines
- Physically indexed (goes through Data Translation Look-aside Buffers (D-TLB)), physically tagged (goes through D-TLB)
- Included in L2 cache
- Required flushing for stable storing

## C.3.3 Memory Controller

The memory system consists of the Memory Control Unit (MCU) in the CPU, and two physical banks (A and B) of DDR-1 Synchronous DRAM memory. Only registered DIMMs are supported.

Clock buffering with a PLL is provided on the DIMMs. Each physical bank consists of two 72-bit DDR-1 SDRAM DIMMs. These two DIMMs share an 8-byte data bus plus ECC data bus. Both physical banks have shared address/control bus. Since each DIMM could be dual sided (upper/lower banks), there are maximum of four data loads per physical bank. The cache line is split across the two physical banks. Both banks are controlled by the memory controller.

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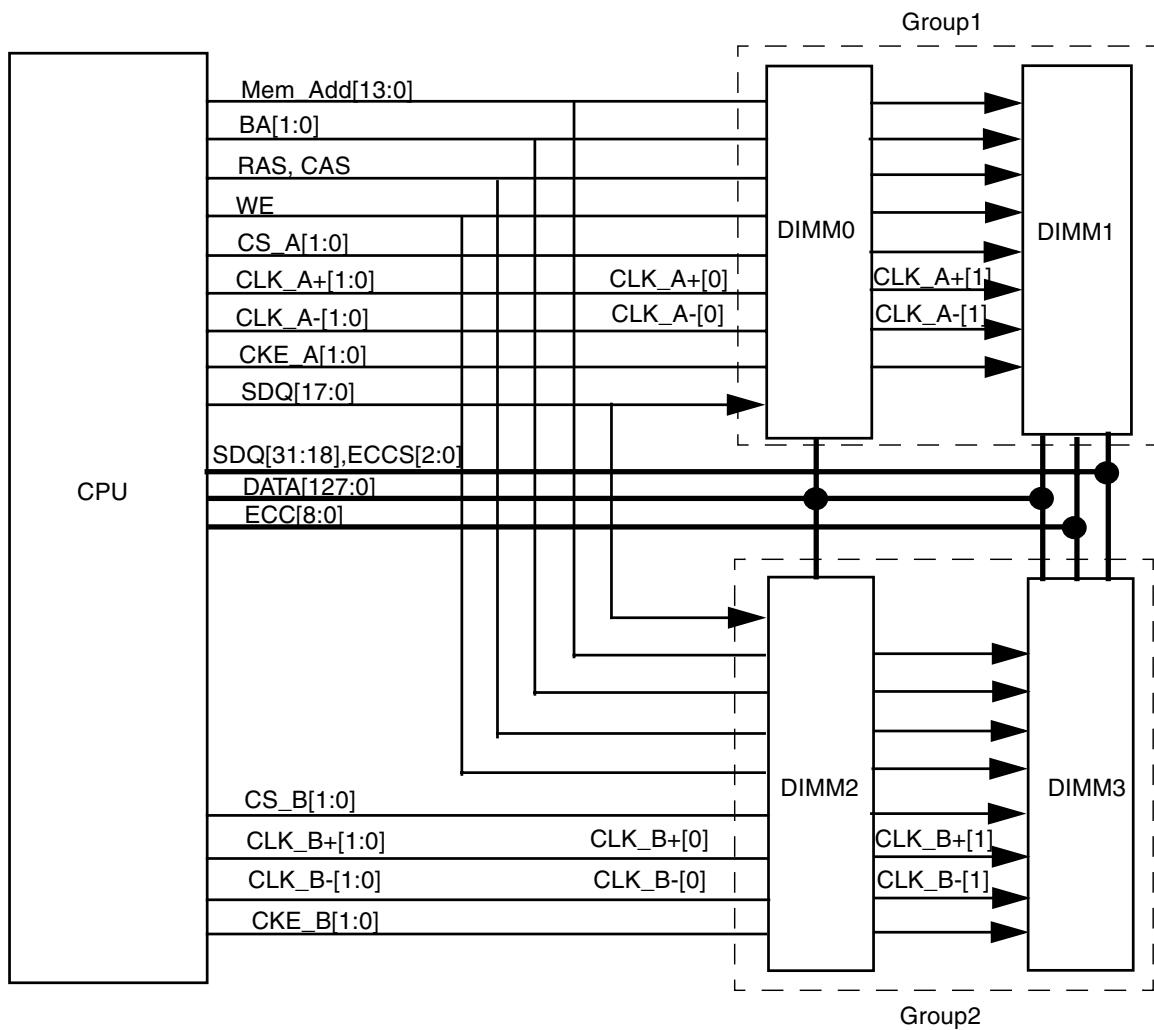
**Note** – DIMMs are always loaded in pairs.

---

A memory controller pipelines requests, making use of 16 memory banks when fully loaded.

## C.3.4 Memory Block Diagram

[FIGURE C-4](#) shows the memory block diagram for the Sun Blade 1500 workstation.



**FIGURE C-4** Sun Blade 1500 Memory Block Diagram

## C.3.5 DIMM Configurations

TABLE C-3 describes supported DIMM memory configurations for the Sun Blade 1500 workstation.

**TABLE C-3** Sun Blade 1500 Supported DIMM Configurations

SDRAM Organization	Number of DRAMs	Physical Bank per DIMM	Module Configuration	DIMM Capacity	Minimal Memory	Maximum Memory
256Mbit (64Mx4)	18	1	64Mx72	512MB	1GB	2GB
256Mbit (32Nx8)	18	2	2x(32Mx72)	512MB	1GB	2GB
512Mbit (64Mx8)	9	1	64Mx72	512MB	1GB	2GB
512Mbit (128Mx4)	18	1	128Mx72	1GB	2GB	4GB
512Mbit (64Mx8)	18	2	2x(64Mx72)	1GB	2GB	4GB
1Gbit (256Mx4)	18	1	256Mx72	2GB	4GB	8GB
1Gbit (128Mx8)	18	2	2x(128Mx72)	2GB	4GB	8GB

## C.3.6 Memory Interleaving

The UltraSPARC IIIi supports four interleaving modes:

- Bank
- Rank
- DIMM
- XOR

### C.3.6.1 Bank Interleaving

Bank interleaving is interleaving within a single device on a DDR1 SDRAM. Each DDR SDRAM used by the workstation contains 18 devices.

### C.3.6.2 Rank Interleaving

Rank interleaving is interleaving between a pair of memory devices on a single DIMM. Each DDR SDRAM used in by the workstation contains 18 devices, nine on one half and nine on the other half. To perform rank interleaving, one discrete device on the left half of the memory module must pair with its adjacent memory module on the right half of the module.

### C.3.6.3 DIMM Interleaving

DIMM interleaving is interleaving between pairs of DIMMs. Interleaving between DIMMs can be done only if all four DIMMs are the same. If the pairs are different, it is still possible to interleave external banks (in double bank DIMMs) and internal banks.

For maximum interleaving performance all DIMMs need to be the same Sun part number.

---

**Note** – There are no constraints for bank or rank interleaving within the same pair.

---

[TABLE C-4](#) shows the different interleaving modes supported based on the DIMMs used.

**TABLE C-4** Interleaving Modes

DIMM Pairs	DIMM Type	Interleaving Mode Support
1	Single bank	Bank
1	Dual bank	Bank/rank
2	Diff, single-single	Bank
2	Diff, single-double	Bank/rank, bank/rank
2	Diff, double-double	Bank/rank, bank/rank
2	Same, single-single	Bank/DIMM
2	Same, single-double	Bank/DIMM/rank (on double)
2	Same, double-double	Bank/DIMM/rank

### C.3.6.4 XOR Interleaving

The Sun Blade 1500 workstation also supports a fourth interleaving mode called XOR interleaving. This interleaving mode is used to distribute L2 cache conflict misses and L2 cache read/writeback pairs across more banks.

To use XOR interleaving, all DIMMs must be identical. XOR interleaving is a special case that is not described in [TABLE C-4](#).

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## C.4 Internal Interfaces and ASICs

This section discusses system buses, interfaces, and the ASICs that support them on the motherboard:

- [“JBus Information” on page C-15](#)
- [“JIO Information” on page C-16](#)
- [“PCI Bus Information” on page C-17](#)
- [“M1535D+” on page C-18](#)
- [“BCM5793” on page C-19](#)
- [“Other Buses” on page C-20](#)

### C.4.1 JBus Information

JBus is a 128-bit MUX address and data bus running at 200MHz SDR with approximately 171 DTL signals. JBus is a multidrop with a peak bandwidth of 2.56GB/s@200MHz. JBus can insert a dead cycle between transactions of 2 different masters if needed. The bus supports two loads — the UltraSPARC IIIi processor and the JIO I/O bridge.

#### *Key Features*

The following are the key features of JBus:

- Simple SMP protocol that is SPARC-V9 and Sun4u correct, high performance for 1-4 CPUs
- 128-bit wide bus
- Full duplex shared multidrop bus up to four loads
- DTL driver/receiver technology
- Snoopy MOESI protocol
- Separate flow-controlled address and data transaction
- Multiplexed address and data bus
- Variable snoop return delay using sideband signals (no hard latency or throughput requirements in the protocols)
- Distributed arbitration
- Distributed snoop results stalling for resource management
- Pushed writes, slit transID based read returns

- Out-of-order data return for different cache addresses. In-order data return from single noncacheable port. In-order data return for same cacheable address. Order determined by address bus order.
- Out-of-order data return values are according to the address bus order. Data return implies completion of prior coherency events, by the requestor, which is a minimal requirement, but also by all other ports, implicitly.
- Four TransIDs per Device ID
- Optional dead cycle for bus turnaround

## C.4.2 JIO Information

The Sun Blade 1500 workstation uses the JIO I/O bridge as the bridge from the JBus to the PCI buses. JIO is a companion core-logic ASIC to the UltraSPARC IIIi CPU. The I/O bridge and UltraSPARC IIIi communicate through JBus. The central task of I/O bridge is to be the point of access to I/O, and system interrupts.

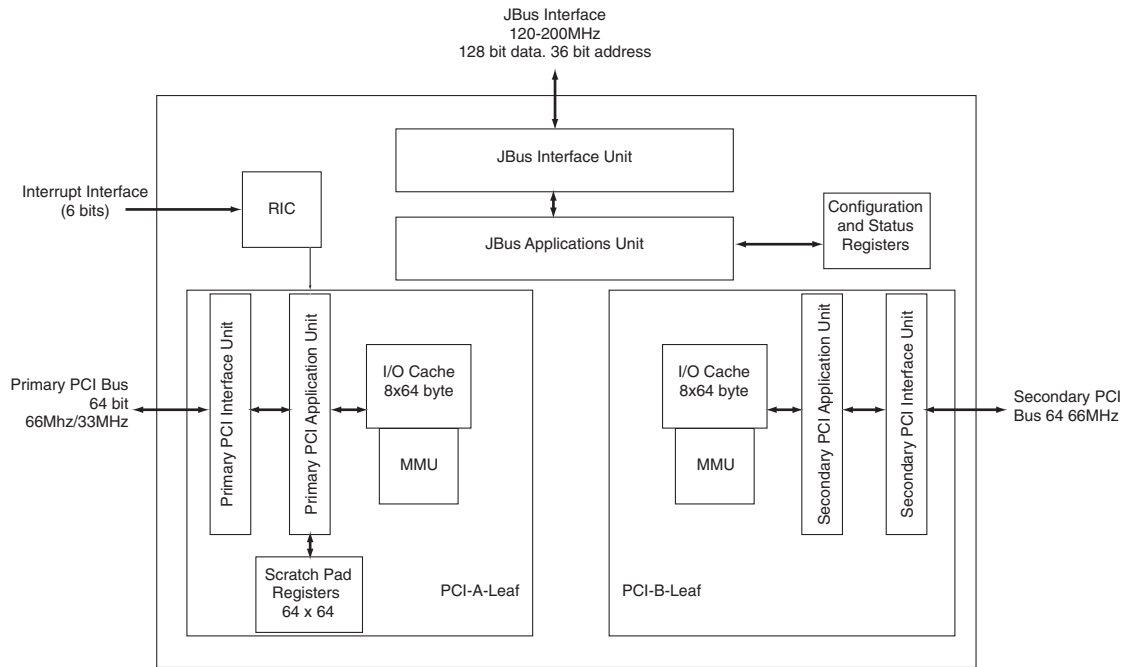
### C.4.2.1 Key Features

The following are key features of the JIO:

- JBus interface
- Two 64-bit/66MHz PCI leafs
- I/O cache (8 x 64-bytes)
  - One per leaf
  - Fully associative
  - In JBus coherency space
- I/O MMU
  - One per leaf
  - Fully associative TLB
- Mondo dispatch unit
- Byte twisting

### C.4.2.2 JIO Block Diagram

[FIGURE C-5](#) shows the block diagram for the JIO I/O bridge.



**FIGURE C-5** JIO Block Diagram

## C.4.3 PCI Bus Information

### C.4.3.1 PCI-A Leaf

The PCI-A leaf on JIO is a 64-bit/66MHz or 64-bit/33MHz version 2.2 compliant implementation. The interface has an internal arbiter that can support up to eight masters resident on the bus.

The PCI-A leaf includes an interrupt block (Mondo Dispatch) that receives system interrupts from the external IChip2 and the PCI interface unit itself. The interrupt unit communicates with the JBus cluster to send out the interrupt onto the JBus.

### C.4.3.2 PCI-B Leaf

The PCI-B interface is a 64-bit/66MHz PCI leaf with an internal arbiter that supports two masters on the PCI bus.

### C.4.3.3 PCI I/O Cache

Each PCI leaf has an I/O cache. Each PCI I/O cache has eight entries, each of which contains 64 bytes of data. The I/O cache can also perform data prefetching, to minimize DMA read latency.

### C.4.3.4 PCI-ISA Bridge

The ISA bus is an I/O bus that runs at 8MHz. The Sun Blade 1500 workstation uses only a subset of this bus called the XBus.

### C.4.3.5 PCI Configuration and I/O Space

The PCI configuration and I/O space in UltraSPARC IIIi based systems conforms to the *PCI Local Bus Specification Revision 2.2* and are partitioned through a software/firmware convention. 32 MB of space is reserved for each PCI bus in the system:

- 16 MB (lower) for the PCI configuration space
- 16 MB (upper) for the PCI I/O space

The PCI specification defines the configuration space for software initialization and configuration of PCI devices. This space is limited to a maximum size of 16 MB per device. Accesses in this space generate PCI transactions called “Configuration Cycles” which are decoded by the JIO.

The PCI specification also defines a 32-bit I/O space for each device. The I/O space is accessed through dedicated transactions and is provided so as to support devices that are “noncompliant”.

## C.4.4 M1535D+

The Sun Blade 1500 workstation uses the M1535D+ I/O subsystem from Acer Labs. The M1535D+ is a highly integrated system I/O chipset in a 328-pin BGA package. The M1535D+ interfaces the PCI A bus and the following interfaces:

- USB 1.1
- ATA 100
- SMBus
- XBus
- Parallel
- Serial
- AC97



## C.4.5 BCM5793

The Sun Blade 1500 workstation uses the BCM5793 Gigabit Ethernet controller from Broadcom. The BCM5793 is a high-performance network interface operating at 10, 100, and 1000 Mb/s link rates.

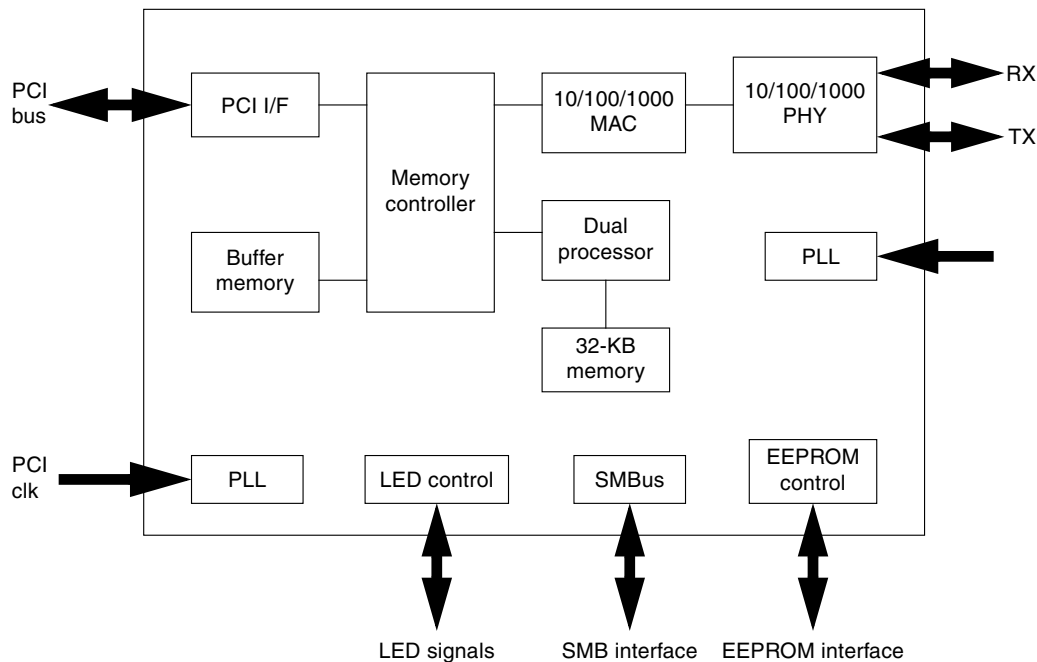
### C.4.5.1 Key Features

The following are key features of the BCM5793:

- Integrated 10BASE-T/100BASE-TX/1000BASE-T transceivers
- Full-duplex support in Gb mode
- 10/100/1000 tri-speed MAC
- 64-bit/66MHz PCI 2.2 host interface
- MII/GMII/TBI interfaces for external transceivers
- 96 KB on chip packet buffer
- Dual high-speed RISC cores with 16-KB caches
- Programmable, inline packet classification
- TCP, IP, UDP checksum
- TCP segmentation
- CPU task off load
- Adaptive interrupts
- Priority queuing-802.1p Layer 2 priority encoding support for four priority queues
- Virtual LANs-802.1q VLAN tagging support for up to 64 VLANs
- Jumbo frames (9KB)
- 802.3 flow control
- Link aggregation-802.3ad, GEC/FEC, smart load balancing (supports heterogeneous teams)
- 300-pin HBGA package
- 3.3v I/O

### C.4.5.2 BCM5793 Block Diagram

[FIGURE C-6](#) shows the block diagram for the BCM5793.



**FIGURE C-6** BCM5793 Block Diagram

## C.4.6 Other Buses

Other buses are used in the Sun Blade 1500 workstation for interfacing various components:

- I<sup>2</sup>C — for fan control, motherboard FRU ID, PCI clock generator, and DIMM flash PROMs
- Ichip2 — interrupt concentrator
- XBus — for real-time clock, firmware, 32K SRAM, and I<sup>2</sup>C master
- SMBus — for smart card reader
- ATA 100 — for hard drives and optical media drive

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**Note** – A second I<sup>2</sup>C bus interfaces the NVRAM with the JIO I/O bridge.

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## C.5 Graphics Accelerators

The Sun Blade 1500 workstation base configurations include one of the following graphics accelerators:

- “Sun XVR-600” on page C-21
- “Sun XVR-100” on page C-24
- “Sun XVR-1200” on page C-25

### C.5.1 Sun XVR-600

The Sun XVR-600 graphics accelerator provides the following features and benefits:

- FRU ID (field replaceable unit identification enables you to identify the Sun XVR-600 graphics accelerator serial number and other data using `fbconfig`)
- OpenGL 1.3 and 1.2.3 for Solaris implementations. For more information access this URL:  
<http://opengl.org>
- Geometry acceleration
  - Model view matrix transformation of vertex and normal coordinates
  - Texture matrix transformation of texture coordinates
  - Full lighting calculations with up to 32 light sources
  - Up to six user clip planes
  - Perspective transformation
  - Viewport transformation
  - View volume clipping
- OpenGL operations
  - Cube-mapping
  - Points (2D, 3D, wide)
  - Vectors (2D and 3D lines and line strips; wide, stippled)
  - Polygons (triangles, triangle strips, quads, quad strips, polygons, point/line polygon mode)
  - Antialiased points, vectors, and polygons
  - Image support (multiple formats, zoom, bilinear scaling, color matrix, color tables)
  - Alpha operations
  - Scissoring

- Window clipping
- Masking
- Fogging (linear, exponential, exponential<sup>2</sup>, user-defined)
- Texture mapping (point, bilinear, trilinear, multiple internal formats)
- Stencil operations
- Dithering
- Rich set of blending operations
- Fast window clears
- Fast window-mode double buffering
- Frame-sequential stereo support
- Support of OpenGL extensions
  - Imaging extensions such as pixel buffer, color table, and color matrix
  - Blend extensions such as blend color, blend minmax, and blend function separate
  - Texture extensions (edge clamp, border clamp, LOD clamp, generate mipmap)
  - Texture color table
  - Post-texturing specular
  - Stencil operation wrap

### C.5.1.1 Additional Features

- 32 Mbytes of DDR display list memory
- 32 Mbytes of texture memory
- 64 Mbytes of frame buffer memory
- 10-bit gamma correction
- Resolution up to  $2048 \times 1536 \times 40$  Hz at 24-bit color
- $1920 \times 1200$  screen support
- $1280 \times 1024$  stereo screen support
- Hardware cursor
- Stereoscopic viewing support (frame sequential)
- Stereo output
- Display Data Channel (DDC) monitor support for bidirectional communication
- Display Power Management Signaling (DPMS) to enable monitor power-saving mode
- High-speed, full-featured DMA over the PCI bus
- PCI 66/33 MHz 64-bit interface

- Multiscreen support using multiple cards in a single workstation
- Framelocking of the video timing to an external timing source
- Multiview functionality for framelocking of multiple cards
- Two video lookup tables
- DVI-I video out

## C.5.1.2 Screen Resolutions and Video Formats

TABLE C-5 lists the monitor screen resolutions and video formats supported by the Sun XVR-600 graphics accelerator:

**TABLE C-5** Sun XVR-600 Graphics Accelerator Monitor Screen Resolutions

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio Format	SPP <sup>1</sup> Single Screen
2048 x 1536	40 Hz	Sun	4:3	1
1920 x 1200	60, 70, 75 Hz	Sun	16:10	1
1920 x 1200	60_240T Hz	Sun	16:10	1
1920 x 1080	72 Hz	Sun	16:9	1
1792 x 1344	75 Hz	VESA	4:3	1
1600 x 1280	76 Hz	Sun	5:4	1
1600 x 1200	60, 75 Hz	VESA	4:3	1
1600 x 1000	66, 76 Hz	Sun	16:10	1
1440 x 900	76 Hz	Sun	16:10	1
1280 x 1024	60, 75, 85 Hz	VESA	5:4	2
1280 x 1024	67, 76 Hz	Sun	5:4	2
1280 x 1024	112 Hz	Sun-stereo	5:4	1
1280 x 800	112 Hz	Sun-stereo	16:10	1
1280 x 800	76 Hz	Sun	16:10	2
1152 x 900	66, 76 Hz	Sun	5:4	1
1152 x 900	120 Hz	Sun-stereo	5:4	1
1024 x 800	84 Hz	Sun	5:4	2
1024 x 768	75 Hz	VESA	4:3	2
1024 x 768	60, 70, 77 Hz	Sun	4:3	2
960 x 680	108, 112 Hz	Sun-stereo	7:5	2

**TABLE C-5** Sun XVR-600 Graphics Accelerator Monitor Screen Resolutions (*Continued*)

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio Format	SPP <sup>1</sup> Single Screen
800 × 600	75	VESA	4:3	4
640 × 480	60 Hz	VESA	4:3	8
1. Samples Per Pixel (SPP).				

## C.5.2 Sun XVR-100

The Sun XVR-100 graphics accelerator provides the following features and benefits:

- 2D 24-bit graphics
- Flexible 8- and 24-bit color application support
- 24-bit color, high resolution for multihead displays in supported systems
- HD15 and DVI monitor connectors for a wide range of Sun and third party monitors
- 3D support through the software

### *Screen Resolutions and Video Formats*

[TABLE C-6](#) lists the monitor screen resolutions and video formats supported by the Sun XVR-100 graphics accelerator.

**TABLE C-6** Sun XVR-100 Graphics Accelerator Monitor Screen Resolutions

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio Format
1920 × 1200	60 Hz (DVI-D port) See Note.	Sun	16:10
1920 × 1200	60, 70, 75 Hz (HD-15 port)	Sun	16:10
1920 × 1080	60, 72 Hz	Sun	16:9
1600 × 1280	76 Hz	Sun	5:4
1600 × 1200	65, 70, 75, 85 Hz	VESA	4:3
1600 × 1000	66, 76 Hz	Sun	16:10
1440 × 900	76 Hz	Sun	16:10
1280 × 1024	60, 75, 85 Hz	VESA	5:4
1280 × 1024	67, 76 Hz	Sun	5:4
1280 × 800	76 Hz	Sun	16:10

**TABLE C-6** Sun XVR-100 Graphics Accelerator Monitor Screen Resolutions (*Continued*)

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio Format
1152 x 900	66, 76 Hz	Sun	5:4
1152 x 864	75 Hz	VESA	4:3
1024 x 768	60, 70, 75, 85 Hz	VESA	4:3
800 x 600	56, 60, 72, 75 Hz	VESA	4:3
720 x 400	85 Hz	VESA	9:5
640 x 480	60, 67, 72, 75 Hz	VESA	4:3

---

**Note** – The 1920 × 1200 resolution is supported by DVI-Digital and HD-15 ports only. It is *not* supported by the DVI-Analog port.

---

## C.5.3 Sun XVR-1200

The Sun XVR-1200 graphics accelerator provides the following features and benefits:

- FRU ID (field replaceable unit identification enables you to identify the Sun XVR-1200 graphics accelerator serial number and other data using `fbconfig`)
- OpenGL 1.3 and 1.2.3 for Solaris implementations. For more information access this URL:  
<http://opengl.org>
- Geometry acceleration
  - Model view matrix transformation of vertex and normal coordinates
  - Texture matrix transformation of texture coordinates
  - Full lighting calculations with up to 32 light sources
  - Up to six user clip planes
  - Perspective transformation
  - Viewport transformation
  - View volume clipping
- OpenGL operations
  - Cube-mapping
  - Points (2D, 3D, wide)
  - Vectors (2D and 3D lines and line strips; wide, stippled)

- Polygons (triangles, triangle strips, quads, quad strips, polygons, point/line polygon mode)
- Antialiased points, vectors, and polygons
- Image support (multiple formats, zoom, bilinear scaling, color matrix, color tables)
- Alpha operations
- Scissoring
- Window clipping
- Masking
- Fogging (linear, exponential, exponential<sup>2</sup>, user-defined)
- Texture mapping (point, bilinear, trilinear, multiple internal formats)
- Stencil operations
- Dithering
- Rich set of blending operations
- Fast window clears
- Fast window-mode double buffering
- Frame-sequential stereo support
- Support of OpenGL extensions
  - Imaging extensions such as pixel buffer, color table, and color matrix
  - Blend extensions such as blend color, blend minmax, and blend function separate
  - Texture extensions (edge clamp, border clamp, LOD clamp, generate mipmap)
  - Texture color table
  - Post-texturing specular
  - Stencil operation wrap

### C.5.3.1 Additional Features

- 32 Mbytes of SDRAM display list memory
- 256 Mbytes of texture memory
- 128 Mbytes of frame buffer memory
- 10-bit gamma correction
- Resolution up to  $2048 \times 1536 \times 40$  at 30-bit color
- Dual  $1920 \times 1200$  screens support from a single board
- Dual  $1280 \times 1024$  stereo screen support
- Hardware cursor



- Stereoscopic viewing support (frame sequential)
- Display Data Channel (DDC) monitor support for bidirectional communication
- Display Power Management Signaling (DPMS) to enable monitor's power-saving mode
- High-speed, full-featured DMA over the PCI bus
- Multiscreen support using multiple cards in a single workstation
- Frame locking of the video timing to an external timing source
- Multiview functionality for framelocking of multiple cards
- Two video lookup tables
- Stereo output
- PCI 66/33 MHz 64-bit interface
- Dual DVI-I video out

### C.5.3.2 Screen Resolutions and Video Formats

[TABLE C-7](#) lists the monitor screen resolutions and video formats supported by the Sun XVR-1200 graphics accelerator. [TABLE C-7](#) also includes the maximum samples per pixel (ssp) for single and dual display configurations.

**TABLE C-7** Sun XVR-1200 Graphics Accelerator Screen Resolutions

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio Format	SPP <sup>1</sup> Single Screen	SPP <sup>1</sup> Dual Screen
2048 x 1536	40 Hz	Sun	16:10	1	1
1920 x 1200	60, 70, 75 Hz	Sun	16:10	1	1
1920 x 1200	60_240T Hz	Sun	16:10	1	1
1920 x 1080	72 Hz	Sun	16:9	2	1
1792 x 1344	75 Hz	VESA	4:3	1	1
1600 x 1280	76 Hz	Sun	5:4	1	1
1600 x 1200	60, 75 Hz	VESA	4:3	2	1
1600 x 1000	66, 76 Hz	Sun	16:10	2	1
1440 x 900	76 Hz	Sun	16:10	1	1
1280 x 1024	60, 75, 85 Hz	VESA	5:4	4	1
1280 x 1024	67, 76 Hz	Sun	5:4	4	1
1280 x 1024	112 Hz	Sun-stereo	5:4	2	1
1280 x 800	112 Hz	Sun-stereo	16:10	2	1

**TABLE C-7** Sun XVR-1200 Graphics Accelerator Screen Resolutions (*Continued*)

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio Format	SPP <sup>1</sup> Single Screen	SPP <sup>1</sup> Dual Screen
1280 x 800	76 Hz	Sun	16:10	4	1
1152 x 900	66, 76 Hz	Sun	5:4	4	2
1152 x 900	120 Hz	Sun-stereo	5:4	2	1
1024 x 800	84 Hz	Sun	5:4	4	2
1024 x 768	75 Hz	VESA	4:3	4	2
1024 x 768	60, 70, 77 Hz	Sun	4:3	4	2
960 x 680	108, 112 Hz	Sun-stereo	Sun-Stereo	4	2
800 x 600	75	VESA	4:3	8	4
640 x 480	60 Hz	VESA	4:3	16	8

1. Samples Per Pixel (SPP).

**Note** – The Sun XVR-1200 graphics accelerator provides two DVI video output ports. Each DVI video port supports both analog (DVI-A) and digital (DVI-D) video formats, however they cannot be used simultaneously from the individual DVI port.

# C.6 System Clocks and Interrupts

## C.6.1 Clock Generation

There are four clock domains in the Sun Blade 1500 workstation:

- PECL — for UltraSPARC IIIi and JIO
- Differential — from UltraSPARC IIIi to DDR memory subsystem
- Single-ended PCI — for PCI devices
- Miscellaneous clocks

The clocks in the four domains are generated from clock synthesizers or dedicated crystals on the motherboard. The SDRAM clocks are generated by the UltraSPARC IIIi processor.

TABLE C-8 lists all the clocks present in the Sun Blade 1500 workstation.

**TABLE C-8** Clock Frequencies

Component	Clock	Frequency (MHz)	Source	Description
UltraSPARC IIIi CPU	J_CLK+	125 ~ 350	MC12429/MC100LVEP14	LVPECL (JBus)
UltraSPARC IIIi CPU	J_CLK-	125 ~ 350	MC12429/MC100LVEP14	LVPECL(JBus)
UltraSPARC IIIi CPU	STICK	12	Oscillator	System tick clock
JIO I/O bridge	J_REFCLK+	125 ~ 350	MC12429/MC100LVEP14	LVPECL(JBus)
JIO I/O bridge	J_REFCLK-	125 ~ 350	MC12429/MC100LVEP14	LVPECL(JBus)
JIO I/O bridge	P_REFCLK	33.33	ICS951601	PCI clock
JIO I/O bridge	G_PCI_REFCLK	66.66	ICS951601	PCI clock
M1535D+ I/O subsystem	PCI_CLK	33.33	ICS951601	PCI clock
M1535D+ I/O subsystem	OSC32KI OSC32KII	32.768KHz	Dedicated crystal	Real-time clock
M1535D+ I/O subsystem	USB_CLK	48.00	ICS951601	USB Clock
M1535D+ I/O subsystem	OSC14M	14.3182	ICS951601	Reference clock
IChip2	PCIClk	33.33	ICS951601	PCI clock
BCM5793 Gigabit Ethernet	PCICLK	66.66	ICS951601	PCI clock
BCM5793 Gigabit Ethernet	XIN	25.000	Dedicated crystal	Integrated PHY Clk
CPLD	PCICLK	33.33	ICS951601	PCI clock
PCI0 (33.3MHz)	PCICLK	33.33	ICS951601	PCI clock
PCI1 (33.3MHz)	PCICLK	33.33	ICS951601	PCI clock
PCI2 (33.3MHz)	PCICLK	33.33	ICS951601	PCI clock
PCI3 (33.3MHz)	PCICLK	33.33	ICS951601	PCI clock
PCI4 (66.6MHz)	PCICLK	66.66	ICS951601	PCI clock

## C.6.2 Interrupt Map

TABLE C-9 lists the interrupts handled by the IChip2 interrupt concentrator.

**TABLE C-9** Sun Blade 1500 Interrupt Map

Ichip2 Pin	Pin Number	Interrupt	INT_NUM	Type	Priority
PCI1_INT0#	108	PCI0, INTA#	0x04	Active low	4
PCI1_INT1#	109	PCI0, INTB#	0x05	Active low	4
PCI1_INT2#	112	PCI0, INTC#	0x06	Active low	4
PCI1_INT3#	113	PCI0, INTD#	0x07	Active low	4
PCI2_INT0#	114	PCI1, INTA#	0x08	Active low	4
PCI2_INT1#	115	PCI1, INTB#	0x09	Active low	4
PCI2_INT2#	117	PCI1, INTC#	0x0A	Active low	4
PCI2_INT3#	118	PCI1, INTD#	0x0B	Active low	4
PCI3_INT0#	119	PCI2, INTA#	0x0C	Active low	4
PCI3_INT1#	120	PCI2, INTB#	0x0D	Active low	5
PCI3_INT2#	123	PCI2, INTC#	0x0E	Active low	6
PCI3_INT3#	124	PCI2, INTD#	0x0F	Active low	7
PCI4_INT0#	125	PCI3, INTA#	0x10	Active low	2
PCI4_INT1#	126	PCI3, INTB#	0x11	Active low	1
PCI4_INT2#	127	PCI3, INTC#	0x12	Active low	1
PCI4_INT3#	128	PCI3, INTD#	0x13	Active low	3
PCI5_INT0#	1	PCI4, INTA#	0x14	Active low	4
PCI5_INT1#	6	PCI4, INTB#	0x15	Active low	6
PCI5_INT2#	7	PCI4, INTC#	0x16	Active low	6
PCI5_INT3#	8	PCI4, INTD#	0x17	Active low	6
PCI6_INT0#	9	Primary IDE interrupt	0x18	Active low	6
PCI6_INT1#	10	RTC power on	0x19	Active low	1
PCI6_INT2#	11	Secondary IDE interrupt	0x1A	Active low	1
PCI6_INT3#	12	I/O subsystem management interrupt (power-off, thermal, SMB, etc)	0x1B	Active low	3
PCI7_INT0#	13	LAN interrupt	0x1C	Active low	4

**TABLE C-9** Sun Blade 1500 Interrupt Map (*Continued*)

Ichip2 Pin	Pin Number	Interrupt	INT_NUM	Type	Priority
PCI7_INT1#	16	Undefined	0x1D	Active low	5
PCI7_INT2#	17	Undefined	0x1E	Active low	6
PCI7_INT3#	18	Undefined	0x1F	Active low	7
OBDIO0_INT0#	19	Power button interrupt	0x20	Active low	3
OBDIO0_INT1#	20	PCIA PME#	0x21	Active low	3
OBDIO0_INT2#	22	Smart card interrupt	0x22	Active low	2
OBDIO0_INT3#	23	PCIB PME#	0x23	Active low	5
OBDIO0_INT4#	24	Audio interrupt	0x24	Active low	8
OBDIO0_INT5#	27	Undefined	0x25	Active low	8
OBDIO0_INT6#	28	USB2 interrupt	0x26	Active low	5
OBDIO0_INT7#	29	USB1 interrupt	0x27	Active low	4
OBDIO0_INT8#	30	Undefined	0x28	Active low	7
OBDIO0_INT9#	31	Undefined	0x29	Active low	8
OBDIO1_INT0#	32	Serial port interrupt	0x2C	Active high	3
OBDIO1_INT1#	33	Parallel port interrupt	0x2D	Active high	4
OBDIO1_INT2#	38	I <sup>2</sup> C device interrupt	0x2E	Active high	7
OBDIO1_INT3#	39	CPU overheat interrupt	0x2F	Active high	

## C.7 External Interfaces

This section discusses buses and interfaces that are off the motherboard or external to the system chassis. Topics include:

- [“ATA 100” on page C-32](#)
- [“Smart Card Reader” on page C-32](#)
- [“USB” on page C-33](#)
- [“Audio” on page C-33](#)
- [“PCI Slots” on page C-33](#)
- [“IEEE 1394/USB 2 Combination Card” on page C-34](#)
- [“Ethernet” on page C-34](#)
- [“Parallel” on page C-34](#)
- [“Serial” on page C-34](#)

# C.7.1 ATA 100

The M1535D+ I/O subsystem provides two channels of IDE within the IDE controller to support up to a maximum of four devices. Each channel can operate at DMA mode 5 independently. The standard configuration is an UltraDMA/100-capable hard drive on the primary channel and an optical media drive on the secondary channel. Key features of the IDE controllers are:

- Supports PCI bus mastering at 200 MB/sec transfer rate.
- Two separate IDE channels that support UltraDMA/100 high performance ATA bus for 100 MB transfer rate and concurrent operation.
- Dedicated ATA bus pins and buffers for each channel

---

**Note** – The hard drives of the Sun Blade 1500 workstation share the same IDE controller channel. Therefore, internal drive mirroring is not supported.

---

# C.7.2 Smart Card Reader

The M1535D+ provides a System Management Bus (SMBus) host controller. The controller provides a communication channel for I<sup>2</sup>C devices using the SMBus protocol. In the Sun Blade 1500 workstation, the smart card reader is the only device on the SMBus.

The smart card reader is ISO7816-compliant and supports Payflex and Cyberflex smart cards. [TABLE C-10](#) lists the functions of the smart card reader LED.

**TABLE C-10** Smart Card Reader LED Status

LED Activity	Condition
Solid amber	Read or write error to the smart card.
Solid green	Device within smart card is open and ready for access.
Flashing green	Reading or writing to smart card.

---

**Note** – The LED indicates the condition of the smart card itself, not the reader.

---

## C.7.3 USB

The USB interface for the Sun Blade 1500 workstation is provided by the M1535D+ I/O subsystem. The M1535D+ supports four USB 1.1 ports. USB 1.1 is an industry standard serial bus intended for slower peripheral devices such as the keyboard and mouse. The protocol on the USB is of a master/slave polling nature with the following features:

- OpenHCI Host Controller
- 1.5 and 12 Mb/s transfer rate
- Four host ports

## C.7.4 Audio

Within the M1535D+ I/O subsystem is a AC97-compliant link controller that provides a cost-effective audio solution when interfaced with any AC97 ver2.1 compliant audio CODEC. For the Sun Blade 1500 workstation, an Analog Devices AD1881 CODEC is used.

Audio outputs and inputs are provided at the front and rear of the Sun Blade 1500 workstation. On the bezel are the monaural microphone and stereo headphone jacks. On the rear panel are the audio-out and audio-in jacks, both of which are stereo.

---

**Note** – If so equipped, do not remove the plastic rivet from the headphone jack of the optical drive. Instead, use the headphone jack at the bottom of the front panel.

---

## C.7.5 PCI Slots

Four 33 MHz and one 66 MHz PCI slots are provided on the Sun Blade 1500 motherboard. The 33 MHz slots are comprised of two 32-bit and two 64-bit. These slots provide 5 VDC power. The 66 MHz slot is 64-bit and supplies 3.3 VDC.

In standard configurations, the bottom slot, PCI0, is preconfigured with the IEEE 1394/USB 2.0 combination card. The top slot, PCI4, has a Sun XVR-600, Sun XVR-100, or Sun XVR-1200 graphics accelerator preinstalled.

# C.7.6 IEEE 1394/USB 2 Combination Card

Supported in standard Sun Blade 1500 configurations, the IEEE 1394/USB 2.0 combination (combo) card adds three USB ports compliant to the USB 2.0 standard. These ports provide 480 Mbps throughput. The card also has two IEEE 1394A ports for additional connectivity at 400 Mbps throughput.

# C.7.7 Ethernet

The BD5703C Gigabit Ethernet controller on the Sun Blade 1500 motherboard provides the MAC and PHY functionality to support one twisted pair Ethernet (TPE) RJ-45 connector at the back of the system. There are two LEDs at the TPE connector, an amber and a green. [TABLE C-11](#) list the functions of these LEDs.

**TABLE C-11** TPE LED Status

LED	Status
Amber - Link	When illuminated, a 10/100/1000 Mbps link exists.
Green - Activity	When flashing, indicates transmit or receive activity.

# C.7.8 Parallel

The M1535D+ provides the Sun Blade 1500 workstation with a parallel port capable of ECP, EPP, and SPP modes, and compliant to IEEE 1284 standards.

# C.7.9 Serial

The M1535D+ I/O subsystem supports 2 serial ports having 16450 and 16550 compatible UARTs with 16-byte FIFO buffers. The UARTs are baud rate programmable and provide dedicated pins for infrared transmissions.

When powering off, the Sun Blade 1500 workstation sends a BREAK signal out the serial ports. This break could interfere with the workstation controlling a server through a TIP connection. Four solutions are available:

- Configure for an alternate BREAK key sequence on the server.
- “Filter” the TIP connection through a network terminal concentrator
- Disable the keyboard abort on the server
- Disable the TIP connection on the server



### C.7.9.1 Configuring for an Alternate BREAK Key Sequence on the Server

As superuser, open a terminal window and configure the alternate BREAK key sequence. Type:

```
# kbd -a alternate
```

To invoke a keyboard abort, type: Return, ~, Ctrl-B.

---

**Note** – You must reconfigure the alternate BREAK key sequence after a server power cycle.

---

### C.7.9.2 Filtering the TIP Connection Through a Network Terminal Concentrator

The network terminal concentrator acts as a proxy between the Sun Blade 1500 workstation and the server under TIP control. The network terminal concentrator communicates with the host Sun Blade 1500 workstation through the telnet protocol. If the workstation sends the BREAK signal, it is ignored by the network terminal concentrator. Additionally, the concentrator does not send the BREAK signal upon powering off.

### C.7.9.3 Disabling the Keyboard Abort on the Server

This procedure configures the server to ignore the BREAK signal.

- As superuser, open a terminal window and disable the keyboard abort. Type:

```
# kbd -a disable
```

To re-enable keyboard abort, type:

```
# kbd -a enable
```

---

**Note** – You must reconfigure the keyboard abort after a server power cycle.

---

### C.7.9.4 Disabling the TIP Connection on the Server

- To disable the TIP connection, turn the server key switch to the lock position.

This action prevents any serial communication with the server. To re-establish serial communications, turn the key to the unlock position.

### C.7.9.5 Permanently Disabling the Keyboard Abort or Configuring an Alternate BREAK Key Sequence on the Server

1. As superuser, edit the `/etc/default/kbd` file.

- To disable the keyboard abort, uncomment this line:

```
#KEYBOARD_ABORT=disable
```

- To configure the alternate BREAK key sequence, uncomment this line:

```
#KEYBOARD_ABORT=alternate
```

2. Save the file.

3. Re-initialize the `kbd` drivers. Type:

```
# kbd -i
```

---

## C.8 System Thermal Management

The Sun Blade 1500 workstation uses an on-demand cooling system. The CPU fan and system chassis fans flowrate is determined from values provided by temperature sensors located on the motherboard and within the UltraSPARC IIIi processor.

### C.8.1 Cooling Fan Control

The Sun Blade 1500 workstation uses an Analog Devices ADM1031 thermal fan controller to interface temperature sensors and cooling fans. The ADM1031 provides a three-channel digital thermometer and over temperature alarms. Two pulse width

modulated outputs control the fan speeds by varying the output duty cycle from 33% to 100%. The speed of each fan is monitored from fan tachometer feedback and adjusted appropriately.

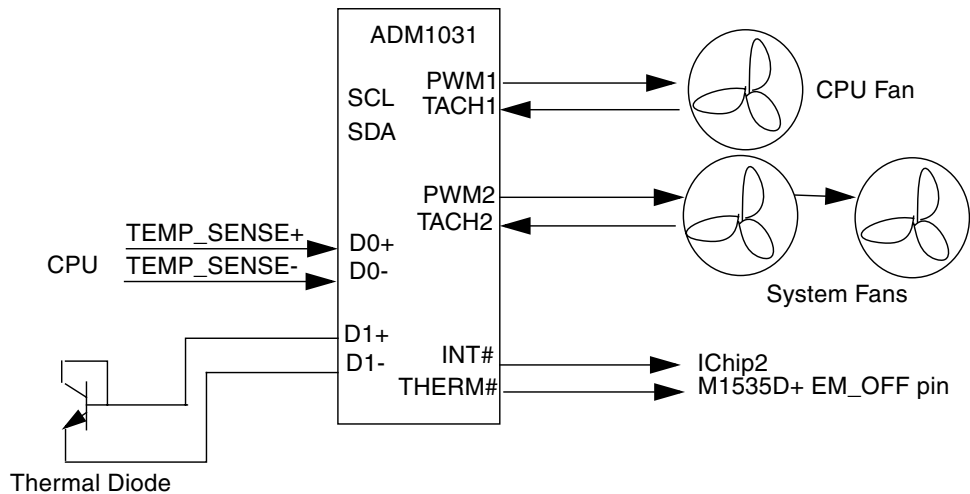
There are two alarm outputs from ADM1031:

- Programmable interrupt output, INT#
- Emergency power-off output, THERM#

The signal from the temperature sensors is analyzed by the OpenBoot PROM which instructs the ADM1031 to set an optimal fan speed for cooling. Should an overheat condition occur, an interrupt is triggered to inform the Solaris software of the situation.

If the temperature exceeds a programmed threshold value, the ADM1031 goes to an alarm state and sends an emergency power-off interrupt directly to the M1535D+ I/O subsystem, powering off the Sun Blade 1500 workstation to prevent CPU damage.

FIGURE C-7 shows a block diagram of the cooling fan control system.



**FIGURE C-7** Cooling Fan Control Block Diagram

---

**Note** – Though there are two system fans, only the front system fan provides tachometer feedback to the ADM1031.

---

# C.9 System Power Management

This section outlines Sun Blade 1500 Energy Star compliance and power budget. For information about setting up power management, see [“Power Management” on page D-1](#).

## C.9.1 Energy Star

The Sun Blade 1500 workstation is designed to meet Energy Star Tier 2, Guideline B conditions. Because a 420 W power supply is provided for the Sun Blade 1500 workstation, the power budget in sleep mode to fulfill Energy Star compliance is 63 W. The following list describes the requirements of Guideline B:

1. The computer must enter a sleep mode after a period of inactivity.
2. If the computer is shipped with the capability to be on a network, it must have the ability to enter a sleep mode irrespective of the network technology.
3. The computer must retain in sleep mode its ability to respond to all types of network requests. There must be no loss in network functionality available to the user. For example, the network functionality available to the user during the sleep mode must be the same as that was available before the computer entered the sleep mode.
4. The computer must consume in the sleep mode, no more than 15% of the maximum continuous power rating of its power supply.

## C.9.2 Power Budget

[TABLE C-12](#) lists the maximum power consumption for components of the Sun Blade 1500 workstation, in both normal operation and Energy Star modes.

**TABLE C-12** Sun Blade 1500 Component Power Consumption

Component	Maximum Power Consumption	
	Normal Operation	Energy Star Mode
UltraSPARC IIIi CPU	68W @ 1.5 Ghz	4.3W @ 1/32 full speed
JIO I/O bridge	11.25 W	3.75 W
Memory	30 W	8 W

**TABLE C-12** Sun Blade 1500 Component Power Consumption (*Continued*)

Component	Maximum Power Consumption	
	Normal Operation	Energy Star Mode
M1535D+ I/O subsystem	2.0 W	0.05 W
BCM5793 Ethernet	7.0 W	3.450 W
Other	19.68 W	7.38 W
Motherboard Total	126.41 W	24.68 W
XVR-600	30 W	3.5 W
PCI cards x4	100 W	3.5 W
System fans x 2	7.2 W	0.0 W
Hard drive, ATA 100, 120 GB	32.3 W	0.0 W
Optical drive, ATA 66	11.5 W	0.0 W
USB keyboard and mouse	5 W	0.5 W
Power supply		22.53 (56% efficiency)
<b>TOTAL</b>	<b>290.91 W</b>	<b>51.21 W</b>

## C.9.3 Peripheral Power Supply

[TABLE C-13](#) lists the power available from various interfaces in the Sun Blade 1500 workstation.

**TABLE C-13** Power Supplied at Various Interfaces

Interface	Voltage	Power
USB 1.1	5 VDC	5 Watts across each pair
USB 2.0	5 VDC	5 Watts across all three
IEEE 1394	8 - 40 VDC	6 Watts across both
PCI slots 0 - 3	5 VDC	20 Watts each
PCI slot 4	3.3 VDC	30 Watts
IDE power connector	5 VDC, 12 VDC	52.3 Watts

Installing peripherals or PCI cards which exceed these power requirements might damage the Sun Blade 1500 workstation or violate Energy Star compliance.



# Power Management

This chapter discusses power management. Topics include:

- [“Power Management Overview” on page D-1](#)
- [“Enabling Power Management” on page D-2](#)
- [“Disabling Power Management” on page D-5](#)

## D.1 Power Management Overview

To help conserve energy, the Sun Blade 1500 workstation has power management features that are configured using the Dtpower application. The Dtpower application reads and writes its configuration to the `/etc/power.conf` file. You can configure power management by editing the `power.conf` file, however use of the Dtpower application is much easier.

**Note** – Your Sun Blade 1500 workstation might ship with power management disabled.

Dtpower has two preconfigured power management modes: minimal and standard. There is also a customizable mode. [TABLE D-1](#) provides information about the different modes.

**TABLE D-1** Dtpower Power Management Modes

Mode	Power Management
Minimal	By default, only displays go into low-power mode after 30 minutes of idle time.
Standard	By default, displays go into low-power mode and the system shuts down after 30 minutes idle time.

**TABLE D-1** Dtpower Power Management Modes (Continued)

Mode	Power Management
Customized	Displays are configured: 15 min, 30 min, 1 hr, 2 hr, or Always On Drives are configured: 15 min, 30 min, 1 hr, 2 hr, or Always On Autoshutdown is configured: 15 min, 30 min, 45 min, 1 hr, 2 hr, 3 hr, 4 hr, 6 hr, or 0 hr at any time

Before configuring power management, consider the role the Sun Blade 1500 workstation plays:

- Is it acting as a server? If so, use only minimal power management or none at all.
- Is it used as a remote host for after hours work? If so, consider the autoshutdown times.
- Is it used in a multiple user environment? If so, weigh the idle time against the expected demand.



## D.2 Enabling Power Management

1. As superuser, open a terminal window and type the following command:

```
# /usr/dt/bin/dtpower
```

The Dtpower window is displayed on your screen.

2. From the Current Power Saving Scheme pulldown menu, select **\*Customized\*, Minimal, or Standard**.
  - If you selected Minimal or Standard, click OK.  
The application exits and you are finished.
  - If you selected **\*Customized\*** or would like to customize a minimal or standard mode, click More.  
The window expands. Continue with the remaining steps.
3. **Select the Device Idle Time Before Power Saving Starts time.**  
“15 Min” means that after 15 minutes of inactivity, both the display and the drives go to a low-power mode, regardless of the time of day. “Always On” disables power management.



4. **Determine if you want to override the idle time for displays or drives and for what idle time.**

For example, you might want the display to go to low-power mode after 15 minutes, the hard drive after 30 minutes, and the entire system after an hour.

- a. **Set the Device Idle Time Before Power Saving Starts time to 1 hour.**
- b. **Select Displays and set the Override Device Idle Time to 15 minutes.**
- c. **Select Disks and set the Override Device Idle Time to 30 minutes.**

---

**Note** – The Device Idle Time Before Power Saving Starts time must be greater than or equal to the largest of the Override Device Idle Times.

---

5. **Determine if you want to use autoshutdown and for what times of day.**

For example, if the system is idle for more than 15 minutes between the hours of 8:00 pm and 7:00 am, you want the system to shut down completely.

- a. **Select Autoshutdown Enabled and click Edit.**  
The Dtpower (autoshutdown) window is displayed.
- b. **Type the starting (8:00 pm) and ending (7:00 am) times into the fields provided.**
- c. **If you want the system to automatically start at the ending time, select the Restart button.**

For example, the system is up and ready for use at 7:02 am before the user arrives.

---

**Note** – The time following the Restart at text is dynamic and updates to the ending time after clicking the OK button.

---

- d. **Set the Shutdown During This Interval If Idle For time to 15 minutes.**
  - e. **Click OK.**
6. **Click OK to close the application.**

# D.2.1 Scenarios for the Example Configuration

TABLE D-2 and TABLE D-3 help clarify the behavior of power management by providing a timeline for two scenarios. For these situations, the previously described example configuration is used. The first scenario describes what happens when the user leaves for lunch.

TABLE D-2 First Scenario Timeline

Time	Event
11:55 am	User is typing at keyboard.
11:59 am	User leaves to go to lunch.
12:14 pm	Display goes to low-power mode.
12:29 pm	Drive goes to low-power mode.
12:59 pm	Entire system goes to low-power mode.
1:01 pm	User returns from lunch and taps keyboard to bring system, drive, and display to a normal state.

The second scenario describes what happens when the user leaves for the day and signs on from home.

TABLE D-3 Second Scenario Timeline

Time	Event
4:25 pm	User logs out and leaves to go home.
4:40 pm	Display goes to low-power mode.
4:55 pm	Drive goes to low-power mode.
5:20 pm	User logs in remotely. Drive and display return to a normal state.
7:53 pm	User logs out.
8:00 pm	Autoshutdown enabled.
8:08 pm	Display goes to low-power mode.
8:15 pm	System shuts down.
7:00 am	Autoshutdown disabled, system restarts.

## D.2.2 Activating the Workstation From Low-Power Mode

You can tell when the Sun Blade 1500 workstation is in low-power mode by observing the power LED. In low-power mode, the LED flashes at a rate of one time every two seconds.

The simplest way to reactivate the Sun Blade 1500 workstation from low-power mode is to tap the spacebar on the keyboard. Additionally, moving the mouse can also bring the system out of low-power mode.

---

## D.3 Disabling Power Management

This section describes how to disable hard drive and system power management.

### D.3.1 Disabling Hard Drive Power Management

When the system goes to low-power mode, the hard drive spins down to conserve power. Later, when you perform a task that accesses the hard drive, the hard drive spins up. You might have to wait a few seconds for the hard drive to reach full speed. If this delay is inconvenient, you can turn off hard drive power management, which prevents the hard drive from entering the low-power mode.

1. As **superuser**, edit the `/etc/power.conf` file to include the following line:

```
device-thresholds /dev/dsk/c0t0d0s0 always-on
```

2. Reinitialize power management, type:

```
# /usr/sbin/pmconfig
```

This procedure configures the power management framework to keep the hard drive spinning all of the time, regardless of system usage. To completely turn off all power-saving features of the Sun Blade 1500 workstation, use the procedure in [“Disabling All System Power Management” on page D-6](#).

## D.3.2 Disabling All System Power Management

You can disable the power management feature by using the Dtpower application.

1. **As superuser, open a terminal window and type the following command:**

```
# /usr/dt/bin/dtpower
```

The Dtpower window is displayed on your screen.

2. **From the Current Power Saving Scheme pulldown menu, select Disabled.**
3. **Click OK.**

The application closes and power management is disabled. The display and drive stay in normal-power mode and autoshtutdown is disabled.

# Glossary

---

---

## A

- address** (1) A number used by system software to identify a data storage location.  
(2) In networking, a unique code that identifies a node to the network.
- ASIC** Application-specific integrated circuit.
- ATA** Advanced Technology Attachment. Synonymous with IDE. See IDE.

---

## B

- bank** A bank can be:  
(1) Interleaving within a single device on a DDR1 SDRAM.  
(2) A pair of adjacent DIMMS.  
See interleaving.
- BGA** Ball grid array.
- boot** The process of reading initial software into the computer.
- bus** A set of conductors that connect various functional units within a computer.

---

## C

- cache** A smaller, faster accessible set of memory used to speed up operations of CPUs, storage, and networking components. Typically found within the component it serves.
- CDE** Common Desktop Environment.
- CD-ROM** Compact disc read-only memory. A CD-ROM drive reads data recorded on the CD-ROM optical disc.
- CD-RW** Rewritable compact disc.
- CODEC** (1) Coder/decoder. A CODEC uses analog-to-digital conversion and digital-to-analog conversion in the same chip.
- (2) compression/decompression. An algorithm or computer program for reducing byte consumption in large files and programs.

---

## D

- DDC2** Display data channel version 2. DDC2 is the I<sup>2</sup>C interface used to communicate with the monitor. This interface is the same for both the HD15 and DVI-I connectors.
- DDR-1 SDRAM** Double data rate synchronous dynamic random access memory.
- default** A preset value that is assumed to be correct unless changed by the user.
- DIMM** Dual inline memory module. A printed circuit card that contains dynamic random access memory chips. See Registered DIMM.
- DMA** Direct memory access. The transfer of data directly into memory without supervision of the processor. The data is passed on the bus directly between the memory and another device.
- DRAM** Dynamic random-access memory. A read/write dynamic memory in which the data can be read or written in approximately the same amount of time for any memory location.
- drive rails** Mounting hardware used to secure hard drives and other peripherals inside the workstation.
- D-TLB** Data translation look-aside buffer.
- DVD-ROM** Digital versatile disc read-only memory.

---

## E

- ECC** Error checking and correction. The detection and correction of all single-bit errors, plus the detection of double-bit and some multiple-bit errors.
- ECP** Extended capabilities port.
- EEPROM** Electrically erasable programmable read only memory.
- EMI** Electromagnetic interference. An electrical characteristic that directly or indirectly contributes to a degradation in performance of an electronic system.
- EPIC-7** Texas Instruments Inc. 0.13 micron chip fabrication process.
- EPP** Enhanced parallel port.
- ESD** Electrostatic discharge.
- Ethernet** A type of network hardware that provides communication between systems connected directly together by transceiver taps, transceiver cables, and various cable types such as coaxial, twisted-pair, and fiber-optic.

---

## F

- flash PROM** Flash programmable read-only memory.
- FPU** Floating-point unit. A device (board or integrated circuit) that performs floating-point calculations.

---

## G

- Gbit** (Gb) Gigabit. 1024 megabits. Commonly used term in ethernet: Gigabit Ethernet.
- Gbyte** (GB) Gigabyte. A gigabyte is 1024 megabytes. Usually refers to data transfer speeds or the capacity of a storage device.
- GHz** Gigahertz. One billion cycles per second.
- GUI** Graphical user interface.

---

## H

**HBGA** High-density ball grid array. The mechanical connection between a chip and a printed circuit board.

---

## I

**I<sup>2</sup>C** Inter-integrated circuits. A chip-to-chip serial bus.

**IChip2** Interrupt concentrator chip.

**IDE** Integrated drive electronics. An interface for mass storage devices. The controller is integrated with the disk or CD-ROM drive.

**IEEE** Institute of Electrical and Electronics Engineers, Inc. The organization establishes standards for some computers and electrical components.

**IEEE 1394** A high-speed communications protocol.

**interleaving** Memory access that alternates between DIMMs and banks based on the lower order address bits.

DIMM interleaving interleaves between pairs of DIMMS.

Bank interleaving is interleaving within a single device on a DDR1 SDRAM.

Rank interleaving interleaves between a pair of memory devices on a single DIMM.

XOR Interleaving. Exclusive-OR interleaving. A DIMM interleaving mode that is used to distribute L2 cache conflict misses and L2 cache read/writeback pairs across more banks than other interleaving modes. To use XOR interleaving, all DIMMS must be identical.

**I/O** Input/output.

**ISA bus** The ISA bus is an I/O bus that runs at 8MHz and is used in the PCI-ISA bridge.

**I-TLB** Instruction translation look-aside buffer.



---

## J

- JIO** The input/output bridge chip that uses the Jbus architecture.
- JBus** The system bus developed for the UltraSPARC IIIi series of processors.

---

## K

- Kbyte** (KB) Kilobyte. 1024 bytes of data.

---

## L

- LAN** Local area network.
- leaf** Any node (location in a tree structure) that is farthest from the primary node.
- LED** Light-emitting diode.

---

## M

- MAC** Media access controller.
- Mbit** (Mb) Megabit. 1,048,576 bits.
- MByte** (MB) Megabyte. One million bytes.
- Mbps** Megabits per second.
- MCU** Memory controller unit.
- MHz** Megahertz. One million cycles per second.
- MII** Media independent interface.
- MOESI** Modified, owned, exclusive, shared, and invalid.

- mondo** Mondo dispatch unit. An interrupt construction on the JBus.
- MUX** Multiplex, multiplexer. A multiplexer merges information from multiple signals to a single channel.
- 

## N

- node** An addressable point on a network.
- NVRAM** Nonvolatile random access memory. Stores system variables used by the boot PROM. Contains the system host ID number and Ethernet address. NVRAM retains the data when the workstation is powered off.
- 

## O

- OpenBoot PROM** OpenBoot PROM contains the PROM monitor program, a command interpreter used for booting, resetting, low-level configuration, and simple test procedures. OpenBoot software initially boots the system to a state in which the system can further load an operating system.
- OpenGL** OpenGL is an application programming interface (API) for developing portable, interactive 2D and 3D graphics applications.
- 

## P

- PCI** Peripheral component interconnect. A high-performance 32- or 64-bit-wide bus with multiplexed address and data lines.
- peripheral** Removable media assembly. A device such as a smart card reader, CD-ROM drive, DVD-ROM drive, 4-mm tape drive, or a diskette drive.
- PHY** Physical access layer. Part of the digital-to-analog connection between the MAC and the physical Ethernet wire.
- PID** Process ID.
- POR** Power-on reset.
- POST** Power-on self-test. A series of tests that verify motherboard components are operating properly. Now initiated with the `post` command.

**PROM** Programmable read-only memory. After the PROM has been programmed, it cannot be reprogrammed. See flash PROM

---

## R

**registered DIMM** A DIMM that includes a register buffer.

**RISC** Reduced instruction set computer. A computer using the RISC architecture.

---

## S

**SCSI** Small computer system interface.

**SDR** Single data rate.

**SDRAM** Synchronous DRAM.

**SEEPROM** Serial electrically erasable programmable read only memory.

**SMBus** System management bus. The SMBus protocol is a subset of the I<sup>2</sup>C protocol.

**smart card** A card used for user authentication or storing individual user preferences.

**snoop** A search for the latest data in memory.

**snoopy MOESI protocol** Cache coherency protocol. Modified, owned, exclusive, shared, and invalid (MOESI).

**Southbridge** ALI M1535D+ highly integrated system I/O chip. One of three I/O subsystem bridge chips.

**SPOR** System power-on reset.

**SPP** Standard parallel port.

**SRAM** Static random access memory.

**SunVTS** A diagnostic application designed to test hardware.

**superscalar** A processor that can execute more than one instruction per cycle.

**superuser** A privileged account with unrestricted access to all files and commands.

---

## T

- TIP connection** A connection that enables a remote shell window to be used as a terminal to display test data from a system using the terminal interface protocol (TIP).
- TPE** Twisted-pair Ethernet.
- TOD** Time of day. A timekeeping integrated circuit.

---

## U

- UART** Universal asynchronous transmitter-receiver.
- UltraDMA** Ultra direct memory access. A DMA mode within an IDE controller.
- UltraSPARC IIIi** The high-performance central processing unit used in the Sun workstations. The CPU uses SPARC V9, 64-bit reduced instruction set computer (RISC) architecture.
- USB** Universal Serial Bus. USB 1.1 can transfer data up to 12 Mbps. USB 2.0 can transfer data up to 480 Mbps.
- UTP** Unshielded twisted-pair.

---

## V

- VCC** Voltage at the common collector (positive [+] electrical connection).

---

## X

- XOR** Exclusive OR. Also see interleaving.

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