# Sun Blade™ 2500 Service, Diagnostics, and Troubleshooting Manual

(Silver)


Sun Microsystems, Inc.
www.sun.com

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# Preface

The *Sun Blade 2500 Service, Diagnostic, and Troubleshooting Manual* is an aid to troubleshooting problems with and replacing components within the Sun Blade 2500 workstation.

**Note –** This document is intended for users of Sun Blade 2500 systems with a ***silver*** bezel. If your system has a ***red*** bezel, refer to the *Sun Blade 2500 Service, Diagnostics, and Troubleshooting Manual*, **816-0996**.

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 2500 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.

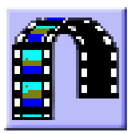

**FIGURE P-1** Link to Multimedia Instructions

Clicking on the above link displays a guided tour of the Sun Blade 2500 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 2500 workstation.

Chapter 3 contains basic troubleshooting tasks, commands, and system responses.

Chapter 4 provides the troubleshooting flowcharts for the Sun Blade 2500 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 2500 workstation.

Chapter 8 instructs how to use OpenBoot Diagnostics to troubleshoot the Sun Blade 2500 workstation.

Chapter 9 summarizes using SunVTS software to exercise a Sun Blade 2500 system 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 2500 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 2500 workstation.

Appendix A lists the specifications of the Sun Blade 2500 workstation.

Appendix B outlines the external signal descriptions.

Appendix C provides a functional description of the Sun Blade 2500 workstation.

Appendix D describes how to manage power-saving modes of the Sun Blade 2500 workstation.

# Safety Information

Read this section before beginning any procedure in the *Sun Blade 2500 Diagnostics, Service, and Troubleshooting Manual*. For your protection, observe the following safety precautions when removing or installing components, configuring, and troubleshooting your Sun Blade 2500 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.

**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.

**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 2500 workstation.

The Sun Blade 2500 system complies with regulatory requirements of safety and EMI as documented in the *Sun Blade 2500 Safety and Compliance Guide*, 817-5130. This document is available online at:

- `http://www.sun.com/documentation`
- `http://docs.sun.com`

# Using UNIX Commands

This document might not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- Online documentation for the Solaris operating system available at:

  `docs.sun.com`

- *Sun Blade 2500 Getting Started Guide*, 816-7565
- *Sun Blade 2500 Troubleshooting Card*, 816-7563
- Other software documentation that you received with your system

# Typographic Conventions

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

* Your browser settings might differ

# Shell Prompts

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

# Related Documentation

**TABLE P-1** Related Documentation

| Application | Title | Part Number |
|---|---|---|
| Setting up poster | *Sun Blade 2500 Start Here* | 817-5123 |
| Handy reference information | *Sun Blade 2500 Troubleshooting Card* | 817-5125 |
| Preinstalled software | *Sun Blade 2500 Getting Started Guide* | 817-5129 |
| Last minute information | *Sun Blade 2500 Product Notes* | 817-5131 |
| Safety and compliance | *Sun Blade 2500 Safety and Compliance Guide* | 817-5130 |
| | *Important Safety Information for Sun Hardware Systems* | 816-7190 |
| Configuration | *Solaris 8 2/04 Sun Hardware Platform Guide* | 817-4347 |
| | *Solaris 9 9/04 Sun Hardware Platform Guide* | 817-6357 |
| | *Solaris Handbook for Sun Peripherals* | 816-4468 |
| SunVTS documentation | *SunVTS 5.1 User's Guide* | 816-5144 |
| | *SunVTS Quick Reference Card* | 816-5146 |
| | *SunVTS 5.1 Test Reference Manual* | 816-5145 |
| | *SunVTS 5.1 Patch Set 5 Documentation Supplement* | 817-4350 |

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

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

| Sun Blade 2500 Support Resources | URL or Telephone Number |
|---|---|
| Find Solaris and other software documents here. This is also an alternative web site for some Sun Blade 2500 documents. This web site has full search capabilities. | `http://docs.sun.com` |
| Warranty and Contract Support contacts. Links to other service tools. | `http://www.sun.com/service/online` |
| Discussion and Troubleshooting Forums. | `http://supportforum.sun.com/` |
| Support, Diagnostic Tools, Alerts, for all Sun products. | `http://www.sun.com/bigadmin/` |
| SunSolve℠: Contains links to software patches. Lists some system specifications, troubleshooting and maintenance information, and other tools. | `http://www.sunsolve.sun.com/handbook_pub/` |
| Lists warranties for every Sun product. | `http://www.sun.com/service/support/warranty` |
| 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 2500 Support Resources | URL or Telephone Number |
|---|---|
| This web site lists international telephone numbers for Sun Service Support. | `http://www.sun.com/service/contacting/solution.html` |

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

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.

# 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`

# 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`

# 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 2500 Service, Diagnostics, and Troubleshooting Manual, part number 817-5117-11.

CHAPTER 1

# 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 2500 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 2500 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 2500 system 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

| Diagnostic Tool | Type of Tool | What the Tool Does | How Tool is Used |
|---|---|---|---|
| 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 "Audio Responses" on page 3-12. |
| NVRAM | Firmware | Contains properties and flags to configure system and diagnostic tests. | The `setenv` command typed at the `ok` prompt or the `eeprom` command in a terminal window can configure the OpenBoot PROM for diagnostics and automatic execution of scripts. See "NVRAM" on page 6-1. |
| 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 "Power-On Self-Test" on page 7-1. |
| 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 "OpenBoot Diagnostics" on page 8-5. |
| 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 "SunVTS" on page 9-1. |
| Solaris Operating System | Software | Commands display system information. | Commands `iostat`, `prtdiag`, `prtconf`, `netstat`, `ping`, `ps`, and `prstat` are run with superuser privileges. See "Troubleshooting Commands" on page 3-15. |

## 1.2 About Flowcharts

The *Sun Blade 2500 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 |
|---|---|---|
| **There is a power problem.** | Rectangles at the top left and throughout flow of the flowchart. | Bold text states a problem. Plain text states an action. |
| Descriptive text about normal operation. | Rectangle at the top right of the flowchart. | Text describes normal operation or provides details about normal conditions. |
| Replace the power supply. See "Replacing the Power Supply" on page 13-2 | Rectangle drawn with bold lines. | Text gives a cross-reference to another flowchart, table, or procedure. The cross-references are clickable links. |
| Do any system fans spin? N Y | 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. |
| Go to A | 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 2500 system, 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

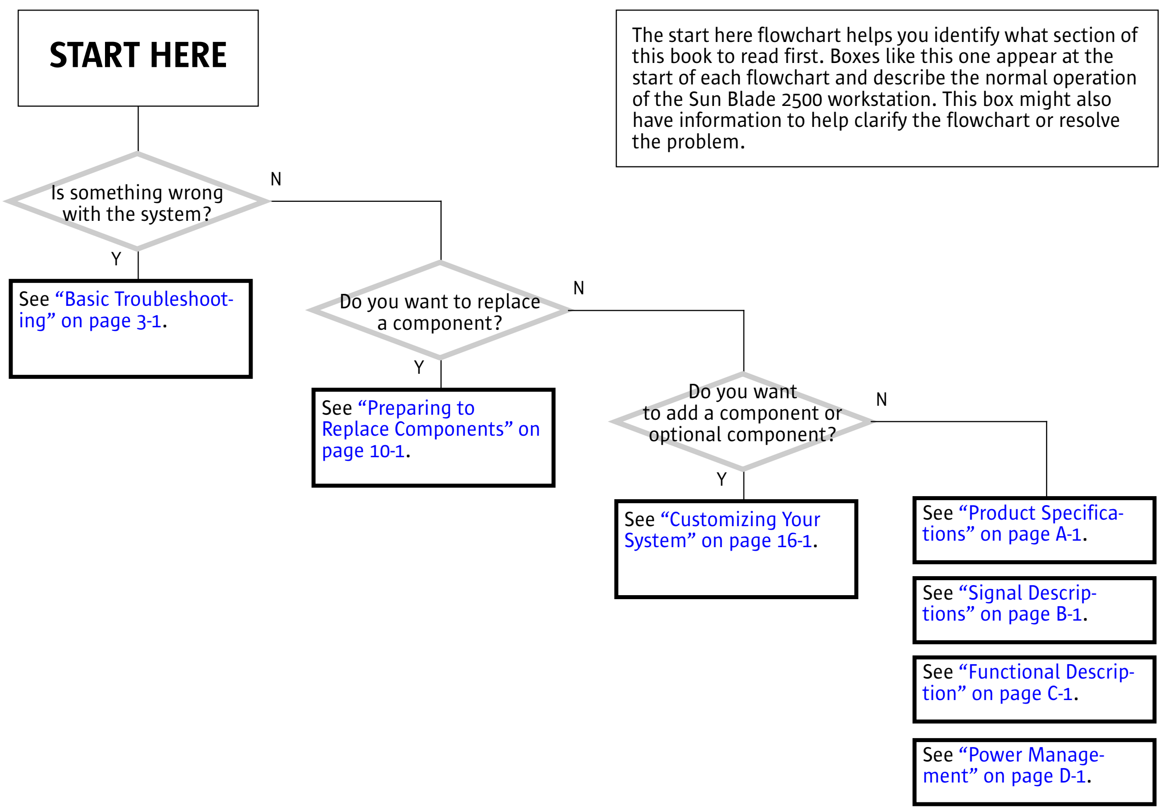


**FIGURE 1-1** Start Here Flowchart

CHAPTER 2

# Product Description

Topics covered in this chapter are:



## 2.1 Product Overview

Your Sun Blade 2500 system is designed to work with one or two UltraSPARC™ IIIi CPUs operating at 1.6 GHz. The workstation uses distributed shared-memory architecture with up to 16 GB of DDR1 SDRAM memory installed.

The workstation uses the latest 64-bit SPARC v9 RISC architecture. This super-scalar processor architecture allows up to four instructions per clock cycle. The SPARC v9 architecture supports high-bandwidth input/output devices, such as UltraSCSI hard drives and the newest generation of Sun 2D and 3D graphics accelerators.

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**Note –** For additional information about Sun Blade 2500 system, see "Functional Description" on page C-1.

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TABLE 2-1 describes the standard and optional features of the Sun Blade 2500 workstation.

**TABLE 2-1** Sun Blade 2500 Configured Features

| Feature | Description |
|---|---|
| Processor options | One or two UltraSPARC IIIi 1.6 GHz CPUs with a 1 MB integrated Level 2 cache |
| Operating system | Preinstalled Solaris 8 2/04 or later, or Solaris 9 9/04 or later operating system supporting 32 and 64-bit applications |
| Enclosure | Deskside system enclosure with front-panel access to a smart card reader, optical media, and tape drives. |
| Memory options | From a minimum of 1 GB to a maximum of 16 GB of ECC DDR1 SDRAM memory, registered DIMMs, using matched pairs of 512 MB, 1 GB, or 2 GB DIMMs<br>Maximum of 4 DIMM pairs per system (8 DIMMs total per system) |
| Power supply | 600 W |
| Internal storage | One or two 146 GB UltraSCSI IV 320 hard disk drives (10,000 RPM) |
| Optical media | One DVD-CDRW drive |
| Audio | Internal audio module on riser card with 1 line-in, 1 line-out, 1 microphone-in, 1 headphone-out, and 1 DB9 serial port |
| Controlled system access | Smart card reader |
| Graphics accelerator | PCI-based graphics accelerators:<br>Sun XVR-100, up to 3 supported, installed in PCI slots 2, 3, or 5<br>Sun XVR-600, up to 3 supported, installed in PCI slots 2, 3, or 5<br>Sun XVR-1200, up to 2 supported, installed in PCI slots 1 and 2,<br>2 and 3, or 4 and 5. (XVR-1200 installation in PCI slots 1 and 2 or 4 and 5 makes available an additional 66 MHz/64Mb slot for other use.) |
| Keyboard | Sun USB Type-6, AT 101 layout |

**TABLE 2-1** Sun Blade 2500 Configured Features *(Continued)*

| Feature | Description |
|---|---|
| Mouse | Sun three-button mouse |
| Expansion slots on the motherboard | Peripheral component interconnect (PCI) slots:<br>Three - 64 bit at 33 MHz connectors (slots 0, 1, 4)<br>Three - 64 bit at 66 MHz connectors (slots 2, 3, 5) |
| Rear panel connectors for external devices | Four universal serial bus (USB) 1.1 ports<br>Two serial connectors (DB-9)<br>One parallel connector (DB-25)<br>One UltraSCSI connector (68-pin LVD/MSE SCSI)<br>One twisted-pair Ethernet (TPE) 10/100/1000BASE-T connector (RJ-45)<br>One audio line-in connector<br>One audio line-out connector<br>One headphone connector<br>One microphone connector<br>One 1394/USB card: 2 IEEE 1394A connectors and 3 universal serial bus (USB) 2.0 connectors |

Diskless Sun Blade 2500 workstations are configured without a hard drive or optical drive.

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**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.

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The Sun Blade 2500 system also supports the following options:

- Second hard drive
- Second optical 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

Use FIGURE 2-1, FIGURE 2-2, and FIGURE 2-3 to identify the external features of the Sun Blade 2500 workstation.

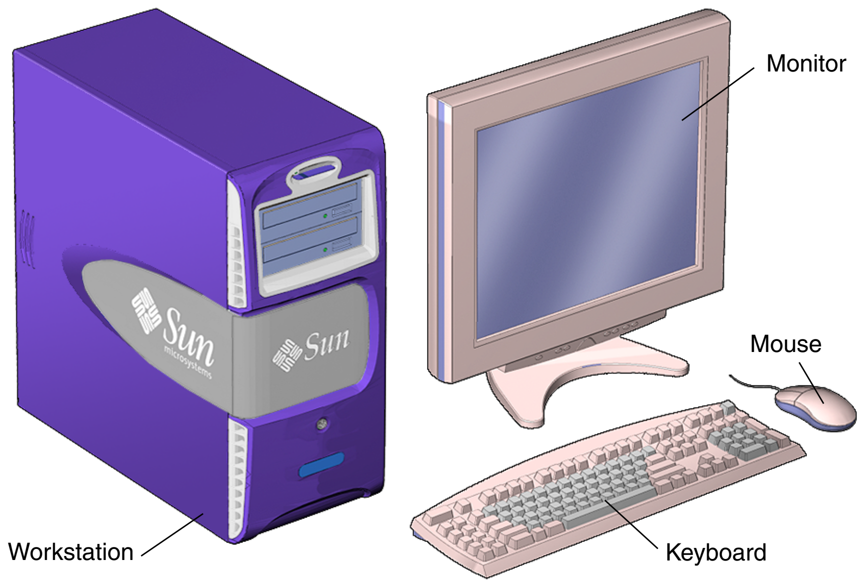


**FIGURE 2-1** Sun Blade 2500 Workstation, Monitor, Keyboard, and Mouse

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**Note –** Ensure that the keyboard and mouse are connected only to USB v1.1 compliant connectors (USB0 and USB1) on the rear panel of the workstation.

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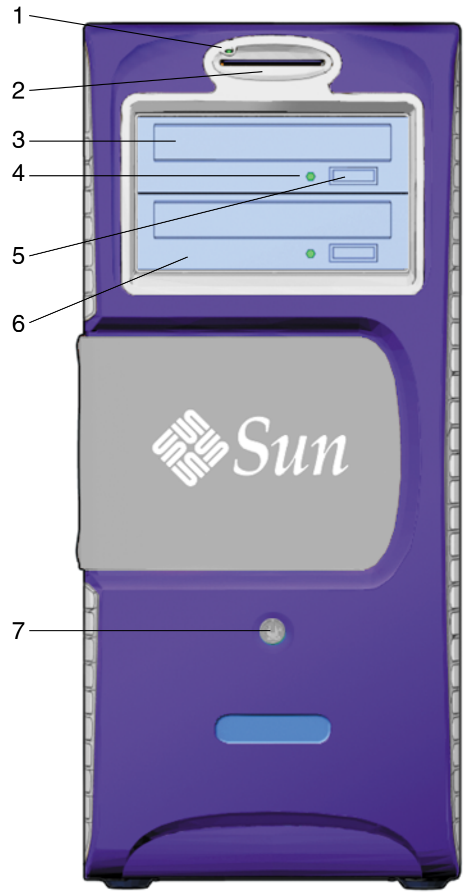


**FIGURE 2-2** Bezel Overview, Sun Blade 2500 Workstation

**TABLE 2-2** Bezel Overview, Sun Blade 2500 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 2500 Workstation *(Continued)*

| Callout in FIGURE 2-2 | Part Description | Bezel Symbol |
|---|---|---|
| 6 | Optical drive (optional) | |
| 7 | Power button with LED | ⏻ |

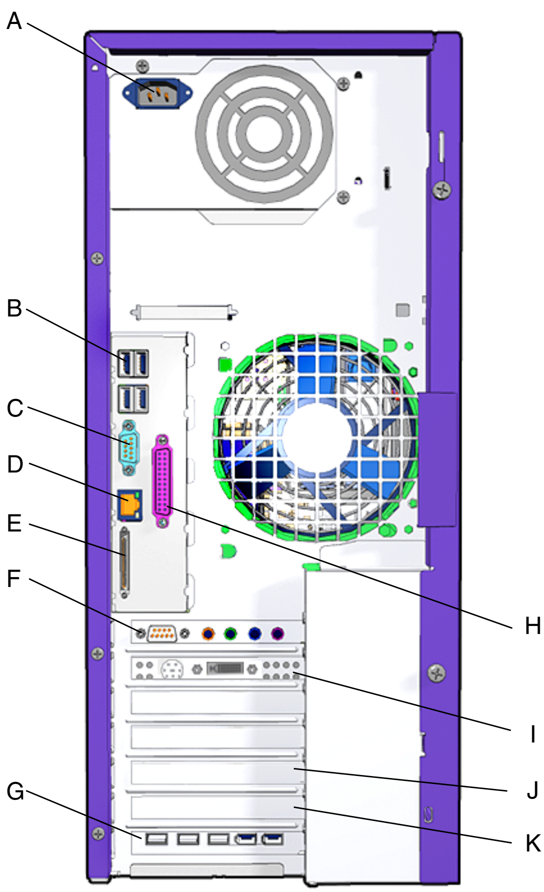


**FIGURE 2-3** Rear Panel Overview, Sun Blade 2500 Workstation

**TABLE 2-3** Rear Panel Overview, Sun Blade 2500 Workstation

| Callout in Figure 2-3 | Part Description | Rear Panel Symbol |
|---|---|---|
| A | Power connector - (Note: orientation of power connector may be horizontal or vertical.) | None |
| B | USB v1.1 connector (4) |  |
| C | Serial connector (DB-9) |  |
| D | Twisted-pair Ethernet (TPE) |  |
| E | External UltraSCSI connector—Low Voltage Differential/Multimode Single Ended (LVD/MSE SCSI) |  |
| F | Audio module, serial (DB-9) connector | None |
| F | Audio module, headphone connector (orange) |  |
| F | Audio module, line-in connector (green) |  |
| F | Audio module, line-out connector (blue) |  |
| F | Audio module, microphone connector (red) |  |
| G | IEEE 1394/USB v2.0 combination card with 2 IEEE 1394a external connectors, 3 USB v2.0 external ports, 1 IEEE 1394a internal connector, and 2 USB v2.0 internal ports |  |
| H | Parallel connector (DB-25) | // |
| I | Graphics accelerator (Sun XVR-600 shown) |  |
| J | Blank filler panel shown. Access to PCI connector 2. Sixty-Six MHz PCI card connectors: PCI connector 2, PCI connector 3, and PCI connector 5<br><br>Note: Sun XVR-1200, up to 2 supported, installed in PCI slots (1 and 2, 2 and 3, or 4 and 5). XVR-1200 installation in PCI slots 1 and 2 or 4 and 5 makes available an additional 66 MHz/64Mb slot for other use. | **PCI 2**<br>**PCI 3**<br>**PCI 5** |
| K | Blank filler panel shown. Access to PCI connector 1. Thirty-three MHz PCI card connectors: PCI connector 0, PCI connector 1, and PCI connector 4 | **PCI 0**<br>**PCI 1**<br>**PCI 4** |

## 2.3 Replaceable Components

FIGURE 2-4 shows the replaceable components for the Sun Blade 2500 workstation.

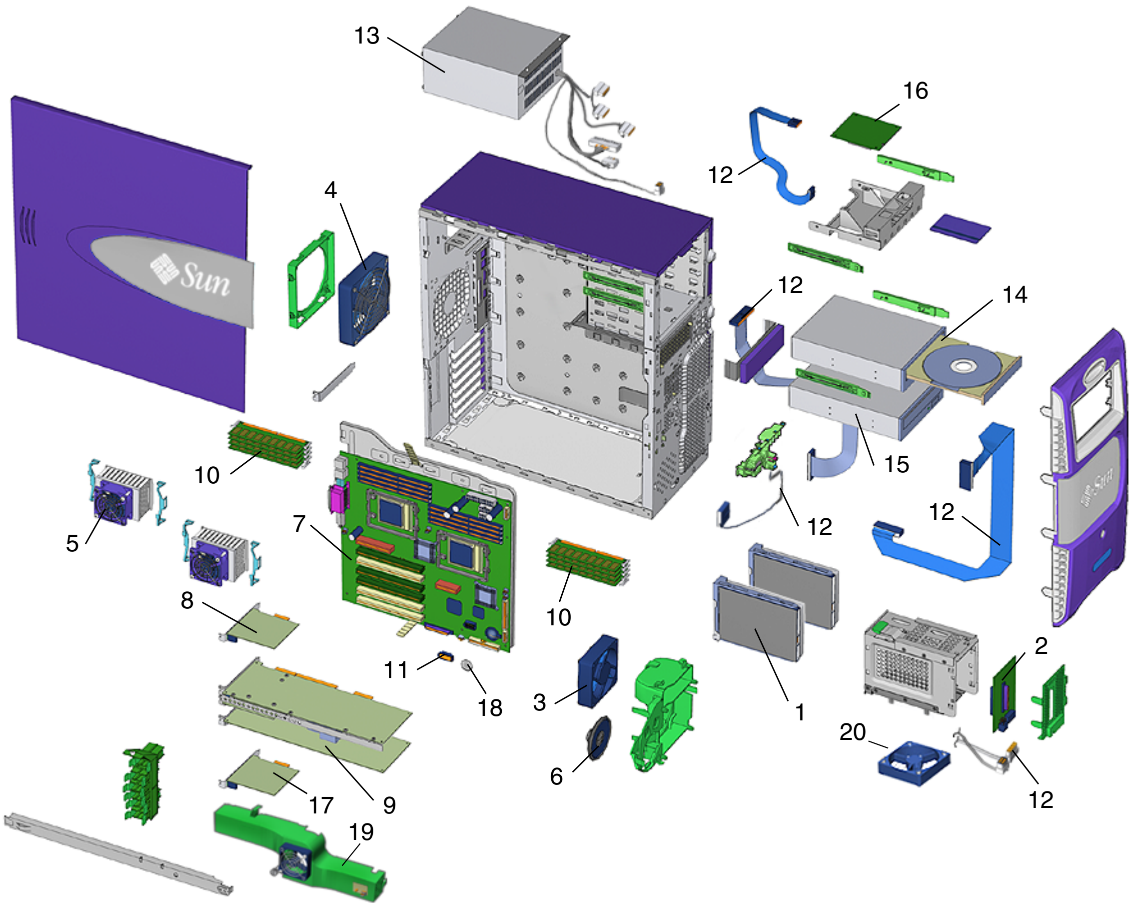


**FIGURE 2-4** Exploded Diagram of Sun Blade 2500 Replaceable Components

More information about the replaceable components is listed in TABLE 2-4

**TABLE 2-4** Sun Blade 2500 Replaceable Components

| Item Number | Component | Description |
|---|---|---|
| 1 | Hard drive, 146GB | 146 GB, 10,000 RPM UltraSCSI hard drive |
| 2 | SCSI backplane | SCSI backplane assembly supporting up to two hard drives |
| 3 | Fan, front | 80 mm variable speed fan |
| 4 | Fan, rear | 120 mm variable speed fan |
| 5 | CPU fan and heat sink assembly | CPU fan and heat sink assembly with heat transfer pad |
| 6 | Speaker | Speaker assembly |
| 7 | Motherboard assembly | Single or dual 1.6 GHz UltraSPARC IIIi CPUs plus motherboard |
| 8 | Audio module assembly | Audio module, 16-bit audio, 8 Hz to 48 kHz |
| 9 | Graphics accelerator | Sun XVR-100 graphics accelerator<br>Sun XVR-600 graphics accelerator<br>Sun XVR-1200 graphics accelerator |
| 10 | 512 MB DIMM<br>1 GB DIMM<br>2 GB DIMM | 512 MB DDR-1 SDRAM DIMM<br>1 GB DDR-1 SDRAM DIMM<br>2 GB DDR-1 SDRAM DIMM |
| 11 | NVRAM | 64 Kbit nonvolatile random access memory (NVRAM) serial EEPROM |
| 12 | Cable kit | Internal system interface cable for optical drive (`IDE1`), SCSI (`SCSI0`), power switch and LED cable assembly (`J3`), smart card reader (`SCR0`), and SCSI to optical drive power cable |
| 13 | Power supply assembly | Power supply, 600W |
| 14 | optical drive | optical drive—headphone connector not supported, use audio module headphone connected |
| 15 | DVD-dual drive | DVD+_RW drive (optional) |
| 16 | Smart card reader | Smart card reader assembly |
| 17 | 1394 IEEE/USB v2.0 combination card | Combination card with two IEEE 1394a external ports and three USB v2.0 ports, and one 1394a internal port and two USB v2.0 internal ports. |

**TABLE 2-4** Sun Blade 2500 Replaceable Components *(Continued)*

| Item Number | Component | Description |
|---|---|---|
| 18 | Battery | Battery |
| 19 | DIMM fan assembly | DIMM cooling duct |
| 20 | Hard drive fan | Hard drive cooling fan |

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

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**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`

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## 2.4 Supported Sun Monitors

The Sun Blade 2500 system 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 2500 Workstation

| | | Number of monitors supported | | |
|---|---|---|---|---|
| **Monitor** | **Maximum resolution** | **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.

CHAPTER 3

# Basic Troubleshooting

This chapter provides basic troubleshooting assistance. Topics include:



## 3.1 Power-On Sequence

When you power on the Sun Blade 2500 workstation, a series of tasks and processes brings the Sun Blade 2500 system 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 2500 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

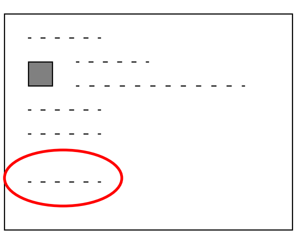
| Screen Images | Description | Meaning | Comment |
|---|---|---|---|
|  | White screen with banner and text. Error message displayed. | Error from OpenBoot PROM. | See “OpenBoot PROM Messages” on page 3-6. |
| | | Error from Solaris operating system. | See “Solaris Error Messages” on page 3-8. |

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

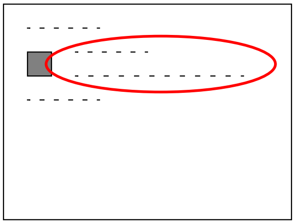
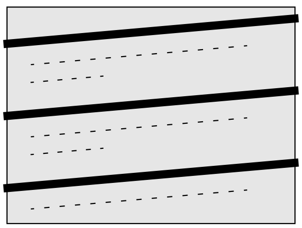
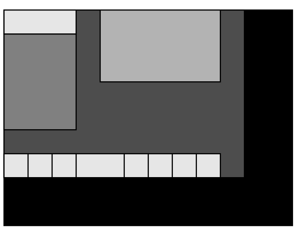
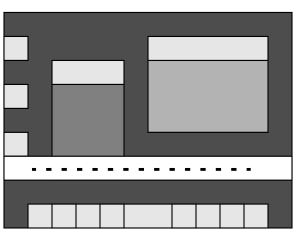
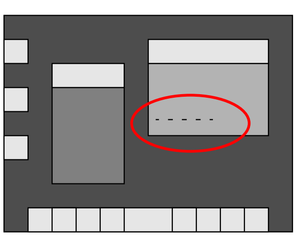
| Screen Images | Description | Meaning | Comment |
|---|---|---|---|
|  | White screen with banner and text. Information displayed in banner is incorrect. | Corruption of OpenBoot PROM. | See "OpenBoot PROM Messages" on page 3-6. |
| | | Corruption of NVRAM. | See "NVRAM Problem" on page 4-39. |
|  | Display has flickering horizontal lines. | Monitor sync problem. | Verify monitor can sync to set frequency. See "Graphics Accelerators" on page C-31. Also see monitor documentation. |
| | | | See "Monitor Problem" on page 4-14. |
| | | | See "PCI Card Problem" 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 "Graphics Accelerators" on page C-31. |
| | | | See "Monitor Problem" on page 4-14. |
|  | White bar with black text across GUI. | Error occurred in Solaris kernel. | See "Other Messages" on page 3-11. |
|  | Error message in terminal window. | Error occurred in process started from that terminal. | See "Solaris Error Messages" on page 3-8. |
| | | | See "Other Messages" on page 3-11. |
| | | | See "Graphical User Interface Problem" on page 4-22. |

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

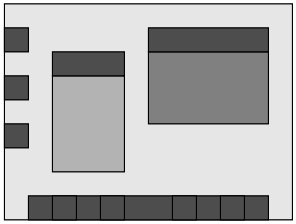
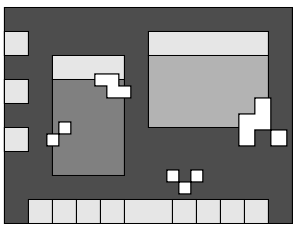
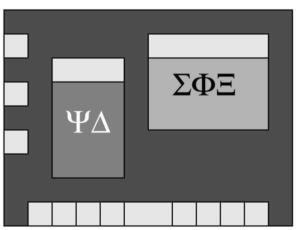
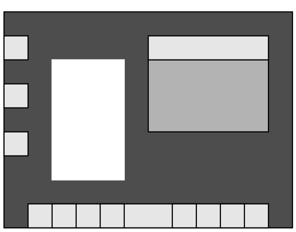
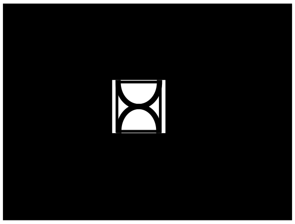
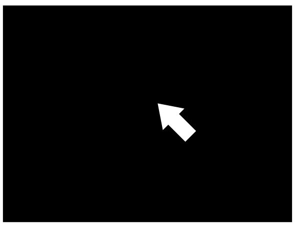
| Screen Images | Description | Meaning | Comment |
|---|---|---|---|
|  | GUI colors flash or are wrong. | Color registers exhausted. | Allocate more colors to GUI. See “Avoiding Colormap Flash” on page 11-53. |
| | | Monitor problem. | See “Monitor Problem” on page 4-14. |
|  | GUI has artifacts. | Graphics accelerator problem. | See “PCI Card Problem” on page 4-28. |
|  | GUI is in wrong language. | Locale problem. | 1. Log out.<br>2. At the login GUI Options pulldown, select Language.<br>3. Select your language.<br>4. Log in as usual. |
|  | Window in GUI is completely white. | Window process is hung. | See “Graphical User Interface Problem” on page 4-22. |
|  | Display is all one color. | Monitor problem. | See “Monitor Problem” on page 4-14. |
| | | Graphics accelerator problem. | See “PCI Card Problem” on page 4-28. |
| | | NVRAM problem. | See “NVRAM Problem” on page 4-39. |

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

| Screen Images | Description | Meaning | Comment |
|---|---|---|---|
|  | Display is black with hourglass. | Network problem. | See "Network Problem" on page 4-17. |
| | | Dtlogin problem. | See "Login Problem" on page 4-20. |
|  | Display is black with mouse pointer. | Network problem. | See "Network Problem" on page 4-17. |
| | | Dtlogin problem. | See "Login Problem" on page 4-20. |

## 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.

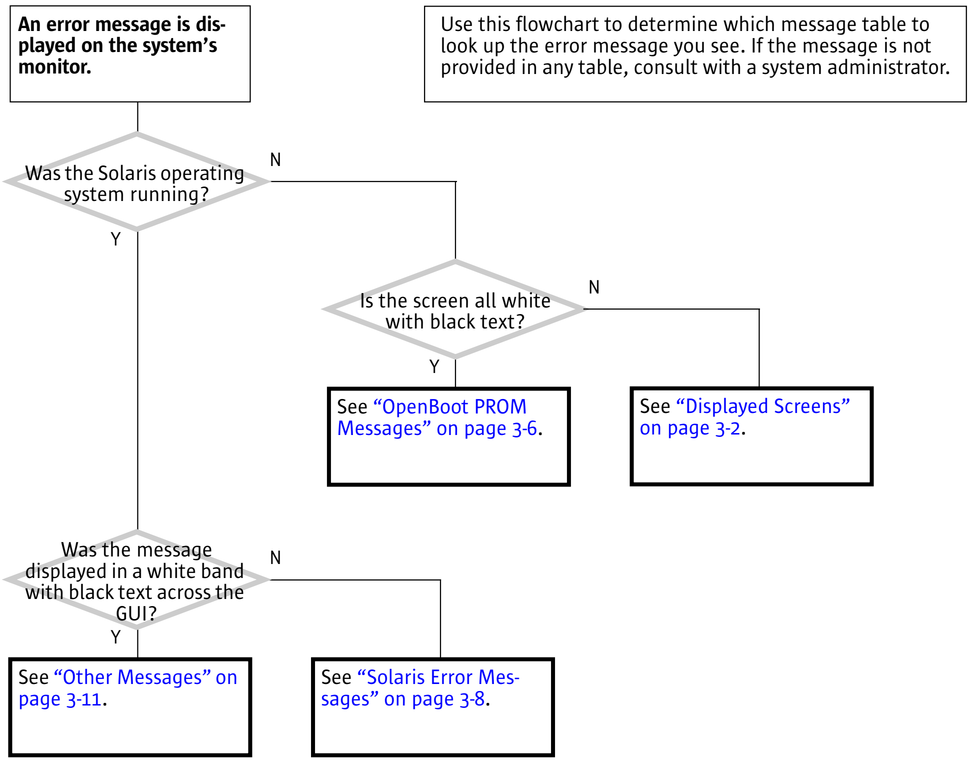



**FIGURE 3-1** Displayed Messages Flowchart

## 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 "Replacing the Battery" on page 11-35. |

**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. | • For hard drive, check internal connections. Drive might be corrupted. See "Hard Drive Problem" on page 4-8.<br>• For optical drive, check that disc is bootable. Check internal connections. See "Optical Drive Problem" on page 4-25.<br>• For network, check network connections. Check boot server. See "Network Problem" on page 4-17. |
| `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:<br>`ok` **`unselect-dev`** |
| `NOTICE - CPU`*x* `Bank`*y* `DIMMs are from different vendors.` | A pair of DIMMs are each from different manufacturers. | Install DIMMs in identical pairs. See "Replacing the DIMMs" on page 11-2. |
| `NOTICE - CPU`*x* `Bank`*y* `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 "Replacing the DIMMs" on page 11-2. |
| `Searching for self-test methods . . . Rejecting alloc-mem!` | OpenBoot Diagnostics failed to start. Some devices might be tied to other processes. | Type:<br>`ok` **`unselect-dev`** |
| `Starting xv-500 self-test` | Sun XVR-1200 PROM error. | Type:<br>`ok` **`show-devs`**<br>search for the text: `xvr-1200` |
| `The process "cs00.sh" has been exited with retcode#256` | The battery has drained. | Replace the battery. See "Replacing the Battery" on page 11-35. |
| `Timeout waiting for ARP/RARP packet` | Network connection problem. | Check network connection. See "Network Problem" on page 4-17. |
| `/usr/bin/ps/getexecname () has failed` | The battery has drained. | Replace the battery. See "Replacing the Battery" on page 11-35. |

**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 "Network Problem" on page 4-17. 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` *hostname* `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 `xhost +` 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 `/usr/include/limits.h` 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 (\|). | 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 `fsck` 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 `fsck`. |
| `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 "Network Problem" on page 4-17. |
| `Network is down` | Network connection faulty. | Check network connection. See "Network Problem" on page 4-17. |
| `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 `volcheck` 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 `/var/adm/utmp` and `/var/adm/utmpx` files. Bring system up and clean out large files starting in the `/var` 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 "Memory Problem" on page 4-37. |
| `xntpd[356]: too many recvbufs allocated (30)` | Problem with network time protocol daemon. | Check network. See "Network Problem" on page 4-17. 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`<br>`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 "Hard Drive Problem" on page 4-8. |

**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 "Network Problem" on page 4-17. 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: fcsm: _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 "Power Problem" on page 4-6. |

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

| Location | Sound | Meaning | Comment |
|---|---|---|---|
| Monitor | Ticking | Monitor is searching for video mode or trying to sync. | Verify monitor can sync to set frequency. See "Graphics Accelerators" on page C-31. Also see monitor documentation. |
| | | | See "Monitor Problem" on page 4-14. |
| | | | See "PCI Card Problem" on page 4-28. |
| | Very high-pitched whine | Monitor cannot sync. | Change graphics accelerator resolution. See graphics accelerator documentation. |
| | | | See "Monitor Problem" on page 4-14. |
| | | | See "PCI Card Problem" on page 4-28. |
| Monitor or power supply | Low-pitched buzz | Power supply degraded. | Replace the power supply. See "Replacing the Power Supply" on page 13-2. |
| | | 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 "Memory Problem" on page 4-37 or "Motherboard Problem" on page 4-34. |
| | Upon power on, four beeps and the system powers off | FRU ID checksum error. | Replace motherboard. See "Replacing the Motherboard" on page 11-54. |
| | Upon power on, five beeps and the system powers off | Internal reset failed. | See "Motherboard Problem" on page 4-34. |
| | Continuous beeping | Keyboard key is stuck or connection is bad. | See "Keyboard Problem" on page 4-19. |
| | Quiet scratching | hard drive heads are moving. | Hard drive is normal. |
| | High-pitched humming | hard drive bearings are failing. | Replace the hard drive. See "Replacing a Hard Drive" on page 12-2. |
| Front or rear of system chassis | Low shrill sound | Front fan bearing is failing. | Replace front fan. See "Replacing the Front Fan" on page 13-11. |
| | | Rear fan bearing is failing. | Replace rear fan. See "Replacing the Rear Fan" on page 13-16. |
| | | Power supply fan bearing is failing. | Replace the power supply. See "Replacing the Power Supply" on page 13-2. |
| | Quiet grumbling sound | Temperature is such that fans are barely turning. | Fans are normal. |
| | Silence from fans | Front fan is not spinning.<br>Rear fan is not spinning. | See "System Fan Problem" on page 4-9. |
| | | Power supply fan is not spinning. | See "Power Problem" on page 4-6. |

**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 "Optical Drive Problem" 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 "Replacing an Optical Drive" on page 12-8. |

# 3.3 Troubleshooting Commands

The section discusses superuser commands that assist in troubleshooting problems with the Sun Blade 2500 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 2500 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 `-e` 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
c1t2d0        Soft Errors: 0 Hard Errors: 0 Transport Errors: 0
Vendor: LITE-ON  Product: COMBO SOHC-4832K Revision: O3K1
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
c0t0d0        Soft Errors: 0 Hard Errors: 0 Transport Errors: 0
Vendor: HITACHI  Product: DK32EJ14NSUN146G Revision: PQ0B
Serial No: 0401Y1QA9H
Size: 146.80GB <146800115712 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 2500 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 2500
System clock frequency: 160 MHZ
Memory size: 1GB
==================================== CPUs ====================================
               E$          CPU                    CPU     Temperature
CPU  Freq      Size        Implementation         Mask    Die   Amb.  Status      Location
---  --------  ----------  -------------------  -----   ----  ----  ------      --------
  0  1600 MHz  1MB         SUNW,UltraSPARC-IIIi   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 2500
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 18:27 Sun Blade 2500 (Silver)
OBDIAG 4.16.3 2004/11/05 18:30
```

## 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 2500 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 2500 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-2500
    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-IIIi, 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 2500 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` *interval* | 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 2500 workstation.

**TABLE 3-10** Options for `ping`

| Option | Description | How It Can Help |
|---|---|---|
| *hostname* | The probe packet is sent to *hostname* and returned. | Verifies that a host is active on the network. |
| `-g` *hostname* | 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` *interface* | 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 2500 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 2500 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 *option* | Allows configurable output. The pid, pcpu, pmem, and comm 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 2500 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. |
| -n *number* | Limits output to number of lines. | Limits amount of data displayed and identifies primary resource consumers. |
| -s *key* | Permits sorting list by key parameter. | Useful keys are cpu (default), time, and size. |
| -v | 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
```

CHAPTER 4

# Troubleshooting Flowcharts

This chapter contains flowcharts to help you troubleshoot problems with your Sun Blade 2500 workstation. The flowcharts are ordered parallel to the power-on sequence. Flowchart topics covered are:

# 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 2500 system 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 2500 system, see "Introduction to Advanced Troubleshooting" on page 5-1 for more in-depth procedures.

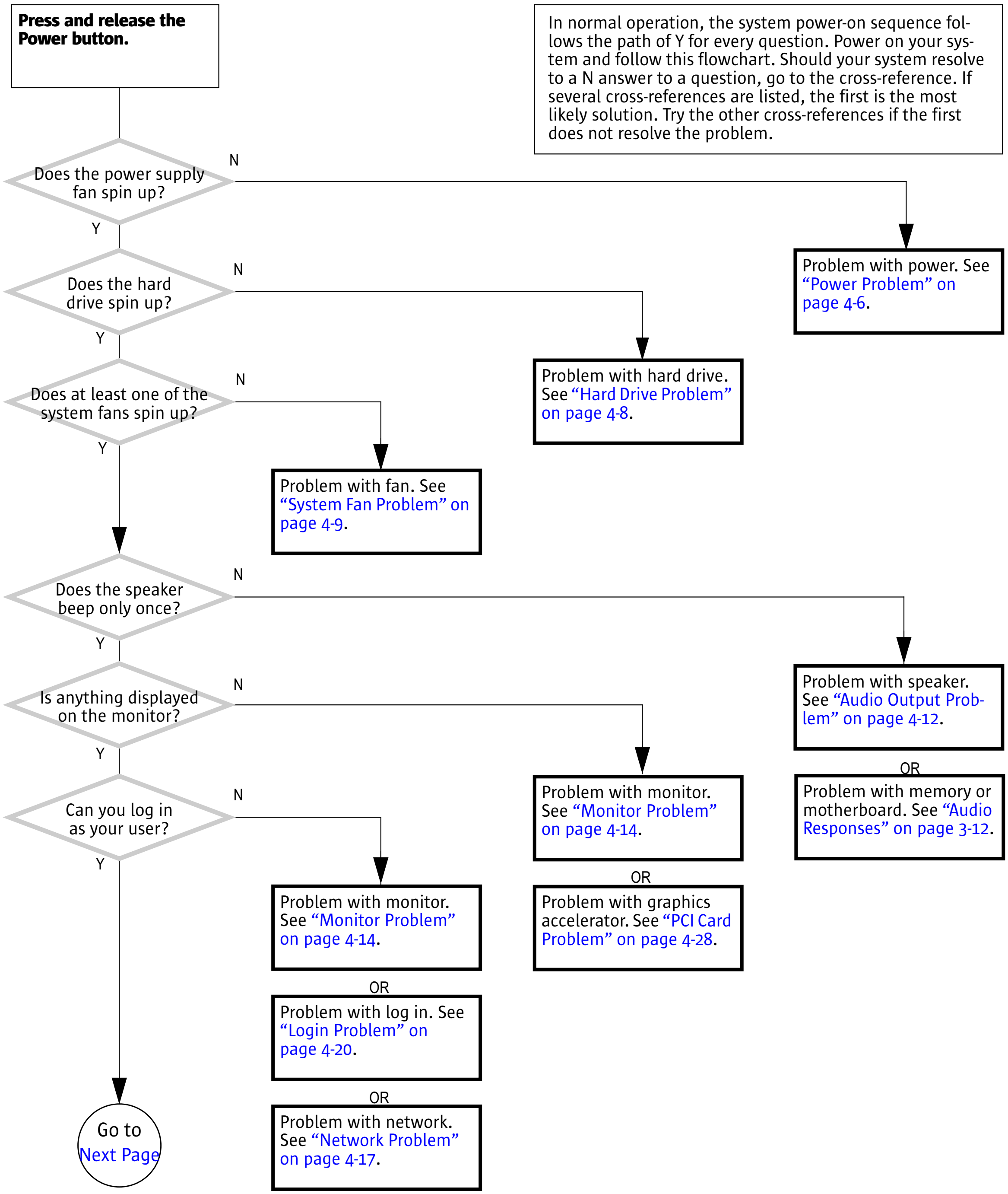



**FIGURE 4-1** Power-On Flowchart

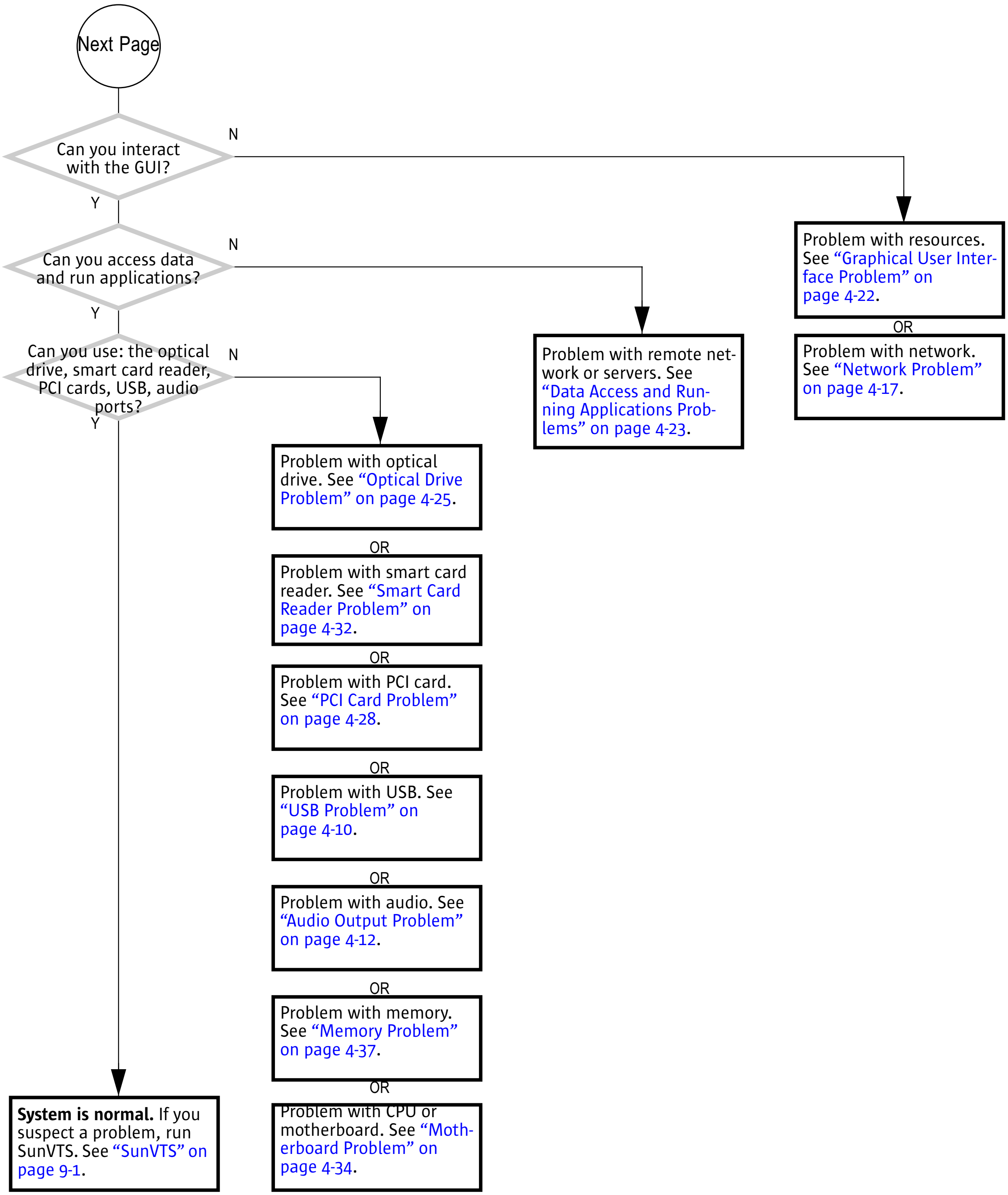



**FIGURE 4-2** Power-On Flowchart *(Continued)*

## 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

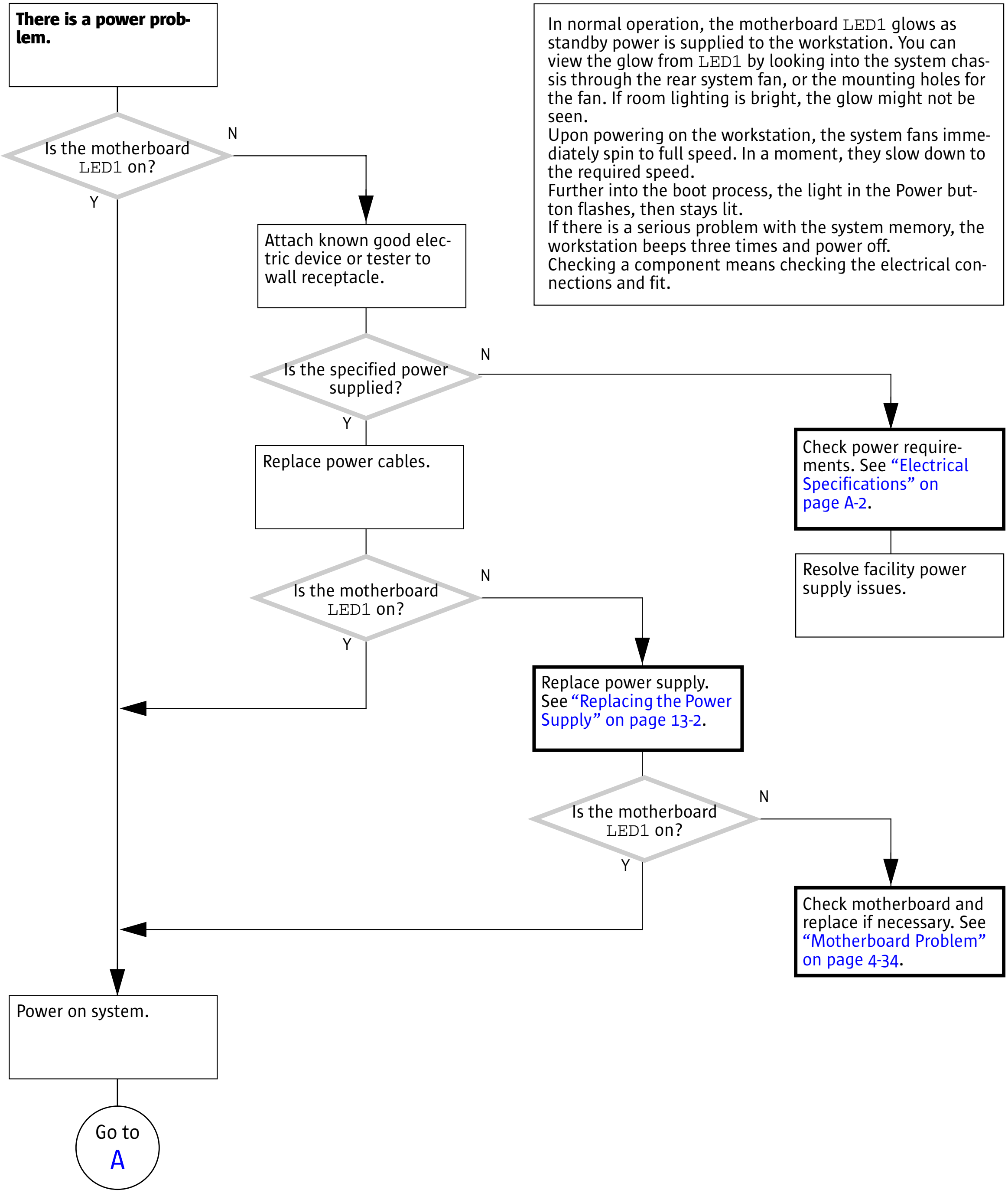



**FIGURE 4-3** Power Problem

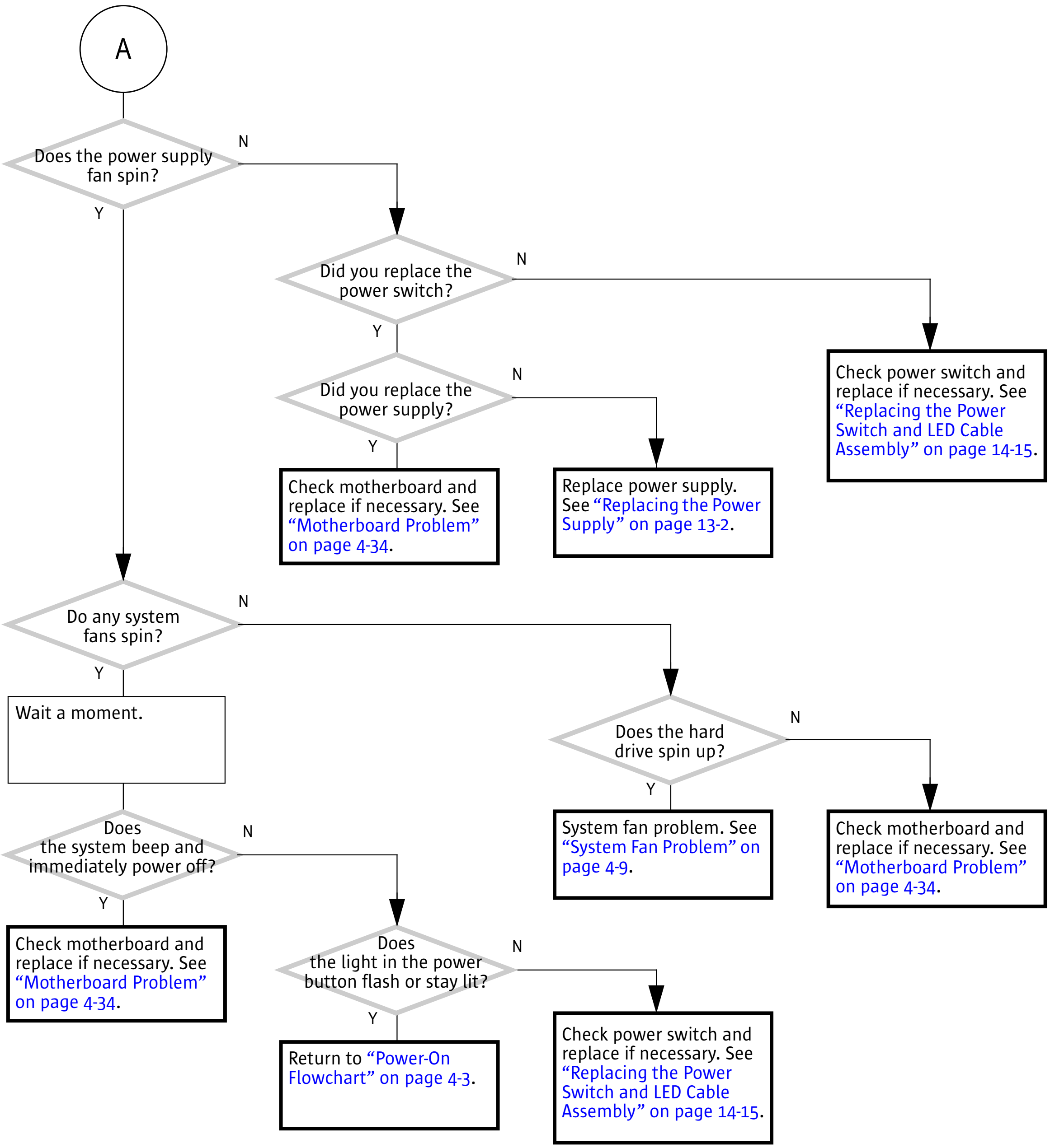



**FIGURE 4-4** Power Problem *(Continued)*

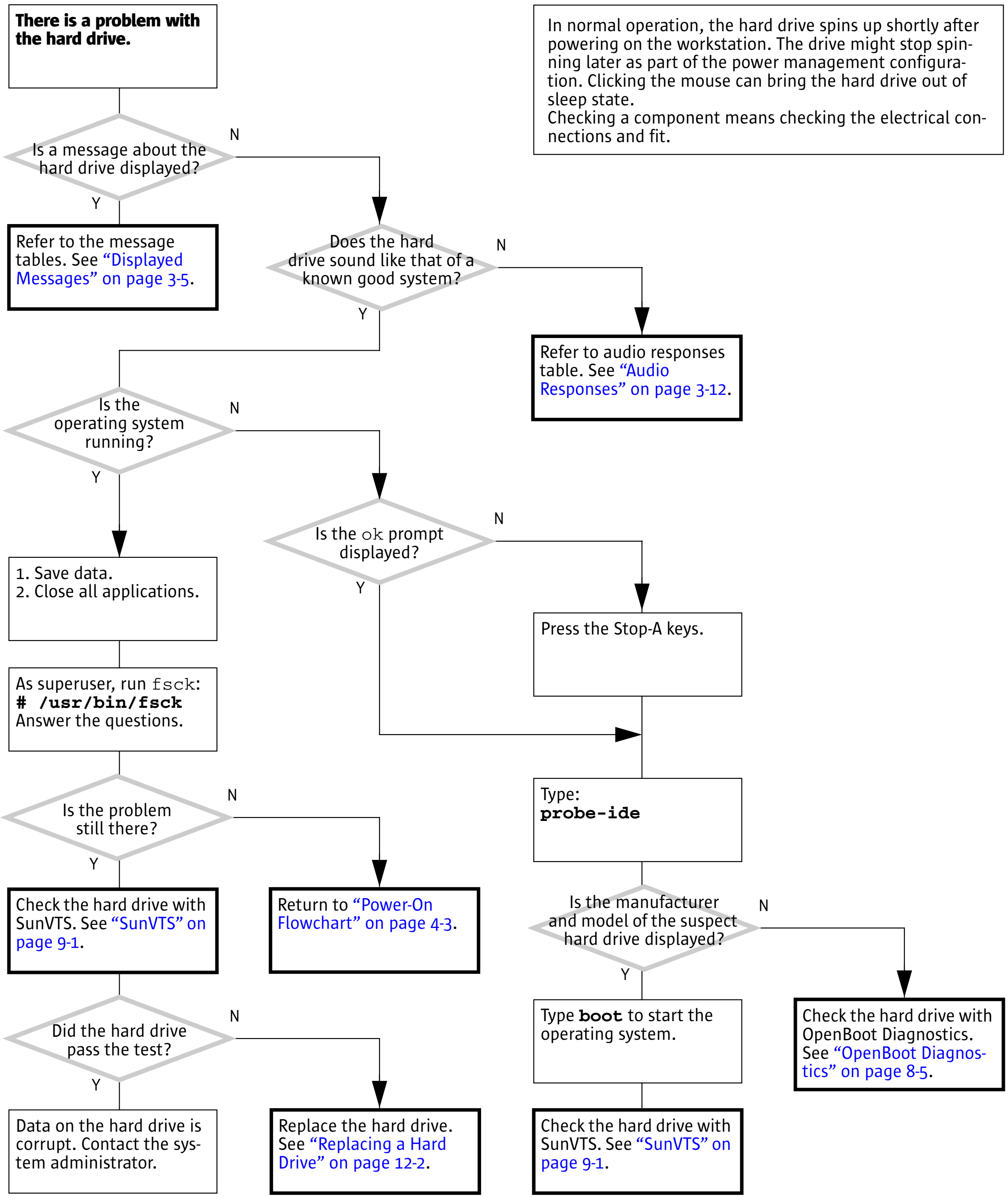



**FIGURE 4-5** Hard Drive Problem

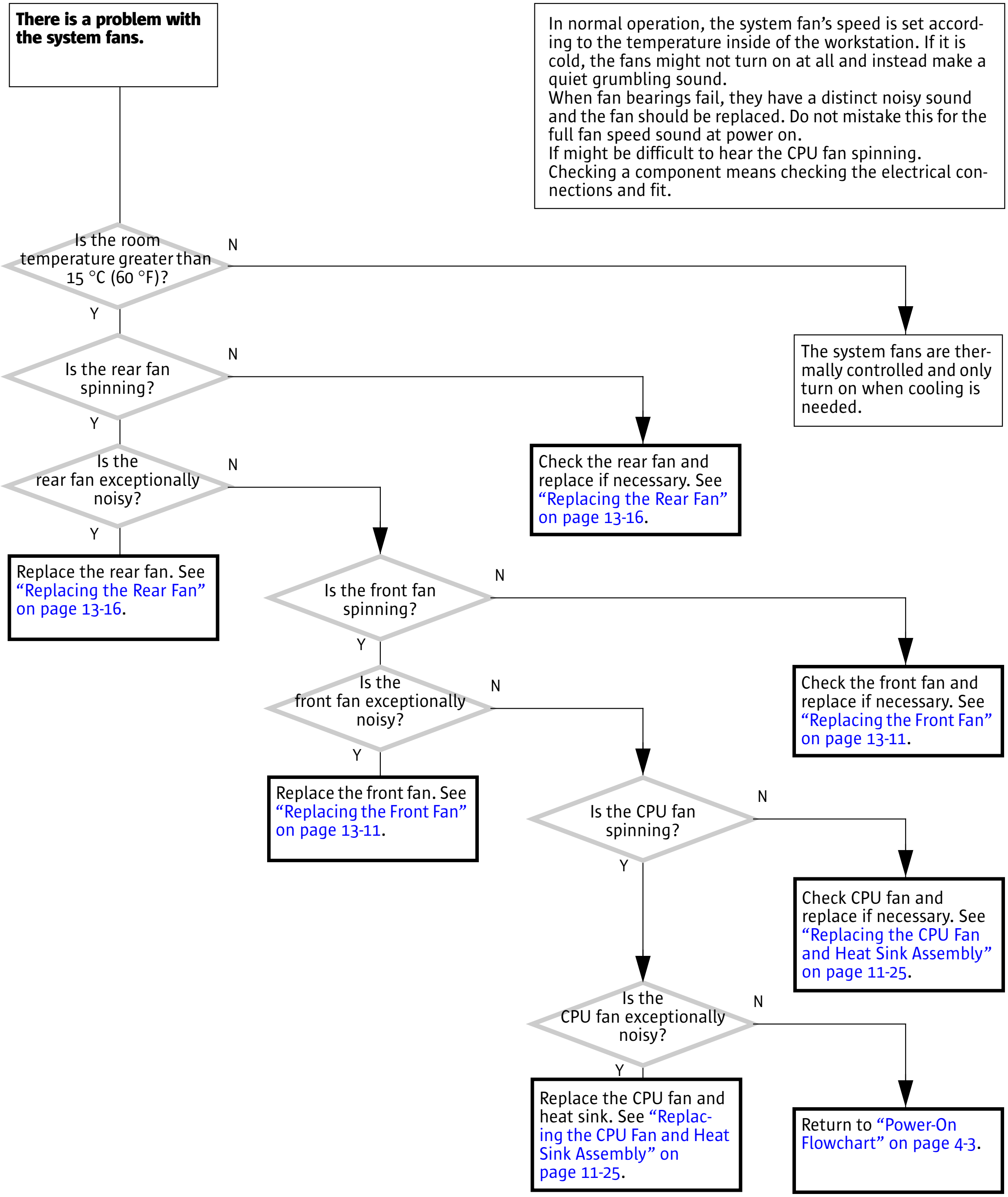



**FIGURE 4-6** System Fan Problem

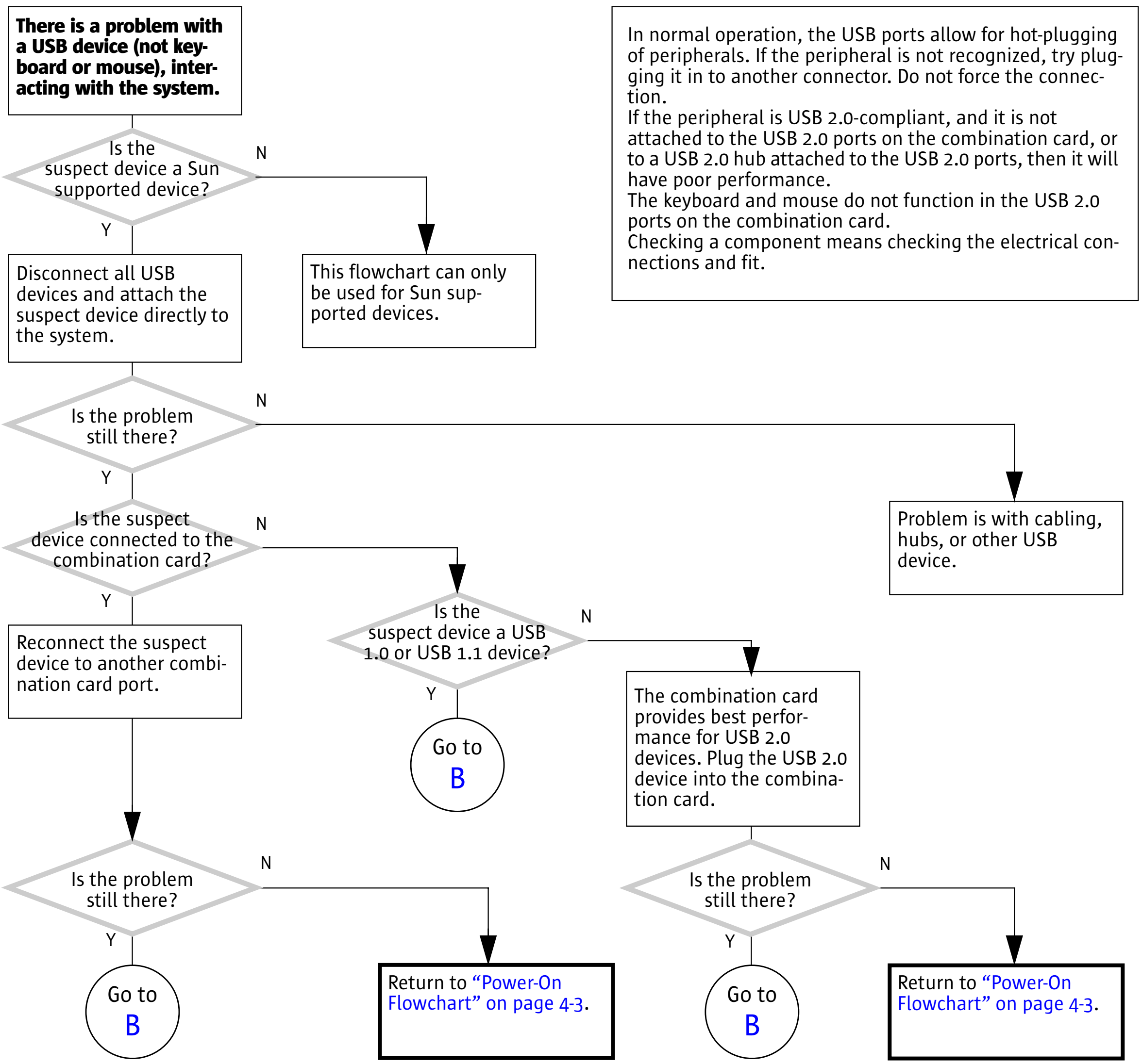



**FIGURE 4-7** USB Problem

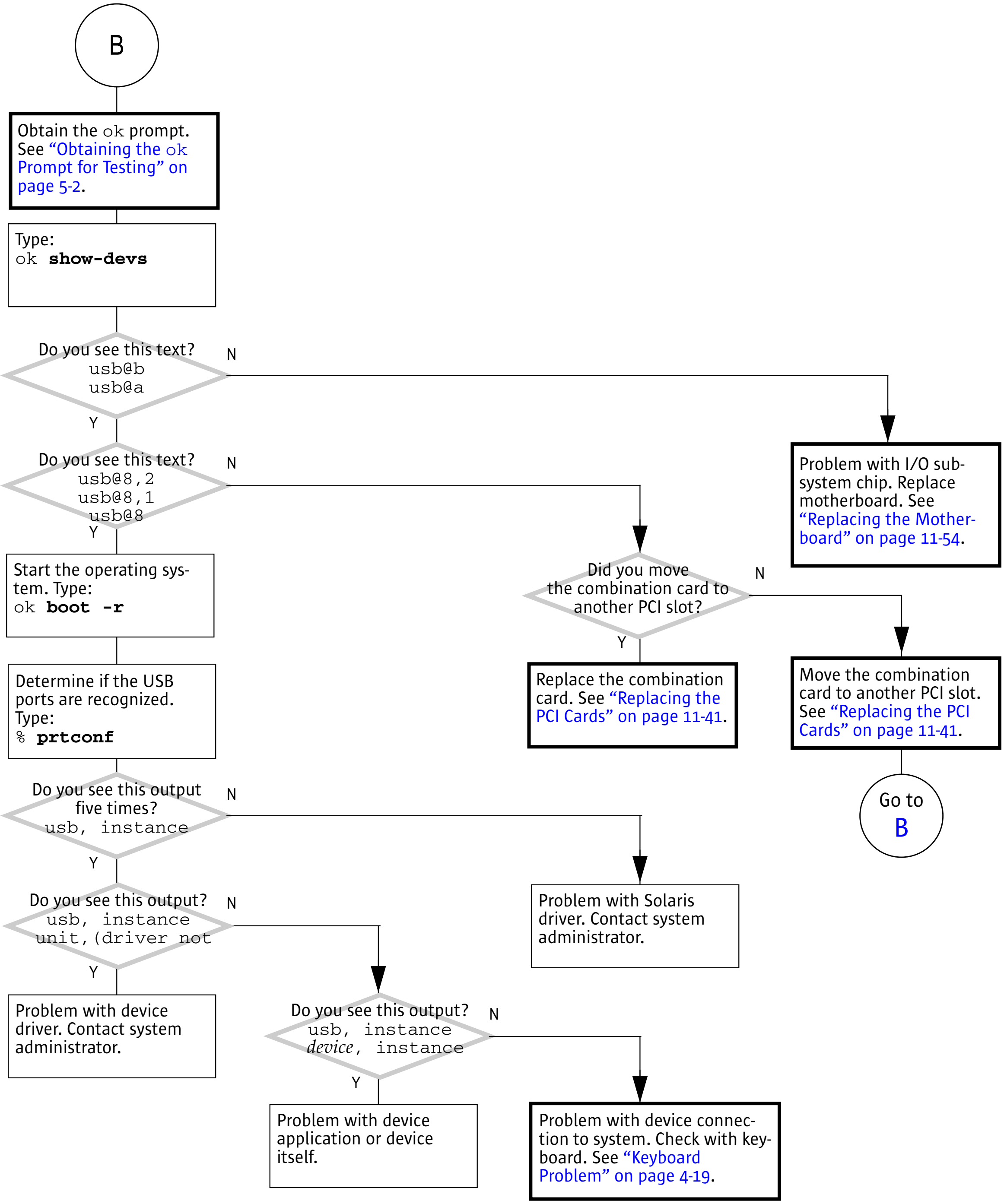



**FIGURE 4-8** USB Problem *(Continued)*

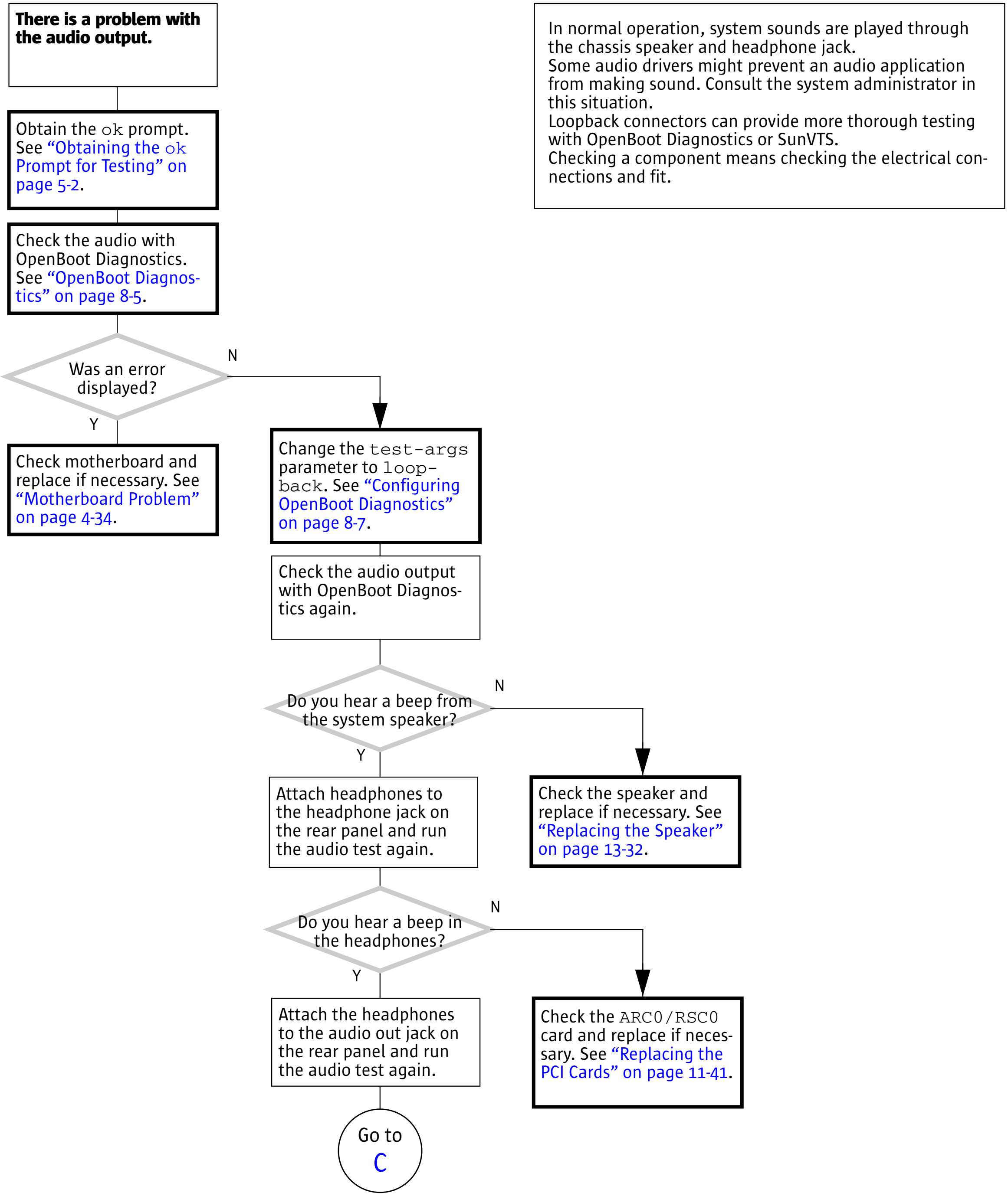



**FIGURE 4-9** Audio Output Problem

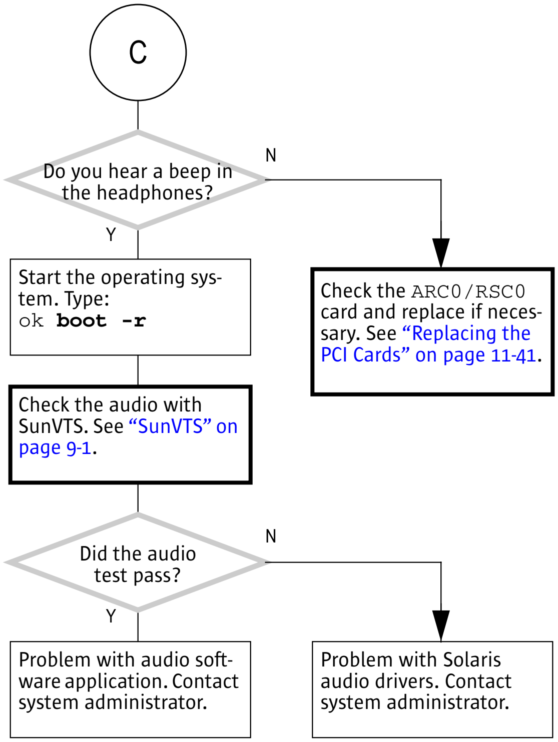



**FIGURE 4-10** Audio Output Problem *(Continued)*

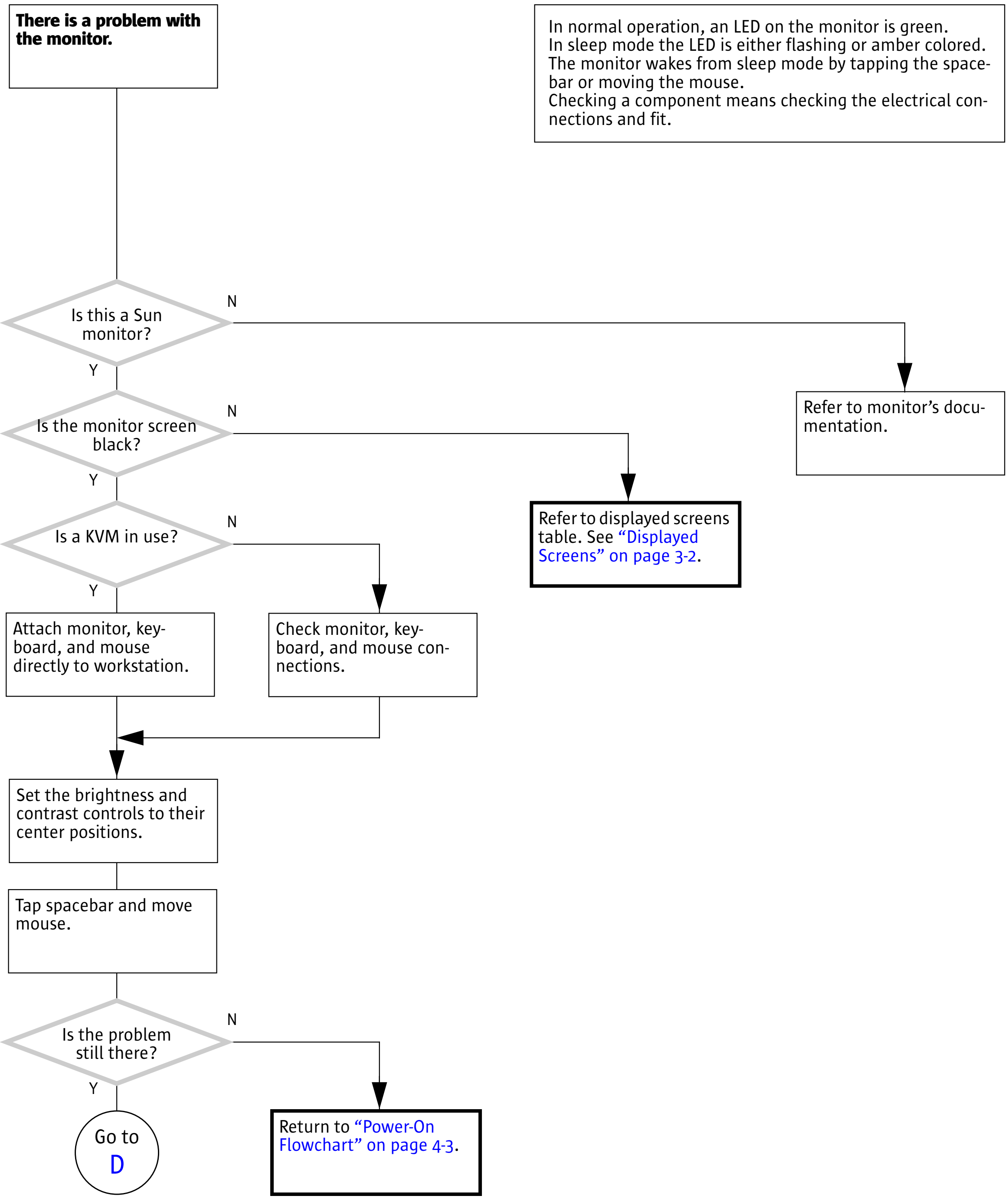



**FIGURE 4-11** Monitor Problem

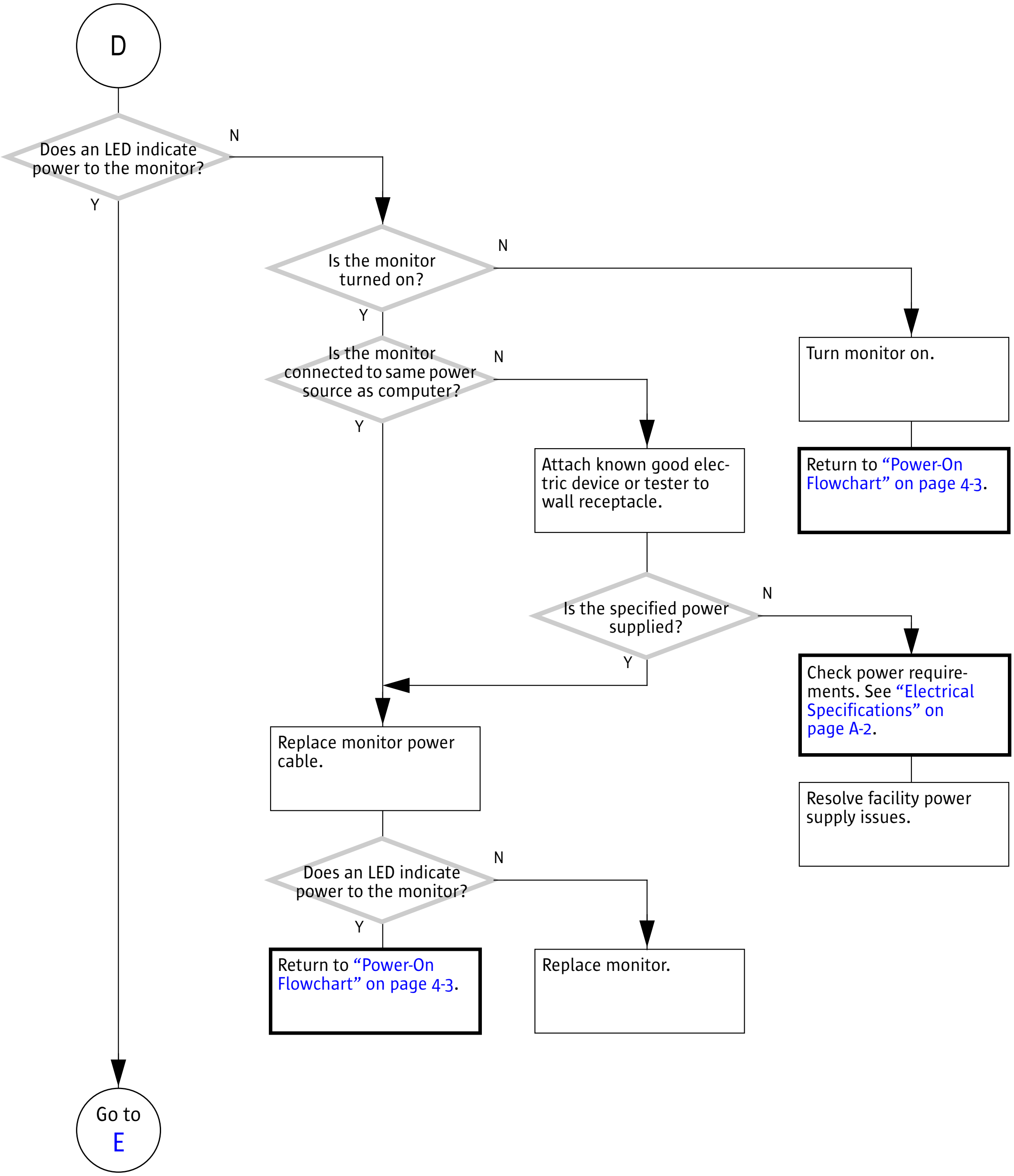



**FIGURE 4-12** Monitor Problem *(Continued)*

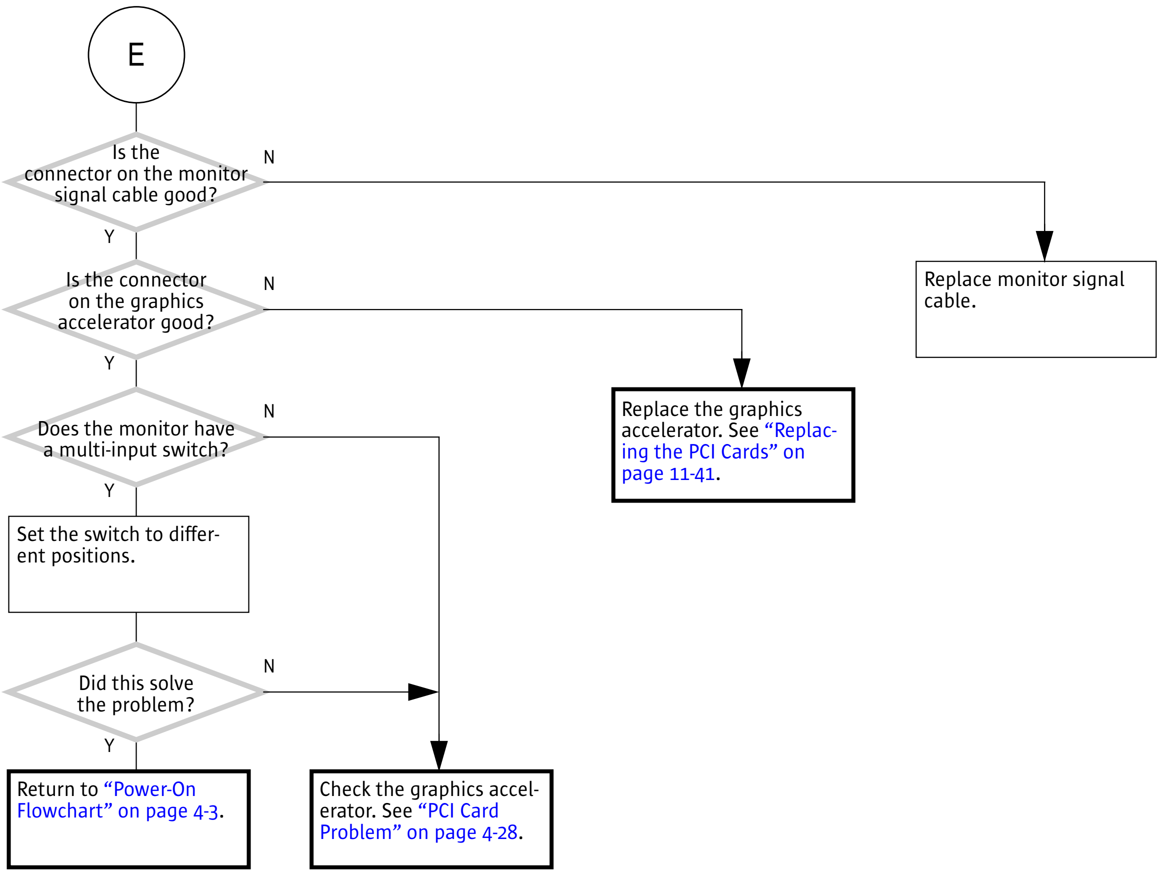
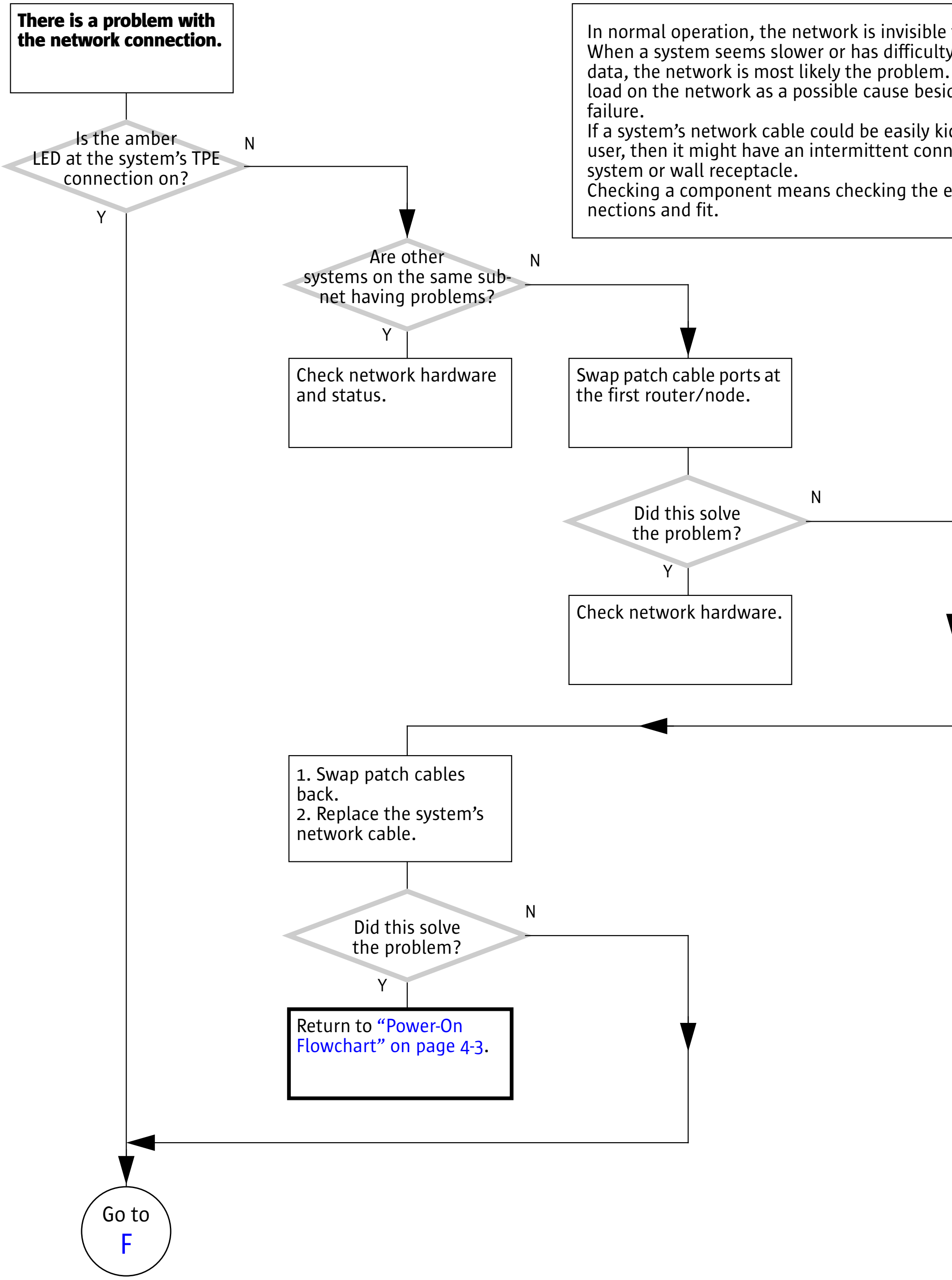



**FIGURE 4-13** Monitor Problem *(Continued)*




In normal operation, the network is invisible to the user. When a system seems slower or has difficulty accessing data, the network is most likely the problem. Consider the load on the network as a possible cause besides hardware failure.
If a system's network cable could be easily kicked by a user, then it might have an intermittent connection at the system or wall receptacle.
Checking a component means checking the electrical connections and fit.

**FIGURE 4-14** Network Problem

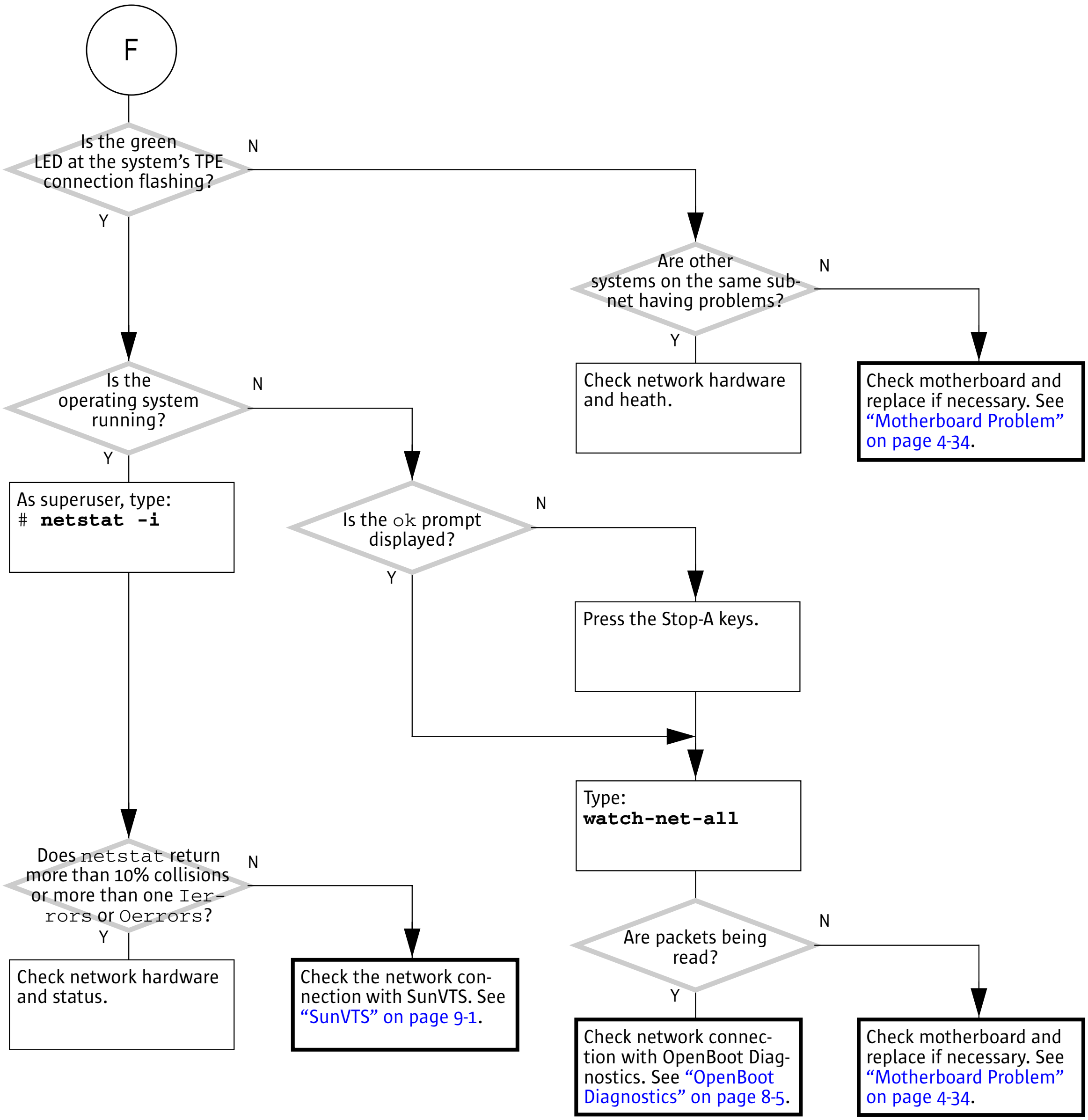



**FIGURE 4-15** Network Problem *(Continued)*

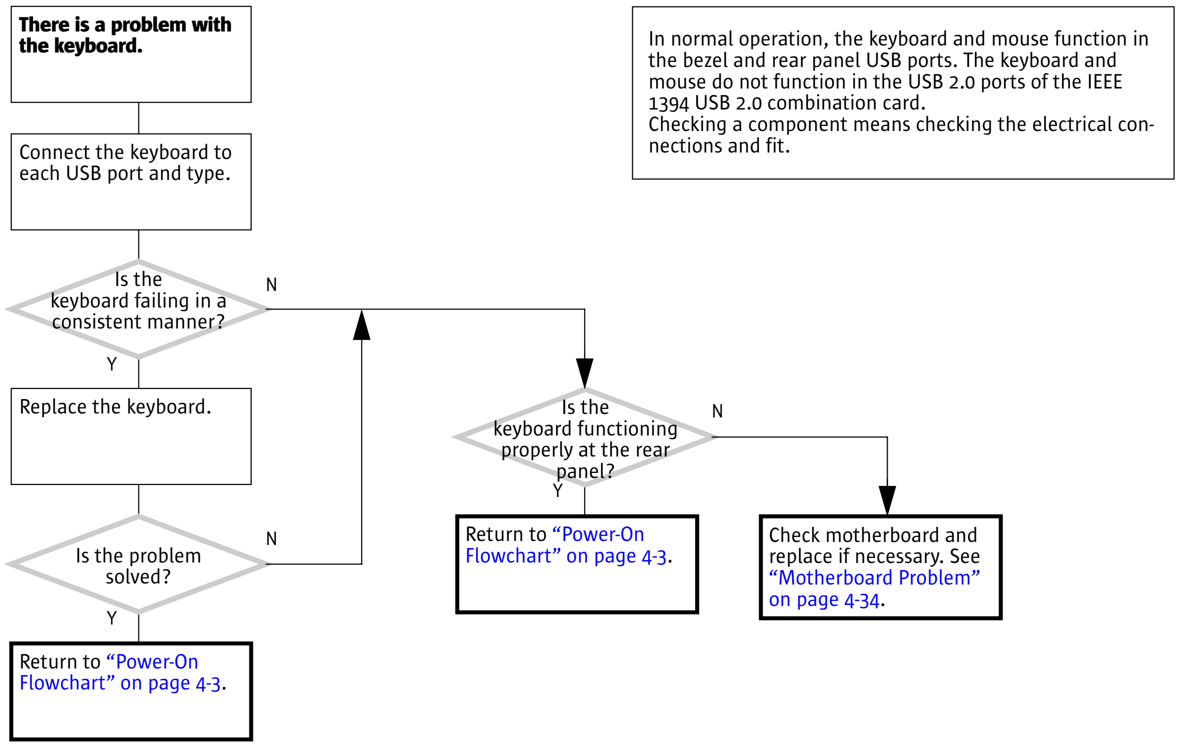



**FIGURE 4-16** Keyboard Problem

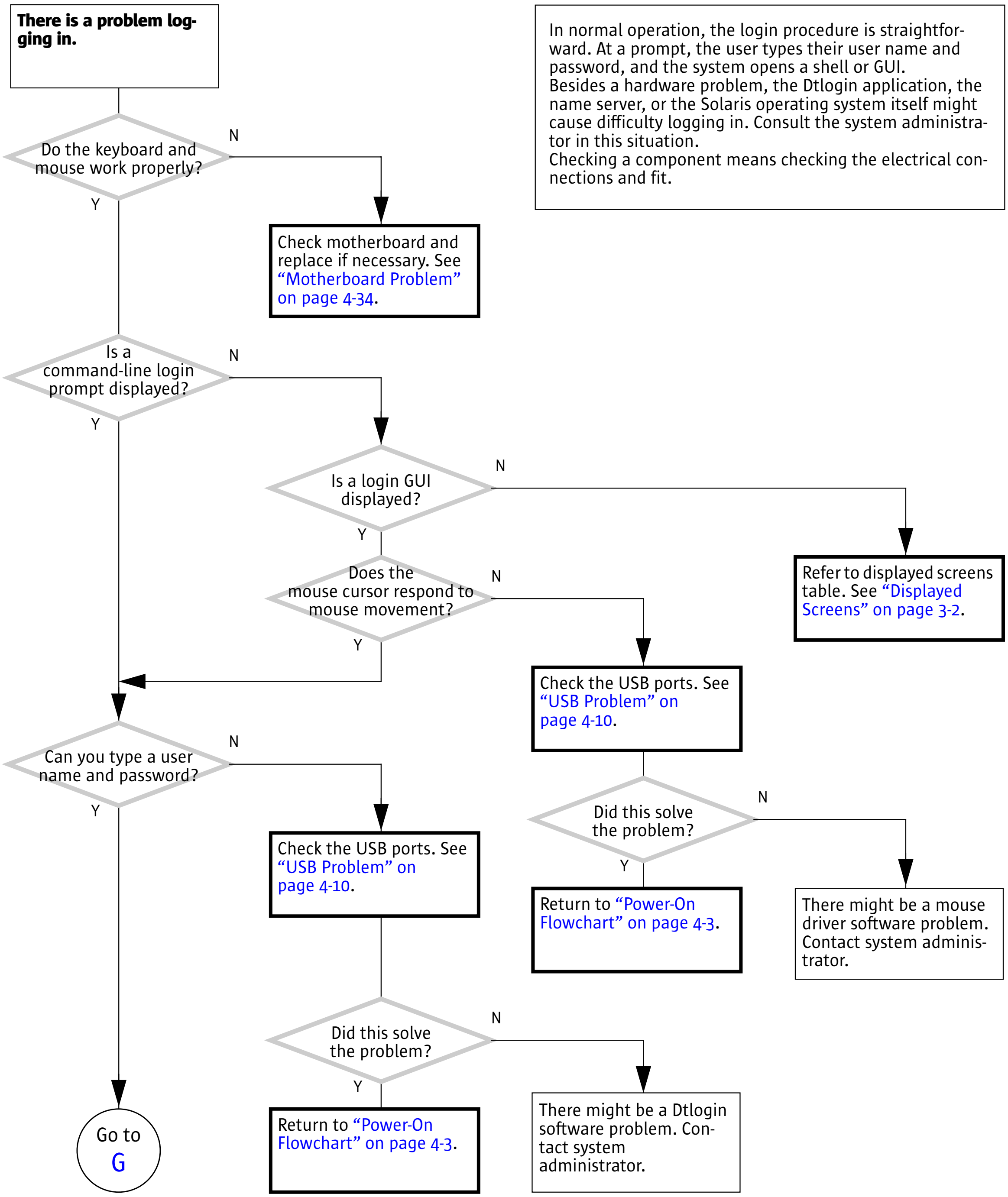



**FIGURE 4-17** Login Problem

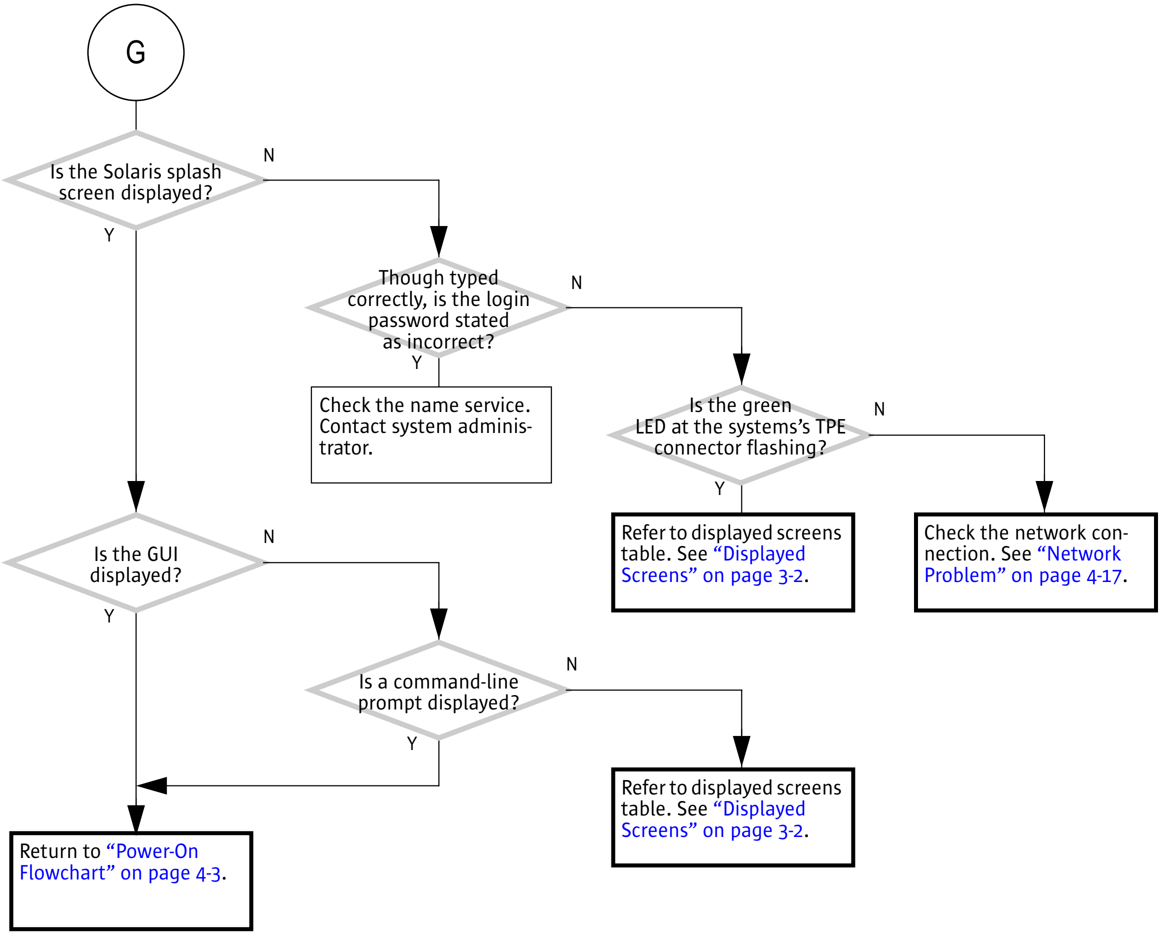



**FIGURE 4-18** Login Problem *(Continued)*

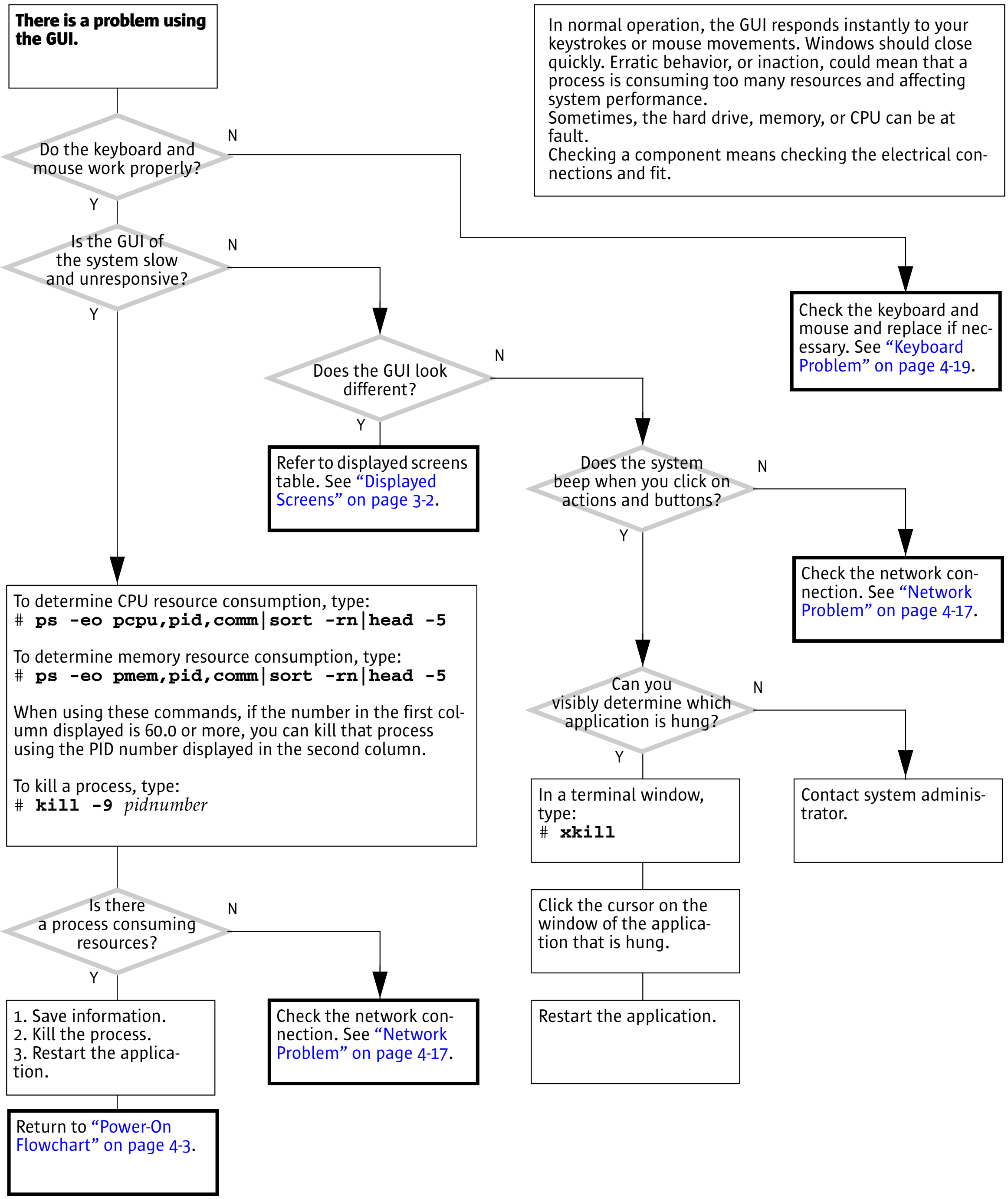



**FIGURE 4-19** Graphical User Interface Problem

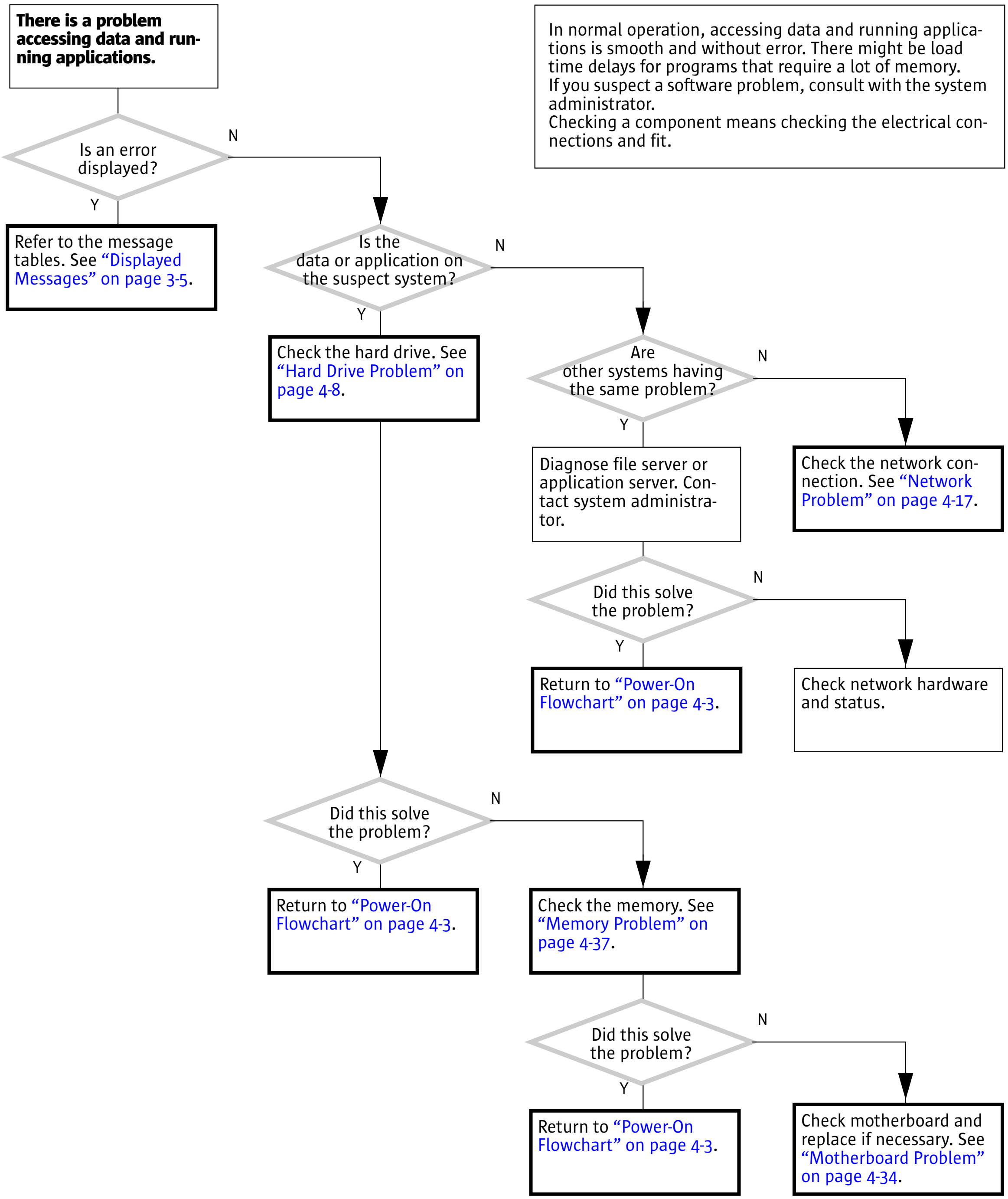



**FIGURE 4-20** Data Access and Running Applications Problems

# 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

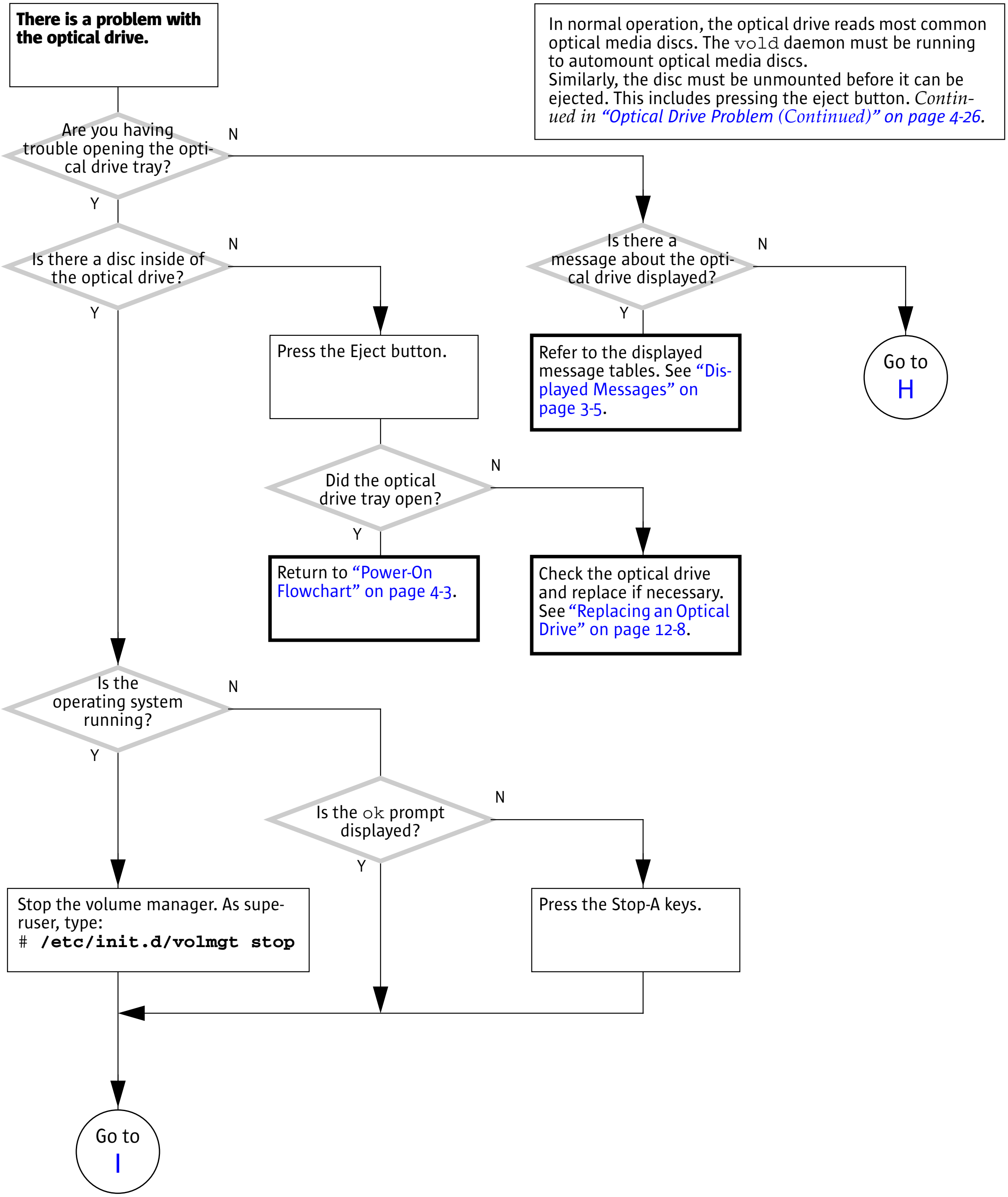



**FIGURE 4-21** Optical Drive Problem

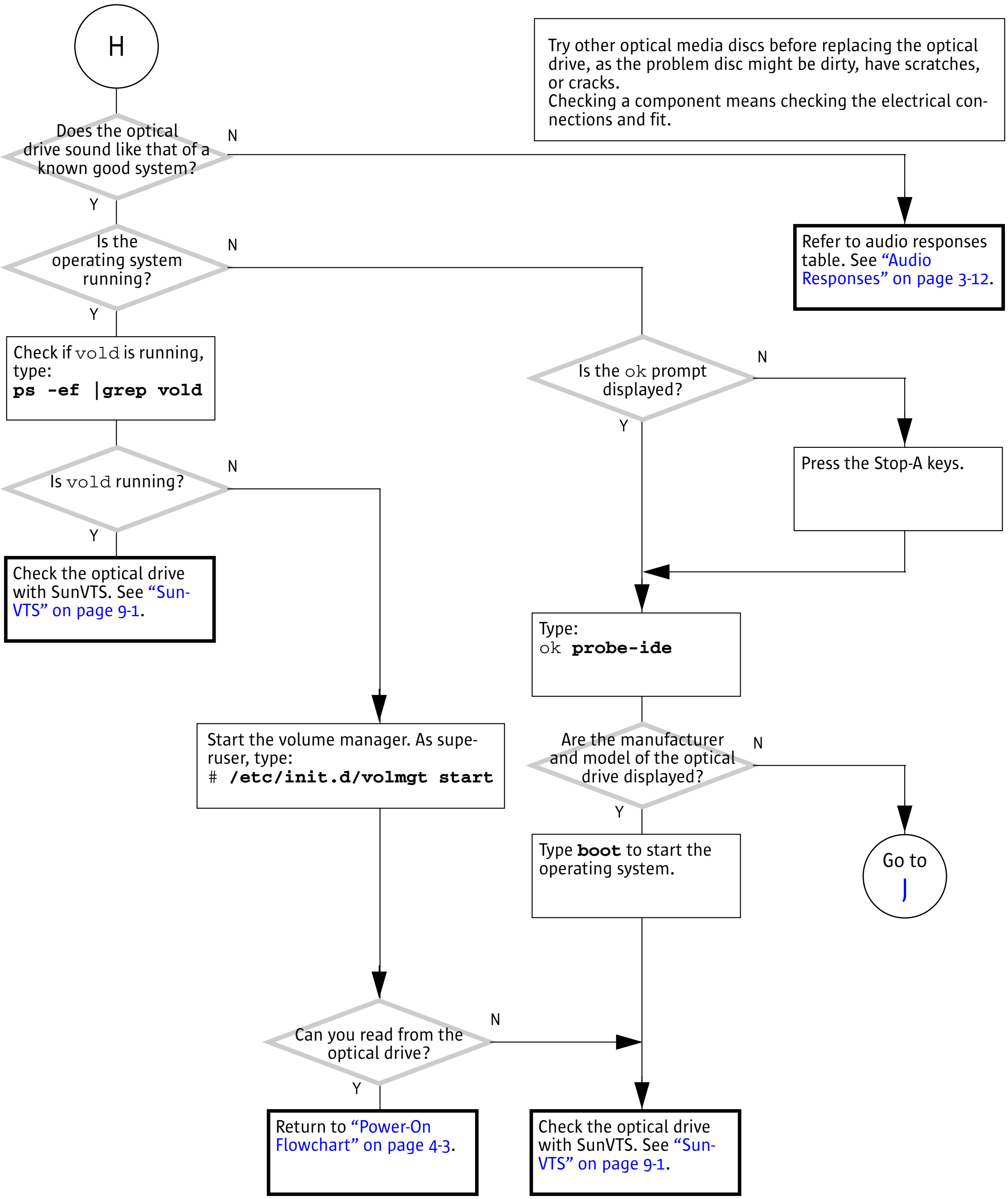



**FIGURE 4-22** Optical Drive Problem *(Continued)*

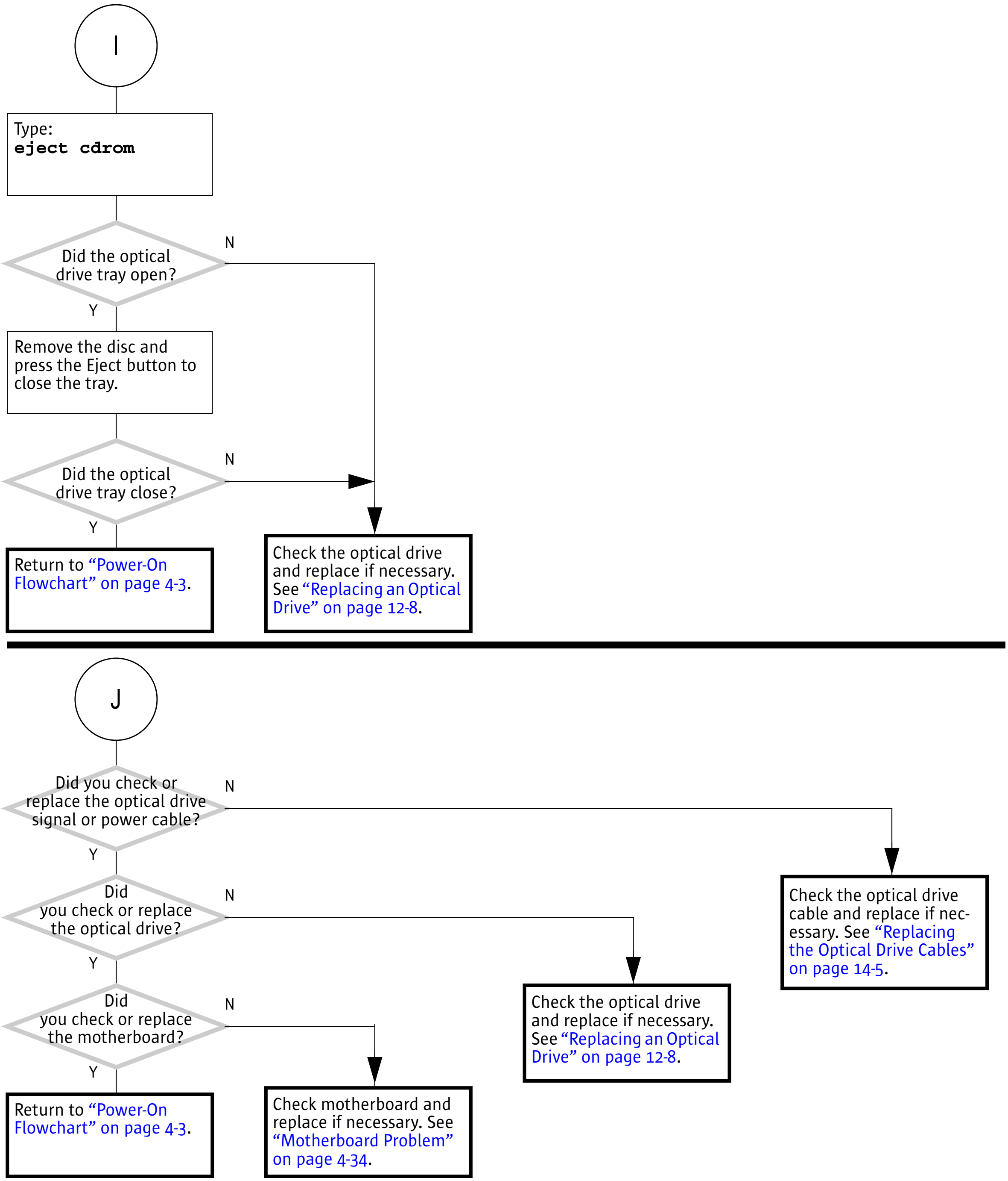



**FIGURE 4-23** Optical Drive Problem *(Continued)*

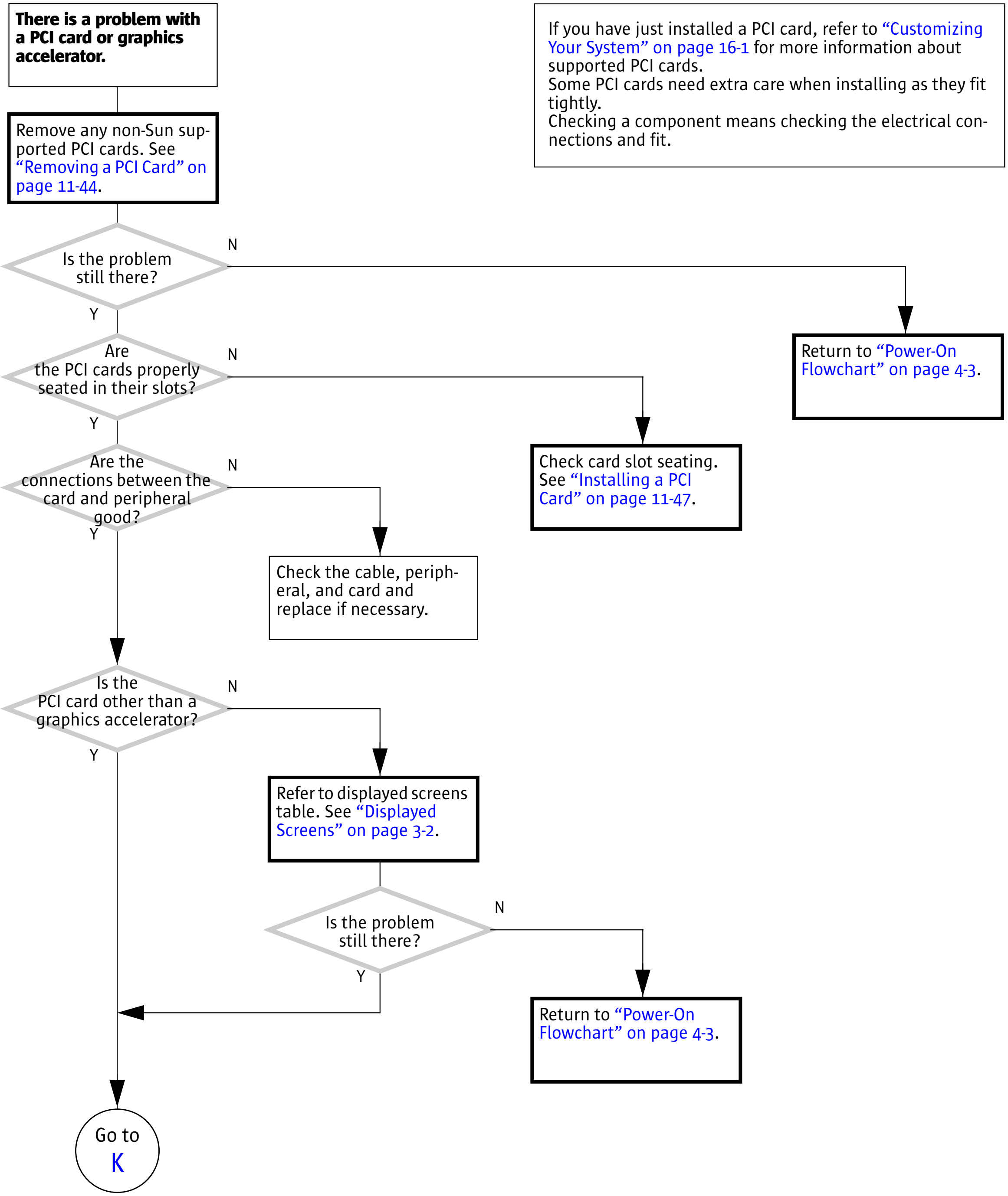



**FIGURE 4-24** PCI Card Problem

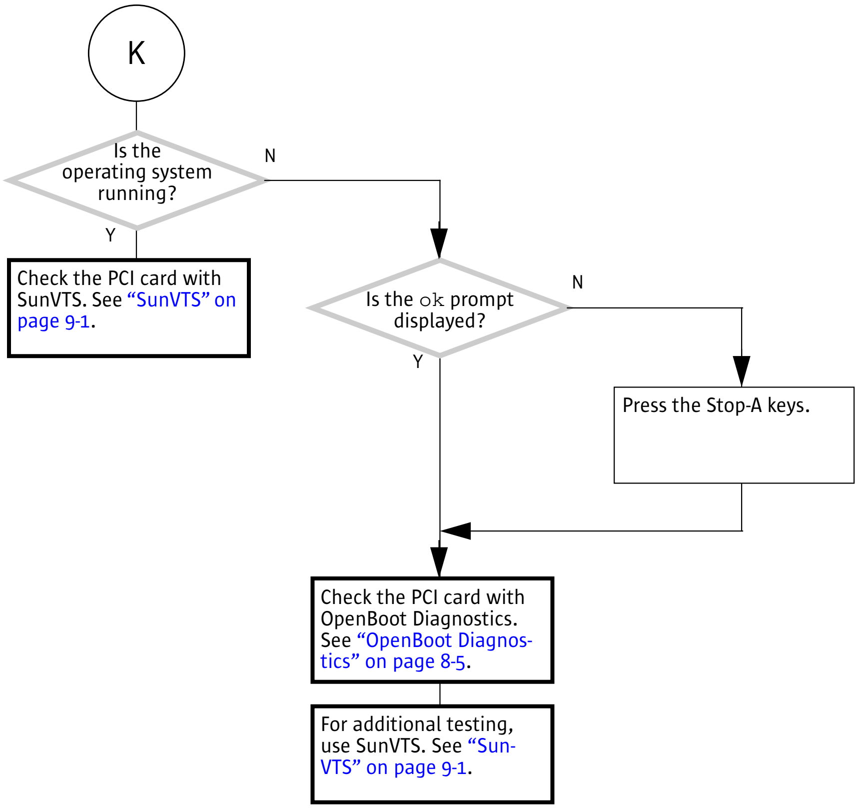



**FIGURE 4-25** PCI Card Problem *(Continued)*

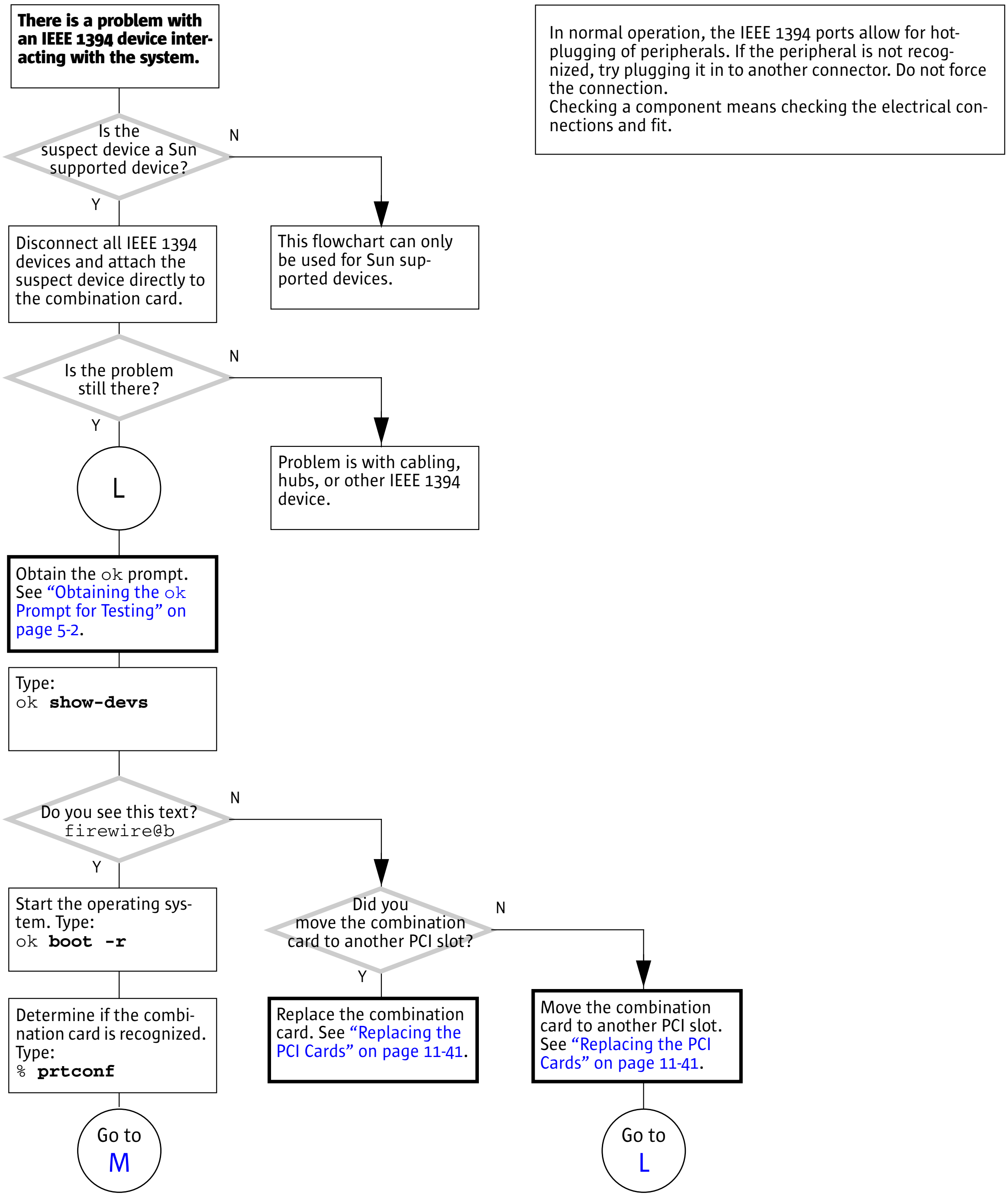



**FIGURE 4-26** IEEE 1394 Problem

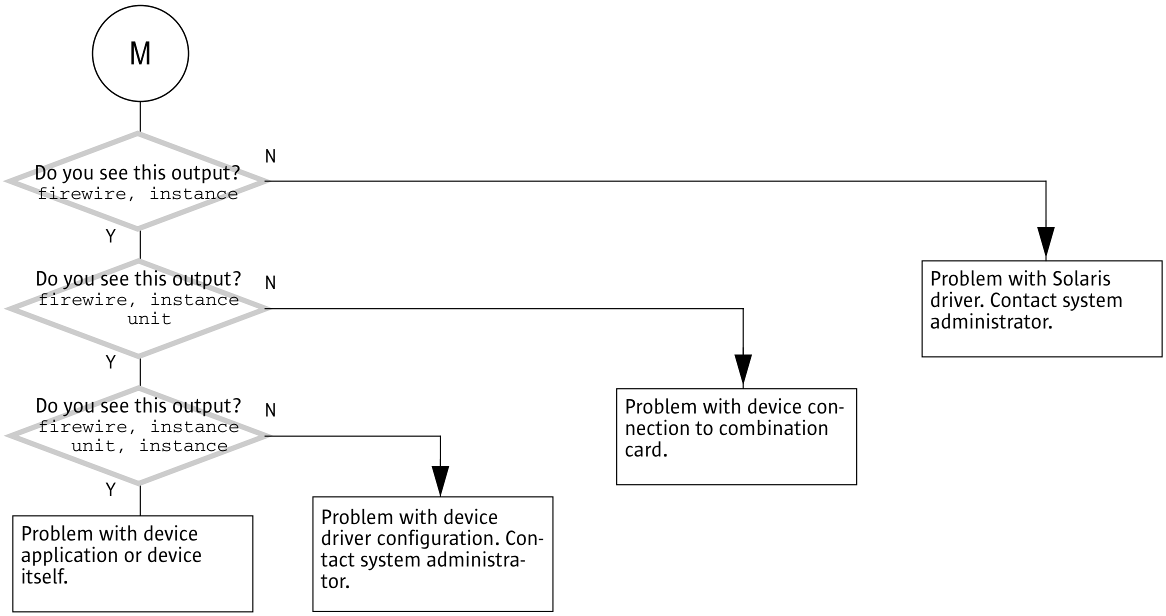



**FIGURE 4-27** IEEE 1394 Problem *(Continued)*

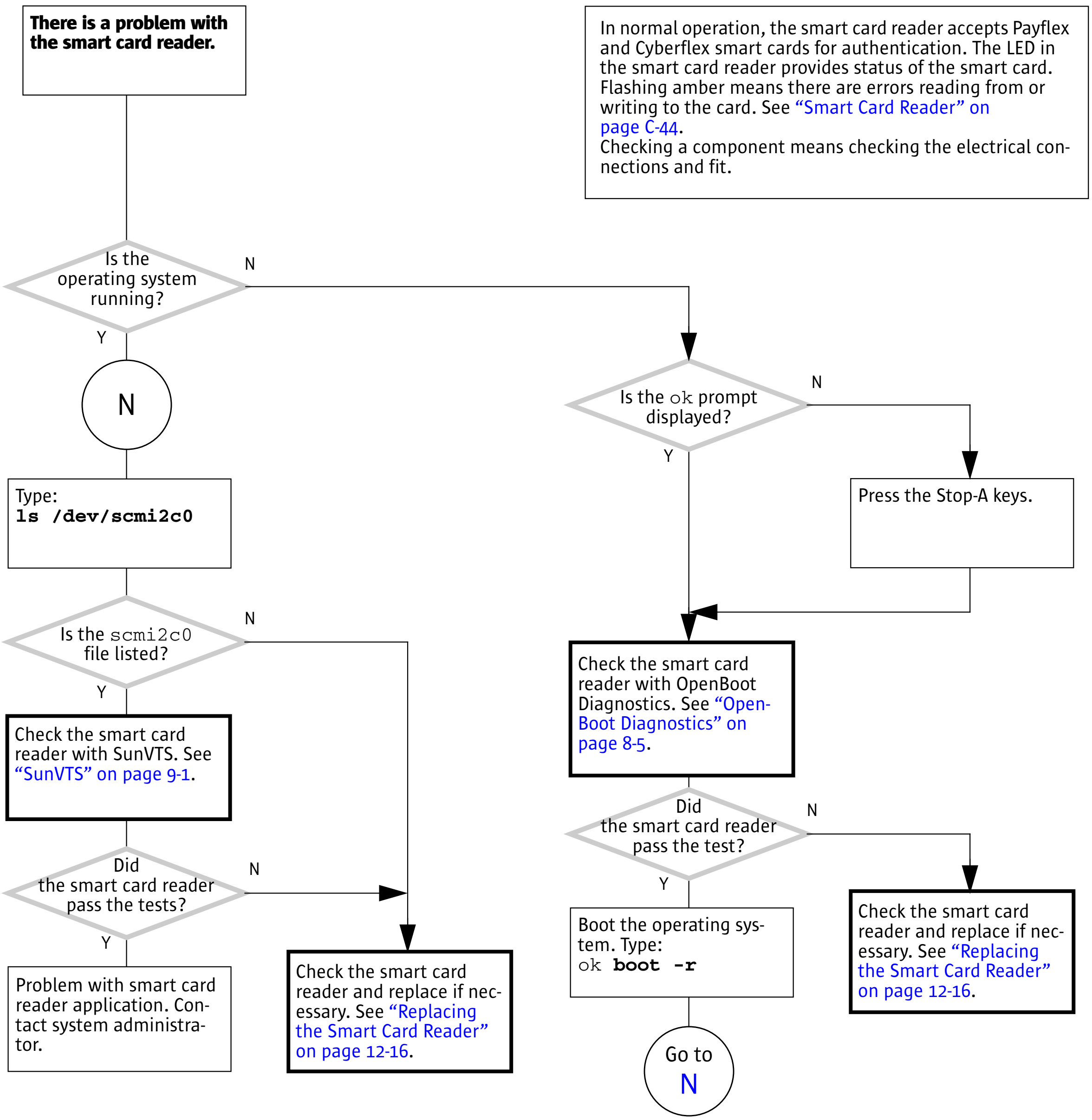



**FIGURE 4-28** Smart Card Reader Problem

# 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
- "DIMM Fan Problem" on page 4-41

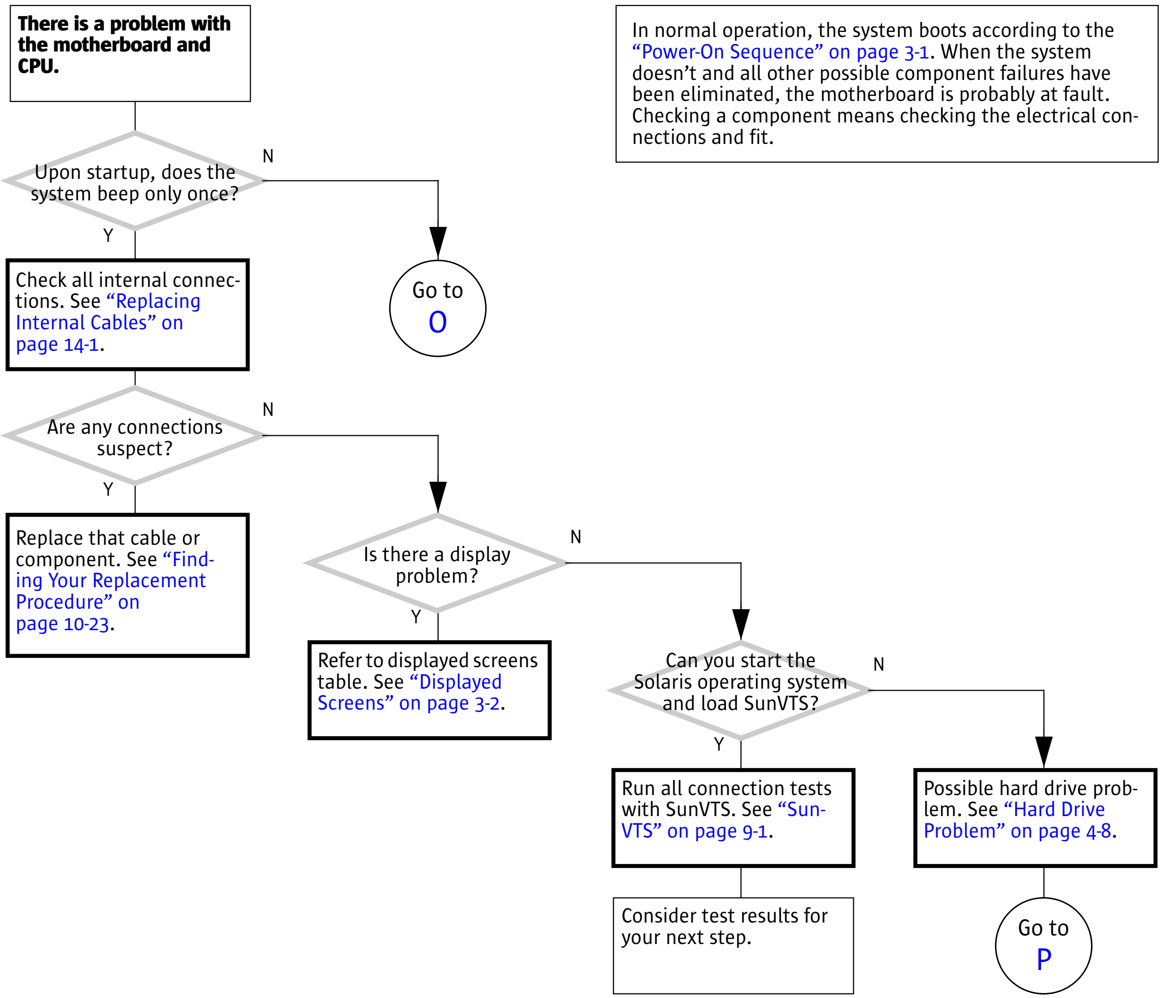



**FIGURE 4-29** Motherboard Problem

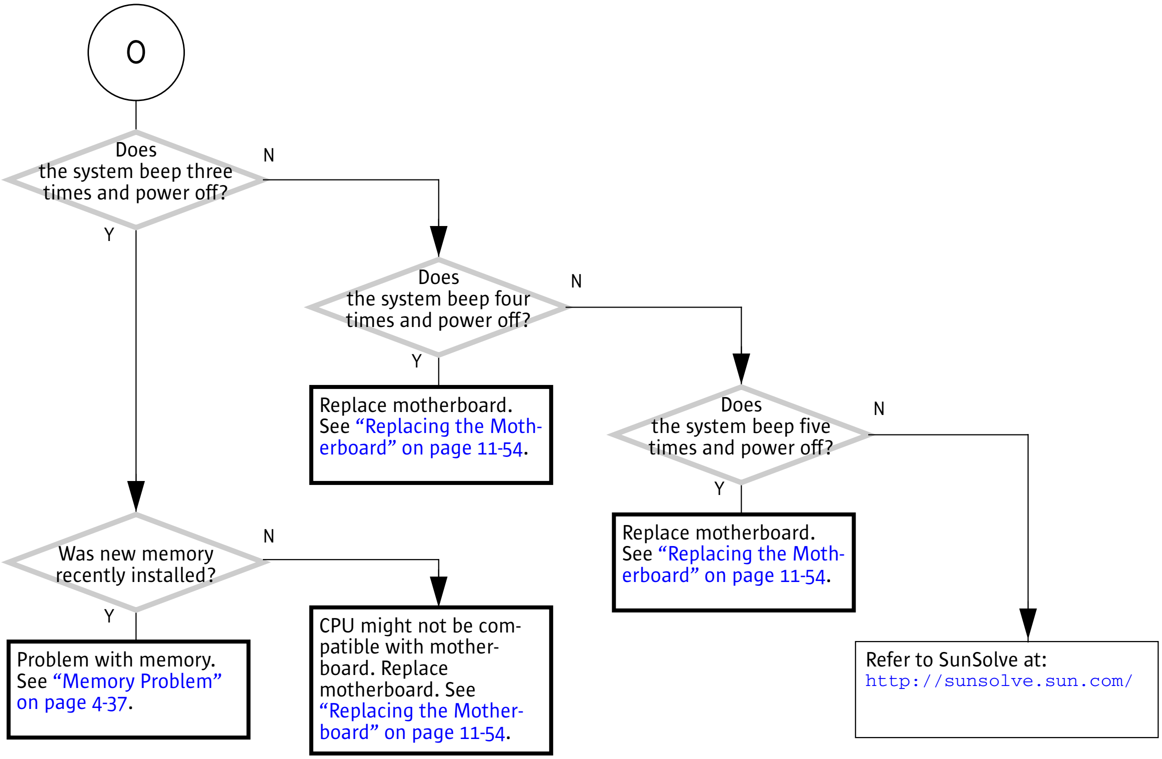



**FIGURE 4-30** Motherboard Problem *(Continued)*

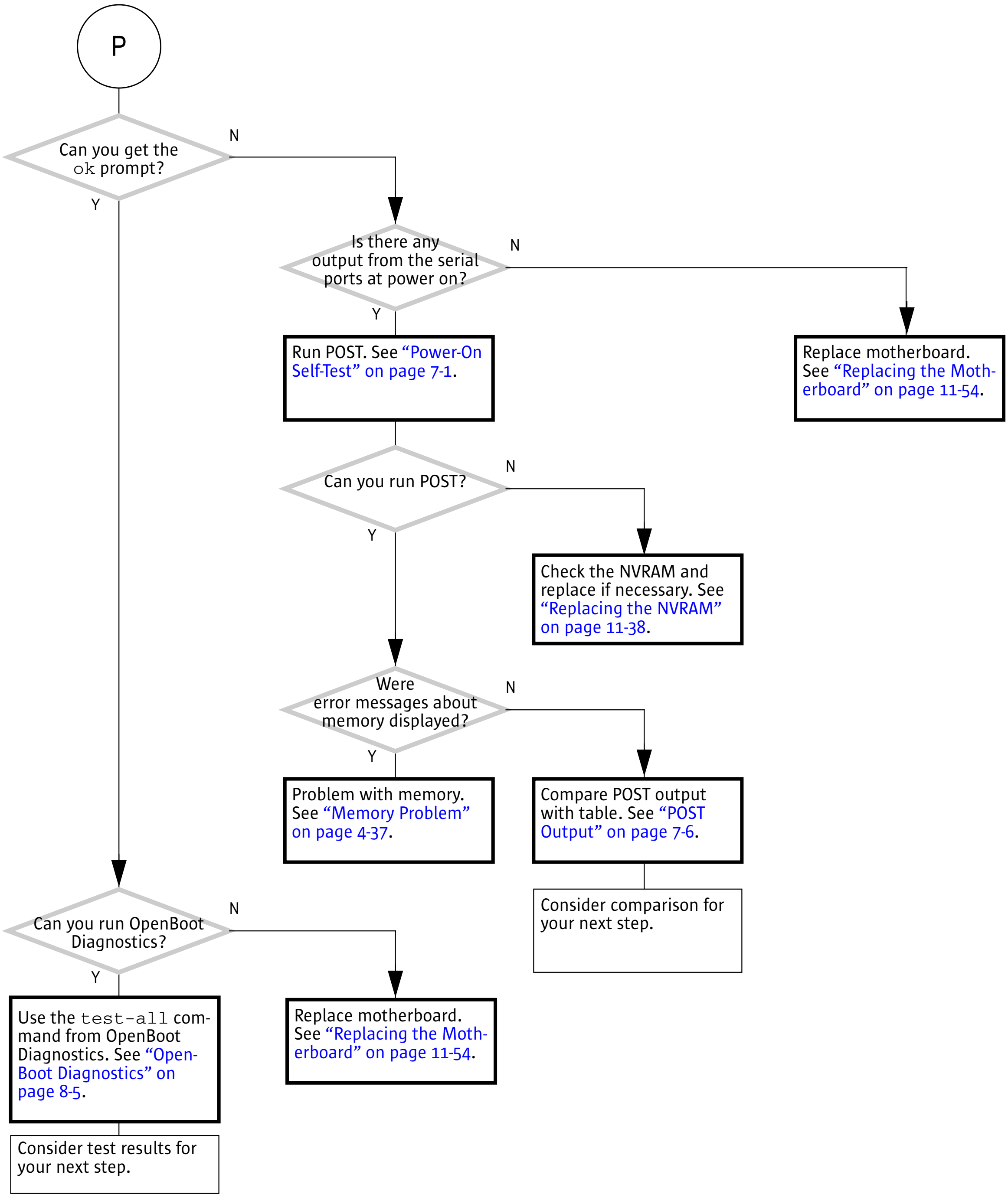



**FIGURE 4-31** Motherboard Problem *(Continued)*

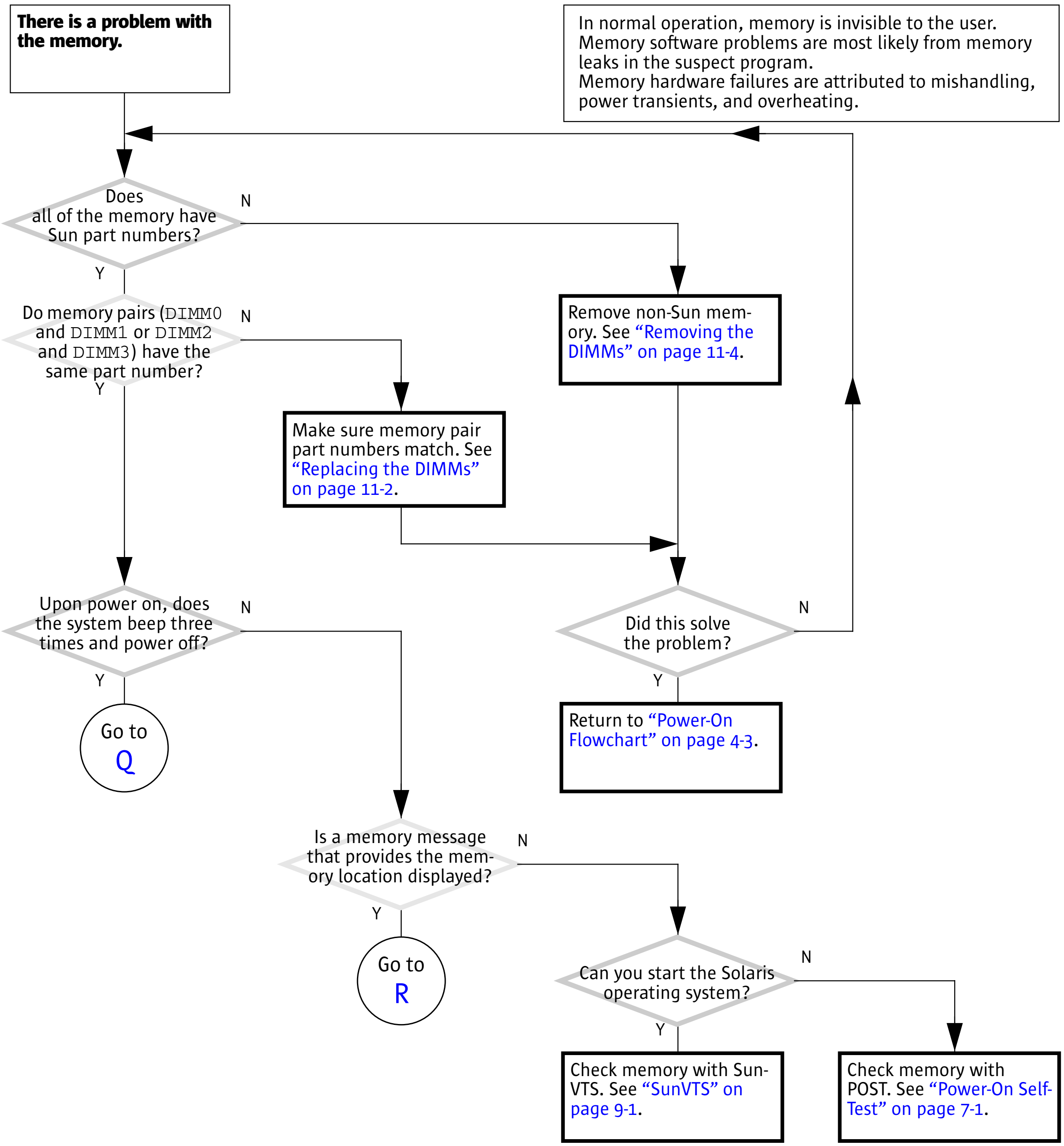



**FIGURE 4-32** Memory Problem

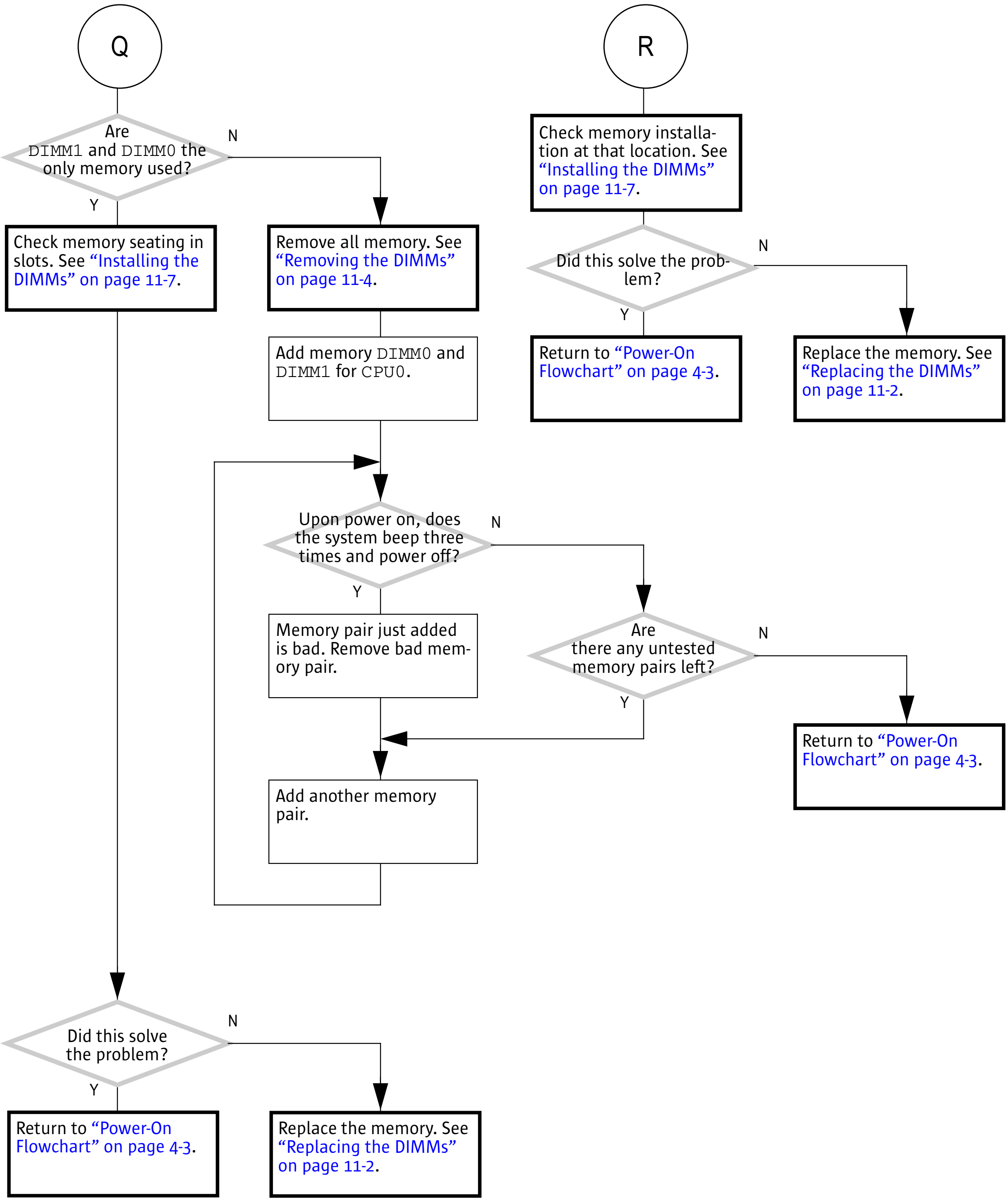



**FIGURE 4-33** Memory Problem *(Continued)*

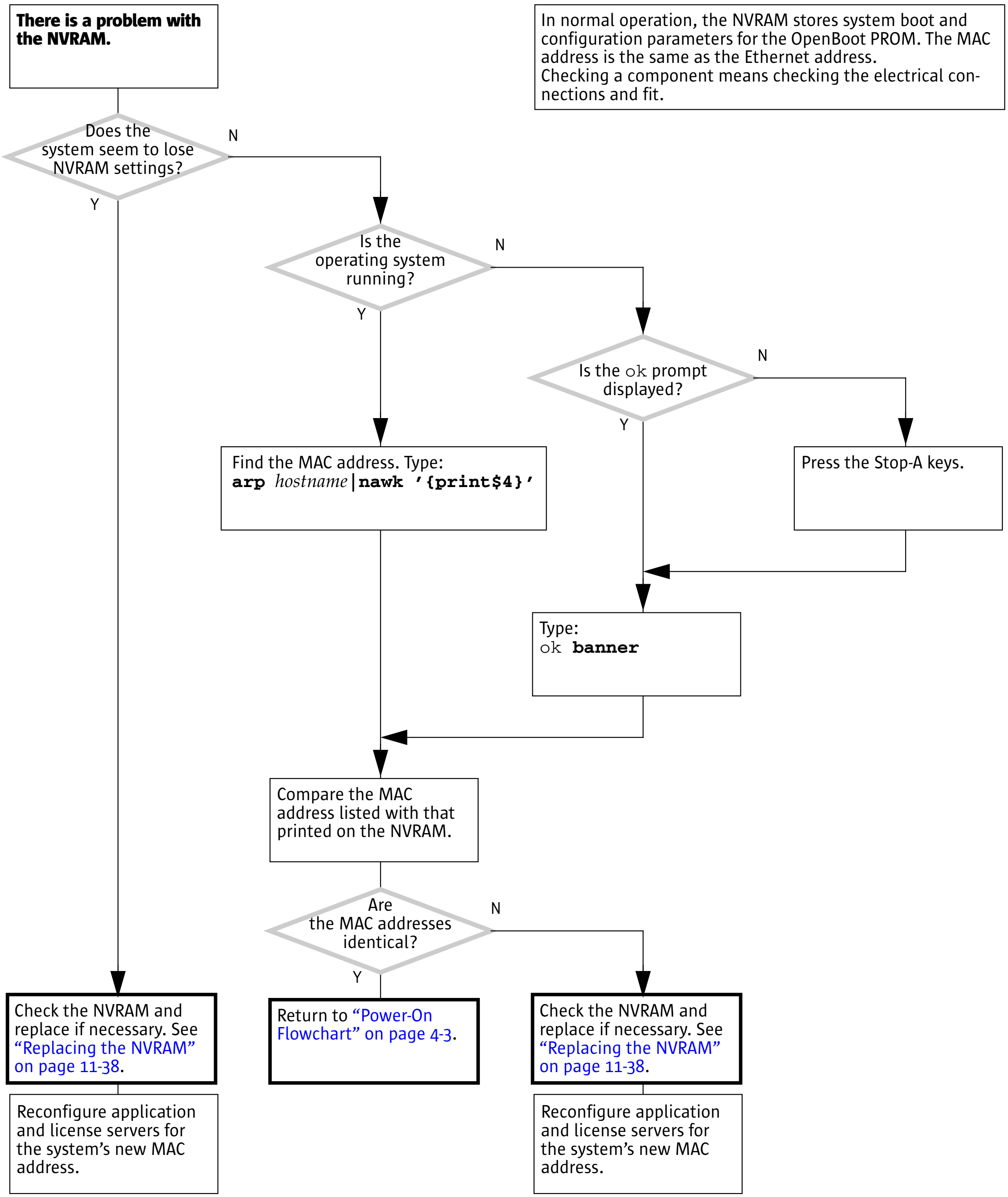



**FIGURE 4-34** NVRAM Problem

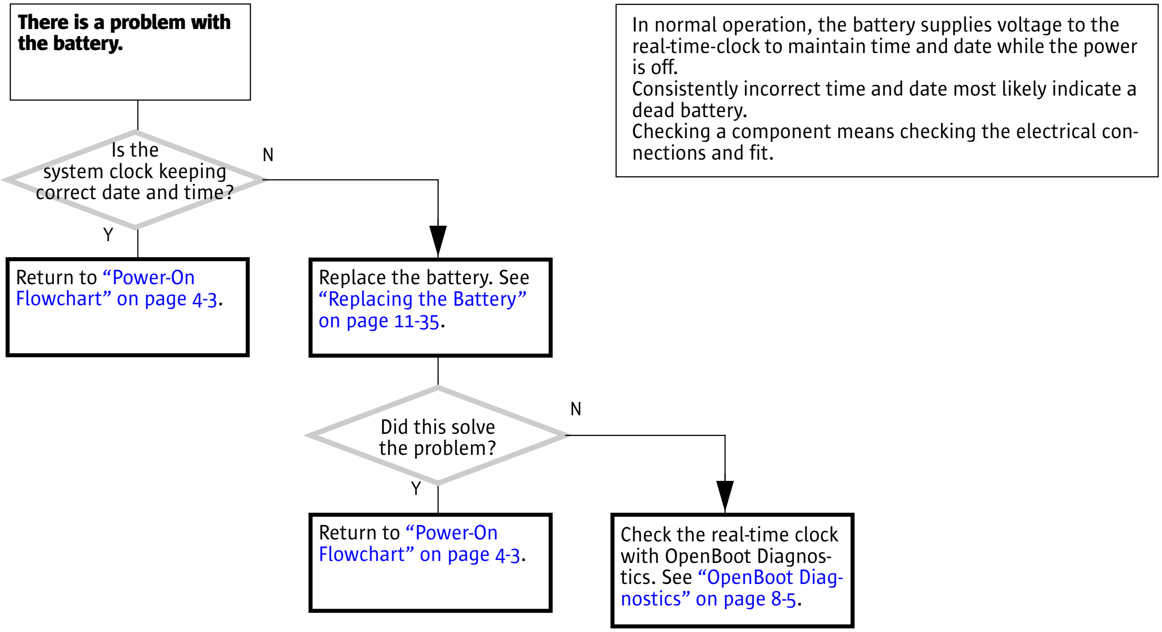



**FIGURE 4-35** Battery Problem

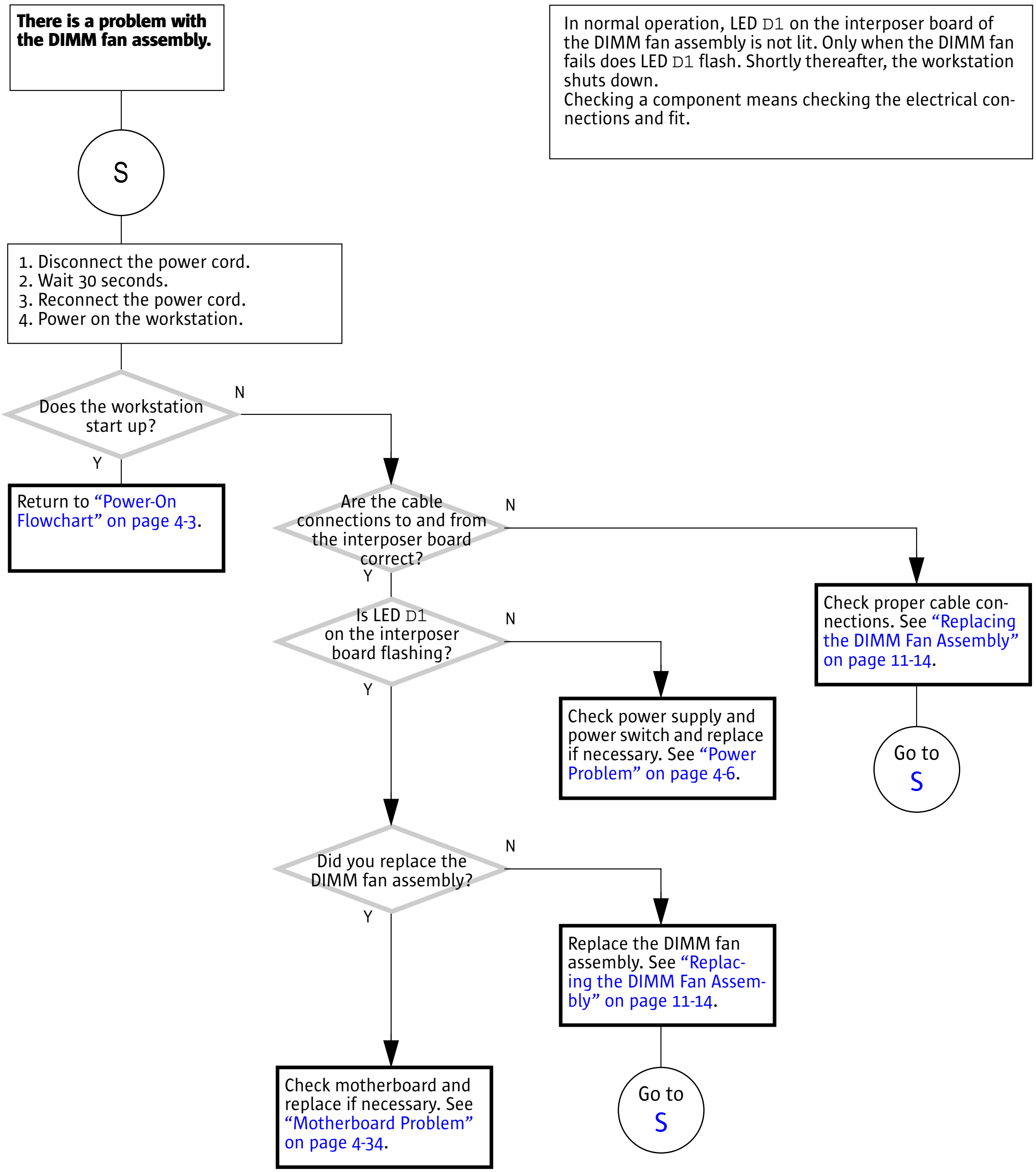



**FIGURE 4-36** DIMM Fan Problem

CHAPTER 5

# Introduction to Advanced Troubleshooting

This chapter discusses advanced troubleshooting using the following software tools:



## 5.1 NVRAM

Chapter 6 contains information on how to use the NVRAM to help troubleshoot the Sun Blade 2500 workstation.

On the Sun Blade 2500 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 2500 system 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 `eeprom` command from the operating system.

## 5.2 Obtaining the ok Prompt for Testing

When the Sun Blade 2500 system 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. | 1. Save all data and close all active applications.<br>2. Become superuser of the system.<br>3. Type: `#` **`init 0`** |
| 2 | Operating system is functioning normally. You do not have superuser access. | 1. Save all data and close all active applications.<br>2. Momentarily press and release the front panel Power button.<br>3. Select Shutdown from the Power Off window (if a GUI is displayed).<br>4. In a few moments, the system powers off.<br>5. Momentarily press and release the front panel Power button to power the system back on.<br>6. When the power LED flashes, press the Power button twice quickly. |
| 3 | System is off. | 1. Momentarily press and release the front panel Power button to power the system back on.<br>2. When the power LED flashes, press the Power button twice quickly. |
| 4 | Operating system is not functioning normally. You can log in as superuser remotely. | Type: `#` **`init 0`** |
| 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 2500 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)`<br>`cpu-unit0(iutest)`<br>`cpu-unit0(fputest)`<br>`l1cache(l1dcachetest)` |
| Memory | Max diag level performs tests including block memory and quick memory tests | No testing | `mem(pmemtest)`<br>`kmem(vmemtest)` |
| I/O bridge chip | Performs several tests including register tests | No testing | No testing |
| Assorted motherboard components | No testing | `i2c@0,320`<br>`pmu@6`<br>`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`<br>`SUNW,XVR-100@3`<br>`SUNW,XVR-1200@3` | `jfb0(jfbtest)`<br>`xvrtest(pfbtest)`<br>`jfb0(jfbtest)` |
| PCI cards | No testing | Tests available if card has IEEE 1275 self-test | |
| Hard drive | No testing | `scsi@4` | `c0t0d0(disktest)` |
| Optical drive | No testing | `ide@d` | `c1t2d0(cddvdrwtest)`<br>`c1t2d0(cdtest)`<br>`c1t2d0(dvdtest)` |
| Assorted motherboard components | No testing | `i2c@0,320, pmu@6, rtc@0,70` | `auxfan1(env3test)` |
| Smart card reader | No testing | `card-reader@0,40` | `scmi2c0(sc2test)` |

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

| Component | POST | OpenBoot Diagnostics | SunVTS |
|---|---|---|---|
| Network* | No testing | `network@2` | `ce0(nettest)`<br>`bge0(netlbtest)` |
| USB | No testing | `usb@a` and `usb@b` | `c1t0d0(disktest)`<br>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(ecpptest)` |
| 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 2500 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 2500 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 2500 system 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 2500 workstation. If an error occurs during that process, a message is likely to be displayed. The error might happen during POST or 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 2500 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 2500 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 2500 hardware and software configuration. Before you can run the Sun Install Check tool, you need to download it from the following web site:

`http://wwws.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 2500** system**, open a web browser and go to the Install Check web site:**

   `http://wwws.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$^{SM}$, Sun Store, or SunSolve$^{SM}$ 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.**

CHAPTER 6

# 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 `eeprom` command from a terminal window, or by key commands.

This chapter contains information about the following topics:



## 6.1 Changing NVRAM Configuration Parameter Values

The NVRAM configuration parameter values set the startup behavior of the Sun Blade 2500 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 |
|---|---|
| `printenv` *parameter* | Displays the current value for the *parameter.*<br>If no parameter is provided, all parameters, their current value, and their default value are displayed. |
| `setenv` *parameter value* | Set *parameter* to *value*. Values are typically textual or numeric. Changes made with the `setenv` command are permanent, but require a reset or power cycle to take affect. |
| `set-default` *parameter* | Resets the *parameter* to the default value. |
| `set-defaults` | Resets all parameters to their default values. |
| `reset-all` | Initiates a warm boot where most NVRAM configuration parameters are read. With power cycling or a cold boot, all NVRAM configuration parameters are read. |
| `password` | Sets the `security-password` |

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

```
ok printenv
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 true means to use the MAC address within the motherboard. |
| fcode-debug? | false | A value of false 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 false disables use of a custom logo. |
| oem-banner | no default | The text of a custom OEM banner. |
| oem-banner? | false | A value of false disables use of a custom banner. |
| ansi-terminal? | true | A value of true 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 `eeprom` 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 |
|---|---|
| `full` | All commands except `go` require the `security-password`. |
| `command` | All commands except `boot` (without arguments) and `go` require the `security-password`. |
| `none` | 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 `eeprom` command displays only the current NVRAM configuration parameter values, similar to the `printenv` command. For example:

```
# eeprom
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 POST. Using the `eeprom` command:

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

The `eeprom` command requires a system reboot for the changes to take effect. For more information, refer to the `eeprom` 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 2500 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 2500 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 2500 system 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 2500 (Silver), Keyboard Present
OpenBoot 4.16.3, 2048 MB memory installed, Serial #56413927.
Ethernet address 0:3:ba:5c:ce:e7, Host ID: 835ccee7.

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 (IOIOI 1) port default settings. See "Setting Up for POST" on page 7-2. |

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

| Parameter | Stop-N Equivalent Value | Description |
|---|---|---|
| `ttyb-mode` | `9600,8,n,1,-` | Serial2 (IOIOI 2) port default settings. See "Setting Up for POST" on page 7-2. |

## 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 to 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.

CHAPTER 7

# Power-On Self-Test

This chapter describes the Sun Blade 2500 power-on self-test (POST). Topics covered are:



---

**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** |
|---|---|
| • Initialize critical CPU resources<br>• CPU tests<br>• CPU $I^2C$ tests<br>• CPU memory<br>• CPU pin checks<br>• Internal cache tests<br>• CPU memory scrub<br>• I/O bridge chip tests | 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:<br>`Executing Power On Self Test` | • Build information is displayed<br>• Test groups are indicated | 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 verbosities are provided in "POST Output" on page 7-6.

## 7.2 Setting Up for POST

To execute POST and view its output, you must:

## 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 IOIOI 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 2500 workstation at the port labeled:

IOIOI 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`

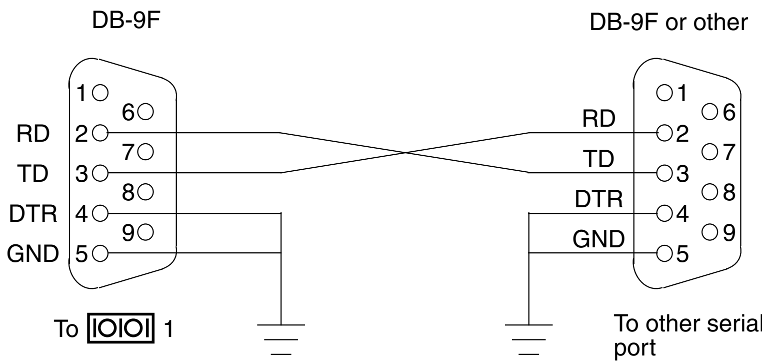



**FIGURE 7-1** Crossover Cable Wiring Diagram

## 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 IOIOI 1.

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 hardwire
```

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 2500 workstation was configured with two 1.6 GHz UltraSPARC IIIi CPUs with two 512 MB DIMMs each.

---

**Note –** The `0>` and `1>` 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 140 seconds.

```
{1} ok post min min

Executing Power On Self Test



Sun Blade 2500 (Silver), Keyboard Present
Copyright 1998-2004 Sun Microsystems, Inc.  All rights reserved.
OpenBoot 4.16.3, 2048 MB memory installed, Serial #56413927.
Ethernet address 0:3:ba:5c:ce:e7, Host ID: 835ccee7.
```

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

---

**Note –** The output beginning with "`Sun Blade....`" or "`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 165 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 |
|---|---|
| `{1} ok` **`post min normal`**<br>`Executing Power On Self Test` | POST is initiated. |
| `0>@(#) Sun Blade[TM] 2500 POST 4.16.3 2004/11/05 19:55` | POST build version and date is displayed. |
| `/dat/fw/common-source/firmware_re/post/post-build-`<br>`4.16.3/Fiesta/enchilada/integrated  (firmware_re)` | POST build path is displayed. |
| `0>Copyright © 2004 Sun Microsystems, Inc. All rights reserved`<br>`SUN PROPRIETARY/CONFIDENTIAL.`<br>`Use is subject to license terms.` | Copyright and license are displayed. |

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

| Output Displayed | What Is Happening |
|---|---|
| `0>OBP->POST Call with %o0=00000800.01012000.`<br>`0>Diag level set to MIN.`<br>`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 1`<br>`0>Test CPU(s)....Done` | The CPUs are identified and tested. |
| `0>Interrupt Crosscall....Done` | Interrupt handlers are set up and checked. |
| `0>Init Memory....Done`<br>`0>PLL Reset....Done`<br>`0>Init Memory....Done`<br>`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 bridges are tested. |
| `0>INFO:`<br>`0>       POST Passed all devices.`<br>`0>`<br>`0>POST: Return to OBP.` | POST has passed successfully and returns control to the OpenBoot PROM. |

---

**Note –** The `0>` and `1>` 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 135 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 |
|---|---|
| `{1} ok` **`post min max`** | POST is initiated. |
| `@(#)OBP 4.16.3 2004/11/05 18:27 Sun Blade 2500 (Silver)`<br>`Clearing TLBs`<br>`Executing Power On Self Test` | OpenBoot PROM resets the system and starts POST. |

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

| Output Displayed | What Is Happening |
|---|---|
| `0>@(#) Sun Blade[TM] 2500 POST 4.16.3 2004/11/05 19:55` | POST build version and date is displayed. |
| `/dat/fw/common-source/firmware_re/post/post-build-4.16.3/Fiesta/enchilada/integrated  (firmware_re)` | POST build path is displayed. |
| `0>Copyright © 2004 Sun Microsystems, Inc. All rights reserved`<br>`SUN PROPRIETARY/CONFIDENTIAL.`<br>`Use is subject to license terms.` | Copyright and license displayed. |
| `0>Soft Power-on RST thru SW`<br>`0>OBP->POST Call with %o0=00001000.01012000.`<br>`0>Diag level set to MIN.`<br>`0>Verbosity level set to MAX.`<br>`0>MFG scrpt mode set NORM`<br>`0>I/O port set to TTYA.` | `CPU0` is acknowledged and POST configuration is read from register. |
| `0>Start Selftest.....`<br>`0>CPUs present in system: 0 1`<br>`0>Test CPU(s).....`<br>`0>Init SB`<br>`0>Initialize I2C Controller`<br>`0>Init CPU`<br>`0>DMMU`<br>`0>DMMU TLB DATA RAM Access`<br>`0>DMMU TLB TAGS Access`<br>`0>IMMU Registers Access`<br>`0>IMMU TLB DATA RAM Access`<br>`0>IMMU TLB TAGS Access`<br>`0>Init mmu regs` | CPU, I/O bridge, data memory management unit (DMMU), and instruction memory management unit (IMMU) are initialized for `CPU0`. |
| `0>Setup L2 Cache`<br>`0>L2 Cache Control = 00000000.00f04400`<br>`0>       Size = 00000000.00100000...`<br>`0>Scrub and Setup L2 Cache` | L2 cache is set up and scrubbed (data values set to defaults) for `CPU0`. |
| `0>Setup and Enable DMMU`<br>`0>Setup DMMU Miss Handler` | DMMU is set up for `CPU0`. |
| `0>Test  Mailbox`<br>`0>Scrub Mailbox` | Mailbox register is checked and initialized for `CPU0`. |
| `0>CPU Tick and Tick Compare Registers Test` | Operation of TICK registers is verified for `CPU0`. |
| `0>CPU Stick and Stick Compare Registers Test` | Operation of STICK registers is verified for `CPU0`. |
| `0>Set Timing` | Motherboard timing is to be configured. |
| `0>       UltraSPARC[TM] IIIi, Version 3.4` | CPU version is identified for `CPU0`. |
| `1>Init CPU` | `CPU1` is initialized. |

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

| Output Displayed | What Is Happening |
|---|---|
| `1>       UltraSPARC[TM] IIIi, Version 3.4` | CPU version is identified for `CPU1`. |
| `1>DMMU`<br>`1>DMMU TLB DATA RAM Access`<br>`1>DMMU TLB TAGS Access`<br>`1>IMMU Registers Access`<br>`1>IMMU TLB DATA RAM Access`<br>`1>IMMU TLB TAGS Access`<br>`1>Init mmu regs` | Data memory management unit (DMMU) and instruction memory management unit (IMMU) are initialized for `CPU1`. |
| `1>Setup L2 Cache`<br>`1>L2 Cache Control = 00000000.00f04400`<br>`1>       Size = 00000000.00100000...`<br>`1>Scrub and Setup L2 Cache` | L2 cache is set up and scrubbed (data values set to defaults) for `CPU1`. |
| `1>Setup and Enable DMMU`<br>`1>Setup DMMU Miss Handler` | DMMU is set up for `CPU1`. |
| `1>Test  Mailbox`<br>`1>Scrub Mailbox` | Mailbox register is checked and initialized for `CPU1`. |
| `1>CPU Tick and Tick Compare Registers Test` | Operation of TICK registers is verified for `CPU1`. |
| `1>CPU Stick and Stick Compare Registers Test` | Operation of STICK registers is verified for `CPU1`. |
| `0>Interrupt Crosscall.....`<br>`1>Setup Int Handlers`<br>`0>Setup Int Handlers`<br>`0>Send Int CPU 1`<br>`1>Send Int to Master CPU` | Interrupt handlers are set up for `CPU0` and `CPU1`. |
| `0>MB:   Part-Dash-Rev#:  3753192-01-02  Serial#:  000116` | Motherboard part number and serial number is read from FRU ID. |
| `0>Set CPU/System Speed`<br>`0>MCR Timing index = 00000000.00000004` | Jumpers for CPU and JBus frequency are read. |
| `0>Send MC Timing CPU 1` | Timing information is sent to `CPU1`. |
| `0>Init Memory.....` | Memory is initialized |
| `0>Probe Dimms`<br>`1>Probe Dimms` | Presence of DIMMs for both CPUs is checked. |
| `1>Init Mem Controller Regs`<br>`0>Init Mem Controller Regs` | Memory controller registers are initialized for both CPUs. |
| `1>Set JBUS config reg`<br>`0>Set JBUS config reg` | JBus frequency registers are set for both CPUs. |

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

| Output Displayed | What Is Happening |
|---|---|
| `0>IO-Bridge unit 0 init test`<br>`0>IO-Bridge unit 1 init test` | Both I/O bridge chips are 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 1600 MHz` | Reconfigured frequencies are displayed. |
| `0>Soft Power-on RST thru SW` | Soft reset. |
| `0>PLL Reset.....`<br>`0>Init SB`<br>`0>Initialize I2C Controller`<br>`0>Init CPU`<br>`0>Init mmu regs`<br>`0>Setup L2 Cache`<br>`0>L2 Cache Control = 00000000.00f04400`<br>`0>       Size = 00000000.00100000...`<br>`0>Setup and Enable DMMU`<br>`0>Setup DMMU Miss Handler`<br>`0>Scrub Mailbox` | Initializations and setups are repeated for `CPU0`. |
| `0>Timing is 10:1 12:1, sys 159 MHz, CPU 1599 MHz, mem 133 MHz.` | New timing ratios and frequencies for `CPU0` are displayed. |
| `0>       UltraSPARC[TM] IIIi, Version 3.4` | CPU version is identified for `CPU0`. |
| `1>Init CPU` | `CPU1` is initialized. |
| `1>       UltraSPARC[TM] IIIi, Version 3.4` | CPU version is identified for `CPU1`. |
| `1>Init mmu regs`<br>`1>Setup L2 Cache`<br>`1>L2 Cache Control = 00000000.00f04400`<br>`1>       Size = 00000000.00100000...`<br>`1>Setup and Enable DMMU`<br>`1>Setup DMMU Miss Handler`<br>`1>Scrub Mailbox` | Initializations and setups are repeated for `CPU1`. |
| `1>Timing is 10:1 12:1, sys 159 MHz, CPU 1599 MHz, mem 133 MHz.` | New timing ratios and frequencies for `CPU1` are displayed. |
| `0>Init Memory.....`<br>`0>Probe Dimms`<br>`1>Probe Dimms`<br>`1>Init Mem Controller Sequence`<br>`0>Init Mem Controller Sequence`<br>`0>IO-Bridge unit 0 init test`<br>`0>IO-Bridge unit 1 init test` | Repeated initialization continues. |

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

| Output Displayed | What Is Happening |
|---|---|
| `0>Test Memory.....`<br>`0>Select Bank Config`<br>`0>Probe and Setup Memory`<br>`0>INFO: 1024MB Bank 0, Dimm Type X4`<br>`0>INFO: No memory detected in Bank 1`<br>`0>INFO: No memory detected in Bank 2`<br>`0>INFO: No memory detected in Bank 3` | Memory is probed for `CPU0`. |
| `0>Data Bitwalk on Master` | CPU data pins are tested for `CPU0`. |
| `0>       Test Bank 0.` | Where found, memory is tested for `CPU0`. |
| `0>Address Bitwalk on Master`<br>`0>Addr walk mem test on CPU 0 Bank 0: 00000000.00000000 to 00000000.40000000.` | `CPU0` address pins are tested. |
| `0>Set Mailbox` | Mailbox register is set for `CPU0`. |
| `0>Final mc1 is 10000006.3e581c60.` | Memory control register 1 is set for `CPU0`. |
| `0>Setup Final DMMU Entries` | Memory is allocated for POST for `CPU0`. |
| `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.`<br>`0>The Memory's CHECKSUM value is e674.`<br>`0>The Memory's Content Size value is 689a9.`<br>`0>Success...  Checksum on Memory Validated.` | Copied data is verified. |
| `1>Select Bank Config`<br>`1>Probe and Setup Memory`<br>`1>INFO: 1024MB Bank 0, Dimm Type X4`<br>`1>INFO: No memory detected in Bank 1`<br>`1>INFO: No memory detected in Bank 2`<br>`1>INFO: No memory detected in Bank 3` | Memory is probed for `CPU1`. |
| `1>Set Mailbox` | Mailbox register is set for `CPU1`. |
| `1>Final mc1 is 10000006.3e581c60.` | Memory control register 1 is set for `CPU1`. |
| `0>Data Bitwalk on Slave 1` | CPU data pins are tested for `CPU1`. |
| `0>       Test Bank 0.` | Where found, memory is tested for `CPU1`. |

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

| Output Displayed | What Is Happening |
|---|---|
| `0>Address Bitwalk on Slave 1`<br>`0>Addr walk mem test on CPU 1 Bank 0: 00000010.00000000 to 00000010.40000000.` | CPU address pins are tested. |
| `1>Setup Final DMMU Entries` | Memory is allocated for POST for CPU1. |
| `1>Map Slave POST to master memory` | POST is mapped to CPU0s memory. |
| `1>FPU Registers and Data Path`<br>`0>FPU Registers and Data Path`<br>`1>FPU Move Registers`<br>`0>FPU Move Registers` | Floating point units (FPU) for both CPUs are checked. |
| `1>FSR Read/Write`<br>`0>FSR Read/Write` | FPU status registers for both CPUs are checked. |
| `1>FPU Block Register Test`<br>`0>FPU Block Register Test` | Additional FPU testing is performed for each CPU. |
| `1>Scrub Memory`<br>`0>Scrub Memory` | Memory is set to zero for both CPUs. |
| `1>Quick Block Mem Test`<br>`1>Quick Test 4194304 bytes at 00000010.00000000`<br>`0>Quick Block Mem Test`<br>`0>Quick Test 4194304 bytes at 00000000.00600000` | A quick test of memory is made at a particular address for each CPU. |
| `1>Flush Caches`<br>`0>Flush Caches` | Caches are set to zero for both CPUs. |
| `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`<br>`0>        to IO-bridge_0`<br>`0>        to IO-bridge_1` | JBus communication with I/O bridges is checked. |
| `0>IO-Bridge unit 0 sram       test` | I/O bridge0 32K scratch pad SRAM is checked for CPU0. |
| `0>IO-Bridge unit 0 reg        test` | I/O bridge0 registers are checked for CPU0. |
| `0>IO-Bridge unit 0 mem        test` | I/O bridge0 memory is checked for CPU0. |
| `0>IO-Bridge unit 0 PCI id     test` | I/O bridge0 PCI buses are checked for CPU0. |
| `0>IO-Bridge unit 0 interrupt test` | I/O bridge0 interrupts are checked for CPU0. |

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

| Output Displayed | What Is Happening |
|---|---|
| `0>IO-Bridge unit 1 sram      test`<br>`0>IO-Bridge unit 1 reg       test`<br>`0>IO-Bridge unit 1 mem       test`<br>`0>IO-Bridge unit 1 PCI id    test`<br>`0>IO-Bridge unit 1 interrupt test` | Tests are repeated for I/O bridge1 and `CPU0`. |
| `0>IO-Bridge unit 0 init      test` | I/O bridge0 is reinitialized. |
| `1>IO-Bridge unit 0 sram      test`<br>`1>IO-Bridge unit 0 reg       test`<br>`1>IO-Bridge unit 0 mem       test`<br>`1>IO-Bridge unit 0 PCI id    test`<br>`1>IO-Bridge unit 0 interrupt test` | Tests are repeated for I/O bridge0 and `CPU1`. |
| `1>IO-Bridge unit 1 init      test` | I/O bridge1 is reinitialized. |
| `1>IO-Bridge unit 1 sram      test`<br>`1>IO-Bridge unit 1 reg       test`<br>`1>IO-Bridge unit 1 mem       test`<br>`1>IO-Bridge unit 1 PCI id    test`<br>`1>IO-Bridge unit 1 interrupt test` | Tests are repeated for I/O bridge1 and `CPU1`. |
| `1>Print Mem Config` | Memory configuration is to be displayed for `CPU1`. |
| `1>Caches : Icache is ON, Dcache is ON, Wcache is ON, Pcache is ON.` | Cache status is displayed for `CPU1`. |
| `1>Memory interleave set to 0`<br>`1>      Bank 0 1024MB : 00000010.00000000 -> 00000010.40000000.` | 4 megabyte portion of memory is scrubbed and tested for `CPU1`. |
| `0>Print Mem Config` | Memory configuration is to be displayed for `CPU0`. |
| `0>Caches : Icache is ON, Dcache is ON, Wcache is ON, Pcache is ON.` | Cache status is displayed for `CPU0`. |
| `0>Memory interleave set to 0`<br>`0>      Bank 0 1024MB : 00000000.00000000 -> 00000000.40000000.` | 4 megabyte portion of memory is scrubbed and tested for `CPU0`. |
| `0>INFO:`<br>`0>      POST Passed all devices.`<br>`0>`<br>`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 210 seconds.

```
{1} 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 260 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 |
|---|---|
| `{1} ok` **`post max normal`**<br><br>`Executing Power On Self Test` | POST is initiated. |
| `0>@(#) Sun Blade[TM] 2500 POST 4.16.3 2004/11/05 19:55` | POST build version and date is displayed. |
| `/dat/fw/common-source/firmware_re/post/post-build-4.16.3/Fiesta/enchilada/integrated (firmware_re)` | POST build path is displayed. |
| `0>Copyright © 2004 Sun Microsystems, Inc. All rights reserved`<br>`SUN PROPRIETARY/CONFIDENTIAL.`<br>`Use is subject to license terms.` | Copyright and license are displayed. |
| `0>OBP->POST Call with %o0=00000800.01014000.`<br>`0>Diag level set to MAX.`<br>`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 1`<br>`0>Test CPU(s)....Done` | CPUs are identified and tested. |
| `0>Interrupt Crosscall....Done` | Interrupt handlers are set up and checked. |

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

| Output Displayed | What Is Happening |
|---|---|
| `0>Init Memory....Done`<br>`0>PLL Reset....Done`<br>`0>Init Memory....Done`<br>`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` | CPUs are tested. |
| `0>IO-Bridge Tests....Done` | I/O bridges are tested. |
| `0>INFO:`<br>`0>       POST Passed all devices.`<br>`0>`<br>`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 200 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 |
|---|---|
| `{1} ok` **`post max max`** | POST is initiated. |
| `@(#)OBP 4.16.3 2004/11/05 18:27 Sun Blade 2500 (Silver)`<br>`Clearing TLBs`<br>`Executing Power On Self Test` | OpenBoot PROM resets the system and starts POST. |
| `0>@(#) Sun Blade[TM] 2500 POST 4.16.3 2004/11/05 19:55` | POST build version and date is displayed. |
| ` /dat/fw/common-source/firmware_re/post/post-build-`<br>`4.16.3/Fiesta/enchilada/integrated  (firmware_re)` | POST build path is displayed. |
| `0>Copyright © 2004 Sun Microsystems, Inc. All rights reserved`<br>`  SUN PROPRIETARY/CONFIDENTIAL.`<br>`  Use is subject to license terms.` | Copyright and license displayed. |
| `0>Soft Power-on RST thru SW`<br>`0>OBP->POST Call with %o0=00001000.01012000.`<br>`0>Diag level set to MIN.`<br>`0>Verbosity level set to MAX.`<br>`0>MFG scrpt mode set NORM`<br>`0>I/O port set to TTYA.` | `CPU0` is acknowledged and POST configuration is read from register. |

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

| Output Displayed | What Is Happening |
|---|---|
| `0>Start Selftest.....`<br>`0>CPUs present in system: 0 1`<br>`0>Test CPU(s).....`<br>`0>Init SB`<br>`0>Initialize I2C Controller`<br>`0>Init CPU`<br>`0>DMMU`<br>`0>DMMU TLB DATA RAM Access`<br>`0>DMMU TLB TAGS Access`<br>`0>IMMU Registers Access`<br>`0>IMMU TLB DATA RAM Access`<br>`0>IMMU TLB TAGS Access`<br>`0>Init mmu regs` | CPU, I/O bridge, data memory management unit (DMMU), and instruction memory management unit (IMMU) are initialized for `CPU0`. |
| `0>Setup L2 Cache`<br>`0>L2 Cache Control = 00000000.00f04400`<br>`0>      Size = 00000000.00100000...`<br>`0>L2 Cache Tags Test`<br>`0>Scrub and Setup L2 Cache` | L2 cache is set up and scrubbed (data values set to defaults) for `CPU0`. |
| `0>Setup and Enable DMMU`<br>`0>Setup DMMU Miss Handler` | DMMU is set up for `CPU0`. |
| `0>Test  Mailbox`<br>`0>Scrub Mailbox` | Mailbox register is checked and initialized for `CPU0`. |
| `0>CPU Tick and Tick Compare Registers Test` | Operation of TICK registers is verified for `CPU0`. |
| `0>CPU Stick and Stick Compare Registers Test` | Operation of STICK registers is verified for `CPU0`. |
| `0>Set Timing` | Motherboard timing is to be configured. |
| `0>      UltraSPARC[TM] IIIi, Version 3.4` | CPU version is identified for `CPU0`. |
| `1>Init CPU` | `CPU1` is initialized. |
| `1>      UltraSPARC[TM] IIIi, Version 3.4` | CPU version is identified for `CPU1`. |
| `1>DMMU`<br>`1>DMMU TLB DATA RAM Access`<br>`1>DMMU TLB TAGS Access`<br>`1>IMMU Registers Access`<br>`1>IMMU TLB DATA RAM Access`<br>`1>IMMU TLB TAGS Access`<br>`1>Init mmu regs` | Data memory management unit (DMMU) and instruction memory management unit (IMMU) are initialized for `CPU1`. |
| `1>Setup L2 Cache`<br>`1>L2 Cache Control = 00000000.00f04400`<br>`1>      Size = 00000000.00100000...`<br>`1>L2 Cache Tags Test`<br>`1>Scrub and Setup L2 Cache` | L2 cache is set up and scrubbed (data values set to defaults) for `CPU1`. |

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

| Output Displayed | What Is Happening |
|---|---|
| `1>Setup and Enable DMMU`<br>`1>Setup DMMU Miss Handler` | DMMU is set up for `CPU1`. |
| `1>Test  Mailbox`<br>`1>Scrub Mailbox` | Mailbox register is checked and initialized for `CPU1`. |
| `1>CPU Tick and Tick Compare Registers Test` | Operation of TICK registers is verified for `CPU1`. |
| `1>CPU Stick and Stick Compare Registers Test` | Operation of STICK registers is verified for `CPU1`. |
| `0>Interrupt Crosscall.....`<br>`1>Setup Int Handlers`<br>`0>Setup Int Handlers`<br>`0>Send Int CPU 1`<br>`1>Send Int to Master CPU` | Interrupt handlers are set up for `CPU0` and `CPU1`. |
| `0>MB:   Part-Dash-Rev#:  3753192-01-02  Serial#:  000116` | Motherboard part number and serial number is read from FRU ID. |
| `0>CPU0 DIMM 0:`<br>`0>Part#:  M3 12L6420ETS-CA2   Serial#:  45100795  Date Code:  0347`<br>`Rev#:  5345`<br>`0>CPU0 DIMM 1:`<br>`0>Part#:  M3 12L6420ETS-CA2   Serial#:  450c079f  Date Code:  0347`<br>`Rev#:  5345`<br>`0>CPU1 DIMM 4:`<br>`0>Part#:  M3 12L6420ETS-CA2   Serial#:  45097cd4  Date Code:  0342`<br>`Rev#:  5345`<br>`0>CPU1 DIMM 5:`<br>`0>Part#:  M3 12L6420ETS-CA2   Serial#:  450a7cce  Date Code:  0342`<br>`Rev#:  5345` | DIMM part numbers, serial numbers, date codes, and revisions are read from FRU IDs. |
| `0>Set CPU/System Speed`<br>`0>MCR Timing index = 00000000.00000004` | Jumpers for CPU and JBus frequency are read. |
| `0>Send MC Timing CPU 1` | Timing information is sent to `CPU1`. |
| `0>Init Memory.....` | Memory is initialized |
| `0>Probe Dimms`<br>`1>Probe Dimms` | Presence of DIMMs for both CPUs is checked. |
| `1>Init Mem Controller Regs`<br>`0>Init Mem Controller Regs` | Memory controller registers are initialized for both CPUs. |
| `1>Set JBUS config reg`<br>`0>Set JBUS config reg` | JBus frequency registers are set for both CPUs. |
| `0>IO-Bridge unit 0 init test`<br>`0>IO-Bridge unit 1 init test` | Both I/O bridge chips are initialized. |
| `0>Do PLL reset` | Phase locked loop (PLL) is reset. |

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

| Output Displayed | What Is Happening |
|---|---|
| `0>Setting timing to 10:1 12:1, system frequency 160 MHz, CPU frequency 1600 MHz` | Reconfigured frequencies are displayed. |
| `0>Soft Power-on RST thru SW` | Soft reset. |
| `0>PLL Reset.....`<br>`0>Init SB`<br>`0>Initialize I2C Controller`<br>`0>Init CPU`<br>`0>Init mmu regs`<br>`0>Setup L2 Cache`<br>`0>L2 Cache Control = 00000000.00f04400`<br>`0>       Size = 00000000.00100000...`<br>`0>Setup and Enable DMMU`<br>`0>Setup DMMU Miss Handler`<br>`0>Scrub Mailbox` | Initializations and setups are repeated for `CPU0`. |
| `0>Timing is 10:1 12:1, sys 159 MHz, CPU 1599 MHz, mem 133 MHz.` | New timing ratios and frequencies for `CPU0` are displayed. |
| `0>       UltraSPARC[TM] IIIi, Version 3.4` | CPU version is identified for `CPU0`. |
| `1>Init CPU` | `CPU1` is initialized. |
| `1>       UltraSPARC[TM] IIIi, Version 3.4` | CPU version is identified for `CPU1`. |
| `1>Init mmu regs`<br>`1>Setup L2 Cache`<br>`1>L2 Cache Control = 00000000.00f04400`<br>`1>       Size = 00000000.00100000...`<br>`1>Setup and Enable DMMU`<br>`1>Setup DMMU Miss Handler`<br>`1>Scrub Mailbox` | Initializations and setups are repeated for `CPU1`. |
| `1>Timing is 10:1 12:1, sys 159 MHz, CPU 1599 MHz, mem 133 MHz.` | New timing ratios and frequencies for `CPU1` are displayed. |
| `0>Init Memory.....`<br>`0>Probe Dimms`<br>`1>Probe Dimms`<br>`1>Init Mem Controller Sequence`<br>`0>Init Mem Controller Sequence`<br>`0>IO-Bridge unit 0 init test`<br>`0>IO-Bridge unit 1 init test` | Repeated initialization continues. |
| `0>Test Memory.....`<br>`0>Select Bank Config`<br>`0>Probe and Setup Memory`<br>`0>INFO: 1024MB Bank 0, Dimm Type X4`<br>`0>INFO: No memory detected in Bank 1`<br>`0>INFO: No memory detected in Bank 2`<br>`0>INFO: No memory detected in Bank 3` | Memory is probed for `CPU0`. |
| `0>Data Bitwalk on Master` | CPU data pins are tested for `CPU0`. |

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

| Output Displayed | What Is Happening |
|---|---|
| `0>       Test Bank 0.` | Where found, memory is tested for `CPU0`. |
| `0>Address Bitwalk on Master`<br>`0>Addr walk mem test on CPU 0 Bank 0: 00000000.00000000 to 00000000.40000000.` | `CPU0` address pins are tested. |
| `0>Set Mailbox` | Mailbox register is set for `CPU0`. |
| `0>Final mc1 is 10000006.3e581c60.` | Memory control register 1 is set for `CPU0`. |
| `0>Setup Final DMMU Entries` | Memory is allocated for POST for `CPU0`. |
| `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.`<br>`0>The Memory's CHECKSUM value is e674.`<br>`0>The Memory's Content Size value is 689a9.`<br>`0>Success...  Checksum on Memory Validated.` | Copied data is verified. |
| `1>Select Bank Config`<br>`1>Probe and Setup Memory`<br>`1>INFO: 1024MB Bank 0, Dimm Type X4`<br>`1>INFO: No memory detected in Bank 1`<br>`1>INFO: No memory detected in Bank 2`<br>`1>INFO: No memory detected in Bank 3` | Memory is probed for `CPU1`. |
| `1>Set Mailbox` | Mailbox register is set for `CPU1`. |
| `1>Final mc1 is 10000006.3e581c60.` | Memory control register 1 is set for `CPU1`. |
| `0>Data Bitwalk on Slave 1` | CPU data pins are tested for `CPU1`. |
| `0>       Test Bank 0.` | Where found, memory is tested for `CPU1`. |
| `0>Address Bitwalk on Slave 1`<br>`0>Addr walk mem test on CPU 1 Bank 0: 00000010.00000000 to 00000010.40000000.` | `CPU` address pins are tested. |
| `1>Setup Final DMMU Entries` | Memory is allocated for POST for `CPU1`. |
| `1>Map Slave POST to master memory` | POST is mapped to `CPU0s` memory. |
| `0>Test CPU Caches.....` | CPU caches are tested. |

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

| Output Displayed | What Is Happening |
|---|---|
| `1>I-Cache RAM Test`<br>`0>I-Cache RAM Test`<br>`1>I-Cache Tag RAM`<br>`0>I-Cache Tag RAM`<br>`1>I-Cache Valid/Predict TAGS Test`<br>`0>I-Cache Valid/Predict TAGS Test`<br>`1>I-Cache Snoop Tag Field`<br>`0>I-Cache Snoop Tag Field`<br>`1>I-Cache Branch Predict Array Test`<br>`0>I-Cache Branch Predict Array Test` | Instruction caches are tested for both CPUs. |
| `1>Branch Prediction Initialization`<br>`0>Branch Prediction Initialization`<br>`1>D-Cache RAM`<br>`0>D-Cache RAM`<br>`1>D-Cache Tags`<br>`0>D-Cache Tags`<br>`1>D-Cache Micro Tags`<br>`0>D-Cache Micro Tags`<br>`1>D-Cache SnoopTags Test`<br>`0>D-Cache SnoopTags Test`<br>`1>W-Cache RAM`<br>`0>W-Cache RAM`<br>`1>W-Cache Tags`<br>`0>W-Cache Tags`<br>`1>W-Cache Valid bit Test`<br>`0>W-Cache Valid bit Test`<br>`1>W-Cache Bank valid bit Test`<br>`0>W-Cache Bank valid bit Test`<br>`1>W-Cache SnoopTAGS Test`<br>`0>W-Cache SnoopTAGS Test` | Data and write caches are tested for both CPUs. |
| `1>P-Cache RAM`<br>`0>P-Cache RAM`<br>`1>P-Cache Tags`<br>`0>P-Cache Tags`<br>`1>P-Cache SnoopTags Test`<br>`0>P-Cache SnoopTags Test`<br>`1>P-Cache Status Data Test`<br>`0>P-Cache Status Data Test` | Prefetch caches are tested for both CPUs. |
| `1>8k DMMU TLB 0 Data`<br>`0>8k DMMU TLB 0 Data`<br>`1>8k DMMU TLB 1 Data`<br>`0>8k DMMU TLB 1 Data`<br>`1>8k DMMU TLB 0 Tags`<br>`0>8k DMMU TLB 0 Tags`<br>`1>8k DMMU TLB 1 Tags`<br>`0>8k DMMU TLB 1 Tags`<br>`1>8k IMMU TLB Data`<br>`0>8k IMMU TLB Data`<br>`1>8k IMMU TLB Tags`<br>`0>8k IMMU TLB Tags` | Translation look-aside buffers (TLB) are tested for data and instruction buffers for both CPUs. |

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

| Output Displayed | What Is Happening |
|---|---|
| `1>FPU Registers and Data Path`<br>`0>FPU Registers and Data Path`<br>`1>FPU Move Registers`<br>`0>FPU Move Registers` | Floating point units (FPU) for both CPUs are checked. |
| `1>FSR Read/Write`<br>`0>FSR Read/Write` | FPU status registers for both CPUs are checked. |
| `1>FPU Block Register Test`<br>`0>FPU Block Register Test`<br>`1>FPU Branch Instructions`<br>`0>FPU Branch Instructions`<br>`1>FPU Functional Test`<br>`0>FPU Functional Test` | Additional FPU testing is performed for each CPU. |
| `1>Scrub Memory`<br>`0>Scrub Memory` | Memory is set to zero for both CPUs. |
| `1>Flush Caches`<br>`0>Flush Caches` | Caches are set to zero for both CPUs. |
| `0>Functional CPU Tests.....` | Functional tests for both CPUs begins. |
| `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`<br>`0>        to IO-bridge_0`<br>`0>        to IO-bridge_1` | JBus communication with I/O bridges is checked. |
| `0>IO-Bridge unit 0 sram      test` | I/O bridge0 32K scratch pad SRAM is checked for `CPU0`. |
| `0>IO-Bridge unit 0 reg       test` | I/O bridge0 registers are checked for `CPU0`. |
| `0>IO-Bridge unit 0 mem       test` | I/O bridge0 memory is checked for `CPU0`. |
| `0>IO-Bridge unit 0 PCI id    test` | I/O bridge0 PCI buses are checked for `CPU0`. |
| `0>IO-Bridge unit 0 interrupt test` | I/O bridge0 interrupts are checked for `CPU0`. |
| `0>IO-Bridge unit 1 sram      test`<br>`0>IO-Bridge unit 1 reg       test`<br>`0>IO-Bridge unit 1 mem       test`<br>`0>IO-Bridge unit 1 PCI id    test`<br>`0>IO-Bridge unit 1 interrupt test` | Tests are repeated for I/O bridge1 and `CPU0`. |
| `0>IO-Bridge unit 0 init      test` | I/O bridge0 is reinitialized. |

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

| Output Displayed | What Is Happening |
|---|---|
| `1>IO-Bridge unit 0 sram test`<br>`1>IO-Bridge unit 0 reg test`<br>`1>IO-Bridge unit 0 mem test`<br>`1>IO-Bridge unit 0 PCI id test`<br>`1>IO-Bridge unit 0 interrupt test` | Tests are repeated for I/O bridge0 and `CPU1`. |
| `1>IO-Bridge unit 1 init test` | I/O bridge1 is reinitialized. |
| `1>IO-Bridge unit 1 sram test`<br>`1>IO-Bridge unit 1 reg test`<br>`1>IO-Bridge unit 1 mem test`<br>`1>IO-Bridge unit 1 PCI id test`<br>`1>IO-Bridge unit 1 interrupt test` | Tests are repeated for I/O bridge1 and `CPU1`. |
| `1>Print Mem Config` | Memory configuration is to be displayed for `CPU1`. |
| `1>Caches : Icache is ON, Dcache is ON, Wcache is ON, Pcache is ON.` | Cache status is displayed for `CPU1`. |
| `1>Memory interleave set to 0`<br>`1> Bank 0 1024MB : 00000010.00000000 -> 00000010.40000000.` | 4 megabyte portion of memory is scrubbed and tested for `CPU1`. |
| `0>Print Mem Config` | Memory configuration is to be displayed for `CPU0`. |
| `0>Caches : Icache is ON, Dcache is ON, Wcache is ON, Pcache is ON.` | Cache status is displayed for `CPU0`. |
| `0>Memory interleave set to 0`<br>`0> Bank 0 1024MB : 00000000.00000000 -> 00000000.40000000.` | 4 megabyte portion of memory is scrubbed and tested for `CPU0`. |
| `1>Block Memory`<br>`0>Block Memory` | Memory is checked again for both CPUs. |
| `1>Test 1073741824 bytes on bank 0....`<br>`0>Test 1067450368 bytes on bank 0....`<br>`0>0% Done...`<br>`0>2% Done...`<br>`0>3% Done...`<br>`0>4% Done...`<br>`...`<br>`0>97% Done...`<br>`0>98% Done...`<br>`0>99% Done...` | Memory is checked in bank0 for both CPUs. |
| `0>INFO:`<br>`0> POST Passed all devices.`<br>`0>`<br>`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 7-24
- "Warning Messages" on page 7-25
- "Info Messages" on page 7-26

## 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.

CHAPTER 8

# OpenBoot PROM

This chapter discusses troubleshooting the Sun Blade 2500 system 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-scsi` Utility" on page 8-3
- "`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 8-5


---

**Note –** In the example outputs provided in this chapter, `{0}` and `{1}` indicate which CPU (`CPU0` or `CPU1` respectively) of a dual CPU Sun Blade 2500 workstation is responding with the ok prompt.

---

## 8.1.1 `show-devs` Utility

The `show-devs` utility displays the devices installed in the Sun Blade 2500 workstation recognized by the OpenBoot PROM. For example:

```
{1} ok show-devs
/i2c@1f,464000
/pci@1f,700000
/ppm@1e,0
/pci@1e,600000
/pci@1d,700000
/ppm@1c,0
/pci@1c,600000
/memory-controller@1,0
/SUNW,UltraSPARC-IIIi@1,0
/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
```

The `{1}` indicates that `CPU1` is responding with the `ok` prompt. 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:

```
{1} 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-scsi Utility

The probe-scsi utility displays the manufacturer and model of devices attached to the scsi bus. For example:

```
{1} ok probe-scsi
Target 0
  Unit 0   Disk HITACHI DK32EJ14NSUN146GPQ0B    286739329 Blocks, 140009 MB
```

If no information regarding an installed device is displayed, check the cable connections inside of the Sun Blade 2500 chassis.

## 8.1.4 probe-ide Utility

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

```
{1} ok probe-ide
Device 0  ( Primary Master )
         Not Present

  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 2500 chassis.

## 8.1.5 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:

```
{1} ok banner
Sun Blade 2500 (Silver), Keyboard Present
Copyright 1998-2004 Sun Microsystems, Inc.  All rights reserved.
OpenBoot 4.16.3, 2048 MB memory installed, Serial #56413927.
Ethernet address 0:3:ba:5c:ce:e7, Host ID: 835ccee7.
```

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

### 8.1.6 `watch-clock` Utility

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

```
{1} 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.

### 8.1.7 `date` Utility

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

```
{1} ok date
09/17/2004 02:42:56  GMT
```

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

### 8.1.8 `.version` Utility

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

- OpenBoot PROM
- OpenBoot Diagnostics
- POST

For example:

```
{1} ok .version
Release 4.16.3  created 2004/11/05 18:27
OBP 4.16.3 2004/11/05 18:27 Sun Blade 2500 (Silver)
OBDIAG 4.16.3 2004/11/05 18:30
POST 4.16.3 2004/11/05 19:55
```

## 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 TIP 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-1200@2      |  2 card-reader@0,40     |  3 flashprom@2,0         |
|  4 i2c@0,320            |  5 ide@d                |  6 network@3             |
|  7 parallel@0,378       |  8 pmu@6                |  9 rtc@0,70              |
| 10 scsi@4               | 11 scsi@4,1             | 12 serial@0,2e8          |
| 13 serial@0,3f8         | 14 sound@8              | 15 usb@a                 |
| 16 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-1200 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@3            |  6 parallel@0,378       |
|  7 pmu@6                |  8 rtc@0,70             |  9 scsi@4               |
| 10 scsi@4,1             | 11 serial@0,2e8         | 12 serial@0,3f8         |
| 13 sound@8              | 14 usb@a                | 15 usb@b                |
|_________________________|_________________________|_________________________|
|        Commands: test test-all except help what setenv set-default exit     |
|_____________________________________________________________________________|
|            diag-passes=1 diag-level=max test-args=verbose,subtests          |
|_____________________________________________________________________________|

obdiag>
```

## 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 FLASHPROM or POST header is unrecognized
   DEVICE  : /pci@1e,600000/isa@7/flashprom@2,0
   SUBTEST : selftest:crc-subtest
   MACHINE : Sun Blade 2500 (Silver)
   SERIAL# : 51221819
   DATE    : 11/05/2004 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 2500 system can perform the following diagnostic tests:


- "SUNW,XVR-1200@2 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 8-12
- "ide@d Test" on page 8-14
- "network@3 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 8-17
- "scsi@4 Test" on page 8-18
- "scsi@4,1 Test" on page 8-18
- "serial@0,2e8 Test" on page 8-18
- "serial@0,3f8 Test" on page 8-19
- "sound@8 Test" on page 8-19
- "usb@a Test" on page 8-21
- "usb@b Test" on page 8-22


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@2`<br>`SUNW,XVR-100@2`<br>`SUNW,XVR-1200@2` | 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 "PCI Card Problem" on page 4-28 or "Replacing the PCI Cards" on page 11-28. |
| `card-reader@0,40` | Checks for the presence of the smart card reader. | Problem with the smart card reader, smart card reader cable, or $I^2C$ chip on motherboard. See "Smart Card Reader Problem" on page 4-32 or "Motherboard Problem" on page 4-34. |
| `flashprom@2,0` | Checks headers and checksums. | Problem with flash PROM on motherboard. Check the motherboard and replace if necessary. See "Motherboard Problem" on page 4-34. |

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

| OpenBoot Diagnostics Test | Purpose | What Error Results Might Mean and What to Do |
|---|---|---|
| `i2c@0,320` | Checks for the presence of the $I^2C$ devices and memory PROMs. | Problem on the $I^2C$ bus or controller, motherboard SEEPROM, DIMM SEEPROM or motherboard clock generator. Check the DIMM memory or the motherboard. See "Memory Problem" on page 4-37 or "Motherboard Problem" on page 4-34. |
| `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 "Hard Drive Problem" on page 4-8 or "Optical Drive Problem" on page 4-25 or "Motherboard Problem" on page 4-34. |
| `network@3` | Tests the network controller chip. | Problem with network or Gigabit Ethernet controller on motherboard. See "Network Problem" on page 4-17 or "Motherboard Problem" on page 4-34. |
| `parallel@0,378` | Tests the parallel port. | Problem with parallel port connector or I/O subsystem chip. Check the motherboard. See "Motherboard Problem" on page 4-34. |
| `pmu@6` | Checks for the presence of the power management unit. | Problem with the power management unit. Check the motherboard. See "Motherboard Problem" on page 4-34. |
| `rtc@0,70` | Tests the real-time clock. | Problem with the battery or the M5819 chip. Check the battery or motherboard. See "Battery Problem" on page 4-40 or "Motherboard Problem" on page 4-34. |
| `scsi@4`<br>`scsi@4,1` | Tests the SCSI host controllers. | Problem with external SCSI device, internal hard drive, SCSI backplane interface cable, or the LSA0725 chip. Check the connection to `SCSI1` at the rear panel or the hard drive and its cabling, or the motherboard. See "Hard Drive Problem" on page 4-8 or "Motherboard Problem" on page 4-34. |
| `serial@0,2e8`<br>`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 "Motherboard Problem" on page 4-34. |
| `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 "Audio Output Problem" on page 4-12 or "Motherboard Problem" on page 4-34. |
| `usb@a`<br>`usb@b` | Tests the first or second USB controller. | Problem with item attached to the rear USB ports or I/O subsystem chip. If not item, check motherboard. See "USB Problem" on page 4-10 or "Motherboard Problem" on page 4-34. |

### 8.2.6.1 `SUNW,XVR-1200@2` Test

The following is an example of a successful `SUNW,XVR-1200@2` test:

```
obdiag> test 1
Hit the spacebar to interrupt testing
Testing /pci@1f,700000/SUNW,XVR-1200@2
Starting XVR-1200 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-1200@2 ............................ passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:25
```

### 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   : 156ad827
>> Flashprom checksum : 63af602
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/i2c-bridge@0,12
>> Major revision: 1
>> Minor revision: 4
Testing /pci@1e,600000/isa@7/i2c@0,320/gpio@0,30
>> PORT MSB  LSB (o=output)
>> oooooooo
Testing /pci@1e,600000/isa@7/i2c@0,320/hardware-monitor@0,52
>> CLearing FAN1_FAULT_LATCHED bit before checking Dimm Fan stat
>> Fan Controller FW Version 7
>>  Fan Period LSByte = 0x98
>>  Fan Period MSByte = 0x4
>> FAN_RPM = 4170
>> Threshold Register: 0x6f
>> Command Register: 0x0
>> Status Register: 0x70
Testing /pci@1e,600000/isa@7/i2c@0,320/hardware-monitor@0,58
>> Manufacturer’s ID: 0x41
>> Device ID: 0x31
>> Configuration Register 1: 0x99
>> Configuration Register 2: 0x7f
>>  Fan 1 Pulsewidth Modulated output Enabled
>>  Fan 2 Pulsewidth 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 0x99
> Restoring Fan Speed Config Reg to 0x33
> 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 0x99
> Restoring Fan Speed Config Reg to 0x33
Testing /pci@1e,600000/isa@7/i2c@0,320/hardware-monitor@0,5c
>> Manufacturer's ID: 0x41
>> Device ID: 0x31
>> Configuration Register 1: 0x99
>> Configuration Register 2: 0x7f
>>  Fan 1 Pulsewidth Modulated output Enabled
>>  Fan 2 Pulsewidth 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 0x99
> Restoring Fan Speed Config Reg to 0x33
> 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 0x99
> Restoring Fan Speed Config Reg to 0x33
Testing /pci@1e,600000/isa@7/i2c@0,320/gpio@0,6e
Testing /pci@1e,600000/isa@7/i2c@0,320/gpio@0,9c
Testing /pci@1e,600000/isa@7/i2c@0,320/motherboard-fru-prom@0,a2
Testing /pci@1e,600000/isa@7/i2c@0,320/power-supply-fru-prom@0,a4
Testing /pci@1e,600000/isa@7/i2c@0,320/scsi-backplane-fru-prom@0,a8
Testing /pci@1e,600000/isa@7/i2c@0,320/dimm-spd@0,b6
Testing /pci@1e,600000/isa@7/i2c@0,320/dimm-spd@0,b8
Testing /pci@1e,600000/isa@7/i2c@0,320/dimm-spd@0,c6
Testing /pci@1e,600000/isa@7/i2c@0,320/dimm-spd@0,c8
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: 0:0:0:14
```

### 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
>> 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: 0:0:0:0
```

### 8.2.6.6 network@3 Test

The following is an example of a successful network@3 test:

```
obdiag> test 6
Hit the spacebar to interrupt testing
Testing /pci@1c,600000/network@3
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-hi1-test
Subtest reg-tests:mac-regs-test:bcm-mac-addr-lo1-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-cntl-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-cntl-test
Subtest reg-tests:gen-regs-test:bcm-gen-mdi-cntl-test
Subtest reg-tests:asf-regs-test
Subtest reg-tests:asf-regs-test:bcm-asf-cntl-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@1c,600000/network@3 ................................. passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:6
```

### 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: 0:0:0:0
```

### 8.2.6.10 `scsi@4` Test

The following is an example of a successful `scsi@4` test:

```
obdiag> test 10
Hit the spacebar to interrupt testing
Testing /pci@1d,700000/scsi@4
Selftest at /pci@1d,700000/scsi@4 .................................... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:0
```

### 8.2.6.11 `scsi@4,1` Test

The following is an example of a successful `scsi@4,1` test:

```
obdiag> test 11
Hit the spacebar to interrupt testing
Testing /pci@1d,700000/scsi@4,1
Selftest at /pci@1d,700000/scsi@4,1 .................................. passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:0
```

### 8.2.6.12 `serial@0,2e8` Test

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

```
obdiag> test 12
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
```

### 8.2.6.13 `serial@0,3f8` Test

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

```
obdiag> test 13
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
```

### 8.2.6.14 `sound@8` Test

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

```
obdiag> test 14
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: 0:0:0:0
```

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.

### 8.2.6.15 usb@a Test

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

```
obdiag> test 15
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-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
>> USB ports connectivity Test not run. To run the test, include "offboard" in
>> TEST-ARGS & connect CATC USB 2.0 Port Tester to USB ports
Selftest at /pci@1e,600000/usb@a .................................... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:1
```

### 8.2.6.16 `usb@b` Test

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

```
obdiag> test 16
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-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
>> USB ports connectivity Test not run. To run the test, include "offboard" in
>> TEST-ARGS & connect CATC USB 2.0 Port Tester to USB ports
Selftest at /pci@1e,600000/usb@b .................................... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:1
```

CHAPTER 9

# SunVTS

This chapter describes using the SunVTS software to troubleshoot problems with the Sun Blade 2500 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


The results provided in the tables of this chapter are from a Sun Blade 2500 configured with two CPUs, 2 GB memory and a Sun XVR-100 graphics accelerator.

## 9.1 Installing SunVTS

The SunVTS software is preinstalled on your Sun Blade 2500 hard drive. Use only version 5.1PS5 or later, which is for the Sun Blade 2500 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 9-7

## 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-CDRW drive test (`c0t2d0s2(cddvdrwtest)`) displays an error, check the cable connections on the DVD-CDRW 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 SCSI - Devices(mpt0).<br>7. Select `c0t0d0(disktest)` for HDD0 or `c0t1d0(disktest)` for HDD1.<br>8. Click Reset.<br>9. Click Start. | `Connection test starting....`<br><br>`09/24/04 14:54:32 dt90-439 SunVTS5.1ps5: VTSID 2009 disktest.INFO c0t0d0(/pci@1d,700000/scsi@4/sd@0,0: ): Connected <Capacity=14339.81 MB, Mounted=(/), Free=2856.92 MB.>`<br><br>`Connection test complete` |
| Optical drive | 6. Click the plus sign adjacent to IDE - Devices(sd0).<br>7. Select `c1t2d0(cddvdrwtest)`, `c1t2d0(cdtest)`, or `c1t2d0(cdrwtest)`<br>8. Click Reset.<br>9. Click Start. | `Connection test starting....`<br><br>`Connection test complete` |
| DIMM memory | 6. Click the plus sign adjacent to Memory.<br>7. Select `mem(pmemtest)`<br>8. Click Reset.<br>9. Click Start. | `Connection test starting....`<br><br>`Memory`<br>`mem`<br>`Status: "Connected`<br>`1024 MB physical memory has been found`<br><br>`Connection test complete` |
| Flash PROM | 6. Click the plus sign adjacent to Memory.<br>7. Select `Seeprom0(seepromtest)`<br>8. Click Reset.<br>9. Click Start. | `Connection test starting....`<br><br>`seeprom0`<br>`Status: Connected:`<br><br>`Name - motherboard-fru-prom`<br>`Size - 0x002000`<br>`FullPath - /devices/pci@1e.600000/isa@7/i2c@0.320/motherboard-fru-prom@0.a2`<br><br>`Connection test complete` |
| SCSI backplane PROM | 6. Click the plus sign adjacent to Memory.<br>7. Select `Seeprom1(seepromtest)`<br>8. Click Reset.<br>9. Click Start. | `Connection test starting....`<br><br>`seeprom1`<br>`Status: Connected:`<br><br>`Name - scsi-backplane-fru-prom`<br>`Size - 0x002000`<br>`FullPath - /devices/pci@1e.600000/isa@7/i2c@0.320/scsi-backplane-fru-prom@0.a8`<br><br>`Connection test complete` |

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

| Component | Steps to Take | Successful Test Results |
|---|---|---|
| `DIMM0` PROM | 6. Click the plus sign adjacent to Memory.<br>7. Select `Seeprom2(seepromtest)`<br>8. Click Reset.<br>9. Click Start. | `Connection test starting....`<br><br>`seeprom2`<br>`Status: Connected:`<br><br>`Name - dimm-spd`<br>`Size - 0x000100`<br>`FullPath - /devices/pci@1e.600000/isa@7/i2c@0.320/dimm-spd@0.b6`<br><br>`Connection test complete` |
| `DIMM1` PROM | 6. Click the plus sign adjacent to Memory.<br>7. Select `Seeprom3(seepromtest)`<br>8. Click Reset.<br>9. Click Start. | `Connection test starting....`<br><br>`Connection test complete`<br><br>`seeprom3`<br>`Status: Connected:`<br><br>`Name - dimm-spd`<br>`Size - 0x000100`<br>`FullPath - /devices/pci@1e.600000/isa@7/i2c@0.320/dimm-spd@0.b8` |
| `DIMM4` PROM | 6. Click the plus sign adjacent to Memory.<br>7. Select `Seeprom4(seepromtest)`<br>8. Click Reset.<br>9. Click Start. | `Connection test starting....`<br><br>`seeprom4`<br>`Status: Connected:`<br><br>`Name - dimm-spd`<br>`Size - 0x000100`<br>`FullPath - /devices/pci@1e.600000/isa@7/i2c@0.320/dimm-spd@0.c6`<br><br>`Connection test complete` |
| `DIMM5` PROM | 6. Click the plus sign adjacent to Memory.<br>7. Select `Seeprom5(seepromtest)`<br>8. Click Reset.<br>9. Click Start. | `Connection test starting....`<br><br>`seeprom5`<br>`Status: Connected:`<br><br>`Name - dimm-spd`<br>`Size - 0x000100`<br>`FullPath - /devices/pci@1e.600000/isa@7/i2c@0.320/dimm-spd@0.c8`<br><br>`Connection test complete` |
| Graphics accelerator | 6. Select Graphics.<br>7. Click Reset.<br>8. Click Start.<br>(The display might flicker during testing.) | `Connection test starting....`<br><br>`Connection test complete` |

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

| Component | Steps to Take | Successful Test Results |
|---|---|---|
| Smart card reader | 6. Click the plus sign adjacent to Other Devices.<br>7. Select `scmi2c0(sc2test)`<br>8. Click Reset.<br>9. Click Start. | `Connection test starting....`<br><br>`OtherDevices`<br>`scmi2c0`<br>`Status: "Connected`<br>`Device /dev/scmi2c0:`<br>`Regs read Test passed`<br><br>`scmi2c0`<br>`Status: "Connected`<br>`Device /dev/scmi2c0:`<br>`Walking 1s Test passed`<br><br>`Connection test complete` |
| Network | 6. Select Network.<br>7. Click Reset.<br>8. Click Start. | `Connection test starting....`<br><br>`09/24/04 15:09:35 dt90-439 SunVTS5.1ps5: VTSID 2002 nettest.INFO bge0(/pci@1c,600000/network@3): Connected: <10.6.91.183, 10.6.91.255>`<br><br>`Connection test complete` |
| Serial ports | 6. Select Comm. Ports.<br>7. Click Reset.<br>8. Click Start. | `Connection test starting....`<br><br>`Comm.Ports`<br>`su0`<br>`Status: Idle:`<br>`/dev/term/a:`<br>`Idle, current baud = 9600, maximum baud = 115200,`<br>`/dev/term/b:`<br><br>`Connection test complete` |
| Parallel port | 6. Click the plus sign adjacent to Other Devices.<br>7. Select `ecpp0(ecpptest)`.<br>8. Click Reset.<br>9. Click Start. | `Connection test starting....`<br><br>`OtherDevices`<br>`ecpp0`<br>`Status: Idle:`<br>`/dev/ecpp0:`<br>`IEEE 1284 parallel port,`<br>`Port mode = ECPP_CENTRONICS (non-IEEE 1284 compliant device mode - Centronics only)`<br><br>`Connection test complete` |
| Speaker | 6. Click the plus sign adjacent to Other Devices.<br>7. Select `sound0(audiotest)`.<br>8. Click Reset.<br>9. Click Start. | `Connection test starting....`<br><br>`audio: Playing 2 second(s) 1 KHz tone through the speaker port...done.`<br>`sound0`<br>`Status: Idle:`<br>`/dev/sound/0:`<br>`AC97 Codec, 16-bit Stereo, 48 KHz sample rate`<br><br>`Connection test complete` |

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

| Component | Steps to Take | Successful Test Results |
|---|---|---|
| System sensors | 6. Click the plus sign adjacent to Other Devices.<br>7. Select `auxfan1(env3test)`.<br>8. Click Reset.<br>9. Click Start. | `Connection test starting....`<br><br>`auxfan1`<br>`Status: Found`<br><br>`dimm-fan (fan. 49000006b2)`<br>`cpu0-fan (fan. 490000069a)`<br>`cpu1-fan (fan. 49000006a0)`<br>`outtake-fan (fan. 49000006a6)`<br>`intake-fan (fan. 49000006ac)`<br>`cpu0 (temperature-sensor. 4900000658)`<br>`cpu1 (temperature-sensor. 4900000663)`<br>`int-amb0 (temperature-sensor. 490000066e)`<br>`sys-out (temperature-sensor. 4900000679)`<br>`sys-in (temperature-sensor. 4900000684)`<br>`int-amb1 (temperature-sensor. 490000068f)`<br><br>`Connection test complete` |
| CPU | 6. Select Processor(s)<br>7. Click Reset.<br>8. Click Start. | `Connection test starting....`<br><br>`09/24/04 15:13:59 dt90-439 SunVTS5.1ps5: VTSID 4002`<br>`iutest(P0).INFO cpu-unit0: sparcv9 based processor running @`<br>`1600MHz  Online`<br><br>`Processor(s)`<br>`cpu-unit0`<br>`Status: "Connected`<br>`A sparcv9 processor operating at 1600 MHz.`<br><br>`cpu-unit1`<br>`Status: Connected`<br>`sparcv9 processor operating at frequency 1600 MHz.`<br><br>`09/24/04 15:13:59 dt90-439 SunVTS5.1ps5: VTSID 4002`<br>`iutest(P1).INFO cpu-unit1: sparcv9 based processor running @`<br>`1600MHz  Online`<br><br>`cpu-unit1`<br>`Status: "Connected`<br>`A sparcv9 processor operating at 1600 MHz.`<br><br>`09/24/04 15:13:59 dt90-439 SunVTS5.1ps5: VTSID 2001`<br>`l1dcachetest.INFO l1cache: "Connected : CPU (cpu-id = 1 )`<br>`Level 1 cache : size 64 Kbytes line 32 bytes associativity 4"`<br><br>`09/24/04 15:13:59 dt90-439 SunVTS5.1ps5: VTSID 2001`<br>`l1dcachetest.INFO l1cache: "Connected : CPU (cpu-id = 0 )`<br>`Level 1 cache : size 64 Kbytes line 32 bytes associativity 4"`<br><br>`Connection test complete` |
| USB | 6. Select USB - Devices<br>7. Click Reset.<br>8. Click Start. | `Connection test starting....`<br><br>`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 SCSI - Devices `(mpt0)`.<br>9. Select `c0t0d0(disktest)` for HDD0 or `c0t1d0(disktest)` for HDD1.<br>10.Click Reset.<br>11.Click Start. | 2600+ seconds<br>Note: This test is stopped by clicking Stop. |
| Optical drive | 8. From Select Devices, check Intervention.<br>9. Click the plus sign adjacent to IDE - Devices `(sd0)`.<br>10.Select `c1t2d0(cddvdrwtest)`, `c1t2d0(dvdtest)`, or `c1t2d0(cdtest)`.<br>11.Click Reset.<br>12.Click Start. | 85 seconds |
| DIMM memory test1 | 8. Click the plus sign adjacent to Memory.<br>9. Select `kmem(vmemtest)`.<br>10.Click Reset.<br>11.Click Start. | 14 seconds |
| DIMM memory test2 | 8. Click the plus sign adjacent to Memory.<br>9. Select `mem(pmemtest)`.<br>10.Click Reset.<br>11.Click Start. | 14 seconds |
| Flash PROM | 8. Click the plus sign adjacent to Memory.<br>9. Select `seeprom0(seepromtest)`.<br>10.Click Reset.<br>11.Click Start. | 8 seconds |
| SCSI backplane PROM | 8. Click the plus sign adjacent to Memory.<br>9. Select `seeprom1(seepromtest)`.<br>10.Click Reset.<br>11.Click Start. | 8 seconds |
| `DIMM0` PROM | 8. Click the plus sign adjacent to Memory.<br>9. Select `seeprom2(seepromtest)`.<br>10.Click Reset.<br>11.Click Start. | 5 seconds |

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

| Component | Steps to Take | Approximate Time for 1 Pass |
|---|---|---|
| `DIMM1` PROM | 8. Click the plus sign adjacent to Memory.<br>9. Select `seeprom3(seepromtest)`.<br>10.Click Reset.<br>11.Click Start. | 5 seconds |
| `DIMM4` PROM | 8. Click the plus sign adjacent to Memory.<br>9. Select `seeprom4(seepromtest)`.<br>10.Click Reset.<br>11.Click Start. | 5 seconds |
| `DIMM5` PROM | 8. Click the plus sign adjacent to Memory.<br>9. Select `seeprom5(seepromtest)`.<br>10.Click Reset.<br>11.Click Start. | 5 seconds |
| Graphics accelerators | 8. Select Graphics.<br>9. Click Reset.<br>10.Click Start.<br>Note: Testing time is dependent on the installed graphics accelerator. | 38 seconds |
| Smart card reader | 8. From Select Devices, check Intervention.<br>9. Click the plus sign adjacent to Other Devices.<br>10.Select `scmi2c0(sc2test)`<br>11.Right click, select Test Parameter Options.<br>12.Click all enable buttons.<br>13.From Within Instance, select Apply.<br>14.Insert a known good smart card.<br>15.Click Reset.<br>16.Click Start. | 16 seconds |
| Network | 8. Select Network.<br>9. Click Reset.<br>10.Click Start. | 17 seconds |
| Serial ports | 8. From Select Devices, check Intervention.<br>9. Click the plus sign adjacent to Comm.Ports.<br>10.Select `su0(sutest)`.<br>11.Right click, select Test Parameter Options.<br>12.For Test_Type, select a_b.<br>13.For Loopback_Type, select Internal_a_to_a__b_to_b.<br>14.From Within Instance, select Apply.<br>15.Click Reset.<br>16.Click Start. | 11 seconds |

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

| Component | Steps to Take | Approximate Time for 1 Pass |
|---|---|---|
| Parallel port | 8. Click the plus sign adjacent to Other Devices.<br>9. Select `ecpp0(ecpptest)`.<br>10.Click Reset.<br>11.Click Start. | 10 seconds |
| Speaker | 8. Click the plus sign adjacent to Other Devices.<br>9. Select `sound0(audiotest)`.<br>10.Click Reset.<br>11.Click Start. | 46 seconds |
| System sensors | Testing is not possible in functional mode. | |
| CPU | 8. Select Processor(s)<br>9. Click Reset.<br>10.Click Start. | 1000+ seconds<br>Note: This test is stopped by clicking Stop. |
| USB | 8. Select USB - Devices<br>9. Click Reset.<br>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.

CHAPTER **10**

# Preparing to Replace Components

This chapter describes common tasks that are completed prior to performing a remove or install procedure on any Sun Blade 2500 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:



## 10.1 Safety Information

This section describes the safety precautions to follow when servicing a Sun Blade 2500 workstation.

## 10.1.1 Safety Precautions

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

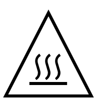
- Follow all Sun standard cautions, warnings, and instructions marked on the equipment and described in *Important Safety Information for Sun Hardware Systems*, 816-7190.
- Follow the cautions, warnings, and instructions in the *Sun Blade 2500 Safety and Compliance Guide*, 817-5120. The document is available 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.

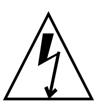
## 10.1.2 Safety Symbols

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 2500 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.

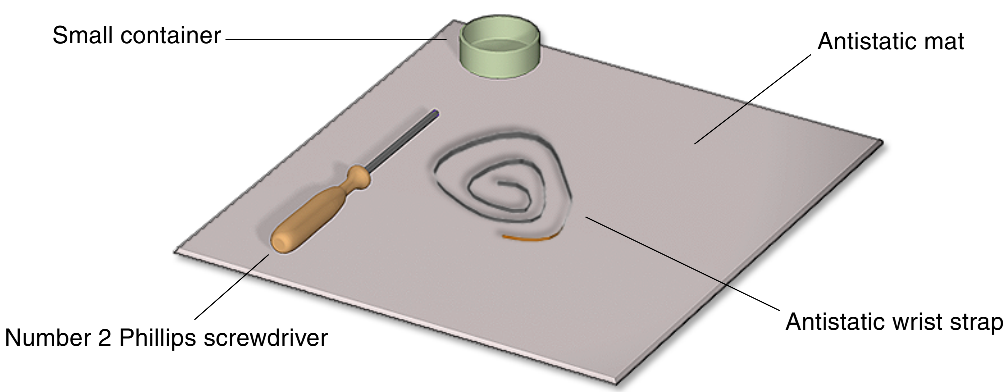



**FIGURE 10-1** Required Tools

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, power off the workstation and all peripheral units.

---

**Caution –** Prior to powering 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, a Sleep key is available for power-off sequences. See FIGURE 10-2.

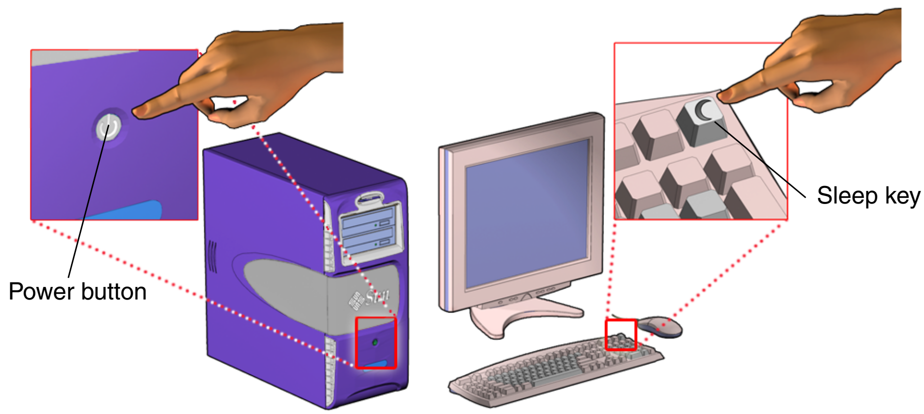



**FIGURE 10-2** Power Button and Sleep Key Location and Identification

## 10.3.2 Powering Off Methods

There are two methods for powering off the workstation.

- Gracefully - 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.

- Forced - 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 shuts down in 5 minutes and reminds 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. See 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 `init default` entry in the `/etc/inittab` 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.

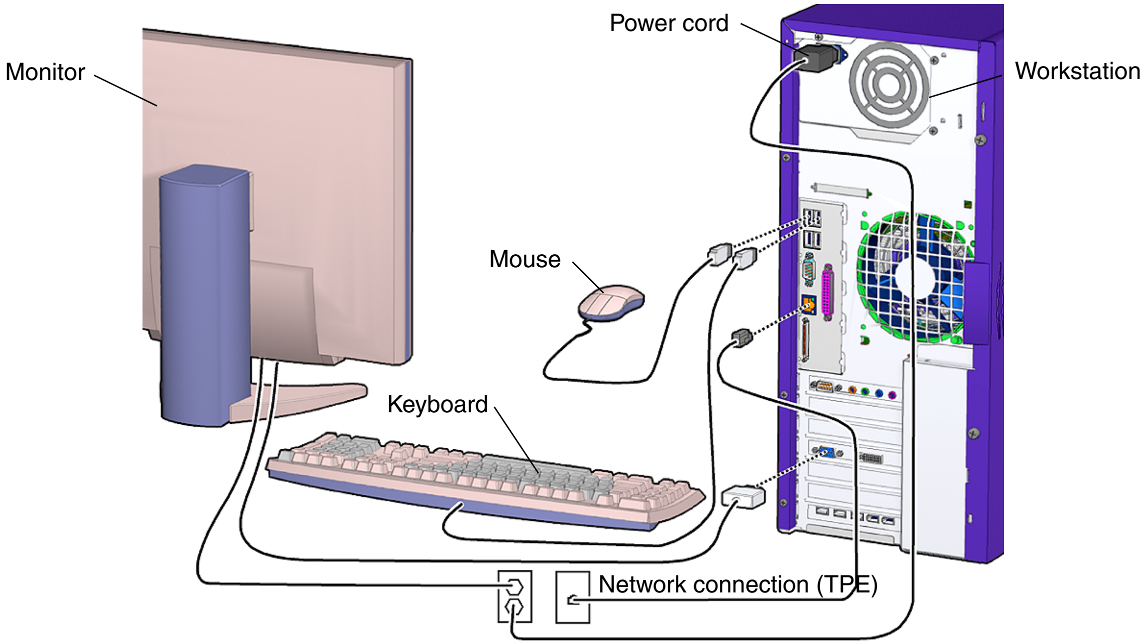
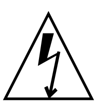



**FIGURE 10-3** Disconnecting Attached Peripherals

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. See "Shutting Down Gracefully" on page 10-5.

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.

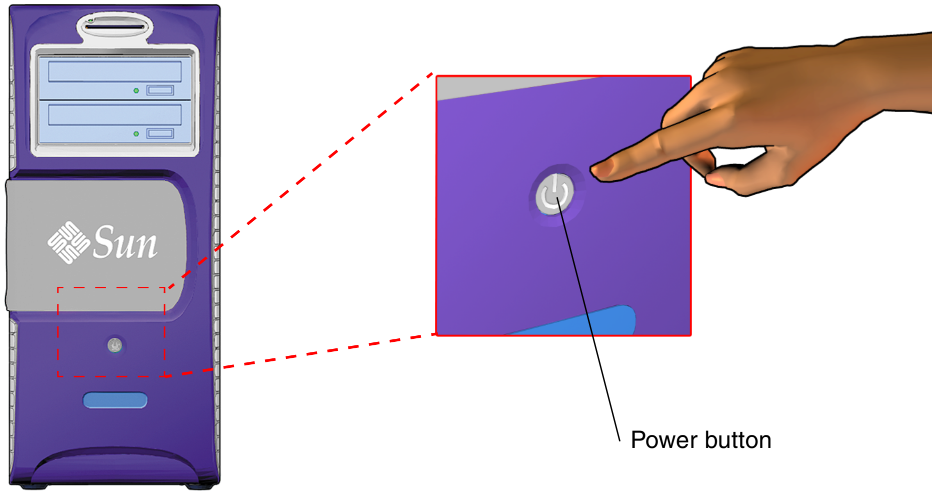



**FIGURE 10-4** Pressing the Power Button

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 10-5.

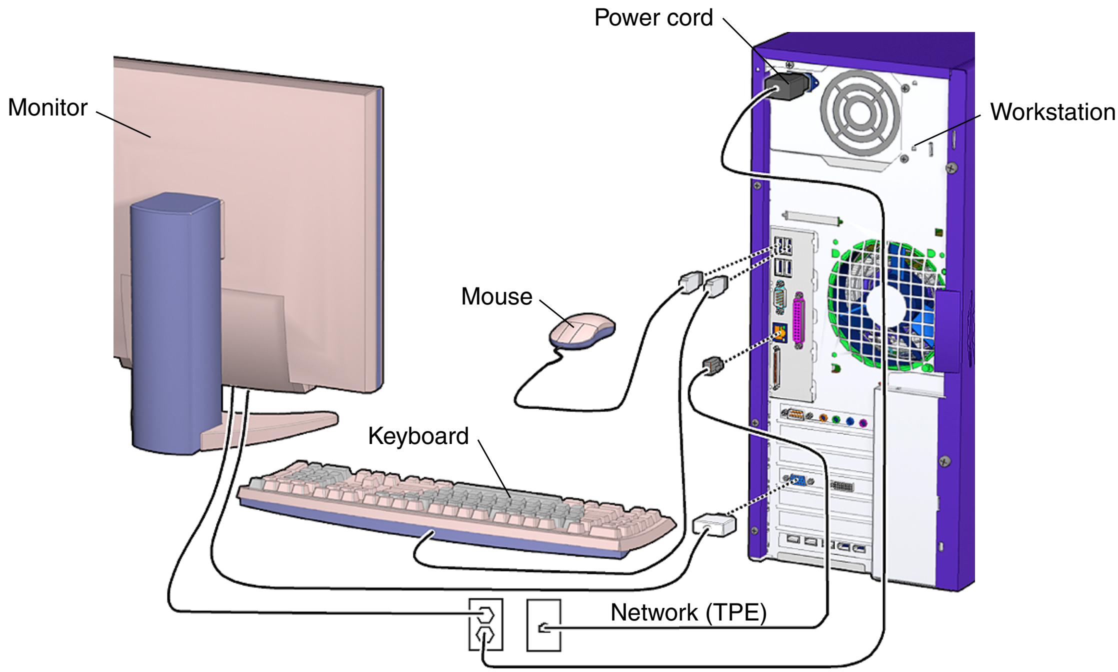



**FIGURE 10-5** Disconnecting Attached Peripherals

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 by disconnecting the power cord from the system to reduce risk of electric shock.**

   See FIGURE 10-6.

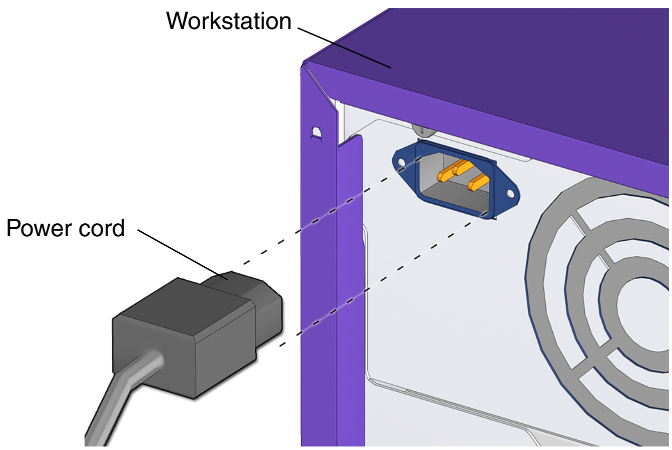



**FIGURE 10-6** Disconnecting the Power Cord

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 back of the system, counter-clockwise to loosen them.**

   See FIGURE 10-7. If the thumbscrews are very tight, use a No. 2 Phillips screwdriver to loosen them.

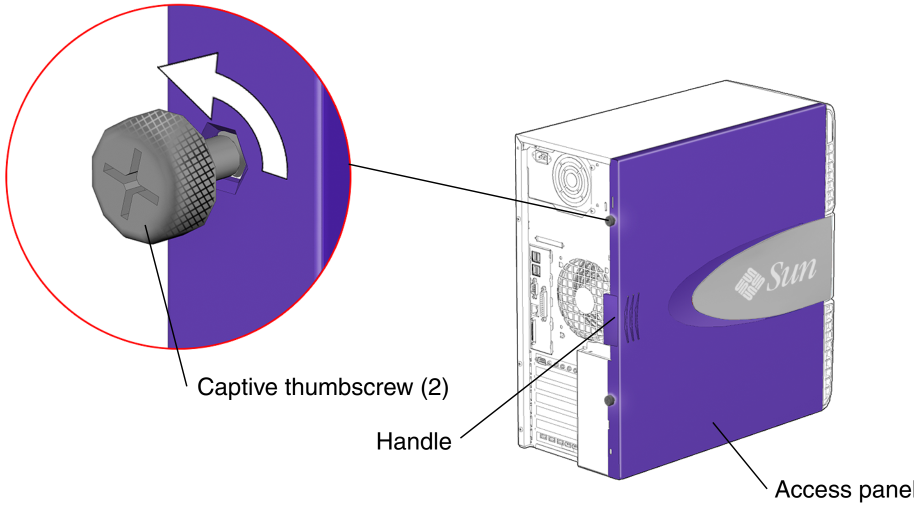



**FIGURE 10-7** Loosening the Screws

4. **Slide the access panel about an inch (2.5 cm) toward the back of the system chassis, then tilt the access panel to the right, lift it from the chassis, and set it aside.**

   See FIGURE 10-8.

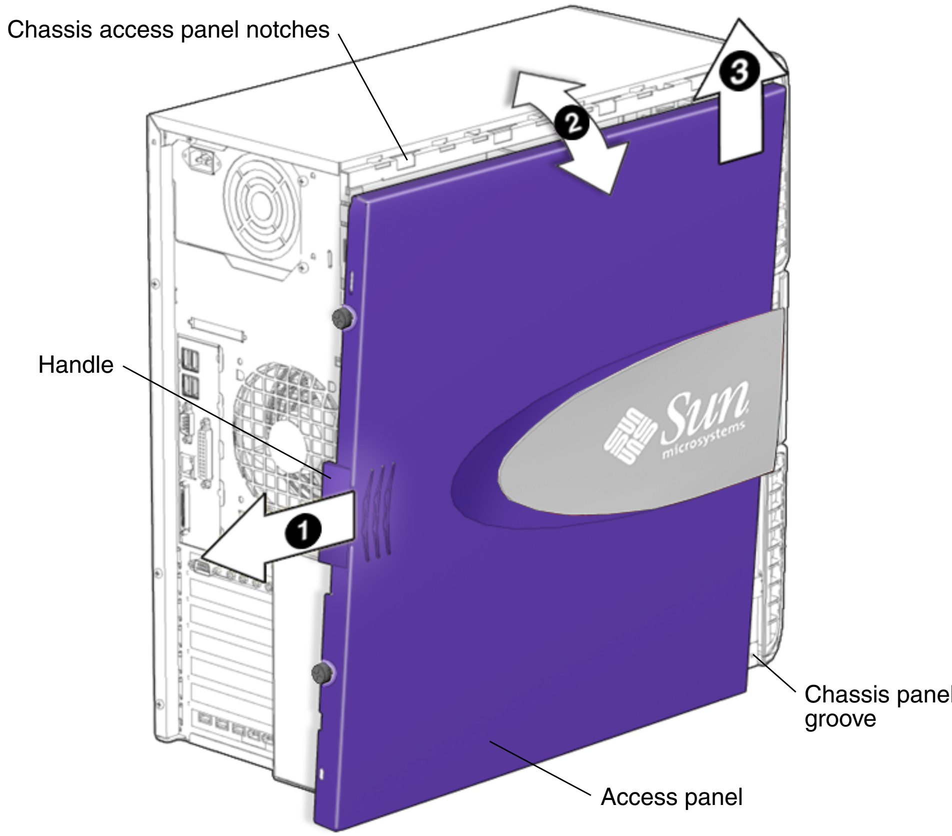



**FIGURE 10-8** Removing the Access Panel

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 10-9. 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 10-9.

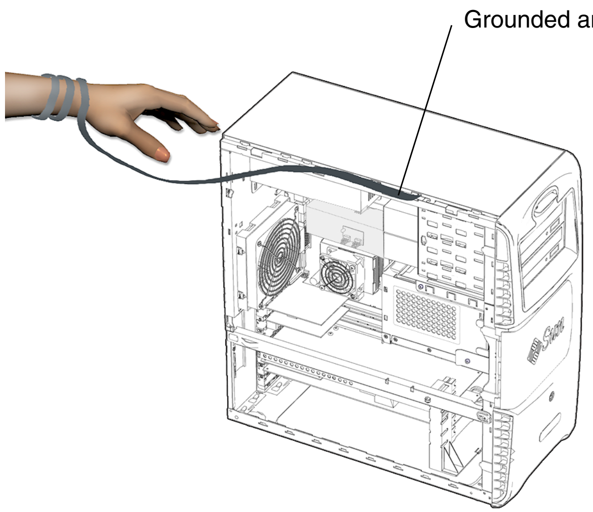



**FIGURE 10-9** Attaching the Antistatic Wrist Strap

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 power supply.

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, See "Installing the Bezel" on page 15-5.

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 10-10.

---

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

---

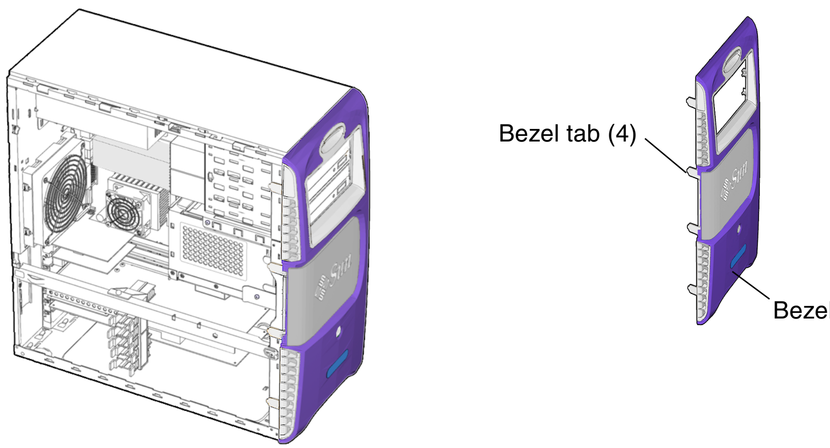



**FIGURE 10-10** Bezel Location and Identification

3. **Facing the left-front side of the bezel and starting with the topmost tab, carefully pull out each bezel mounting tab about a millimeter, and then forward slightly.**

   See FIGURE 10-11.

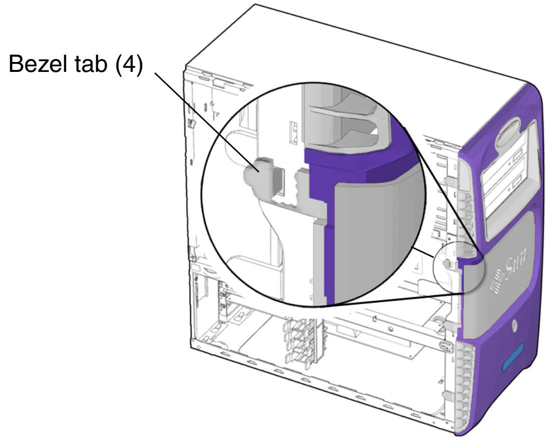



**FIGURE 10-11** Releasing the Bezel Mounting Tabs

As you do this, you should see the edge of the bezel nearest the tab move slightly away from the front of the chassis.

4. **Move the left-front side of the bezel slightly forward, disengaging the left-side tabs from the chassis.**

5. **Swing the bezel to the right, releasing it from the right-front chassis tabs and chassis.**

   See FIGURE 10-12. Set the bezel aside.

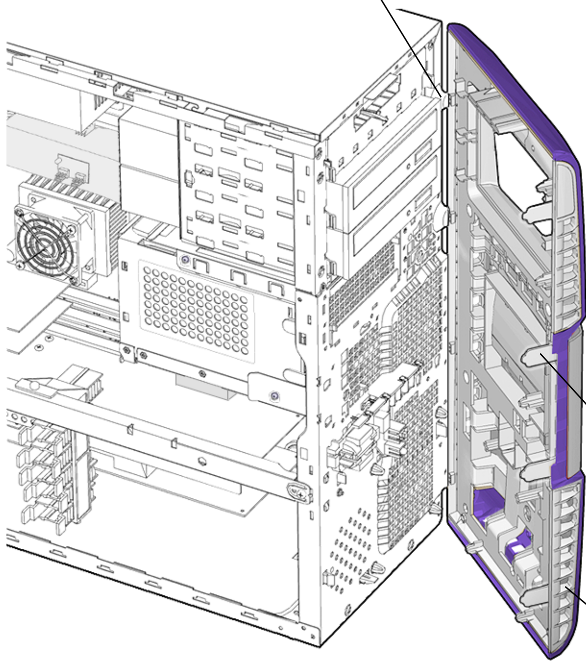



**FIGURE 10-12** Removing the Bezel

# 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 no 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 FIGURE 10-8.**
2. **Using both hands, gently set the system chassis on its side, with the opening facing up. See FIGURE 10-13.**

---

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

---

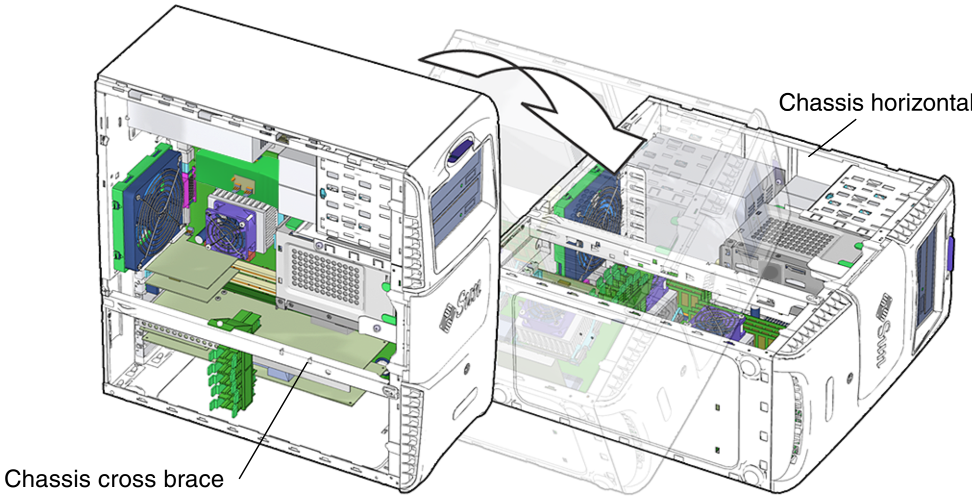



**FIGURE 10-13** Positioning the Chassis

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** 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 and removable media drives |
| Left | Side with access panel |
| Right | Side opposite the access panel |

# 10.7 Removing the Hard Drive Assembly

1. **Using a No. 2 Phillips screwdriver, remove the two screws.**

   See FIGURE 10-14.

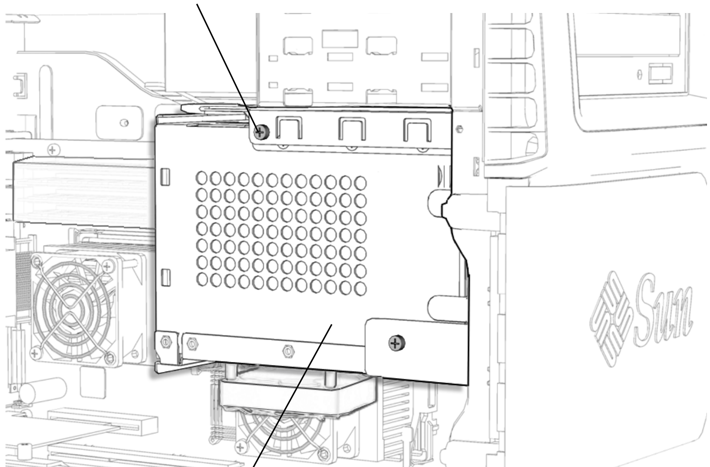



**FIGURE 10-14** Removing the Screws for the Hard Drive Assembly

---

**Caution –** The two power cables and the SCSI interface cable are attached to the hard drive assembly

---

2. **Press the green tab on the top of the hard drive assembly and slide the hard drive assembly out of the hard drive bay.**

   See FIGURE 10-15.

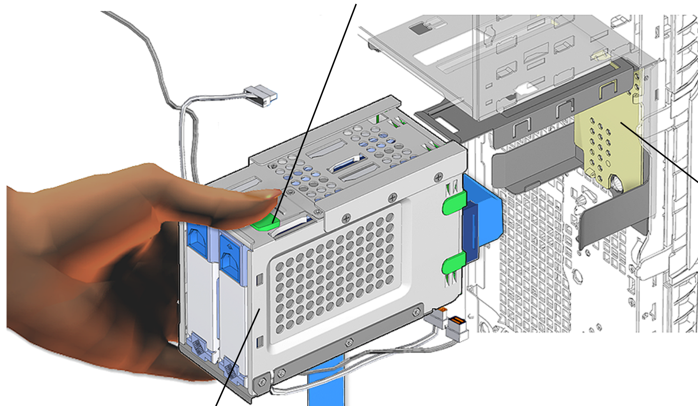



**FIGURE 10-15** Removing the Hard Drive Assembly

**3. Disconnect the two power cables from the SCSI backplane.**

- 6-pin power supply and cable connector `P5`
- 4-pin SCSI to optical drive power cable

See FIGURE 10-16.

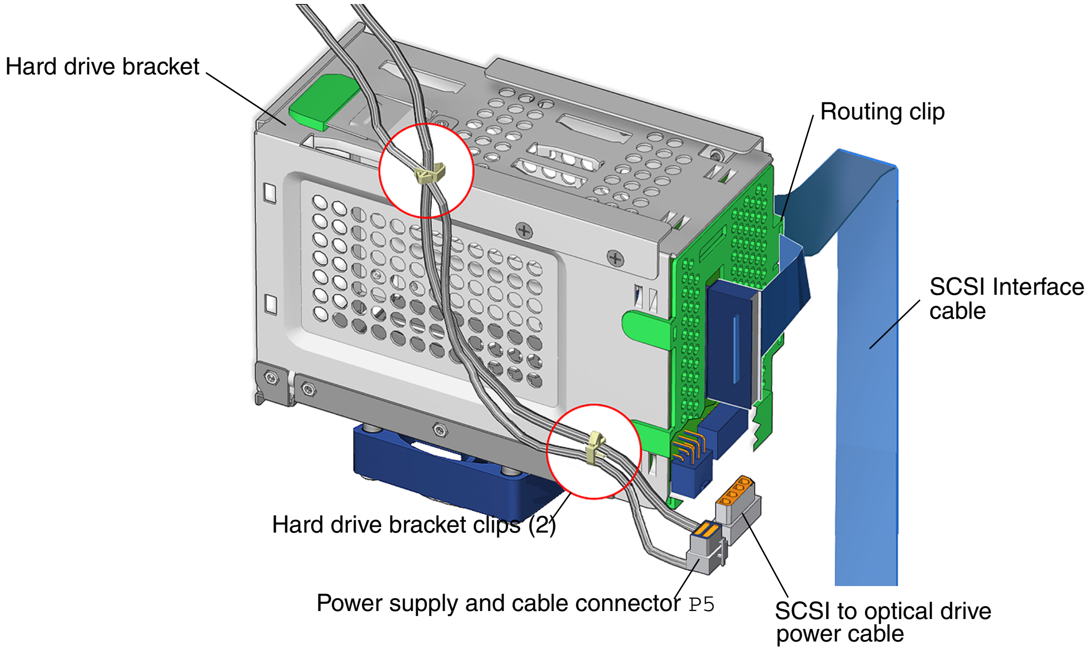



**FIGURE 10-16** Disconnecting the Hard Drive Bracket Cables

4. **Release the hard drive power cables from the hard drive bracket clips.**

   The clips are on the bottom and the back side of the hard drive bracket. See FIGURE 10-16.

5. **Disconnect the SCSI interface cable from the SCSI backplane.**

   See FIGURE 10-16. The interface cable is plugged into the SCSI backplane through the SCSI backplane cover.

6. **Release the interface cable from the routing clip.**

   The routing clip is located on the bottom of the green plastic SCSI backplane bracket.

---

**Caution –** The routing clip for the SCSI interface cable is fragile.

---

7. **Set the hard drive bracket on an antistatic mat.**

---

**Note –** If you removed the hard drive assembly as part of a removal procedure, return to that procedure.

---

## 10.8 Finding Your Replacement Procedure

After troubleshooting the problem and determining the component at fault, identify the component in FIGURE 10-17 and see TABLE 10-3 to find the replacement procedure.

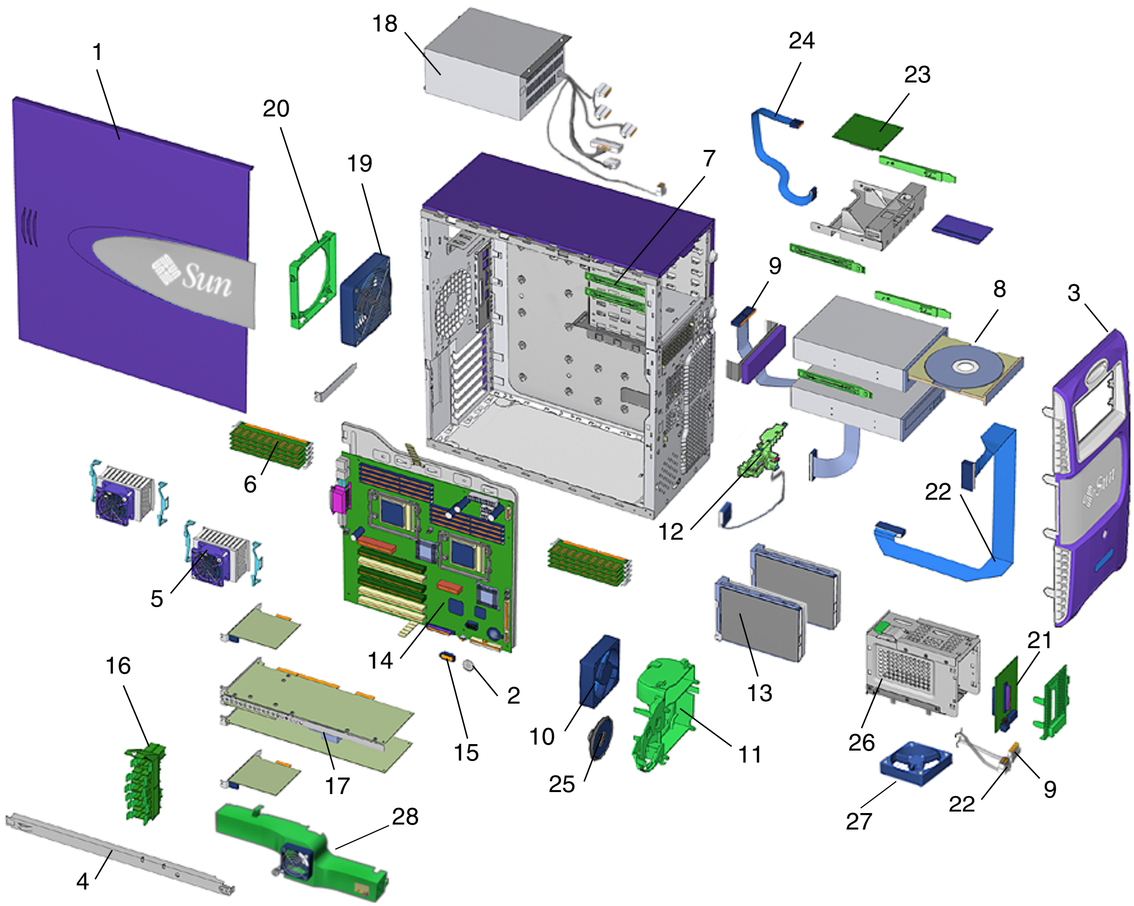



**FIGURE 10-17** Workstation Components

**TABLE 10-3** Component Replacement Procedures

| Component | Item Number | Reference Section |
|---|---|---|
| Access Panel | 1 | "Removing the Access Panel" on page 10-12 and "Installing the Access Panel" on page 15-6 |
| Battery | 2 | "Replacing the Battery" on page 11-35 |
| Bezel | 3 | "Removing the Bezel" on page 10-15 and "Installing the Bezel" on page 15-5 |
| Chassis cross brace | 4 | "Replacing the PCI Card Support and Chassis Cross Brace" on page 13-41 |
| CPU fan and heat sink assembly | 5 | "Replacing the CPU Fan and Heat Sink Assembly" on page 11-25 |
| DIMMs (memory) | 6 | "Replacing the DIMMs" on page 11-2 |
| Drive rails | 7 | "Removing System Drive Rails" on page 13-48 |
| optical drive (replaceable media drive) | 8 | "Replacing an Optical Drive" on page 12-8 |
| optical drive cables | 9 | "Replacing the Optical Drive Cables" on page 14-5 |
| Front fan | 10 | "Replacing the Front Fan" on page 13-11 |
| Front fan bracket | 11 | "Replacing the Front Fan Bracket" on page 13-36 |
| Power switch and LED cable assembly | 12 | "Replacing the Power Switch and LED Cable Assembly" on page 14-15 |
| Hard drive | 13 | "Replacing a Hard Drive" on page 12-2 |
| Motherboard | 14 | "Replacing the Motherboard" on page 11-54 |
| NVRAM | 15 | "Replacing the NVRAM" on page 11-38 |
| PCI card support | 16 | "Replacing the PCI Card Support and Chassis Cross Brace" on page 13-41 |
| PCI cards | 17 | "Replacing the PCI Cards" on page 11-41 |
| Power supply | 18 | "Replacing the Power Supply" on page 13-2 |
| Rear fan | 19 | "Replacing the Rear Fan" on page 13-16 |
| Rear fan bracket | 20 | "Replacing the Rear Fan" on page 13-16 |
| SCSI backplane | 21 | "Replacing the SCSI Backplane" on page 13-27 |
| SCSI backplane cables | 22 | "Replacing the SCSI Backplane Cables" on page 14-11 |
| Smart card reader | 23 | "Replacing the Smart Card Reader" on page 12-16 |

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

| Component | Item Number | Reference Section |
| --- | --- | --- |
| Smart card reader cable | 24 | "Replacing the Smart Card Reader Cable" on page 14-3 |
| Speaker | 25 | "Replacing the Speaker" on page 13-32 |
| Hard drive assembly | 26 | "Removing the Hard Drive Assembly" on page 10-19 and "Installing the Hard Drive Assembly" on page 15-2 |
| Hard drive fan | 27 | "Replacing the Hard Drive Fan" on page 13-23 |
| DIMM fan assembly | 28 | "Replacing the DIMM Fan Assembly" on page 11-14 |

CHAPTER 11

# Replacing the Motherboard and Associated Components

This chapter describes the replacement procedures for the Sun Blade 2500 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 11-54.

This chapter contains the following topics:



**Caution –** Follow the cautions, warnings, and instructions in the *Sun Blade 2500 Safety and Compliance Guide* (817-5120). This document is available at: `http://www.sun.com/documentation`

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

**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 within the workstation.

# 11.1 Replacing the DIMMs

This section describes removal and installation of the system dual inline memory modules (DIMMs). Topics include:

- "Identifying the DIMMs" on page 11-2
- "Removing the DIMMs" on page 11-4
- "Installing the DIMMs" on page 11-7

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

## 11.1.1 Identifying the DIMMs

Sun Blade 2500 memory is installed as matched pairs of DDR1 SDRAM DIMMs. Within a matched pair, DIMMs must be from the same manufacturer with the same type and number of memory devices, the same amount of memory per device, and the same memory speed.

DIMMs must be installed on the motherboard in consecutive connector slots. The workstation requires a minimum of one pair of matching 512 MB or 1 GB DIMMs installed in connector slots `DIMM2` and `DIMM3`.

Before replacing Sun Blade 2500 memory, verify that the latest version of OpenBoot PROM, system firmware, and recommended system patches are installed on your system. If necessary, check the *Sun System Handbook* at SunSolve Online:
`http://sunsolve.sun.com/handbook_pub/`

**Note –** For information about Sun Blade 2500 memory interleaving, see "Memory Interleaving" on page C-17.

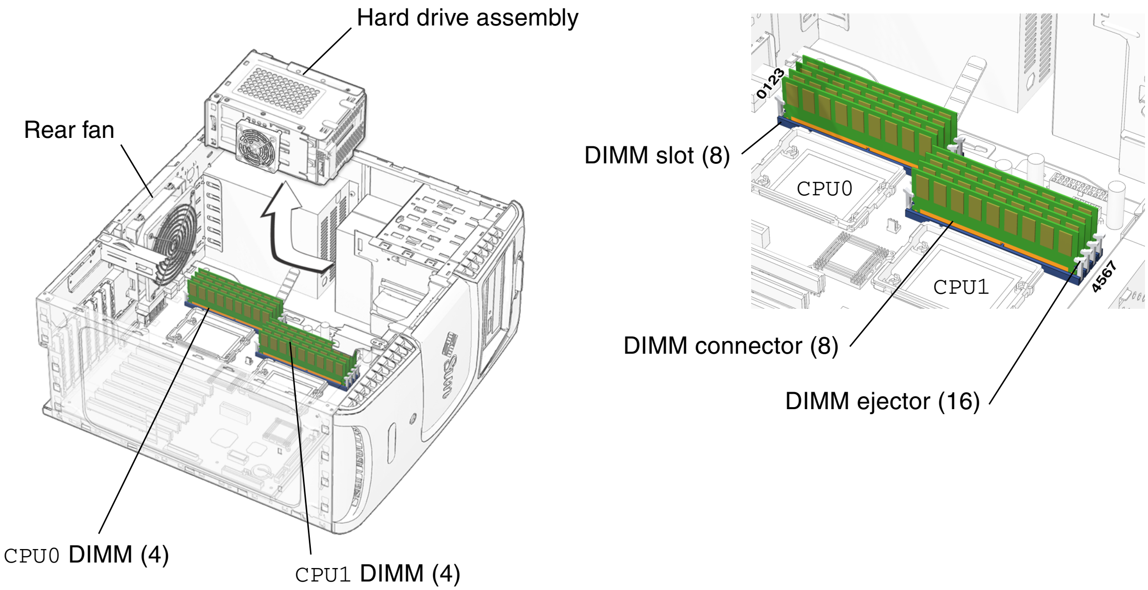



**FIGURE 11-1** DIMM Memory Location and Identification

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.

---

**Note –** Before replacing Sun Blade 2500 DIMMs verify that the latest version of OpenBoot PROM, system firmware, and recommended system patches are installed on your workstation.

---

**TABLE 11-1** DIMM Pair Configuration

| Memory | Installed DIMMs | Configuration |
|---|---|---|
| 1 GB memory | 2 x 512 MB DIMMs | Standard |
| 2 GB memory | 2 x 1 GB DIMMs | Standard |
| 4 GB memory | 4 x 1 GB DIMMs | Optional |
| 8 GB memory | 8 x 1 GB DIMMs | Optional |
| 16 GB memory | 8 x 2 GB DIMMs | Optional |

When your workstation boots up, the system utility OpenBoot checks for compatible memory modules. See “OpenBoot PROM Memory Message” on page 11-12 for additional information.

If you are not removing an existing DIMM, proceed to "Installing the DIMMs" on page 11-7.

## 11.1.2 Removing the DIMMs

1. **Power off the workstation and open the chassis.**

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12

2. **Locate the DIMM slots.**

   See FIGURE 11-1. The DIMM slots are divided into two sets of four slots. One set is adjacent to `CPU0`. The other set is adjacent to `CPU1`.

3. **Remove the rear fan.**

   See "Removing the Rear Fan" on page 13-18.

4. **Remove the hard drive assembly.**

   See "Removing the Hard Drive Assembly" on page 10-19.

---

**Note –** You do not need to remove the hard drive(s) or the SCSI backplane from the hard drive assembly in this removal process.

---

5. **Position the chassis.**

   See "Positioning the Chassis" on page 10-18.

6. **Remove the DIMM fan assembly.**

   See "Removing the DIMM Fan Assembly" on page 11-15.

7. **Release the desired DIMM by simultaneously pressing down on both ejector levers at the ends of the DIMM slot.**

   See FIGURE 11-2.

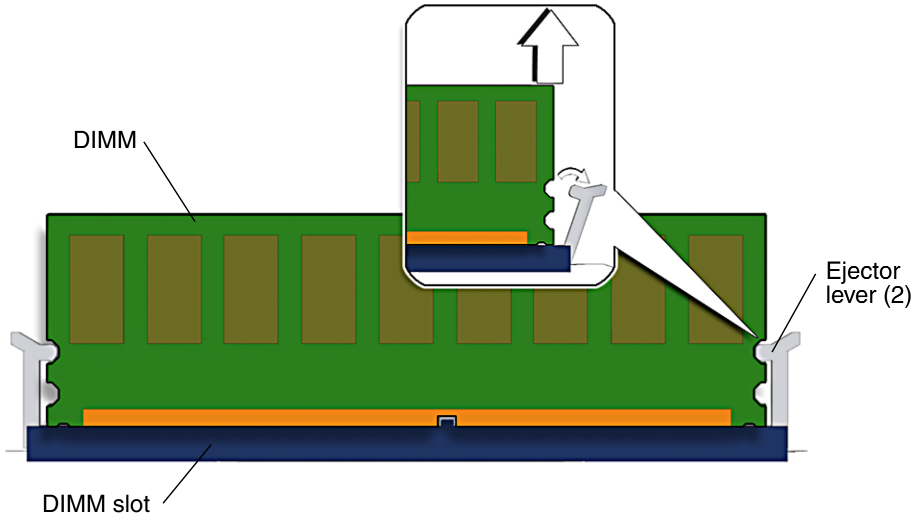



**FIGURE 11-2** Releasing the DIMM

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

   See FIGURE 11-3.

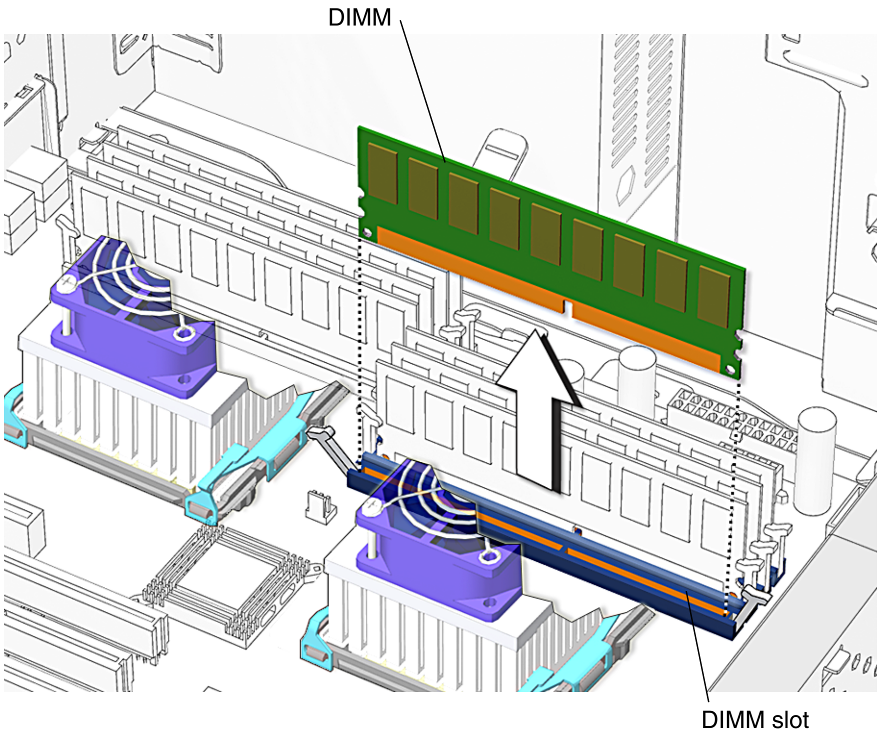



**FIGURE 11-3** Removing the DIMM

---

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

---

**Caution –** Do not lift the DIMM out of the DIMM slot at an angle as it might damage the edge connector for the DIMM or 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 the DIMMs" on page 11-7.

- If you removed a DIMM and will not replace it at this time, install the DIMM fan assembly, reposition the chassis, replace the rear fan (if needed), replace the access panel, and power on the system.

  See:

  - "Installing the DIMM Fan Assembly" on page 11-20
  - "Repositioning the Chassis" on page 15-2
  - "Installing the Rear Fan" on page 13-19
  - "Installing the Access Panel" on page 15-6
  - "Powering On the Workstation" on page 15-7

## 11.1.3 Installing the DIMMs

---

**Caution –** If you are installing additional memory, remember that DIMMs must be installed in matched pairs of DIMMs. See FIGURE 11-4. The workstation requires a minimum of one pair of matching DIMMs.

---

Before installing Sun Blade 2500 memory, verify that the latest version of OpenBoot PROM, system firmware, and recommended system patches are installed on your system. If necessary, check the Sun System Handbook at SunSolve Online: `http://sunsolve.sun.com/handbook_pub/`

---

**Note –** Install DIMMs in consecutive pairs into DIMM slots: `DIMM0` and `DIMM1`, or `DIMM2` and `DIMM3`, or `DIMM4` and `DIMM5`, or `DIMM6` and `DIMM7`.

---

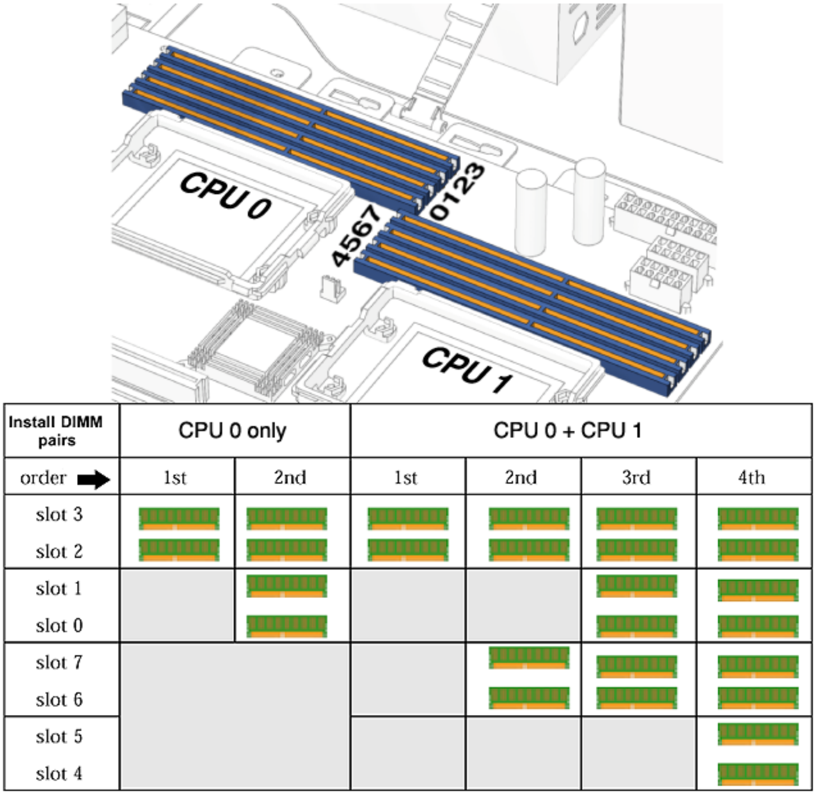



**FIGURE 11-4** Replacing and Installing Sun Blade 2500 DIMMs

---

**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.

---

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

See:

- "Powering Off the Workstation" on page 10-4
- "Removing the Access Panel" on page 10-12
- "Positioning the Chassis" on page 10-18

2. **Remove the DIMM fan assembly.**

   See "Removing the DIMM Fan Assembly" on page 11-15.

3. **Locate the DIMM slots.**

   See FIGURE 11-5.

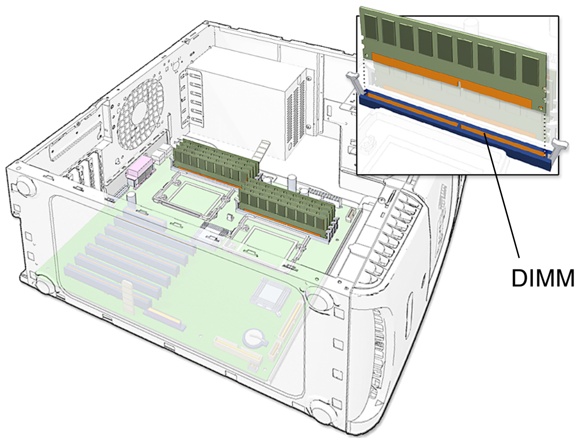
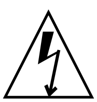



**FIGURE 11-5** DIMM Placement on the Motherboard

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



---

**Caution –** Handle DIMMs only by the edges. Do not touch DIMM components or metal parts. Always wear an antistatic wrist strap when handling DIMMs.

---

5. **Review the recommended DIMM installation and configurations before installing the DIMM.**

   See FIGURE 11-4, "Replacing and Installing Sun Blade 2500 DIMMs" on page 11-8.

---

**Caution –** If you replace a single DIMM, the replaced DIMM must be identical to the one removed.

---

6. **Align the DIMM notch to the DIMM connector key.**

   See FIGURE 11-6.

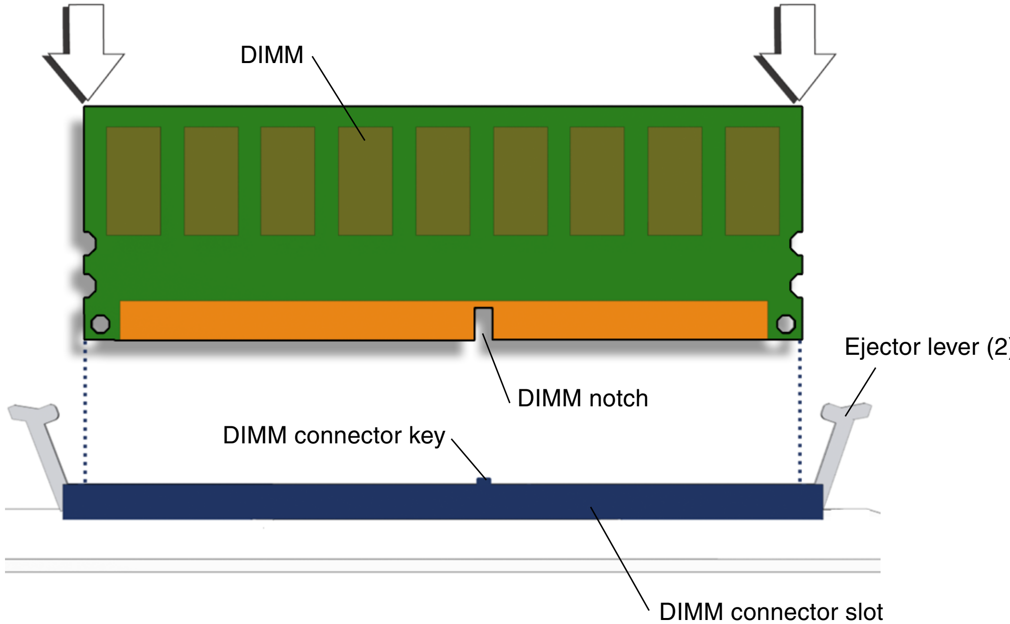



**FIGURE 11-6** Aligning the DIMM to the DIMM Connector Slot

7. **Using both thumbs, press the DIMM straight down into the DIMM connector slot until both ejector levers close, locking the DIMM in the DIMM connector slot.**

   See FIGURE 11-7.

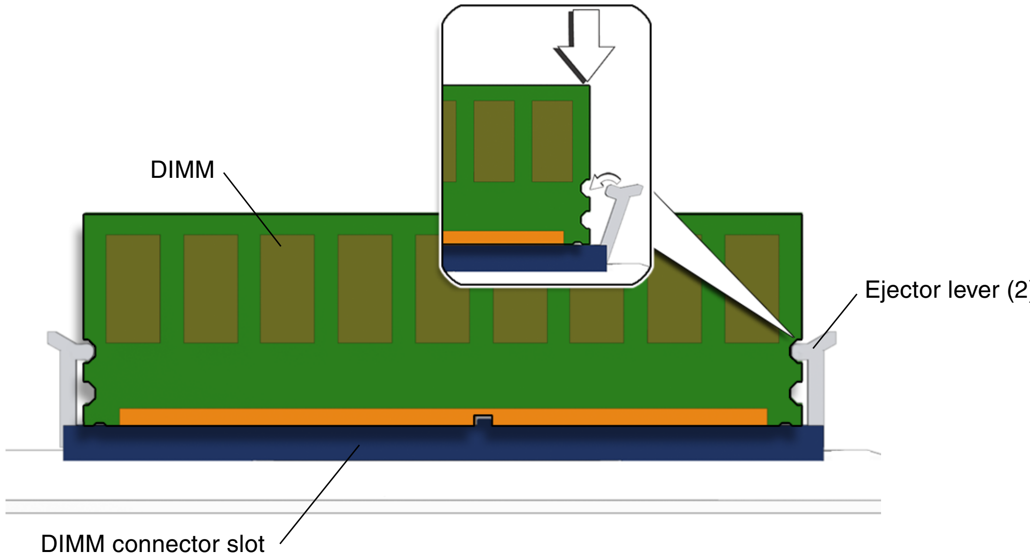



**FIGURE 11-7** Securing the DIMM

---

**Note –** The DIMMs must be inserted evenly, straight down into the DIMM connector slot until the ejector levers lock into place.

---

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

8. **Repeat Step 6 and Step 7 until all DIMMs are installed.**
9. **Verify that the DIMM ejector levers are upright, seated, and tight.**
10. **Install the DIMM fan assembly.**

    See "Installing the DIMM Fan Assembly" on page 11-20.
11. **Reposition the chassis.**

    See "Repositioning the Chassis" on page 15-2.
12. **Replace the hard drive assembly.**

    See "Installing the Hard Drive Assembly" on page 15-2.
13. **Replace the rear fan and rear fan bracket, if needed.**

    See "Replacing the Rear Fan" on page 13-16.
14. **Inspect the rear fan and hard drive assemblies to verify that:**
    - The rear fan assembly bracket feet are well seated in the chassis.
    - The hard drive assembly is seated and the screws are installed.

15. **Inspect the DIMMs and related component cabling to verify that:**
    - The rear fan cable is firmly connected to the motherboard.
    - The SCSI backplane power cables are plugged into the SCSI backplane.
    - The hard drive interface cable is fed through the SCSI backplane bracket, plugged into the SCSI backplane, and plugged into the motherboard.
16. **Replace the access panel, power on the system, and verify the component installation.**

    See:
    - "Installing the Access Panel" on page 15-6
    - "Powering On the Workstation" on page 15-7
    - "Verifying an Installation" on page 15-10

## 11.1.4 OpenBoot PROM Memory Message

---

**Note –** Before installing Sun Blade 2500 DIMMs, verify that the latest version of OpenBoot PROM, system firmware, and recommended system patches are installed on your system.

---

During system startup, OpenBoot PROM checks for DIMM type and DIMM manufacturer. TABLE 11-2 shows the result and the action taken by the OpenBoot PROM.

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

| Check Result | Action Taken |
|---|---|
| Wrong DIMM type | System beeps three times and powers off. |
| DIMMs in a pair have different architecture | System does not use dissimilar DIMMs. A message is displayed and the system continues to boot; the system attempts to use the DIMM pair. |
| 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 you only have one DIMM pair installed and the DIMMs have a different architecture, the system beeps three times powers off. No message is displayed.

---

The Sun Blade 2500 motherboard has four DIMM connector slots above each CPU. See FIGURE 11-8.

- `CPU0` has four memory slots. The two lower slots make up physical `Bank 0` and the two upper slots make up physical `Bank 2`.
- `CPU1` has four memory slots. The two lower slots make up physical `Bank 0` and the two upper slots make up physical `Bank 2`.

OpenBoot PROM references memory by bank if a problem is found. For example, if each DIMM of a DIMM pair is from a different manufacturer the following error is displayed:

```
NOTICE - CPU0 Bank 0 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 attempts to use the DIMMs.

```
NOTICE - CPU0 Bank 2 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 11-8 identifies the location of the faulty DIMMs in the previous examples.

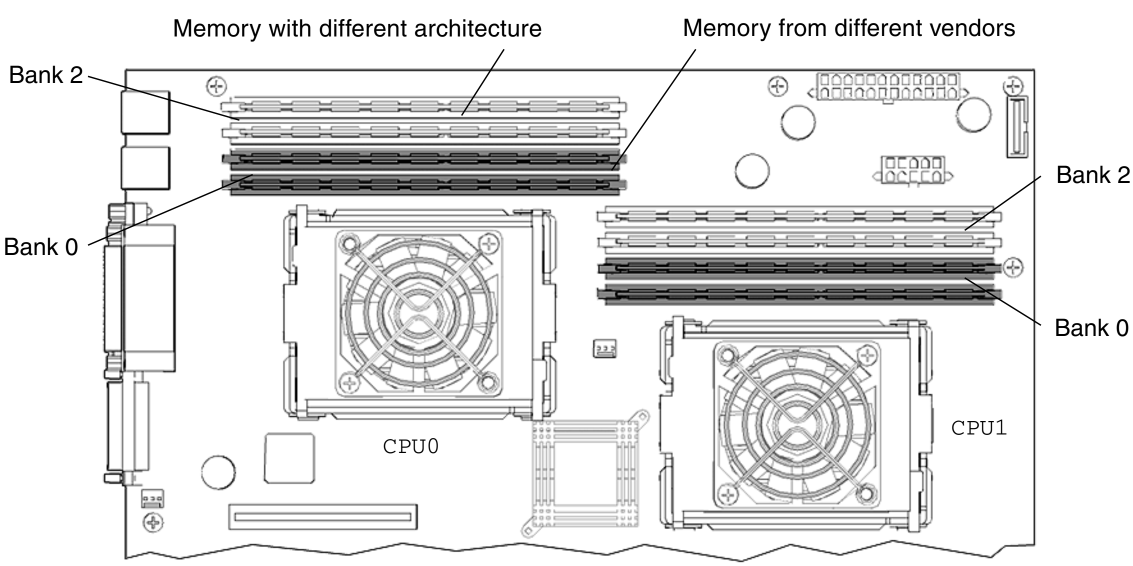



**FIGURE 11-8** Examples of Faulty DIMM Locations

A system must have at least one functional pair of DIMMs to display a message.

---

**Note –** A system with more than one pair of DIMMs might display more than one message.

---

For additional information about memory interleaving, see "Memory Interleaving" on page C-17.

# 11.2 Replacing the DIMM Fan Assembly

This section describes the removal and installation of the DIMM fan assembly. Topics include:



## 11.2.1 Identifying the DIMM Fan Assembly

The DIMM fan assembly provides cooling for the Sun Blade 2500 DIMMs. The built-in fan monitoring circuit shuts down the system, should the fan fail to provide cooling air. The duct covers the DIMMs, so it must be removed to replace the DIMMs. See FIGURE 11-9.

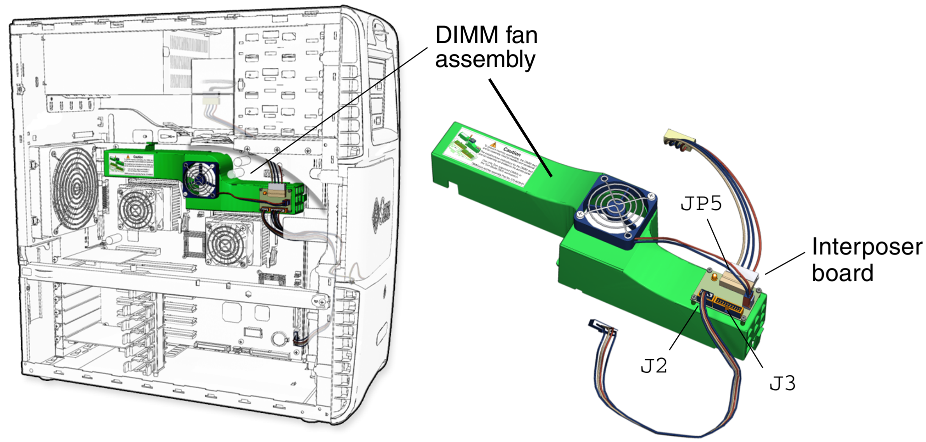



**FIGURE 11-9** DIMM Fan Assembly Location and Identification

## 11.2.2 Removing the DIMM Fan Assembly

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12
   - "Positioning the Chassis" on page 10-18

2. **Using the No. 2 Phillips screwdriver, remove the two screws that secure the hard drive assembly.**

   See FIGURE 11-10.

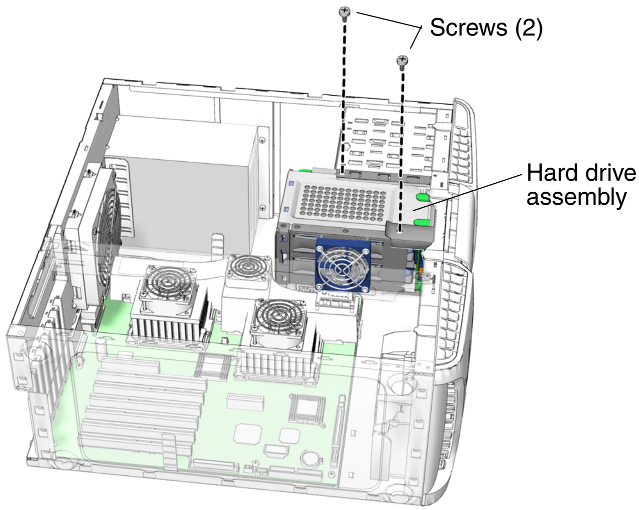



**FIGURE 11-10** Removing the Hard Drive Assembly Screws

3. **Press the green tab of the hard drive assembly and gently slide the hard drive assembly to the left.**

   See FIGURE 11-11.

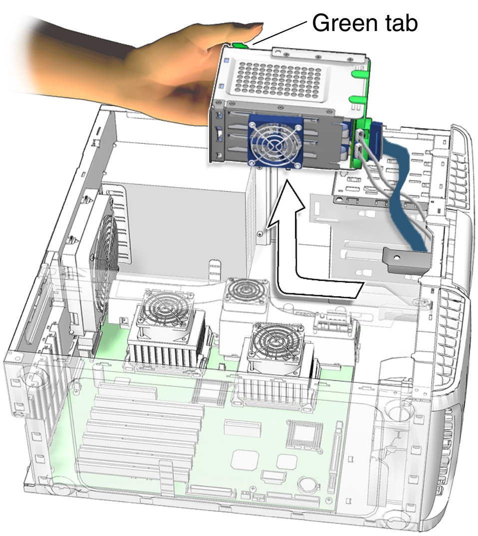



**FIGURE 11-11** Removing the Hard Drive Assembly

**Caution –** The 6-pin power supply, 4-pin SCSI to optical drive power cable, and SCSI interface cable are still connected to the hard drive assembly. Be careful not to pull on them.

4. **Place the hard drive assembly in a secure location on the chassis.**
5. **Disconnect the following cables from the interposer board on the DIMM fan assembly:**
   - Power cable assembly from connector `JP5`
   - Power switch and LED cable assembly from connector `J3`
   - Signal cable assembly from connector `J2`

   See FIGURE 11-12.

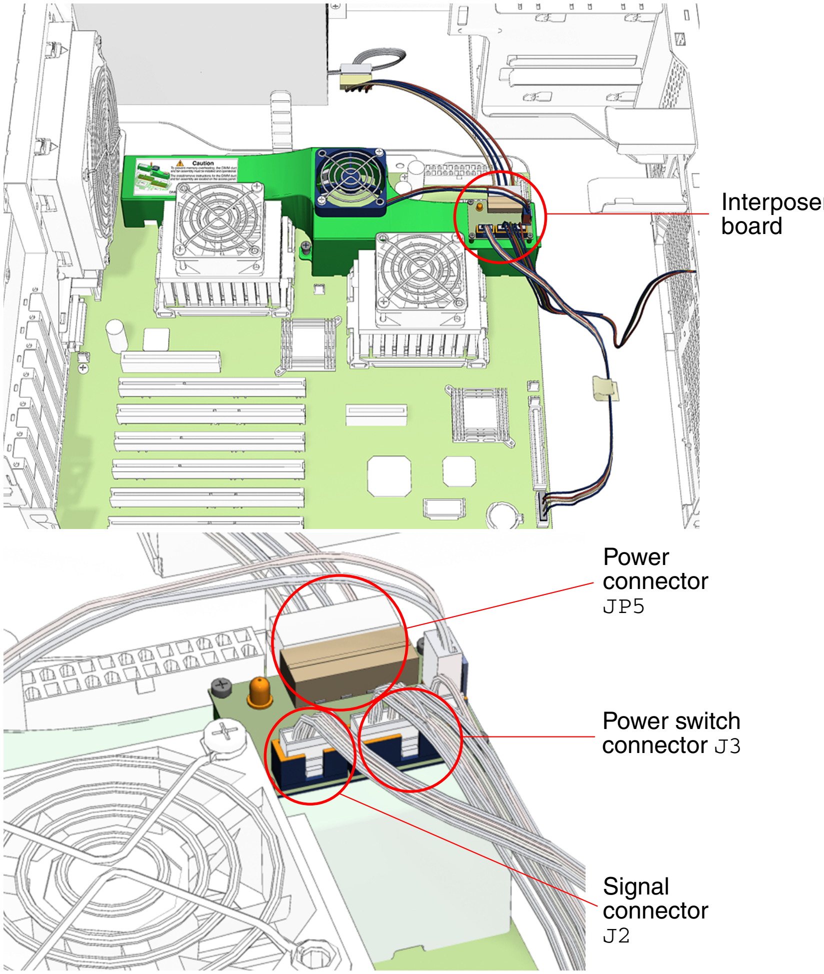



**FIGURE 11-12** Removing Cables From the Interposer Board

6. **Using the No. 2 Phillips screwdriver, loosen the screw that secures the DIMM fan assembly to the motherboard.**

   See FIGURE 11-13.

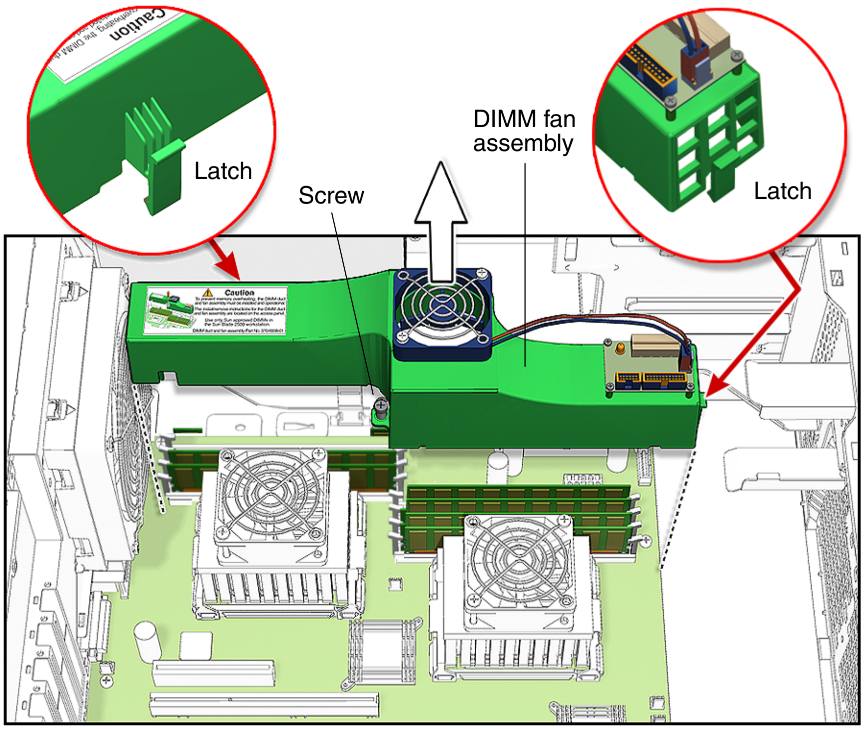



**FIGURE 11-13** Removing the DIMM Fan Assembly

7. **Press the two latches, then lift and remove the DIMM fan assembly.**

   See FIGURE 11-13. Set the DIMM fan assembly aside.

8. **Choose your next step:**

   - If you removed the DIMM fan assembly to remove DIMMs, return to Step 6 of "Removing the DIMMs" on page 11-4.
   - If you removed the DIMM fan assembly to install DIMMs, return to Step 3 of "Installing the DIMMs" on page 11-7.
   - If you removed the DIMM fan assembly to replace the motherboard, return to Step 7 of "Removing the Motherboard" on page 11-57.
   - Otherwise, proceed to "Installing the DIMM Fan Assembly" on page 11-20.

   The Sun Blade 2500 system does not operate without the DIMM fan assembly installed.

## 11.2.3 Installing the DIMM Fan Assembly

1. **Open and position the chassis.**

   See:

   - "Removing the Access Panel" on page 10-12
   - "Positioning the Chassis" on page 10-18

2. **Locate where the DIMM fan assembly is to be installed.**

   See FIGURE 11-9.

3. **Remove the new DIMM fan assembly from its packaging.**

4. **Position the DIMM fan assembly over the DIMMs and lower it to the motherboard.**

   See FIGURE 11-14.

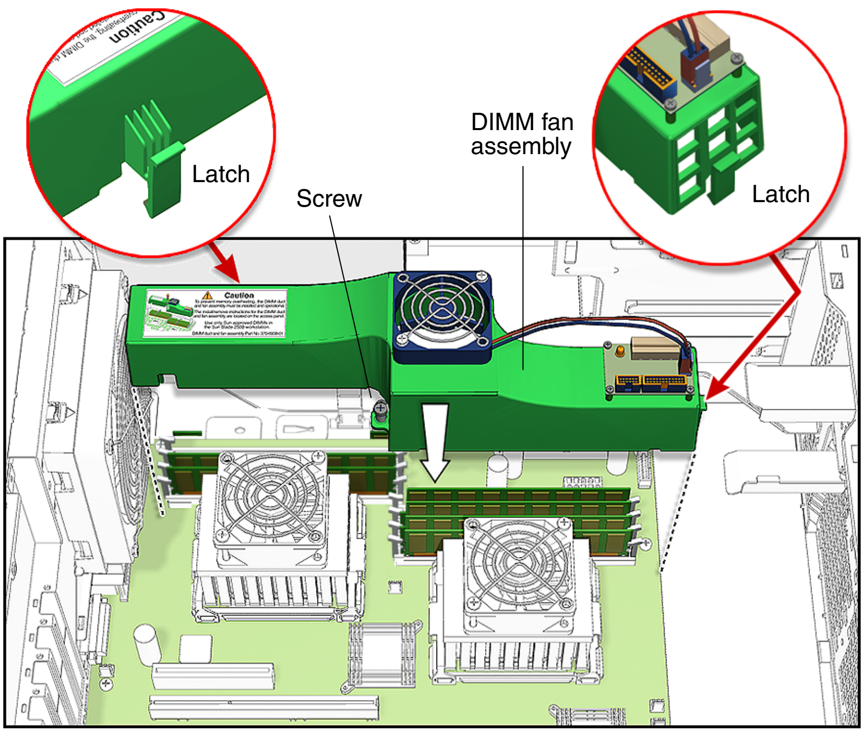



**FIGURE 11-14** Installing the DIMM Fan Assembly

5. **Attach the two latches to the underside of the motherboard.**

   See FIGURE 11-14.

6. **Using a No. 2 Phillips screwdriver, tighten the screw to secure the DIMM fan assembly to the motherboard.**

---

**Caution –** Do not overtighten the screw. Overtightening the screw will void the warranty.

---

7. **Reconnect the following cables to the interposer board on the DIMM fan assembly:**

   - Signal cable assembly to connector `J2`
   - Power switch and LED cable assembly to connector `J3`
   - Power cable assembly to connector `JP5`

   See FIGURE 11-15.

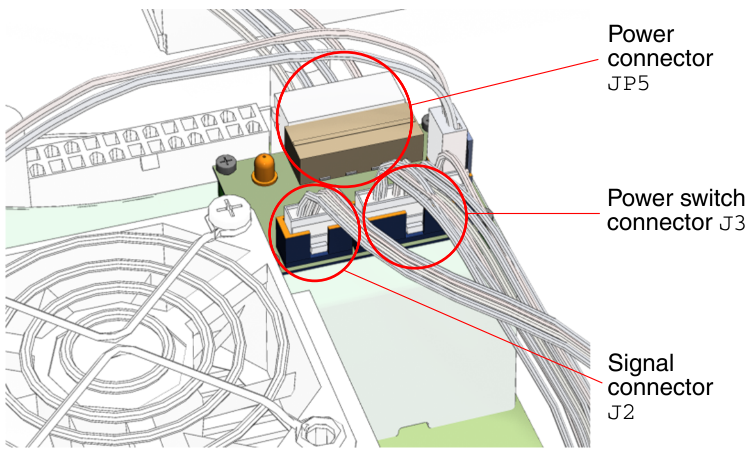



**FIGURE 11-15** Connecting Cables to the Interposer Board

8. **Reinstall the hard drive assembly.**

   See FIGURE 11-16.

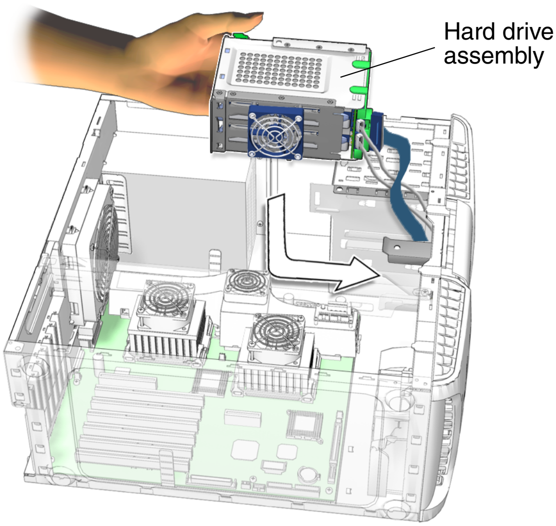



**FIGURE 11-16** Installing the Hard Drive Assembly

9. **Using a No. 2 Phillips screwdriver, attach the two screws.**

   See FIGURE 11-17.

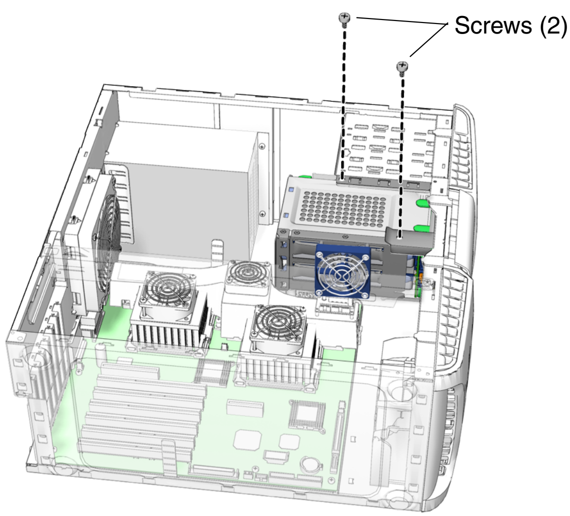



**FIGURE 11-17** Securing the Hard Drive Assembly

10. **Inspect the DIMM fan assembly to verify that:**
    - The two latches are secure to the motherboard.
    - The screw is secure and not binding.
11. **Inspect the DIMM fan assembly cabling to verify that:**
    - Cables are secure at interposer board connectors `J2`, `J3`, and `JP5`.
    - Cable is secure at motherboard connector `J15`.
    - Cable is secure at power supply connector `P9`
12. **Choose your next step:**
    - If you installed the DIMM fan assembly after removing memory, return to Step 11 of "Installing the DIMMs" on page 11-7.
    - If you installed the DIMM fan assembly after installing memory, return to Step 10 of "Installing the DIMMs" on page 11-7.
    - If you installed the DIMM fan assembly as part of the motherboard installation, return to Step 13 of "Installing the Motherboard" on page 11-63.
    - Otherwise, reposition the system, replace the access panel, power on the system, and verify the component installation.

      See:
      - "Repositioning the Chassis" on page 15-2
      - "Installing the Access Panel" on page 15-6
      - "Powering On the Workstation" on page 15-7
      - "Verifying the DIMM Fan Assembly Operation" on page 11-23

## 11.2.4 Verifying the DIMM Fan Assembly Operation

1. **Power on and boot the workstation.**

   If the workstation does not boot, see "DIMM Fan Problem" on page 4-41.

   e. **Look through the rear fan and verify that the interposer board LED `D1` is off.**

   See FIGURE 11-18.

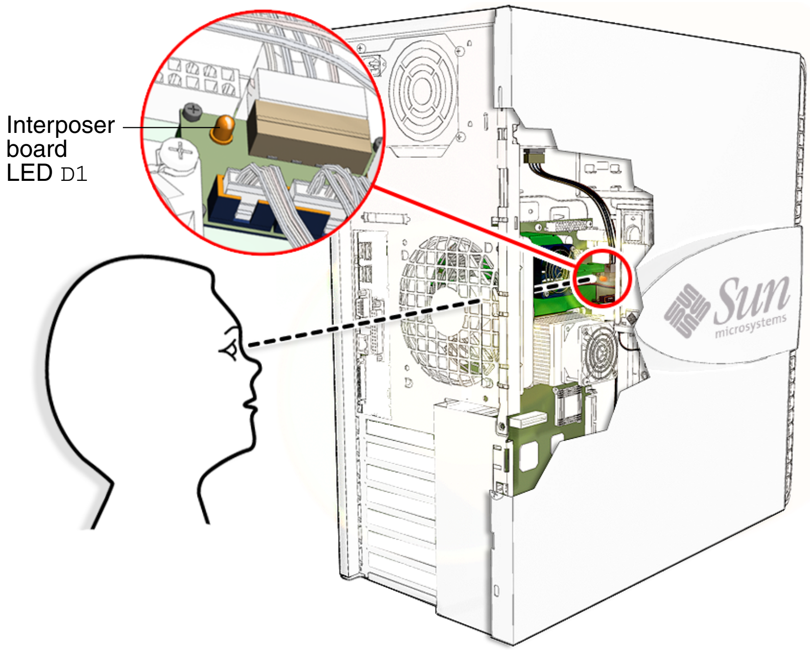



**FIGURE 11-18** Verifying LED `D1` Is Off

- If LED `D1` is off, the system is operating normally.
- If LED `D1` is on or flashing, see "DIMM Fan Problem" on page 4-41.

# 11.3 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 11-25
- "Removing the CPU Fan and Heat Sink Assembly" on page 11-25
- "Installing the CPU Fan and Heat Sink Assembly" on page 11-30


## 11.3.1 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.

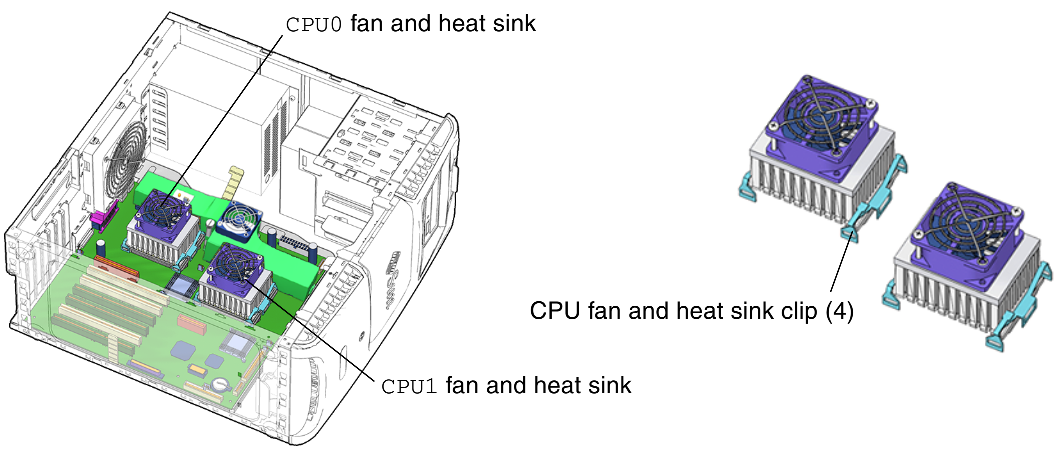



**FIGURE 11-19** CPU Fan Locations and Identification

## 11.3.2 Removing the CPU Fan and Heat Sink Assembly

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

   See:


- "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 11-19.

   - If you are replacing the CPU fan and heat sink assembly for `CPU0`, remove the rear fan.

     See, "Removing the Rear Fan" on page 13-18.

   - If you are replacing the CPU fan and heat sink assembly for `CPU1`, remove the hard drive assembly.

     See "Removing the Hard Drive Assembly" on page 10-19.

3. **Position the chassis.**

   See "Positioning the Chassis" on page 10-18.

4. **Disconnect the fan cable for the CPU fan and heat sink assembly that you are replacing from the motherboard.**

   See FIGURE 11-20.

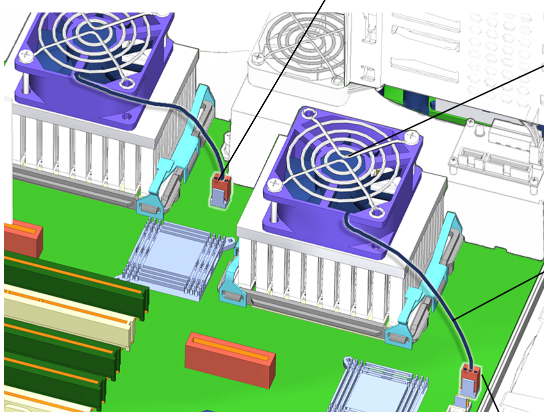



**FIGURE 11-20** Disconnecting CPU Fan Cables

5. **Release the CPU fan and heatsink assembly clips.**

   See FIGURE 11-21.

---

**Caution –** Do not damage the motherboard components located around the CPU fan and heat sink assembly.

---

---

**Note –** Check the orientation of the clips before removal. You must reinstall the clips in the same orientation later.

---

a. **Press down and release the latch on the right clip.**

b. **Rotate the clip outward to remove it from the locking ring.**

   As you release the clip, lift it out of the system and set it aside.

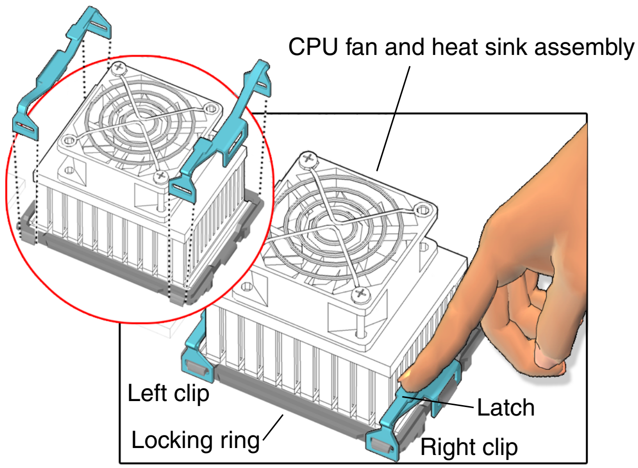



**FIGURE 11-21** Removing CPU Fan Assembly Clips

c. **Push down on the CPU fan and heat sink assembly with one hand to prevent it from lifting up.**

   See FIGURE 11-22.

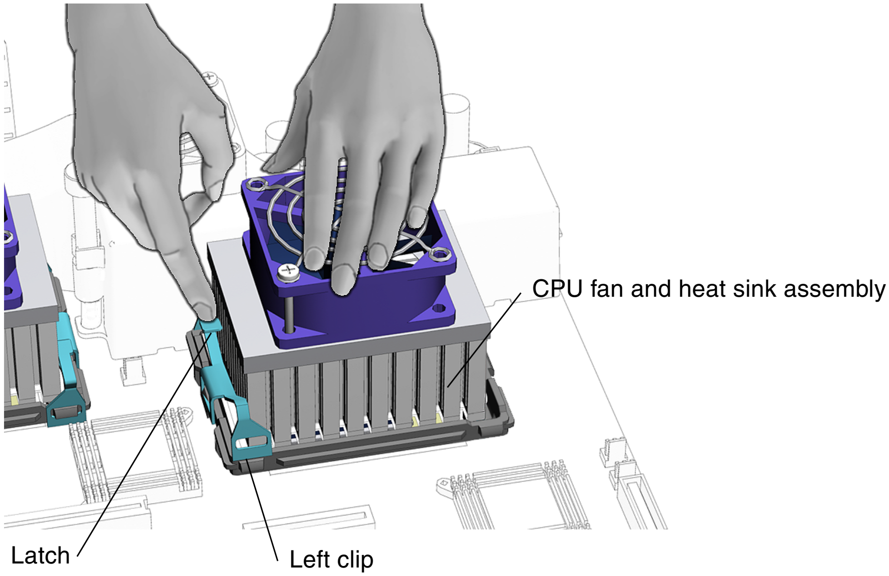



**FIGURE 11-22** Holding the CPU Fan and Heat Sink Assembly

d. **Press down and release the latch on the left clip.**

e. **Rotate the clip outward to remove it from the locking ring.**

As you release the clip, lift it out of the system and set it aside.

6. **Remove the CPU fan and heat sink assembly.**

a. **If necessary, rotate the CPU fan and heat sink assembly counterclockwise.**

See FIGURE 11-23.

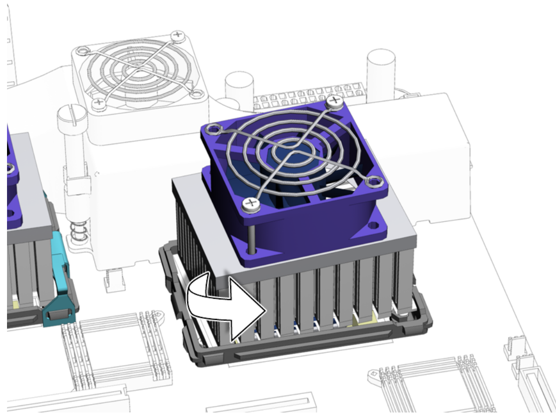


**FIGURE 11-23** Rotating the CPU Fan and Heat Sink Assembly Counterclockwise

This action breaks the seal between the heat sink, thermal pad, and CPU. It might be necessary to rotate the CPU fan and heat sink counterclockwise and clockwise several times to break the seal.

---

**Note –** If you cannot easily break the seal between the CPU fan and heat sink thermal pad and the CPU, replace the motherboard.

---

**b. Lift and remove the CPU fan and heat sink assembly.**

See FIGURE 11-24. Remove the CPU fan and heat sink assembly, and place it on its side.

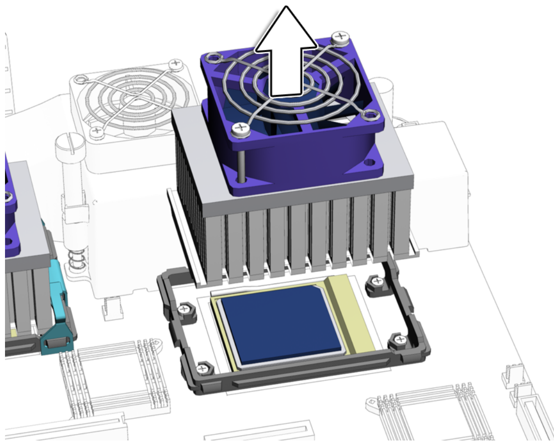


**FIGURE 11-24** Removing the CPU Fan and Heat Sink Assembly

---

**Caution –** Do not place the CPU fan and heat sink assembly face down on any surface. The thermal pad might attract dirt and oil from the surface, which contamination prevents efficient heat transfer.

---

7. **If necessary, repeat Step 4 through Step 6 of this procedure to remove the second CPU fan and heat sink assembly.**

   Proceed to "Installing the CPU Fan and Heat Sink Assembly" on page 11-30.

---

**Caution –** Do not power on the system if the CPU fan and heat sink assembly is not installed. Powering on the system will immediately damage the CPU.

---

## 11.3.3 Installing the CPU Fan and Heat Sink Assembly

1. **Open and position the chassis.**

---

**Caution –** If the CPU fan and heat sink assembly is not installed, the workstation should not be powered on. If it was powered on, see "Powering Off the Workstation" on page 10-4 for information about powering off the workstation.

---

See:

- "Removing the Access Panel" on page 10-12

■ "Positioning the Chassis" on page 10-18

2. **Identify the CPU fan and heat sink assembly location on the motherboard.**

   The CPU fan and heat sink assembly is installed on `CPU0` or `CPU1`. See FIGURE 11-19.

3. **Remove the CPU fan and heat sink assembly from its packaging.**

4. **Place the CPU fan and heat sink assembly onto the CPU.**

   See FIGURE 11-25.

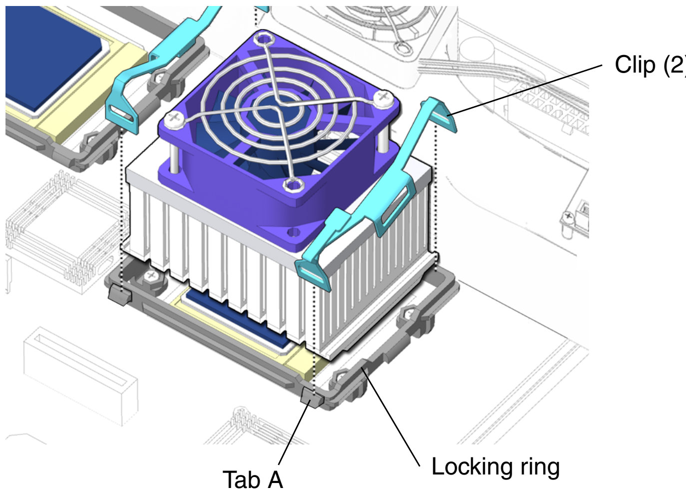



**FIGURE 11-25** Installing the Clip on Tab A

5. **Arrange the CPU fan so that the cable is facing the bottom-front corner of the chassis.**

   See FIGURE 11-30.

6. **Fasten the CPU fan and heat sink assembly onto the CPU.**

   a. **Place the right CPU fan and heat sink assembly clip over the locking ring tab A.**

      See FIGURE 11-25.

   b. **Place the clip over tab B of the locking ring.**

      See FIGURE 11-26.

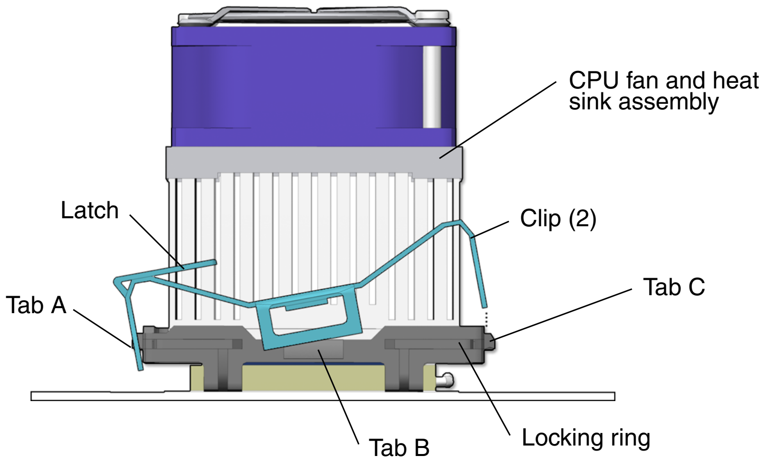



**FIGURE 11-26** Installing the Clip on Tab B

c. **Install the leading edge of the clip (the edge without the latch) over tab C.**

d. **Press down on the clip until it is seated into the lock-down position.**

See FIGURE 11-27.

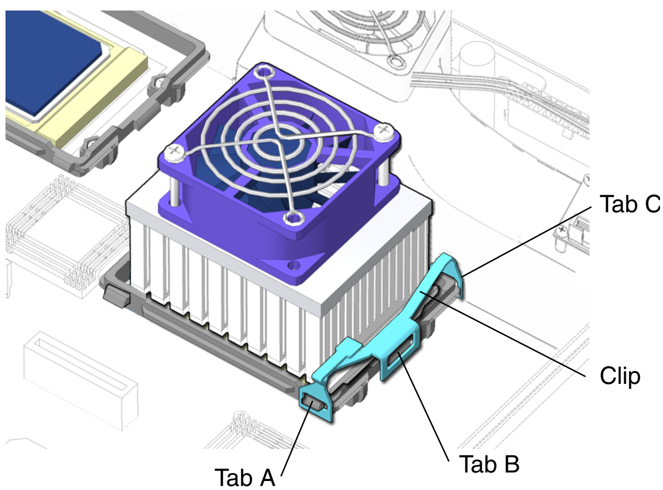



**FIGURE 11-27** Installing the Clip Into the Lock-Down Position

Ensure that the clip is correctly seated on the locking ring at tabs A, B, and C.

e. **Place the left CPU fan and heat sink assembly clip over the locking ring tab D.**

See FIGURE 11-28.

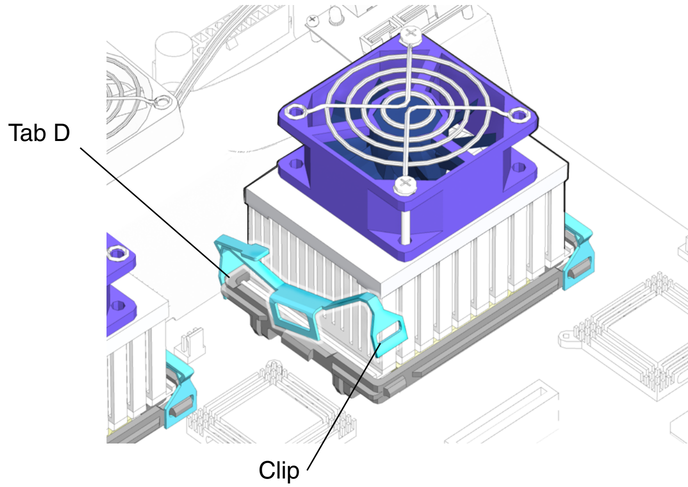



**FIGURE 11-28** Installing the Clip Over Tab D

f. **Place the clip over tab E of the locking ring.**

See FIGURE 11-29.

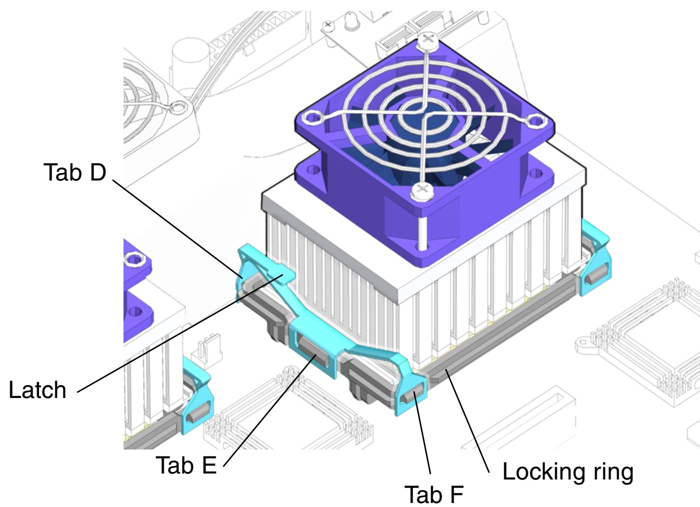



**FIGURE 11-29** Installing the Clip Over Tab E

g. **Install the leading edge of the clip (the edge without the latch) over tab F.**

h. **Press down on the clip until seats into the lock-down position.**

See FIGURE 11-29. Ensure that the clip is correctly seated on CPU connector tabs D, E, and F.

7. **Connect the CPU fan and heat sink assembly cable.**

See FIGURE 11-30. Each CPU fan and heat sink assembly cable has a designated connector on the motherboard. Connect the fan cable connector for `CPU0` to `FAN1`. Connect the fan cable connector for `CPU1` to `FAN3`.

8. **If necessary, repeat Step 2 through Step 7 of this procedure to install the second CPU fan and heat sink assembly.**

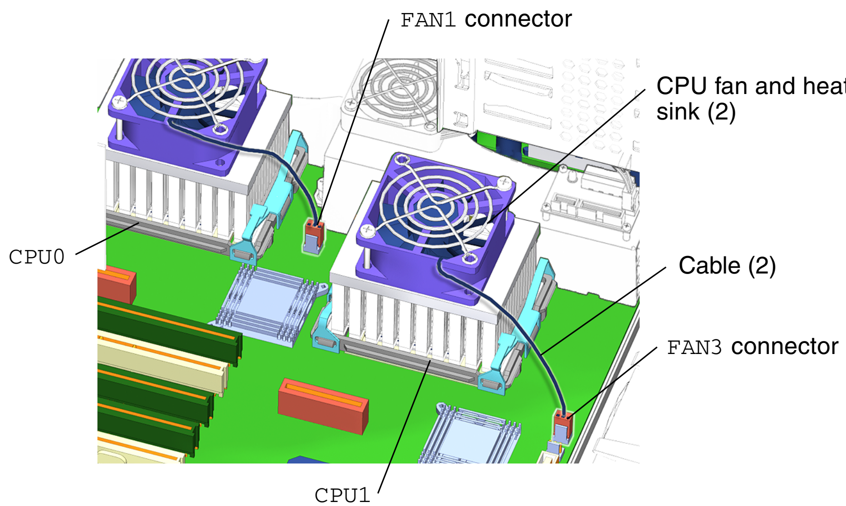



**FIGURE 11-30** Connecting CPU Fan and Heat Sink Assembly Connectors

9. **Reposition the chassis.**

See "Repositioning the Chassis" on page 15-2.

10. **Chose your next step:**

- If you replaced the CPU fan and heat sink assembly for `CPU1`, also reinstall the hard drive assembly.

  See "Installing the Hard Drive Assembly" on page 15-2.

- If you replaced the CPU fan and heat sink assembly for `CPU0`, also reinstall the rear fan and rear fan bracket.

  See: "Installing the Rear Fan" on page 13-19.

11. **Inspect the CPU fan and heat sink assembly clips to verify that:**

- The CPU fan and heat sink assembly clips are down and both clips for each CPU fan assembly are locked in place.

- The rear fan bracket feet are well seated in the chassis.
- The hard drive bracket is tight in the hard drive bay.

12. **Inspect the CPU fan and heat sink assembly cabling to verify that:**
    - Each CPU fan and heat sink assembly power cable is securely connected to the motherboard.
    - The rear fan cable is securely connected to the motherboard.
    - The SCSI backplane power cables are plugged into the SCSI backplane.
    - The SCSI interface cable is fed through the SCSI backplane bracket, plugged into the SCSI backplane, and plugged into the motherboard.

13. **Replace the access panel, power on the system, and verify the component installation.**

    See:


    - "Installing the Access Panel" on page 15-6
    - "Powering On the Workstation" on page 15-7
    - "Verifying an Installation" on page 15-10


# 11.4 Replacing the Battery

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


- "Identifying the Battery" on page 11-36
- "Removing the Battery" on page 11-36
- "Installing the Battery" on page 11-37

## 11.4.1 Identifying the Battery

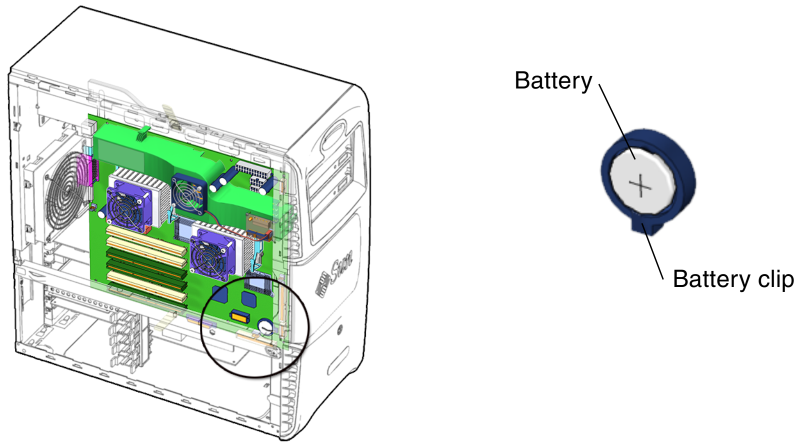



**FIGURE 11-31** Battery Location and Identification

TABLE 11-3 lists the battery specifications.

**TABLE 11-3** Battery Specifications

| Specification | Value |
|---|---|
| Voltage | 3 VDC |
| Form factor | CR 2032 |
| Vendor | Maxell |

## 11.4.2 Removing the Battery

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12
   - "Positioning the Chassis" on page 10-18

2. **Locate the battery.**

   See FIGURE 11-31.

3. **Release the battery by squeezing the battery latch together until the battery shifts out of the motherboard socket.**

   See FIGURE 11-32.

4. **Remove the battery.**

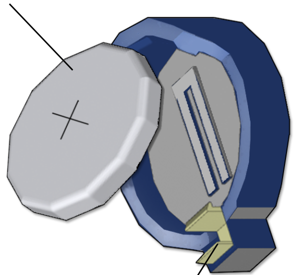



**FIGURE 11-32** Releasing the Battery

The workstation does not function without the battery. To install the new battery proceed to "Installing the Battery" on page 11-37.

## 11.4.3 Installing the Battery

The battery installs directly onto the motherboard. There are no additional fasteners or cables.

1. **Open and position the chassis.**

   See:

   - "Removing the Access Panel" on page 10-12
   - "Positioning the Chassis" on page 10-18

2. **Identify the battery installation site.**

   See FIGURE 11-31.

3. **Tilt the battery into the battery connector, angling the battery under the latch.**

   See FIGURE 11-33.

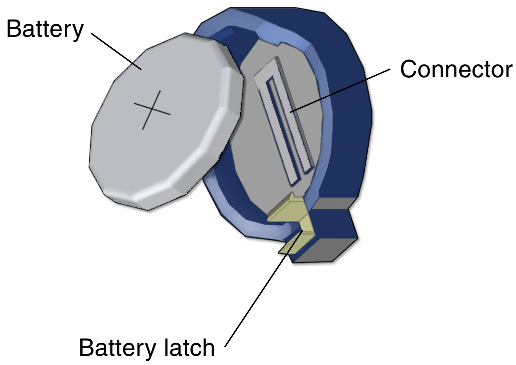



**FIGURE 11-33** Installing the Battery

4. **Slide the battery until it clicks into place.**

5. **Ensure that the battery latch secures the battery in its connector.**

6. **Reposition the chassis, replace the access panel, power on the system, and verify the component installation.**

   See:

   - "Repositioning the Chassis" on page 15-2
   - "Installing the Access Panel" on page 15-6
   - "Powering On the Workstation" on page 15-7
   - "Verifying an Installation" on page 15-10

## 11.5 Replacing the NVRAM

This section describes removal and installation of the nonvolatile random access memory (NVRAM). Topics include:

- "Identifying the NVRAM" on page 11-39
- "Removing the NVRAM" on page 11-39
- "Installing the NVRAM" on page 11-40

## 11.5.1 Identifying the NVRAM

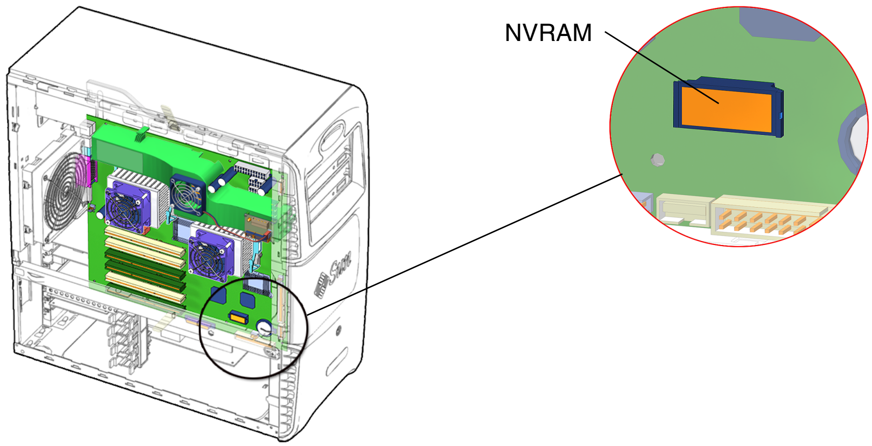



**FIGURE 11-34** NVRAM Location and Identification

## 11.5.2 Removing the NVRAM

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12
   - "Positioning the Chassis" on page 10-18

2. **Locate the NVRAM.**

   See FIGURE 11-34.

3. **Pull the NVRAM straight up from the connector.**

   See FIGURE 11-35.

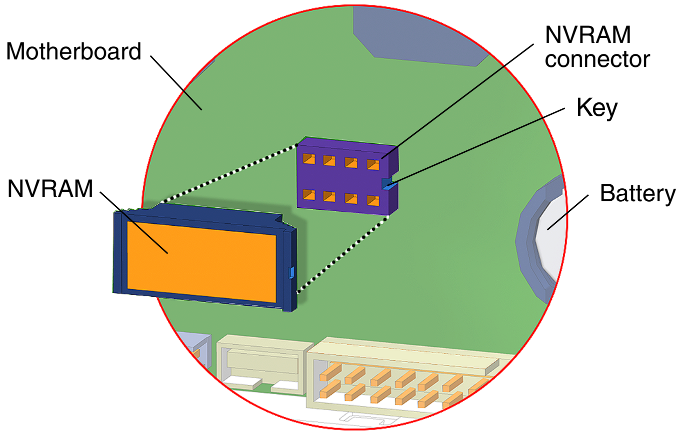



**FIGURE 11-35** Removing NVRAM

---

**Note –** NVRAM and the NVRAM connector are keyed.

---

The workstation does not function without NVRAM. To install new NVRAM, proceed to "Installing the NVRAM" on page 11-40.

## 11.5.3 Installing the NVRAM

NVRAM installs directly onto the motherboard. There are no additional fasteners or cables.

1. **Open and position the chassis.**

   See:

   - "Removing the Access Panel" on page 10-12
   - "Positioning the Chassis" on page 10-18

2. **Locate the NVRAM connector.**

   See FIGURE 11-34.

3. **Align the NVRAM key to the NVRAM connector key on the motherboard.**

   See FIGURE 11-35.

---

**Note –** NVRAM and the NVRAM connector are keyed.

---

4. **Press the NVRAM down until snug.**

5. **Ensure that the NVRAM is tight in its connector.**

6. **Reposition the chassis, replace the access panel, power on the system, and verify the component installation.**

   See:


   - "Repositioning the Chassis" on page 15-2
   - "Installing the Access Panel" on page 15-6
   - "Powering On the Workstation" on page 15-7
   - "Verifying an Installation" on page 15-10


## 11.6 Replacing the PCI Cards

This section describes removal and installation of interface (PCI) cards in the workstation. Topics include:

- "Identifying the PCI Cards" on page 11-41
- "PCI Slot Configurations" on page 11-43
- "Removing a PCI Card" on page 11-44
- "Installing a PCI Card" on page 11-47
- "Special Considerations for Multiple Graphic Accelerators Installed in a Single Workstation" on page 11-50

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

### 11.6.1 Identifying the PCI Cards

Peripheral Component Interface (PCI) cards are supported in the six PCI slots (`PCI0 - PCI5`) and the one audio riser card 0/remote system controller 0 (`ARC0/RSC0`) slot that reside on the system motherboard. See FIGURE 11-36.

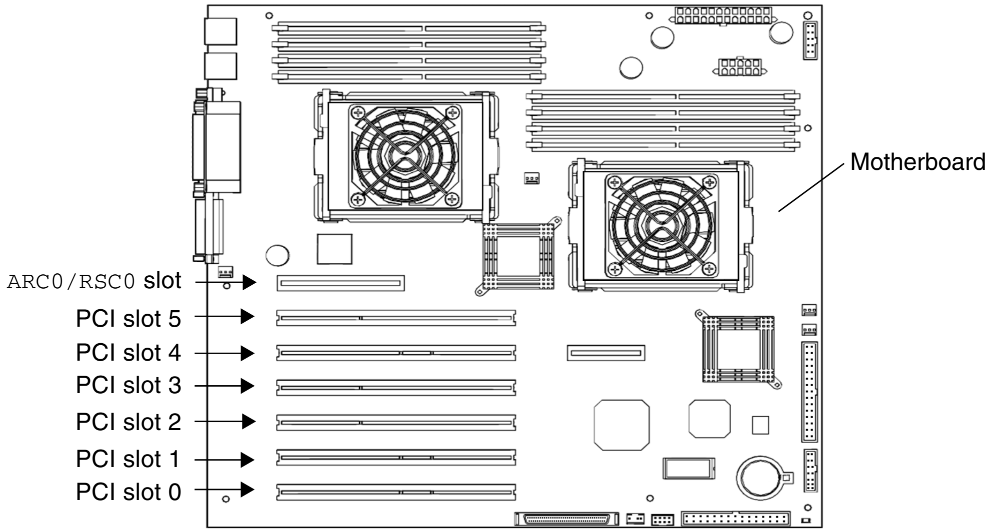



**FIGURE 11-36** Location of PCI and `ARC0/RSC0` Slots on the Motherboard

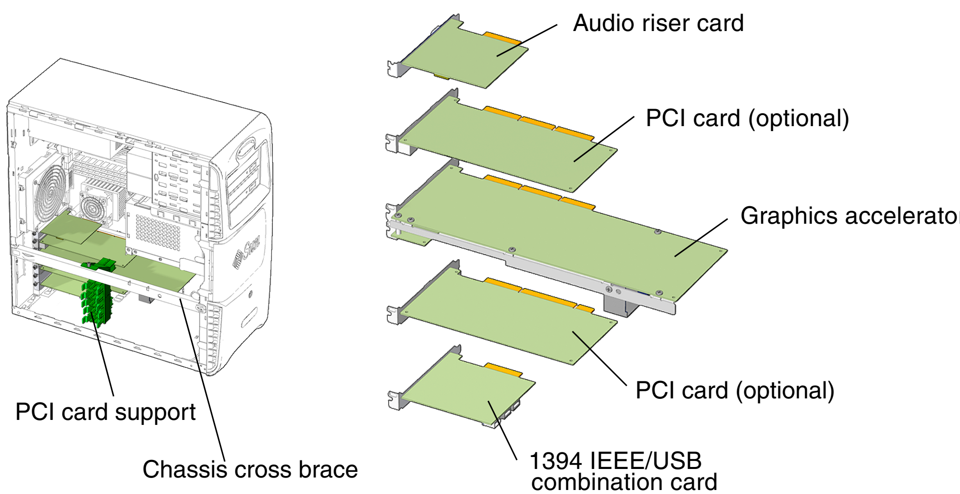



**FIGURE 11-37** PCI Cards Location and Identification

TABLE 11-4 lists PCI card slots, motherboard-supported speeds, and motherboard slot connector colors.

**TABLE 11-4** PCI Card Slot Specifications

| PCI Card Slots | Motherboard-Supported Speed | Motherboard Slot Connector Colors |
|---|---|---|
| ARC0/RSC0 Slot | Dedicated audio module | Brown |
| Slot 5 | 66 MHz | Green |
| Slot 4 | 33 MHz | White |
| Slot 2 and 3 | 66 MHz | Green |
| Slot 1 | 33 MHz | White |
| Slot 0 | 33 MHz, for IEEE 1394 USB 2.0 combination card slot | White |

---

**Note –** If you are installing or upgrading PCI cards, proceed to "Installing a PCI Card" on page 11-47.

---

## 11.6.2 PCI Slot Configurations

The Sun Blade 2500 workstation ships configured with the following components:

- One Sun XVR-100 or Sun XVR-600 graphics accelerator installed in `PCI5` or a Sun XVR-1200 graphics accelerator installed in `PCI4` and `PCI5`
- One audio module installed in the `ARC0/RSC0` slot
- One IEEE 1394a/USB 2.0 combination card installed in `PCI0`

TABLE 11-5 is a summary of the Sun Blade 2500 PCI slot configurations.

**TABLE 11-5** Sun Blade 2500 PCI Slot Configurations

| PCI Slot | PCI Slot Performance | Basic 3D Graphics Configuration | Basic 2D Graphics Configuration | Multihead CAD Configuration | Dual-Platform Interoperability Configuration |
|---|---|---|---|---|---|
| `ARC0/RSC0` | | Audio module | Audio module | Audio module | Audio module |
| `PCI5` | 66 MHz, 64 bit | Sun XVR-600<br>Sun XVR-1200 | Sun XVR-100 | Sun XVR-600 | SunPCi III coprocessor |
| `PCI4` | 33 MHz, 64 bit | Sun XVR-600<br>Sun XVR-1200 | | | |

**TABLE 11-5** Sun Blade 2500 PCI Slot Configurations *(Continued)*

| PCI Slot | PCI Slot Performance | Basic 3D Graphics Configuration | Basic 2D Graphics Configuration | Multihead CAD Configuration | Dual-Platform Interoperability Configuration |
|---|---|---|---|---|---|
| PCI3 | 66 MHz, 64 bit | Sun XVR-600<br>Sun XVR-1200 | Sun XVR-100 | Sun XVR-600 | SunPCi III coprocessor |
| PCI2 | 66 MHz, 64 bit | Sun XVR-600<br>Sun XVR-1200 | Sun XVR-100 | Sun XVR-600 | SunPCi III coprocessor |
| PCI1 | 33 MHz, 64 bit | Sun XVR-600<br>Sun XVR-1200 | | | |
| PCI0 | 33 MHz, 64 bit | IEEE 1394a/USB 2.0 combination card | IEEE 1394a/USB 2.0 combination card | IEEE 1394a/USB 2.0 combination card | IEEE 1394a/USB 2.0 combination card |

In the following list, each bullet item identifies the maximum number of graphics accelerators configurable:

- Three Sun XVR-100
- Three Sun XVR-600

Place the accelerators in `PCI2`, `PCI3`, or `PCI5` for maximum system performance. Placement in other PCI slots might reduce system performance. The factory default position is `PCI5`.

---

**Note –** Two Sun XVR-1200 graphics accelerators can be placed in slots `PCI1` and `PCI2`, `PCI2` and `PCI3`, or `PCI4` and `PCI5`. Installation of the XVR-1200 in `PCI1` and `PCI2`, or `PCI4` and `PCI5` makes available an additional 66 MHz PCI slot for other use.

---

## 11.6.3 Removing a PCI Card

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12

2. **Remove the PCI card support and the chassis cross brace.**

   See "Removing the PCI Card Support and Chassis Cross Brace" on page 13-42.

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

3. **Position the chassis.**

   See "Positioning the Chassis" on page 10-18.

4. **Locate the PCI card you want to remove.**

5. **Using a No. 2 Phillips screwdriver, remove the screw(s) that secure the card bracket tab to the chassis rear panel.**

   See FIGURE 11-38. Set the screw(s) aside in a container.

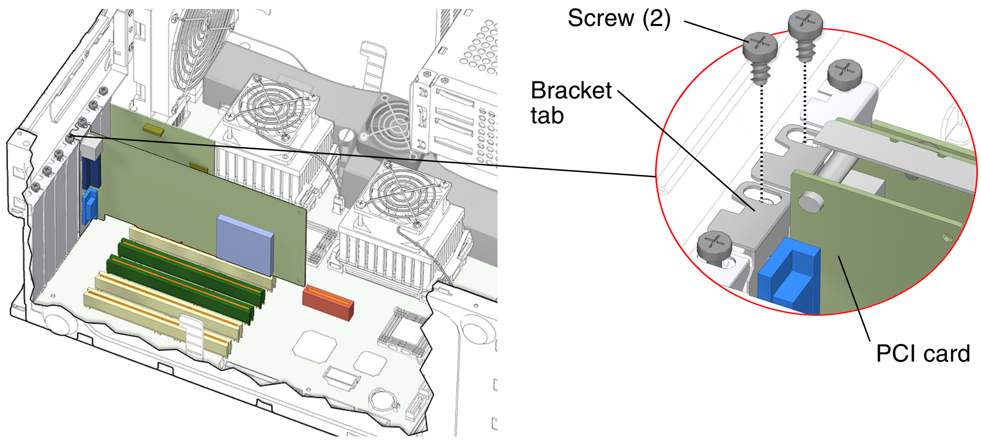



**FIGURE 11-38** Removing the PCI Card Bracket Tab Screw

**Note –** The Sun XVR-1200 graphics accelerator shown has two boards and, therefore, two screws.

6. **Gently rock the PCI card forward, then lift it straight out of the PCI card slot.**

   See FIGURE 11-39. Set the PCI card aside on an antistatic mat.

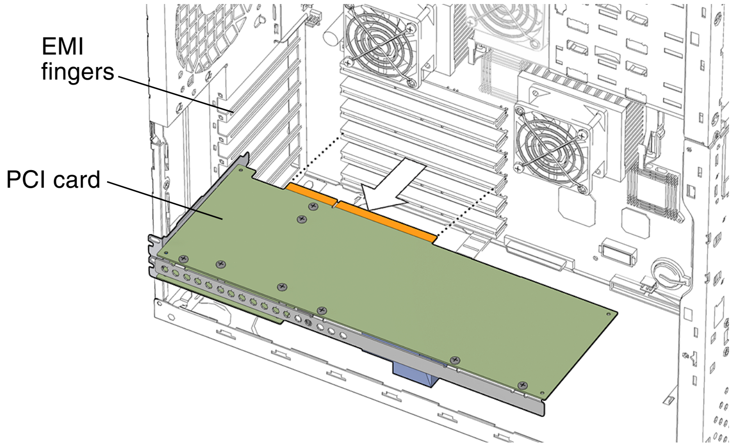



**FIGURE 11-39** Removing the PCI Card

---

**Note –** Use care not to damage the EMI fingers around the PCI card openings.

---

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 11-47, to install the new PCI cards.
- If you removed PCI cards prior to removing the motherboard, return to Step 8 of "Removing the Motherboard" on page 11-57.
- If you are not replacing the PCI card you removed, install a filler panel.

a. **Insert a PCI slot filler panel into the chassis rear panel slot.**

To meet system EMI and airflow requirements, the rear panel opening must be closed with a filler panel.See FIGURE 11-40.

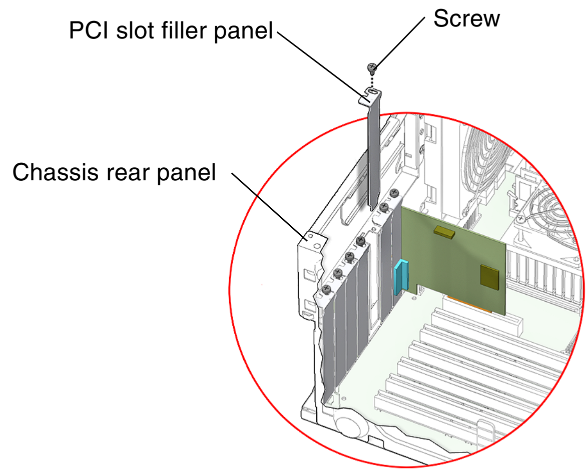



**FIGURE 11-40** Installing a PCI Slot Filler Panel

b. **Use a No. 2 Phillips screwdriver to replace the screw that secures the filler panel to the chassis rear panel.**

   See FIGURE 11-40.

c. **Reposition the chassis, replace the PCI card support and chassis cross brace, replace the access panel, and power on the system.**

   See:

   - "Repositioning the Chassis" on page 15-2
   - "Replacing the PCI Card Support and Chassis Cross Brace" on page 13-41
   - "Installing the Access Panel" on page 15-6
   - "Powering On the Workstation" on page 15-7

## 11.6.4 Installing a PCI Card

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12

2. **Remove the PCI card support and the chassis cross brace.**

   See "Replacing the PCI Card Support and Chassis Cross Brace" on page 13-41.

3. **Position the chassis.**

   See "Positioning the Chassis" on page 10-18.

4. **Locate the available PCI card slots.**

   See FIGURE 11-41.

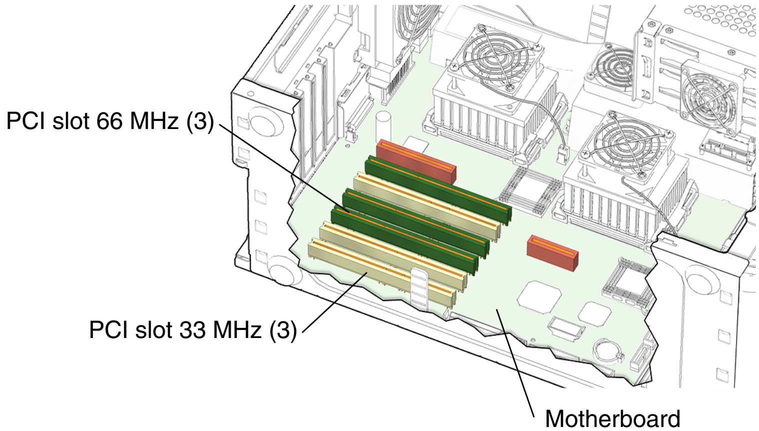



**FIGURE 11-41** Locating PCI Slots

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 a new PCI card and you are not replacing a PCI card, check the PCI card documentation to ensure you install the PCI card into an appropriate PCI card slot. Ensure that the speed of the card matches the speed of the PCI card slot. See TABLE 11-4. The white PCI slots are 33 MHz and the green PCI slots are 66 MHz.

---

5. **Using a No. 2 Phillips screwdriver, remove the chassis filler panel screw (if needed).**

   See FIGURE 11-40.

6. **Slide the filler panel out.**

   Set the filler panel and screw aside.

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 connector edge.

---

8. **Position the PCI card so that the card aligns with the PCI card opening and the PCI card slot.**

   See FIGURE 11-42.

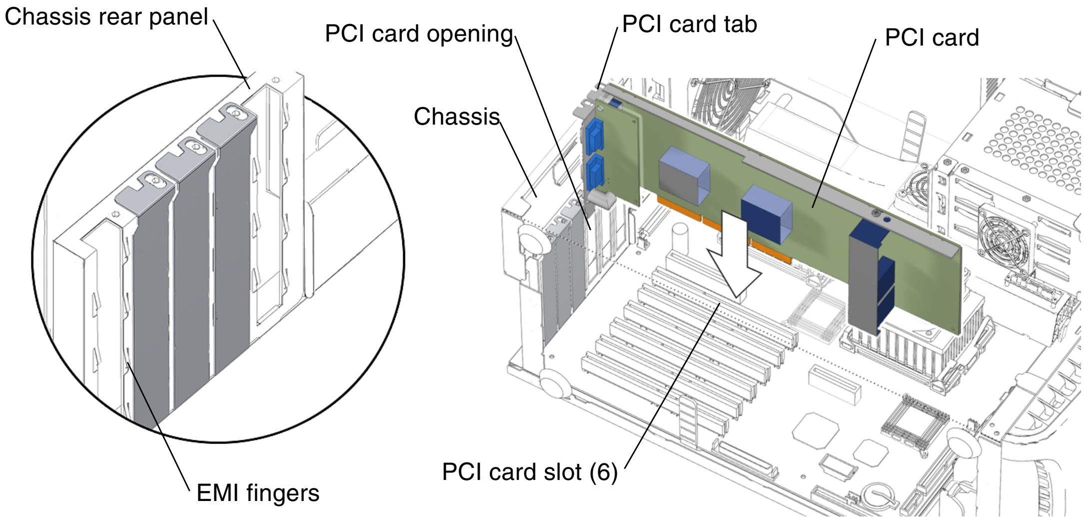



**FIGURE 11-42** Inserting a PCI card

9. **Firmly press the PCI card straight down into the PCI card slot until it is fully seated.**

---

**Note –** Do not damage the EMI fingers surrounding the chassis rear panel opening. See FIGURE 11-42.

---

10. **Use a No. 2 Phillips screwdriver to fasten the screw that secures the PCI card tab to the chassis rear panel.**

    If necessary, repeat for the second PCI card tab.

11. **Reposition the chassis.**

    See "Repositioning the Chassis" on page 15-2.

12. **Replace the PCI card support and chassis cross brace.**

    See "Replacing the PCI Card Support and Chassis Cross Brace" on page 13-41.

13. **Inspect the PCI card connectors to verify that:**
    - The PCI card slot screws are tight.
    - The PCI card is seated in the PCI card slot.
    - If applicable, verify that the second PCI card is well seated in the PCI card slot.

14. **Replace the access panel, power on the system, and verify the component installation.**

    See:


    - "Installing the Access Panel" on page 15-6
    - "Powering On the Workstation" on page 15-7
    - "Verifying an Installation" on page 15-10


## 11.6.5 Special Considerations for Multiple Graphic Accelerators Installed in a Single Workstation

A single Sun Blade 2500 workstation can support multiple Sun XVR-100, Sun XVR-600, and Sun XVR1200 graphics accelerators. TABLE 11-6 describes the recommended PCI slot locations for the recommended Sun graphics accelerators.

**TABLE 11-6** PCI Slot Locations for Sun Blade 2500 Graphics Accelerators

| Graphics Accelerator | Number of Graphics Accelerators Supported | PCI Slot Location(s) |
|---|---|---|
| Sun XVR-100 | 3 | `PCI2`, `PCI3`, or `PCI5` |
| Sun XVR-600 | 3 | `PCI2`, `PCI3`, or `PCI5` |
| Sun XVR-1200 | 2 | `PCI2`, `PCI3`, or `PCI5` |

### 11.6.5.1 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 single graphics accelerator is installed into the `PCI5`, then that card is the default console display. If there is no graphics accelerator installed into slot `PCI5`, consider the probe order described in TABLE 11-7.

### 11.6.5.2 Probe Order

During the boot sequence, device nodes are probed. The PCI slots are probed in the order described in TABLE 11-7:

**TABLE 11-7** PCI Card Probe Order

| Probe Order | Slot Identifier | Slot Position on Rear Panel | Device Node |
|---|---|---|---|
| 1 | `PCI5` | Top slot | `/devices/pci@1f,700000 device 3` |
| 2 | `PCI4` | Second slot from top | `/devices/pci@1e,600000 device 2` |
| 3 | `PCI1` | Second slot from the bottom | `/devices/pci@1e,600000 device 3` |
| 4 | `PCI0` | Bottom slot | `/devices/pci@1e,600000 device 4` |
| 5 | `PCI2` | Third slot from the bottom | `/devices/pci@1e,600000 device 5` |
| 6 | `PCI3` | Third slot from top | `/devices/pci@1e,600000 device 1` |

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`.

### 11.6.5.3 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 TIP connection, then test information is output to that connection. For example:

```
ok test screen
Testing screen

Starting XV-100 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-100 graphics accelerator.

If the device does not have a self-test built in, the following message is displayed.

```
screen device has no selftest method
```

### 11.6.5.4 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-100 graphics accelerator is installed in slot `PCI5` and a Sun XVR-1200 graphics accelerator is installed in slots `PCI2` and `PCI3`. Initially, the Sun XVR-100 graphics accelerator is the default console display. This example configures the Sun XVR-1200 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-100@3
b) /pci@1e,600000/SUNW,XVR-1200@1
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, then 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
```

In this example, the system now uses the Sun XVR-1200 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 want to check the new console display, type: **`test newconsoledisplay`**.

---

## 11.6.5.5 Avoiding Colormap Flash

Your Sun Blade 2500 system 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.

---

# 11.7 Replacing the Motherboard

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

- "Identifying the Motherboard" on page 11-54
- "Removing the Motherboard" on page 11-57
- "Installing the Motherboard" on page 11-63

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

---

**Caution –** This procedure is intended for Sun authorized service providers only.

---

## 11.7.1 Identifying the Motherboard

The motherboard and CPU are a single replaceable unit. See FIGURE 11-43.

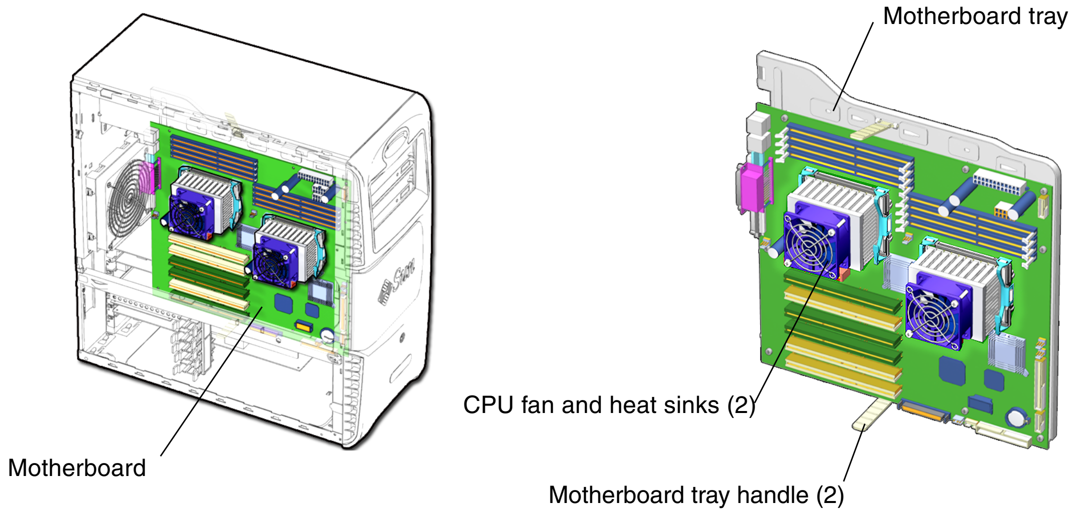



**FIGURE 11-43** Motherboard Location and Identification

The motherboard contains the CPU, and the CPU fan and heat sink assembly and is attached to the motherboard tray by nine screws. The motherboard tray provides structural reinforcement for the motherboard.

---

**Caution –** Do not separate the motherboard from the motherboard tray when returning the motherboard for replacement.

---

FIGURE 11-44 identifies the major motherboard connectors and components.

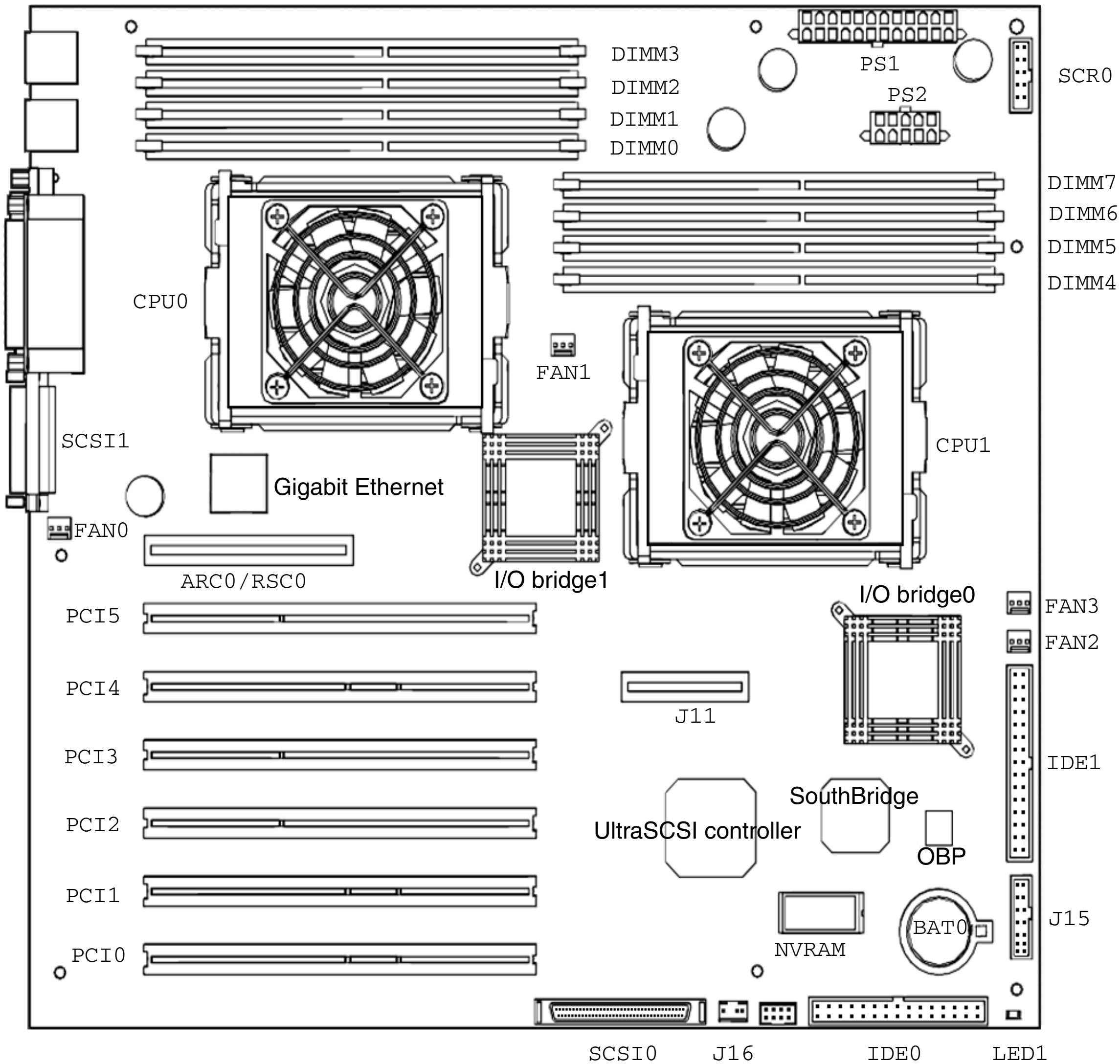



**FIGURE 11-44** Major Motherboard Components and Connectors

TABLE 11-8 describes the major motherboard connectors and components.

**TABLE 11-8** Major Motherboard Components and Connectors

| Location | Description |
|---|---|
| BAT0 | Battery, lithium |
| FAN1, FAN3 | CPU fan connections |
| CPU0, CPU1 | UltraSPARC IIIi processors |
| DIMM0 - DIMM7 | DDR1 SDRAM, 132-pin memory DIMMs |
| FAN2 | Fan, front fan connection |
| FAN0 | Fan, rear fan connection |
| SCSI0 | Internal SCSI connector for hard drives |
| IDE0 | IDE connection, primary (not used) |
| IDE1 | IDE connection, secondary (used for optical drive) |
| LED | Motherboard 5 VDC indicator |
| NVRAM | Nonvolatile random access memory |
| PCI0 - PCI5 | 33 and 66 MHz PCI card slots |
| ARC0/RSC0 | Audio riser card slot |
| PS1 | Power connection from power supply to motherboard |
| PS2 | Power connection from power supply to motherboard |
| SCR0 | Smart card reader connection |
| J16 | Speaker connector |
| J15 | Secondary power connection for the power switch and LED cable assembly |

## 11.7.2 Removing the Motherboard

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12

2. **Locate the motherboard.**

   Se FIGURE 11-43.

3. **Remove the hard drive assembly.**

See FIGURE 11-45 and "Removing the Hard Drive Assembly" on page 10-19.

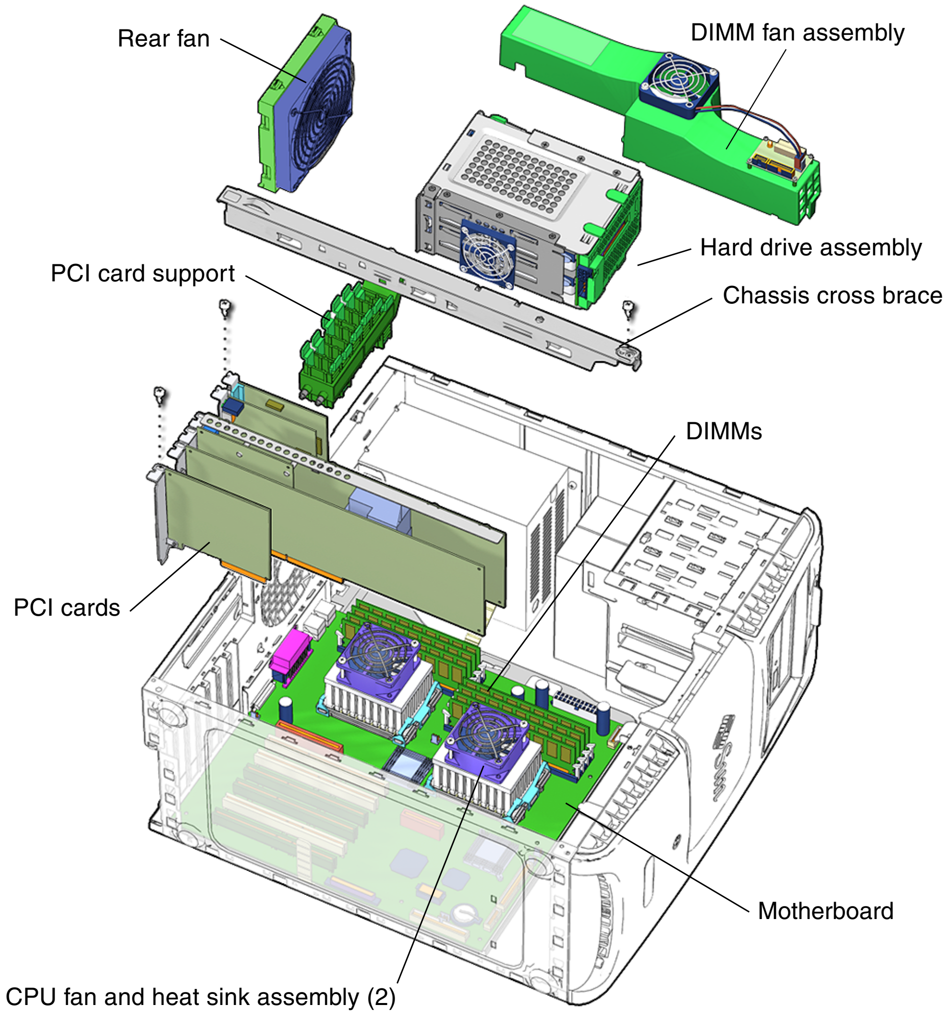



**FIGURE 11-45** Removing Chassis Components

4. **Remove the PCI card support and the chassis cross brace.**

   See FIGURE 11-45 and "Removing the PCI Card Support and Chassis Cross Brace" on page 13-42.

---

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

---

5. **Remove the rear fan.**

   See FIGURE 11-45 and "Removing the Rear Fan" on page 13-18.

6. **Position the chassis to access the motherboard.**

   See "Positioning the Chassis" on page 10-18.

7. **Remove the DIMM fan assembly.**

   See "Removing the DIMM Fan Assembly" on page 11-15.

8. **Remove the PCI cards.**

   See FIGURE 11-45 and "Removing a PCI Card" on page 11-44.

   Set the PCI cards on an electrostatic mat.

9. **Disconnect the power cables from the corresponding component connectors and set them out of the way of the motherboard**

   See FIGURE 11-46. Disconnect the following devices:

   - Power supply cables at connectors (`PS1` and `PS2`)
   - Front fan power connector (`FAN2`)
   - Speaker (`J16`)

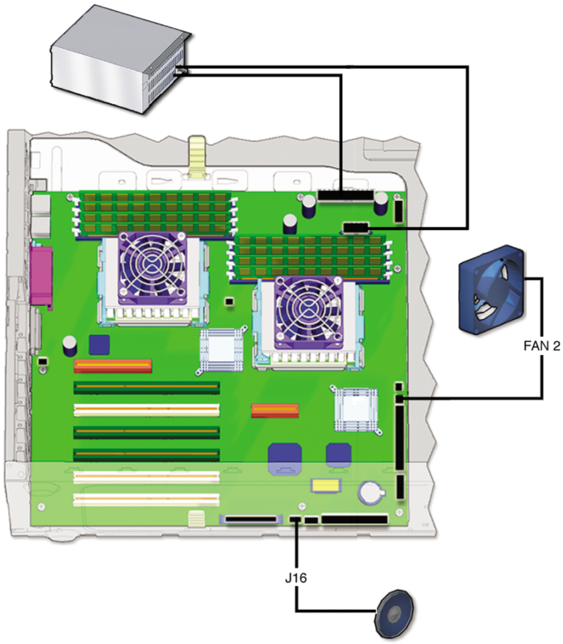



**FIGURE 11-46** Disconnecting Power Cables

10. **Disconnect the interface cables from the corresponding component connectors and set them out of the way of the motherboard:**

    See FIGURE 11-47. Disconnect the following devices:

    - Smart card reader (`SCR0`)
    - Optical drive (`IDE1`)
    - SCSI connector (`SCSI0`)
    - secondary optical drive (`IDE0`) (optional)

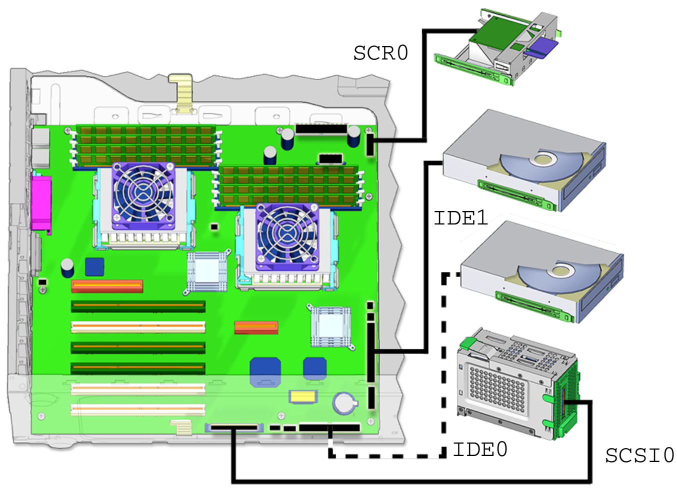



**FIGURE 11-47** Disconnecting Interface Cables

11. **Use a 3/16-inch socket and driver to remove the two parallel port fastening screws.**

    See FIGURE 11-48. Set the screws in a container.

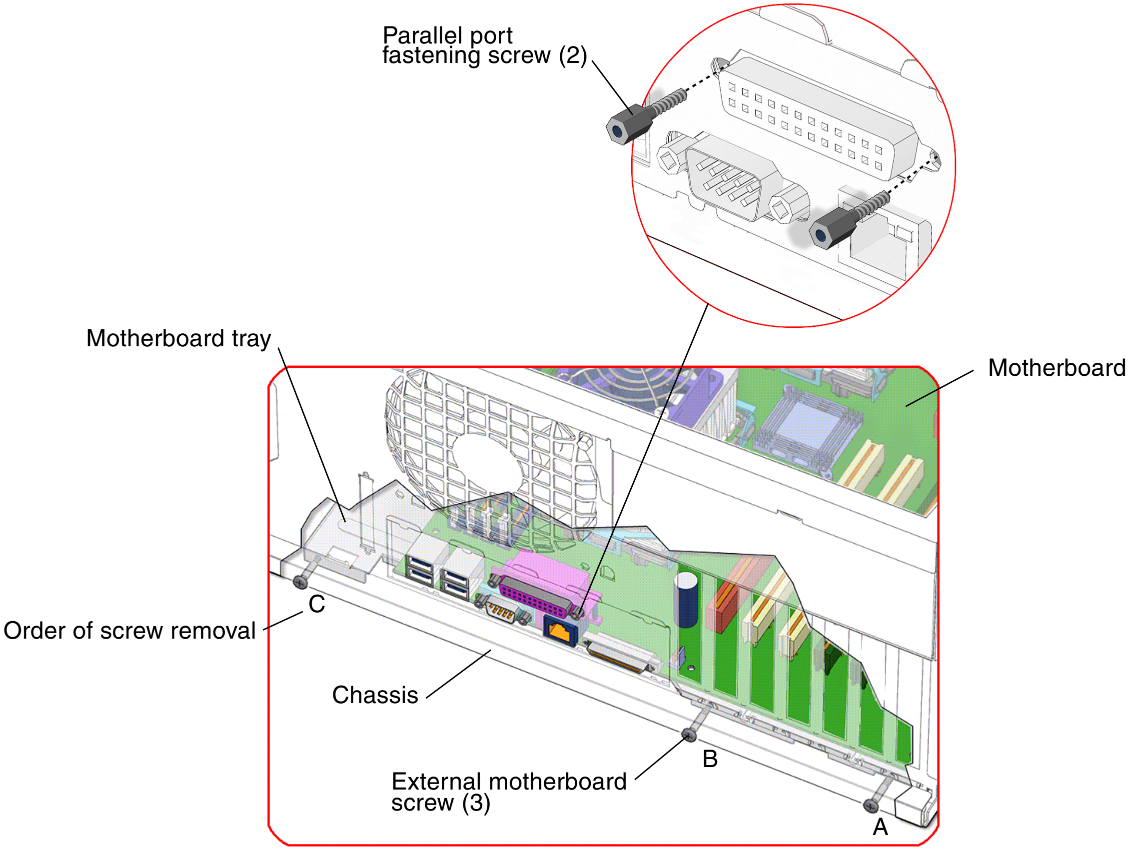



**FIGURE 11-48** Removing the Parallel Port Fastening and External Motherboard Screws

12. **Use a No. 2 Phillips screwdriver to remove the three screws that secure the motherboard tray to the chassis.**

    See FIGURE 11-48. Set the motherboard tray fastening screws in a container.

13. **Grasp both motherboard tray handles and slide the tray sideways toward the front of the chassis to release it from the chassis.**

    See FIGURE 11-49.

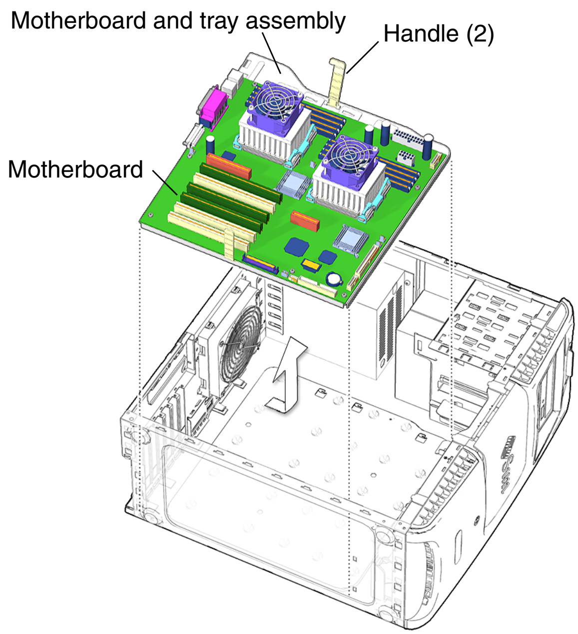



**FIGURE 11-49** Removing the Motherboard and Tray Assembly

14. **Use the handles to lift the tray out of the chassis.**

    See FIGURE 11-49. Set the motherboard tray assembly on an antistatic mat.

15. **Remove the DIMMs.**

    See "Removing the DIMMs" on page 11-4. Set the DIMMs on an electrostatic mat.

16. **(Optional) If you wish to use the same Ethernet address and system ID for the new motherboard, remove the NVRAM.**

    See "Removing the NVRAM" on page 11-39. Set the NVRAM on an antistatic mat.

    Proceed to "Installing the Motherboard" on page 11-63 to install the new motherboard.

## 11.7.3 Installing the Motherboard

1. **Open and position the chassis.**

   See:

   - "Removing the Access Panel" on page 10-12
   - "Positioning the Chassis" on page 10-18

2. **Remove the new motherboard from its antistatic package and place it on an antistatic mat.**

   If you want to transfer the NVRAM from the old motherboard to the new motherboard, see "Installing the NVRAM" on page 11-40.

3. **Install the new CPU fan and heat sink assembly, if necessary.**

   See "Replacing the CPU Fan and Heat Sink Assembly" on page 11-25.

4. **Install the DIMMs on the new motherboard.**

   See "Installing the DIMMs" on page 11-7.

5. **Grasping both motherboard tray handles, lower the motherboard into the chassis.**

   See FIGURE 11-50.

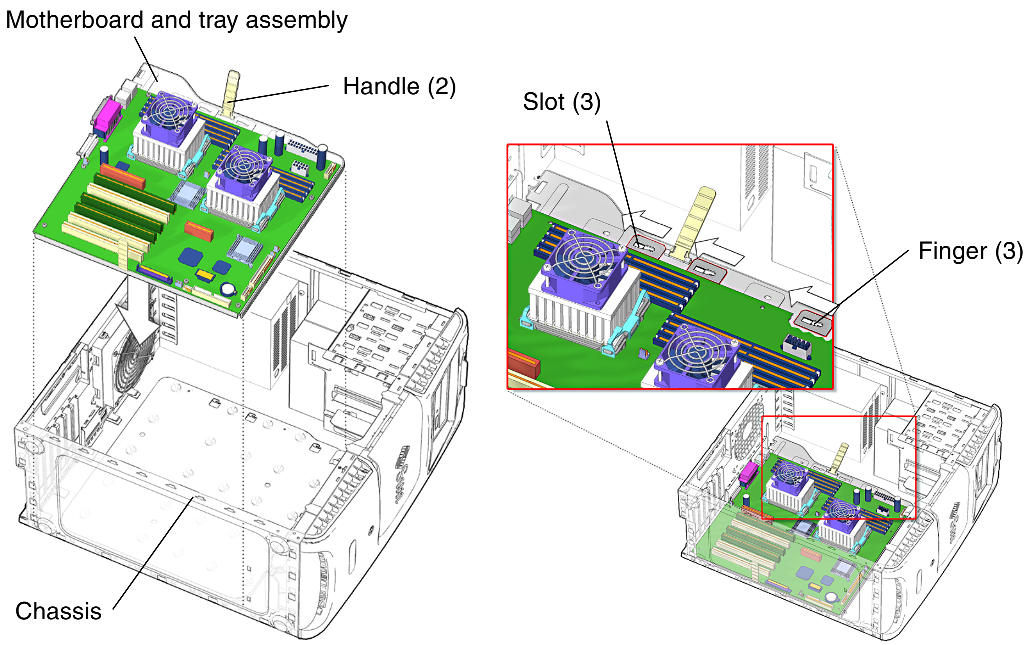



**FIGURE 11-50** Inserting the Motherboard and Tray Assembly Into the Chassis

---

**Note –** Make sure that no cables are positioned under the motherboard and tray assembly.

---

6. **Align the motherboard tray slots with their matching chassis fingers and slide the motherboard tray all the way to the back of the chassis.**

   See FIGURE 11-50.

7. **Using a No. 2 Phillips screwdriver, replace the three external motherboard screws that secure the motherboard and tray to the chassis.**

   See FIGURE 11-51. Install the screws in the order A, B, and C.

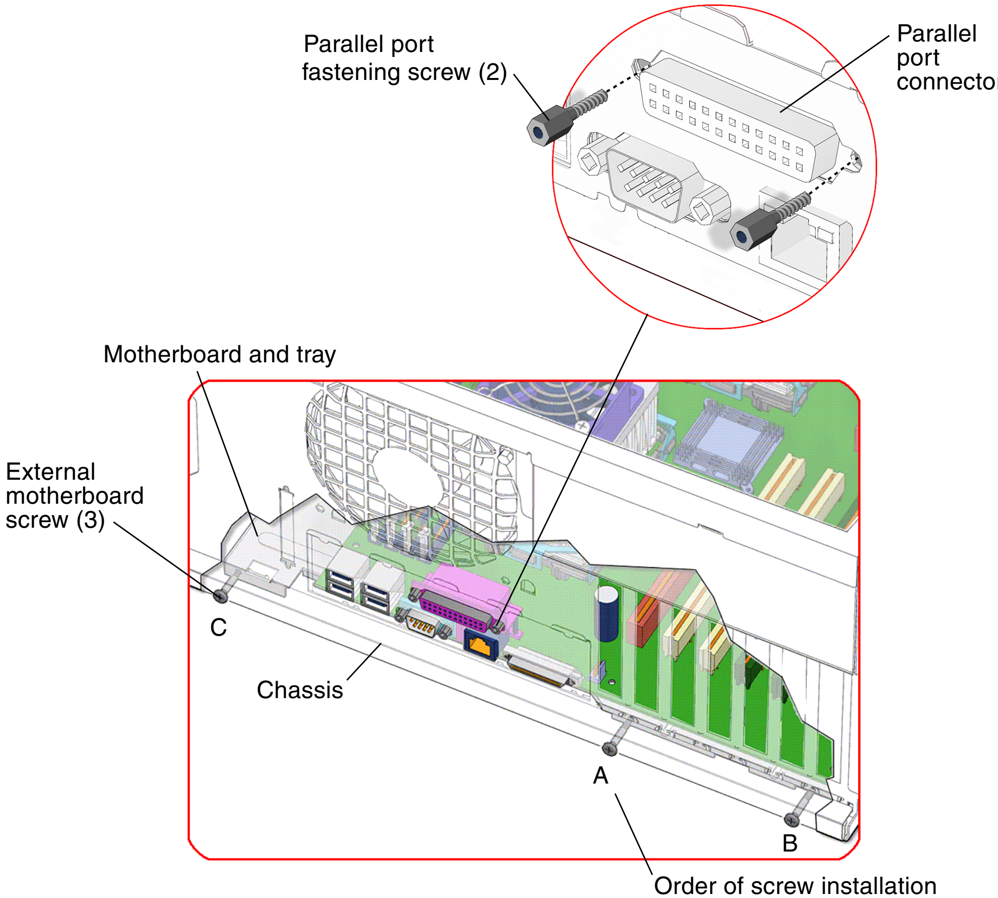



**FIGURE 11-51** Installing the External Motherboard and Parallel Port Fastening Screws

---

**Note –** Observe the fastening screw sequence to prevent any unnecessary strain on the parallel port connector.

---

8. **Use a 3/16-inch (5.0 mm) socket and driver to install the two parallel port fastening screws.**

   See FIGURE 11-51.

9. **Connect the interface cables to the corresponding component connector:**

- SCSI backplane for the hard drive(s) (`SCSI0`)
- Optical drives (`IDE1`)
- Smart card reader (`SCR0`)
- CD-RW (`IDE0`) (if installed)

See FIGURE 11-52.

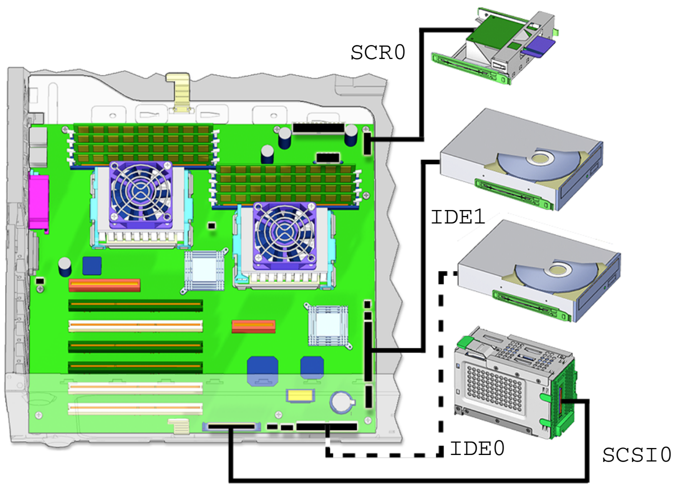



**FIGURE 11-52** Installing Motherboard Interface Cables

---

**Note –** FIGURE 11-52 shows the second optional CD-RW or DVD-ROM drive with interface cable installed.

---

**10. Connect the power and signal cables to the corresponding component connector:**

- Front fan power connector (`FAN2`)
- Power supply cables at connectors (`PS1`, `PS2`)
- Speaker (`J16`)

See FIGURE 11-53.

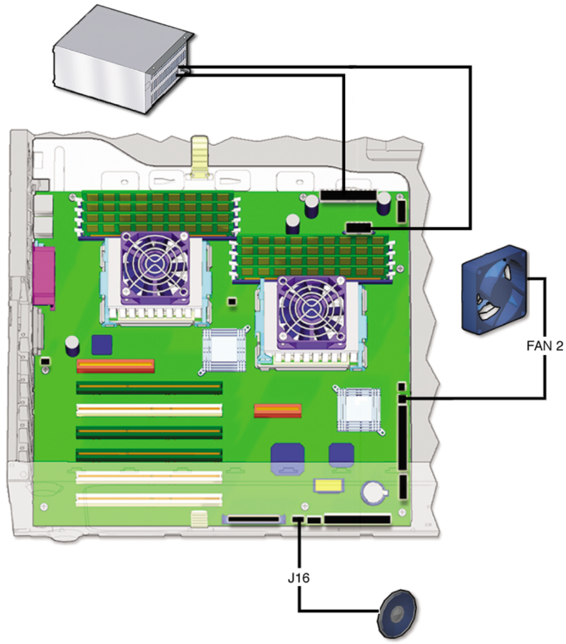



**FIGURE 11-53** Installing Motherboard Power Cables

11. **Replace the PCI cards.**

    See "Installing a PCI Card" on page 11-47.

12. **Replace the PCI card support and the chassis cross brace.**

    See "Replacing the PCI Card Support and Chassis Cross Brace" on page 13-41.

---

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

---

13. **Install the DIMM fan assembly.**

    See "Installing the DIMM Fan Assembly" on page 11-20.

14. **Reposition the chassis.**

    See "Repositioning the Chassis" on page 15-2.

15. **Replace the rear fan assembly.**

    See "Installing the Rear Fan" on page 13-19.

16. **Inspect the memory and related component fasteners to verify that:**

    - The DIMM ejectors are upright and tight.

- The rear fan and rear fan bracket assembly bracket feet are well seated in the chassis.
- The PCI card support is tight in the chassis brace.

17. **Replace the hard drive assembly.**

    See "Installing the Hard Drive Assembly" on page 15-2.

---

**Caution –** The interface and power cables are attached to the SCSI backplane and could be damaged when you slide the drive bracket into the hard drive bay.

---

18. **Inspect the fan and SCSI backplane component cabling to verify that:**

    - The rear fan cable is firmly connected to the motherboard.
    - The SCSI backplane power cables are plugged into the SCSI backplane.
    - The SCSI interface cable is fed through the SCSI backplane bracket, plugged into the SCSI backplane, and plugged into the motherboard.

19. **Reposition the chassis, replace the access panel, power on the system, and verify the component installation.**

    See:


    - "Repositioning the Chassis" on page 15-2
    - "Installing the Access Panel" on page 15-6
    - "Powering On the Workstation" on page 15-7
    - "Verifying an Installation" on page 15-10

CHAPTER 12

# Replacing Storage Devices

This chapter describes the replacement procedures for the Sun Blade 2500 replaceable storage devices.

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

This chapter contains the following topics:



**Caution –** Follow the cautions, warnings, and instructions in the *Sun Blade 2500 Safety and Compliance Guide* (817-5120). The document is available at: `http://www.sun.com/documentation`

**Caution –** The procedures in this chapter are described with the chassis in an upright position. Use care to ensure 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 within 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 the Hard Drive" on page 12-3
- "Installing a Hard Drive" on page 12-5


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

## 12.1.1 Identifying the Hard Drive

The workstation supports up to two hard drives. The hard drive assembly seen in FIGURE 12-1 consists of the:

- SCSI backplane
- Hard drive(s)
- Hard drive bracket

The hard drive assembly is installed in the hard drive bay. See FIGURE 12-2. The hard drives are labeled `HDD0` and `HDD1`, with the inner hard drive (`HDD0`) being the boot drive.

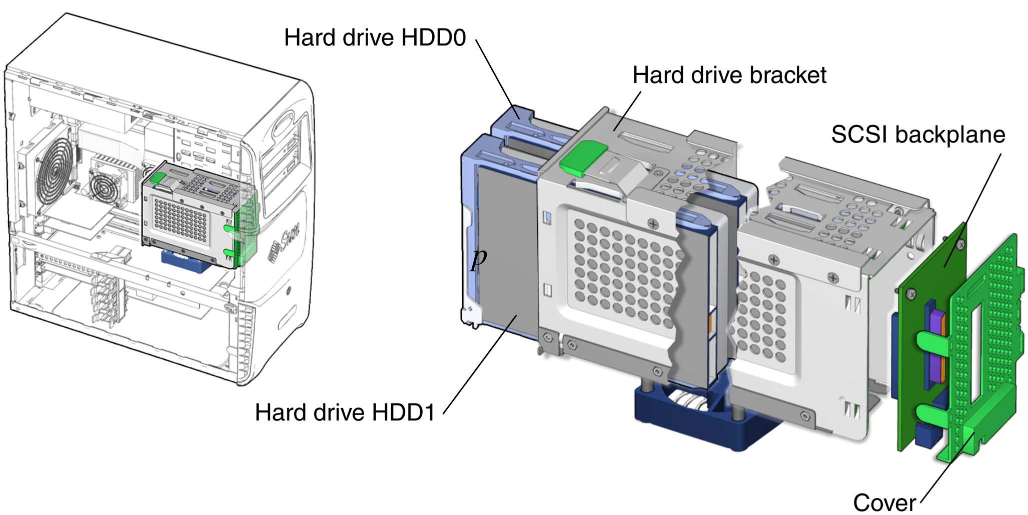



**FIGURE 12-1** Hard Drive Assembly Location and Identification

TABLE 12-1 lists the hard drive specifications.

**TABLE 12-1** Hard Drive Specifications

| Specification | Value |
|---|---|
| Capacity | 146 GByte, UltraSCSI IV 320 |
| Speed | 10,000 RPM |
| Access Time | 5.4 mseconds |
| Interface | SCSI |

## 12.1.2 Removing the Hard Drive

---

**Note –** The Sun Blade 2500 workstation can accommodate up to two hard drives. If you are not removing an existing drive, proceed to "Installing a Hard Drive" on page 12-5.

---

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

   See:

   - "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 12-2. Hard drive 0, the boot drive, is in the hard drive bay farther from the chassis opening. Hard drive 1 (optional drive) is near the chassis opening.

3. **Unlock the hard drive handle by lifting the handle release button upward until the handle pops out.**

   See FIGURE 12-2.

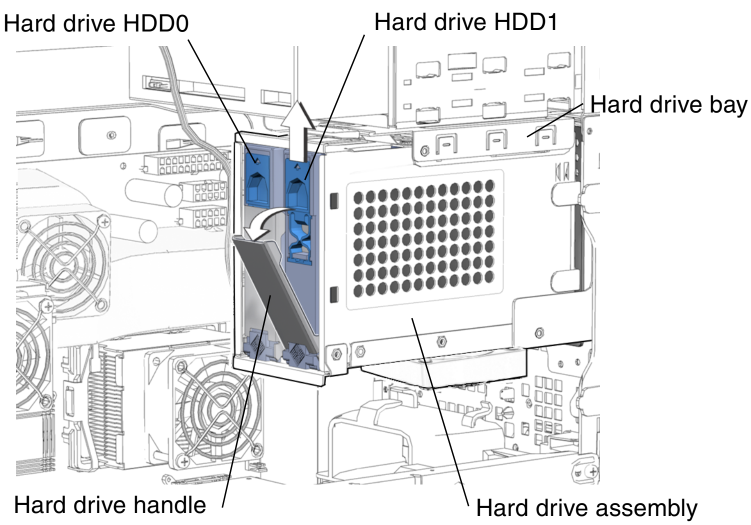



**FIGURE 12-2** Releasing the Hard Drive From the Hard Drive Assembly

4. **Disconnect the hard drive from the hard drive assembly by pulling the hard drive by the handle.**

   See FIGURE 12-3.

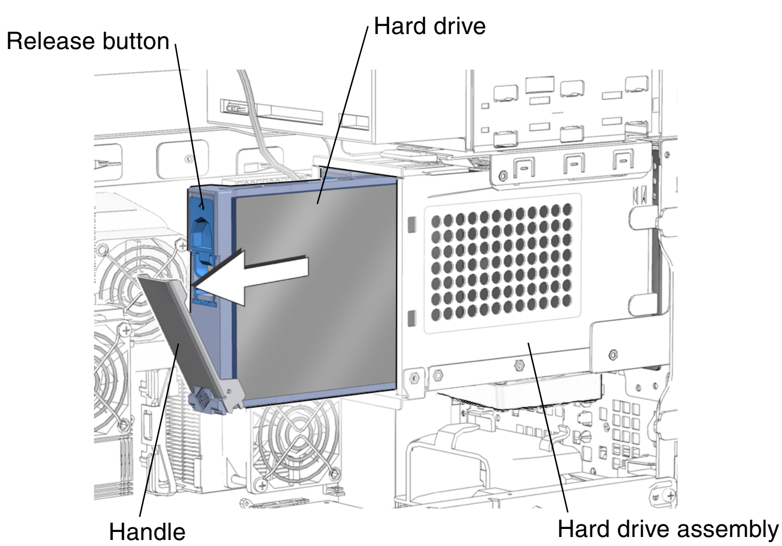



**FIGURE 12-3** Removing the Hard Drive From the Hard Drive Assembly

5. **Set the hard drive aside on an antistatic mat.**

6. **Choose your next step:**
   - If you removed the hard drive to replace it, proceed to "Installing a Hard Drive" on page 12-5 to install the new hard drive.
   - If you removed the hard drive and will not replace it at this time:, replace the access panel, and power on the system.

     See:

     - "Installing the Access Panel" on page 15-6
     - "Powering On the Workstation" on page 15-7

## 12.1.3 Installing a Hard Drive

---

**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.

---

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12

2. **Remove the hard drive from its antistatic packaging.**

3. **Lift the handle release button upward until the hard drive handle pops open.**

   See FIGURE 12-4.

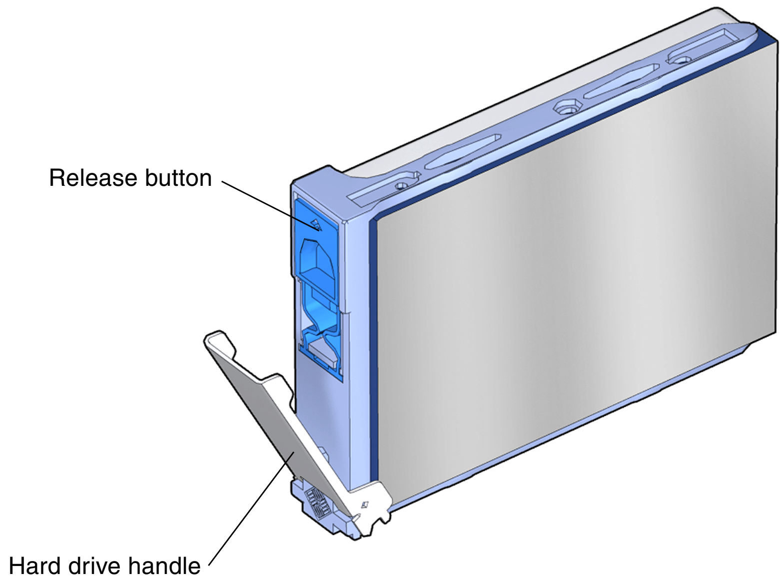



**FIGURE 12-4** Preparing the Hard Drive for Installation

4. **Locate the hard drive assembly and hard drive assembly guides.**

   See FIGURE 12-5. If you are installing a second hard drive, install it in the remaining free slot in the hard drive assembly. The boot hard drive must be installed in hard drive slot `HDD0`, the slot farthest from the chassis opening. The second hard drive bay is hard drive slot `HDD1`, the slot closest to the chassis opening.

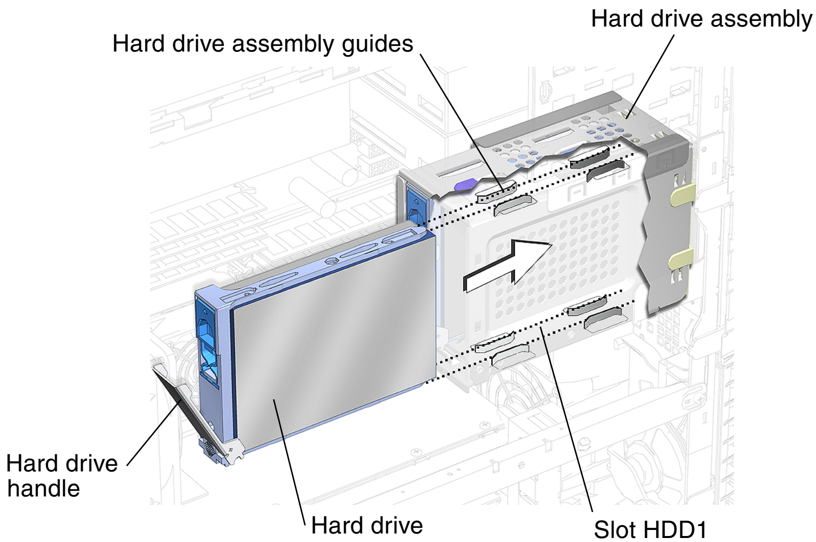



**FIGURE 12-5** Installing the Hard Drive into the Hard Drive Assembly

5. **Align the hard drive with the hard drive assembly guides and slide the hard drive into the hard drive assembly until the hard drive handle begins to close.**

   See FIGURE 12-5.

6. **Press the hard drive handle closed until it locks the hard drive in the hard drive assembly.**

   See FIGURE 12-6. This seats the hard drive connector into the SCSI backplane connector.

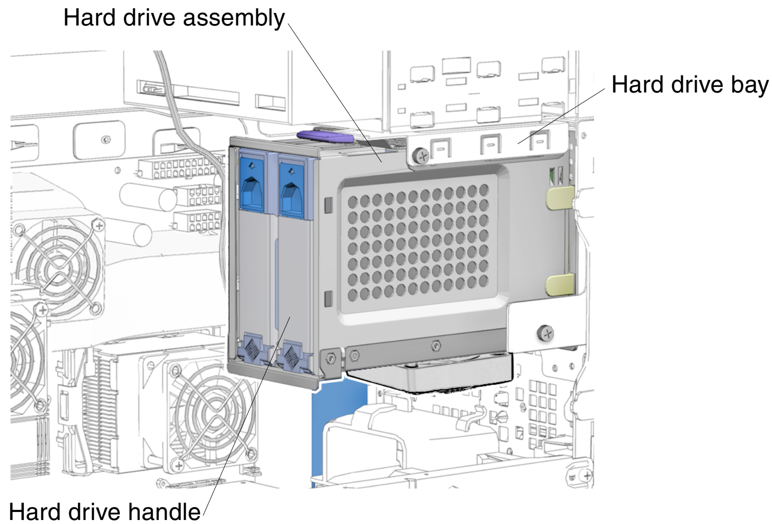



**FIGURE 12-6** Installing the Hard Drive in the Hard Drive Assembly

7. **Inspect the hard drive and related component fasteners to verify that:**
   - The hard drive handle is locked.
   - The hard drive assembly is tight in the hard drive bay.

8. **Replace the access panel, power on the system, and verify the component installation.**

   See:
   - "Installing the Access Panel" on page 15-6
   - "Powering On the Workstation" on page 15-7
   - "Verifying an Installation" on page 15-10

## 12.2 Replacing an Optical Drive

This section describes removal and installation of the optical drive. The same steps can be used to install or replace other removable media drives, such as a DVD+-RW or a tape drive. Topics include:

- "Identifying the Optical Drive" on page 12-9
- "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 up to two media drives. See FIGURE 12-7. An optical drive is installed on drive rails that slide into the removable media bay. The removable media bay is accessible when the bezel is removed.

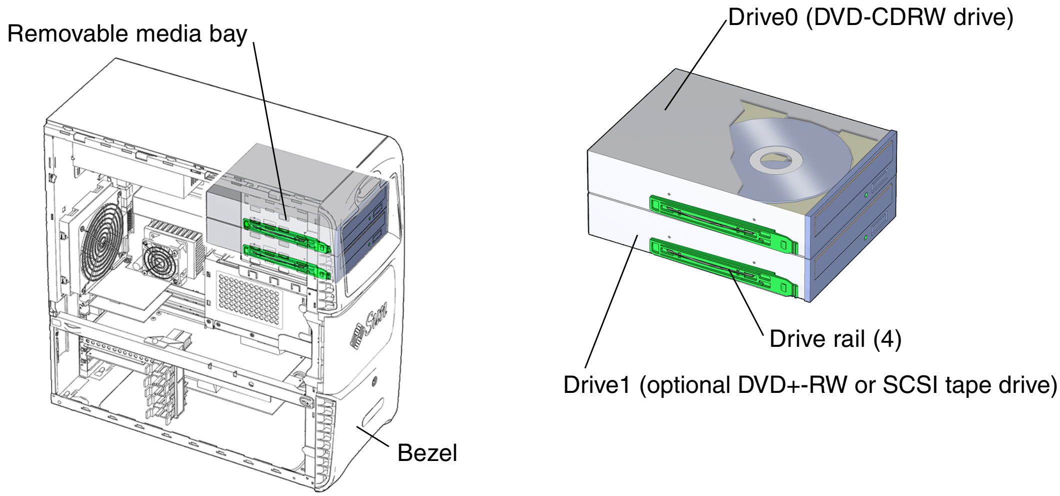



**FIGURE 12-7** Optical Drive or Media Drives Location and Identification

---

**Note –** If so equipped, do not remove the plastic rivet from the headphone jack on the optical drive. Do not use the headphone jack on the CD-RW drive. Instead, use the headphone jack on the audio module located on the rear panel of your workstation.

---

## 12.2.2 Removing the Optical Drive

---

**Note –** The instructions in this section apply to any removable media drive, such as a DVD+-RW or a tape drive.

---

**Note –** The Sun Blade 2500 workstation can accommodate multiple internal media drives such as an additional CD-RW, or tape drive.

---

If you are not removing an existing drive, proceed to "Installing the Optical Drive" on page 12-12.

1. **Power off the system, open the chassis, attach the antistatic wrist strap, and remove the bezel.**

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12
   - "Removing the Bezel" on page 10-15

2. **Locate the optical drive to be removed.**

   See FIGURE 12-7.

3. **Disconnect the interface cable(s).**

   See FIGURE 12-8. The interface cable is located at the back of the optical drive.

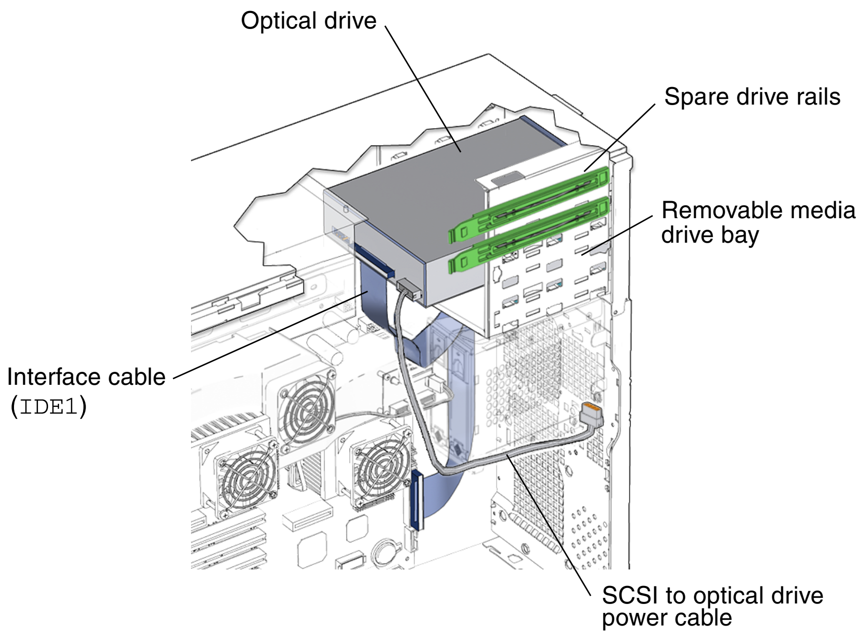



**FIGURE 12-8** Optical Drive Interface and Power Cables

---

**Note –** If a optical drive is installed along with a tape drive, disconnect the interface cable only from the media drive you are removing.

---

4. **Disconnect the power cable(s).**

   The power cable is located at the back of the optical drive and is connected to the SCSI backplane. See FIGURE 12-8.

---

**Note –** 6-pin power supply and cable connector `P5` is routed from the power supply to the SCSI backplane. A 4-pin power cable (jumper) is then routed from the SCSI backplane to the optical drive. This provides power from the power supply to the optical drive.

---

**Note –** To supply power to an optional CD-RW or tape drive use power supply connector `P7`, `P8`, or `P9`.

---

5. **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 12-9.

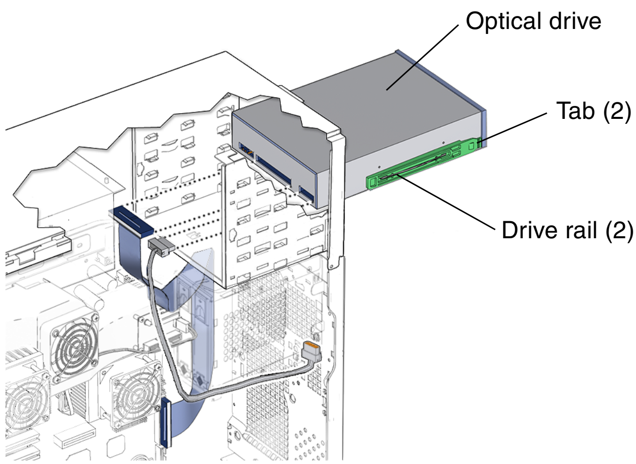



**FIGURE 12-9** Removing the Optical Drive and Drive Rails

6. **Set the optical drive down on an antistatic mat.**

7. **Detach the green plastic drive rails off the sides of the optical drive.**

   See FIGURE 12-10. Set them aside.

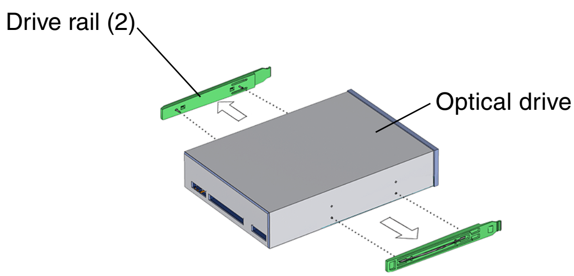



**FIGURE 12-10** Removing the Optical Drive Rails

8. **If you removed the hard drive to replace it, install the new hard drive.**

   Proceed to "Installing a Hard Drive" on page 12-5.

9. **If you are not replacing the hard drive you removed, close the chassis and install a optical drive EMI filler panel to protect the workstation.**

   See FIGURE 12-11.

---

**Note –** The front panel slot must be closed with a filler panel for system EMI and airflow requirements.

---

   a. **Facing the front of the chassis, tip the filler panel into the right side of the chassis.**

   b. **Squeeze the filler panel tab and pull the filler panel into the left side of the chassis.**

   c. **Release the filler panel tab and you should hear the panel click into place.**

10. **Replace the bezel, access panel, and power on the system.**

    See:


- "Installing the Bezel" on page 15-5
- "Installing the Access Panel" on page 15-6
- "Powering On the Workstation" on page 15-7
- "Verifying an Installation" on page 15-10


## 12.2.3 Installing the Optical Drive

1. **Power off the system, open the chassis, and remove the bezel.**

   See:


- "Powering Off the Workstation" on page 10-4
- "Removing the Access Panel" on page 10-12

■ "Removing the Bezel" on page 10-15

---

**Note –** If you are installing an additional media drive into the removable media drive bay, it is necessary to remove the plastic filler panel that is enclosed in the bezel.

---

2. **Locate where the optical drive installs into the removable media bay.**

   See FIGURE 12-11.

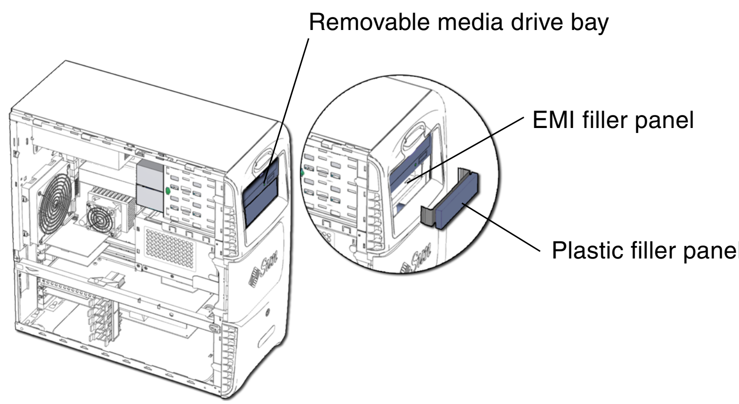



**FIGURE 12-11** Removable Media Drive Bay and EMI Filler Panel

3. **Remove the EMI filler panel, if needed.**

   a. **Insert your finger in the round hole on the left side of the EMI filler panel and pull the EMI filler panel straight out from the system chassis.**

   b. **Set the EMI filler panel aside.**

4. **Remove the spare drive rails from their storage position, if needed.**

   The drive rails are stored on the side of the optical drive bracket. See FIGURE 12-8. Unsnap them from their storage location.

5. **Remove the new optical drive from its packaging.**

6. **Snap the drive rails into the lower pair of holes on both sides of the optical drive.**

   See FIGURE 12-12. The flat end of the rails are toward the optical drive power and interface connectors. The drive rail squeeze tabs are toward the front of the optical drive.

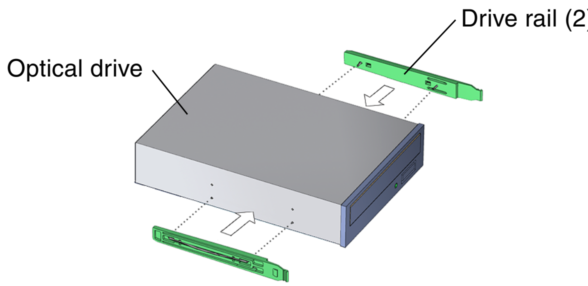



**FIGURE 12-12** Installing Drive Rails

7. **Verify that the optical drive is configured for master (MA) mode operation.**

   See FIGURE 12-13. See the optical drive documentation for instructions on setting the master (MA) mode.

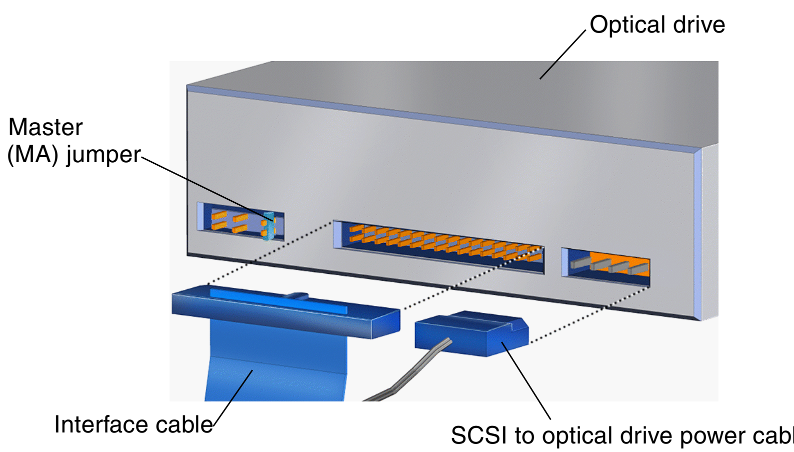



**FIGURE 12-13** Location of the Optical Drive Master Jumper

---

**Note –** The location of the master (MA) jumper might vary depending on the manufacturer of the optical drive.

---

8. **Slide the optical drive into the removable media bay until the drive rails click.**

   See FIGURE 12-14.

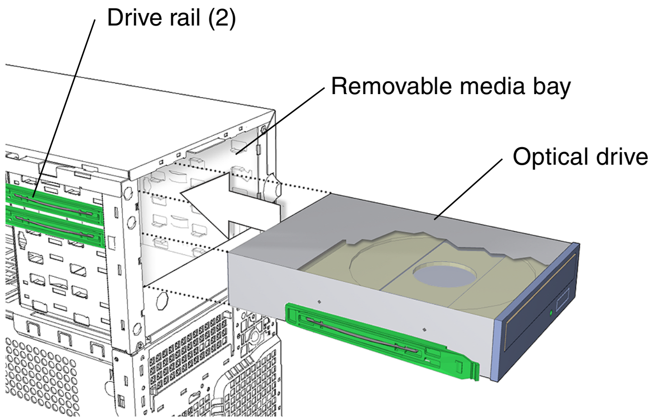



**FIGURE 12-14** Installing the Optical Drive

9. **Connect the optical drive power cable.**

   See FIGURE 12-13. The optical drive power cable connects to the optical drive and to the SCSI backplane.

10. **Connect the optical drive interface cable.**

    See FIGURE 12-13. The optical drive interface cable connects to the motherboard at connector `IDE1`.

11. **Inspect the optical drive and related component fasteners to verify that:**

    - The optical drive rails are well seated on the optical drive.
    - The optical drive assembly is tight in the removable media bay.

12. **Inspect the optical drive and related component cabling to verify that:**

    - The optical drive power cable is firmly connected to the optical drive and to the SCSI backplane.
    - The optical drive interface cable is firmly connected to the optical drive and to the motherboard.

13. **Replace the bezel and access panel, power on the system, verify the component installation.**

    See:

    - "Installing the Bezel" on page 15-5
    - "Installing the Access Panel" on page 15-6
    - "Powering On the Workstation" on page 15-7
    - "Verifying an Installation" on page 15-10

# 12.3 Replacing the Smart Card Reader

This chapter describes removal and installation of the smart card reader. Topics include:



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. See FIGURE 12-15. The smart card reader is installed on the smart card reader bracket. The smart card reader bracket has drive rails that slide it into the removable media drive bay. The removable media drive bay is accessible when the bezel is removed.

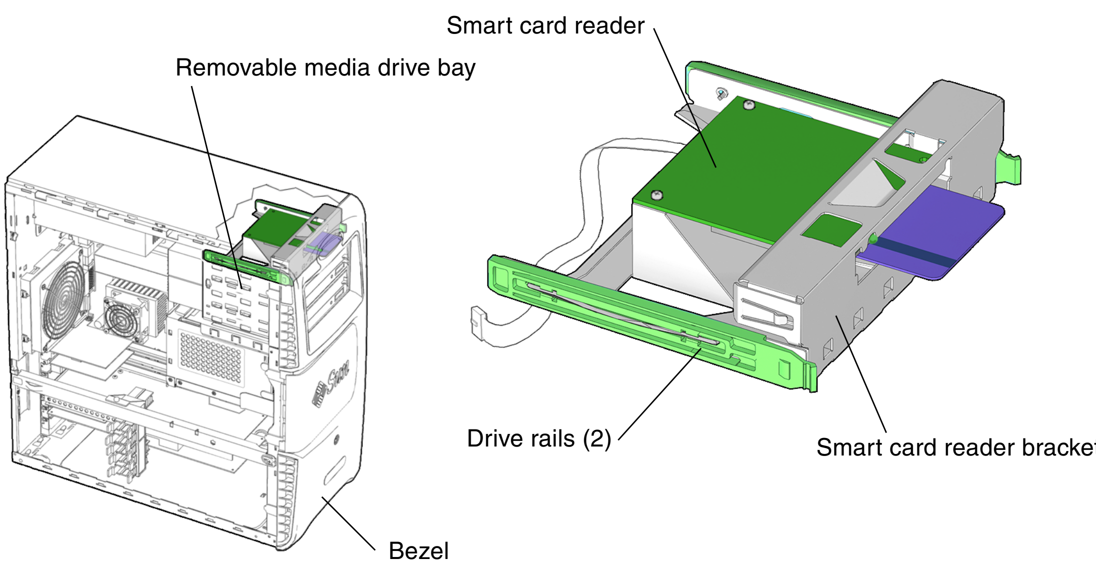



**FIGURE 12-15** Smart Card Reader Location and Identification

## 12.3.2 Removing the Smart Card Reader

1. **Power off the system, open the chassis, and remove the bezel.**

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12
   - "Removing the Bezel" on page 10-15

2. **Locate the smart card reader.**

   See FIGURE 12-16. The smart card reader is installed on a smart card reader bracket that fits into the top slot of the removable media drive bay.

3. **Disconnect the smart card reader interface cable from the smart card reader.**

   See FIGURE 12-16.

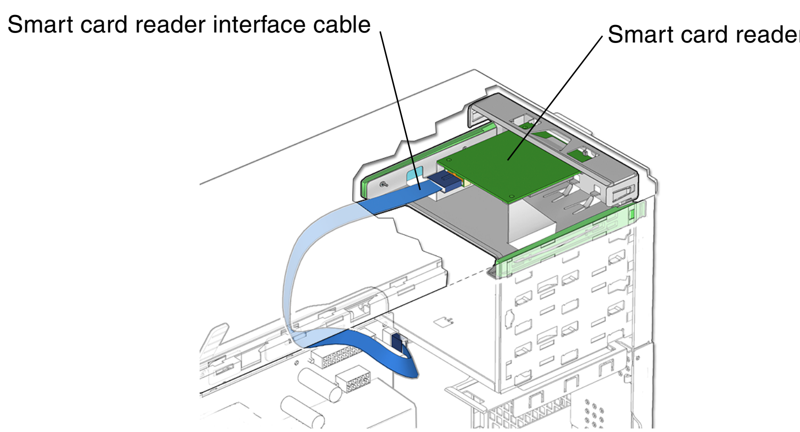



**FIGURE 12-16** Removing the Smart Card Reader Cable

4. **Remove the smart card reader assembly.**

   See FIGURE 12-17.

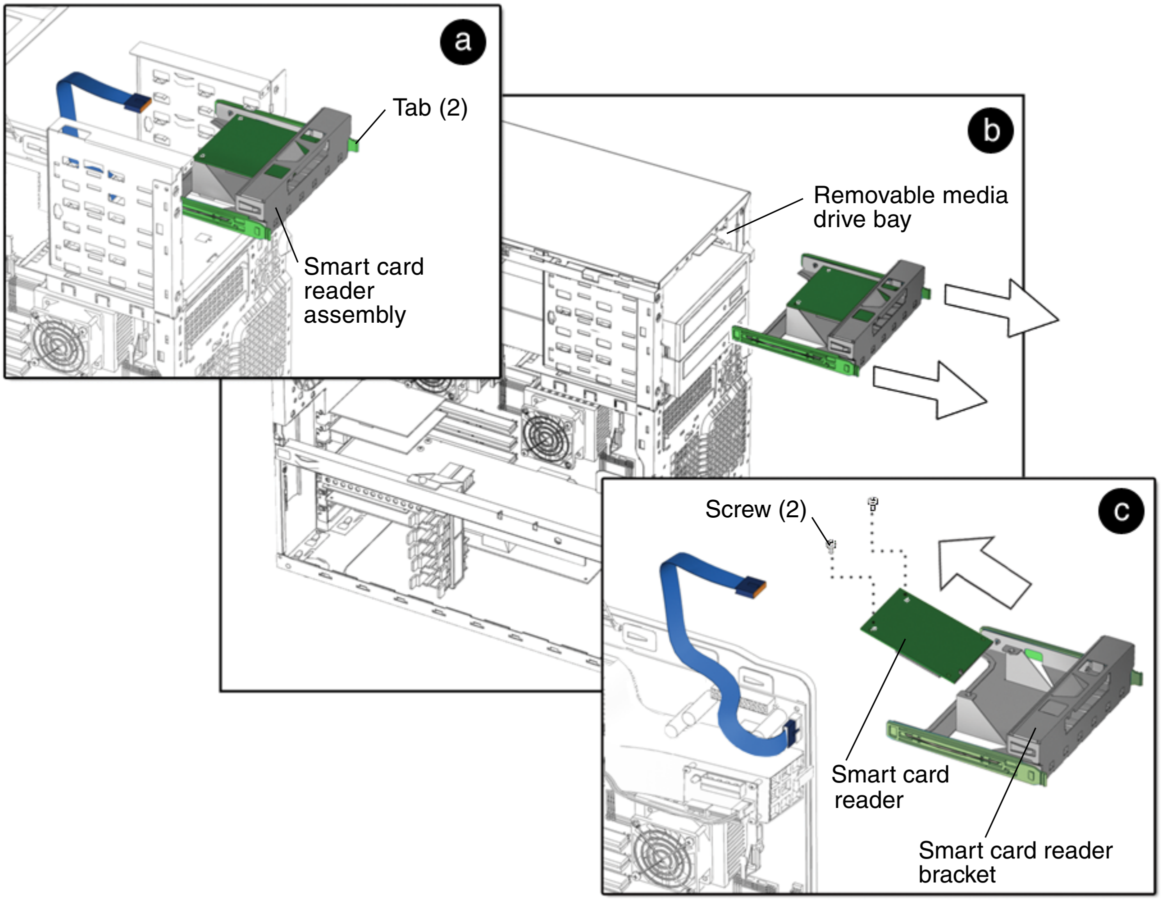



**FIGURE 12-17** Removing the Smart Card Reader Assembly

a. **Squeeze together the two green plastic tabs at the front sides of the smart card reader assembly.**

b. **Pull the smart card reader assembly straight out of the removable media drive bay.**

   Set the smart card reader assembly down on an antistatic mat.

c. **Using a No. 2 Phillips screwdriver, remove the two screws that secure the smart card reader to its bracket.**

   Set the screws aside.

5. **Tilt and lift the smart card reader from the bracket.**

   See FIGURE 12-17. Set the smart card reader aside.

Proceed to "Installing the Smart Card Reader" on page 12-19.

## 12.3.3 Installing the Smart Card Reader

1. **Power off the system, open the chassis, and remove the bezel.**

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12
   - "Removing the Bezel" on page 10-15

2. **Locate the smart card reader bracket.**

   See FIGURE 12-18. The smart card reader installs into the smart card reader bracket.

3. **Remove the new smart card reader from its packaging.**

4. **Tilt and slide the smart card reader into the smart card reader bracket.**

   See FIGURE 12-18.

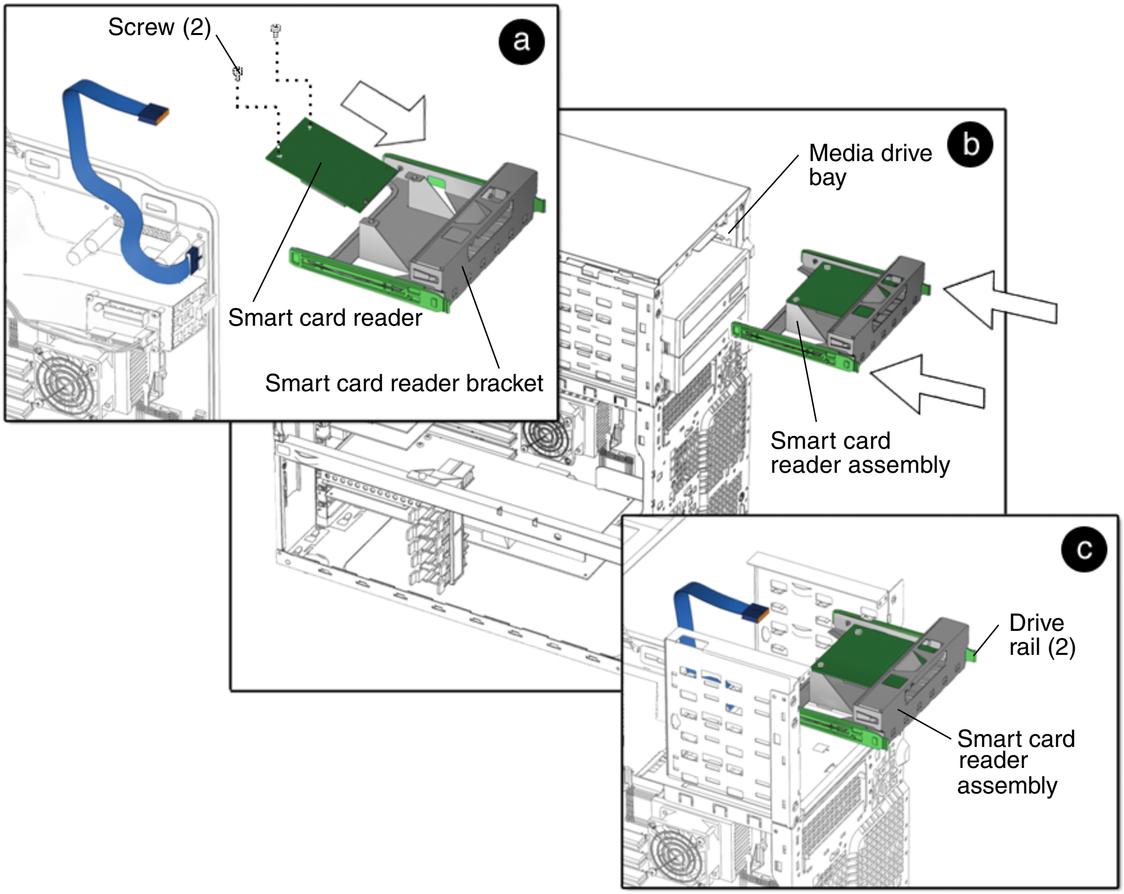



**FIGURE 12-18** Installing the Smart Card Reader

5. **Install the smart card reader assembly.**

   See FIGURE 12-18.

   a. **Using a No. 2 Phillips screwdriver, install both screws that secure the smart card reader to the smart card reader bracket.**

   b. **Slide the smart card reader into the smart card reader bay.**

   c. **Slide the smart card reader assembly into the removable media drive bay until the drive rails click.**

6. **Connect the smart card reader interface cable to the smart card reader.**

   See FIGURE 12-19.

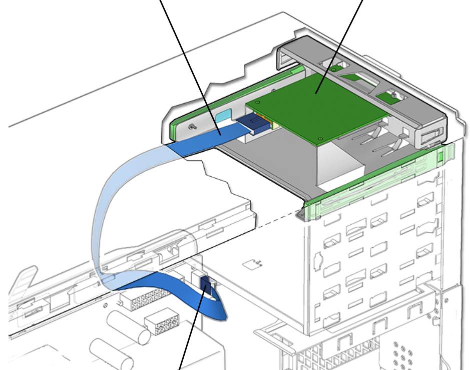



**FIGURE 12-19** Connecting the Smart Card Reader Cable

7. **Inspect the smart card reader assembly and related component fasteners to verify that:**
   - The smart card reader assembly drive rails are seated on the smart card reader assembly.
   - The smart card reader assembly is tight in the removable top media bay.

8. **Inspect the smart card reader assembly and related component cabling to verify that:**
   - The smart card reader interface cable is firmly connected to the motherboard at connector `SCR0`.
   - The smart card reader assembly interface cable is firmly connected to smart card reader assembly.

9. **Replace the bezel and access panel, power on the system, and verify the component installation.**

   See:

   
   - "Installing the Bezel" on page 15-5
   - "Installing the Access Panel" on page 15-6
   - "Powering On the Workstation" on page 15-7
   - "Verifying an Installation" on page 15-10
   

CHAPTER 13

# Replacing Chassis Components

This chapter describes the replacement procedures for the Sun Blade 2500 replaceable chassis components.

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

This chapter contains the following topics:



---

**Caution –** Follow the cautions, warnings, and instructions in the *Sun Blade 2500 Safety and Compliance Guide* (817-5120). The document is available at: `http://www.sun.com/documentation`

---

**Caution –** Many of the procedures in this chapter are described with the chassis lying on its side. If you perform any of the procedures in this chapter with the chassis in its upright position, use care to ensure 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 chapter 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 13-7

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

## 13.1.1 Identifying the Power Supply

A 600W power supply is required for workstation operation. See FIGURE 13-1. Power is supplied from the power supply to connectors `P5`, `P7`, `P8`, `P9`, `PS1`, and `PS2`.

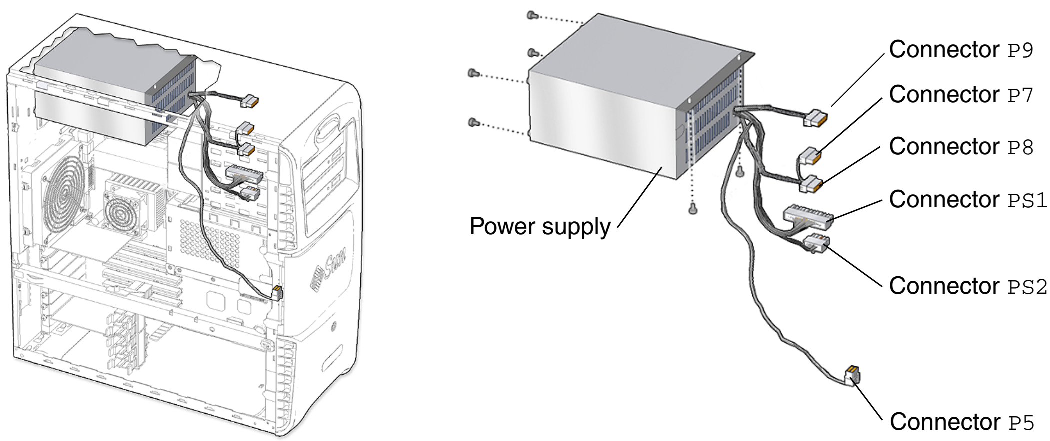



**FIGURE 13-1** Power Supply Location and Identification

---

**Note –** Connector `P9` might be daisy-chained with connectors `P7` and `P8` of the wiring harness.

---

TABLE 13-1 lists the power supply specifications.

**TABLE 13-1** Power Supply Specifications

| Specification | Value |
|---|---|
| Input Voltage | 100-240 AC |
| Frequency | 47 - 63 Hz |
| Current | 10 A |
| Wattage | 600 W maximum |

## 13.1.2 Removing the Power Supply

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12
   - "Positioning the Chassis" on page 10-18

2. **Locate the power supply.**

   See FIGURE 13-1. The power supply is fastened directly to the upper back corner of the chassis.

3. **Disconnect the power supply and cable connector `P5` from the hard drive assembly.**

   See FIGURE 13-2. Power supply and cable connector `P5` is connected to the SCSI backplane, on the underside of the hard drive assembly.

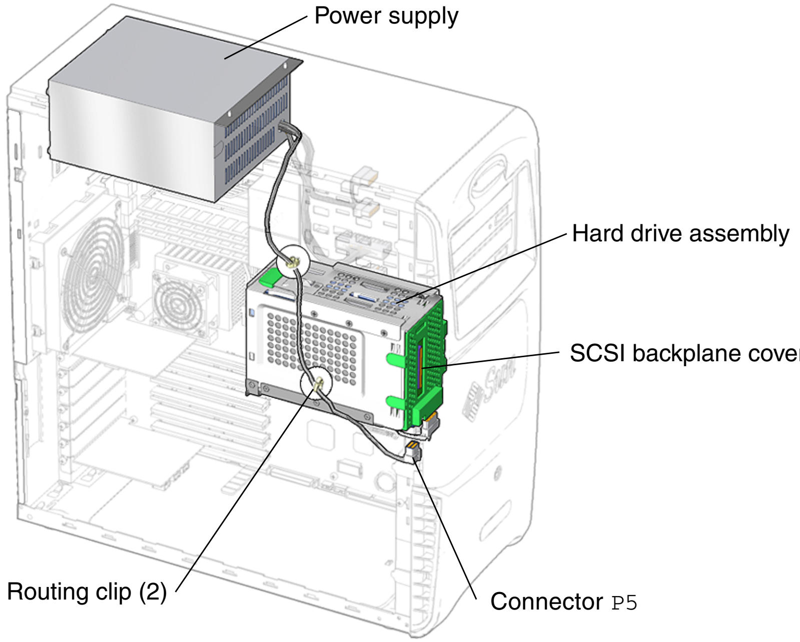



**FIGURE 13-2** Disconnecting Power Supply Cable Connector `P5` From the Hard Drive Assembly

4. **Remove the hard drive assembly.**

   See “Removing the Hard Drive Assembly” on page 10-19.

5. **Position the chassis.**

   See “Positioning the Chassis” on page 10-18.

6. **Open the power supply cable routing clips.**

   See FIGURE 13-2.

7. **Remove the cables contained within the routing clips.**

8. **Disconnect the two power supply cables from motherboard at `PS1` and `PS2`.**

   See FIGURE 13-3.

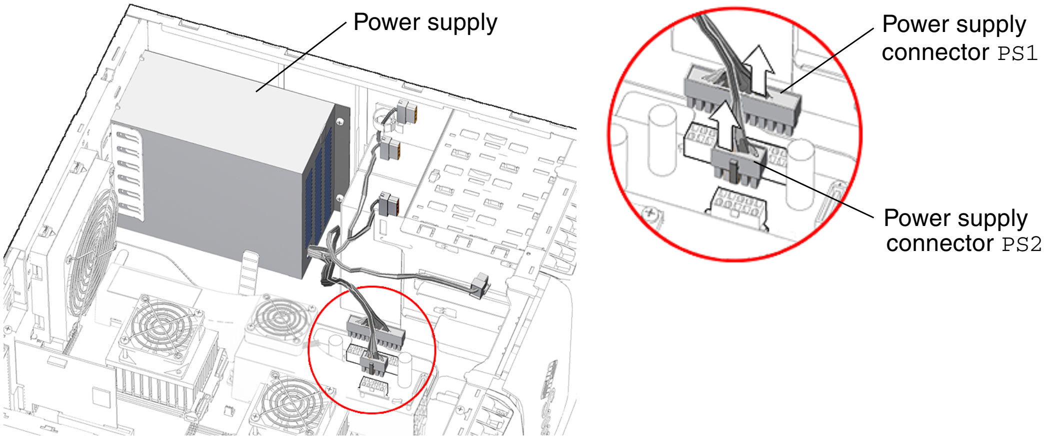



**FIGURE 13-3** Disconnecting the Power Supply Cables

9. **If necessary, open the cable routing clips and remove the power cable(s) from the clip(s).**

---

**Note –** There might be more than one media drive connected to the power supply. If so, connectors `P7`, `P8`, or `P9` might be used to supply power to the additional media drives. Disconnect the power cables from those drives.

---

10. **Using a No. 2 Phillips screwdriver, remove the three external screws that secure the power supply to the chassis.**

See FIGURE 13-4.

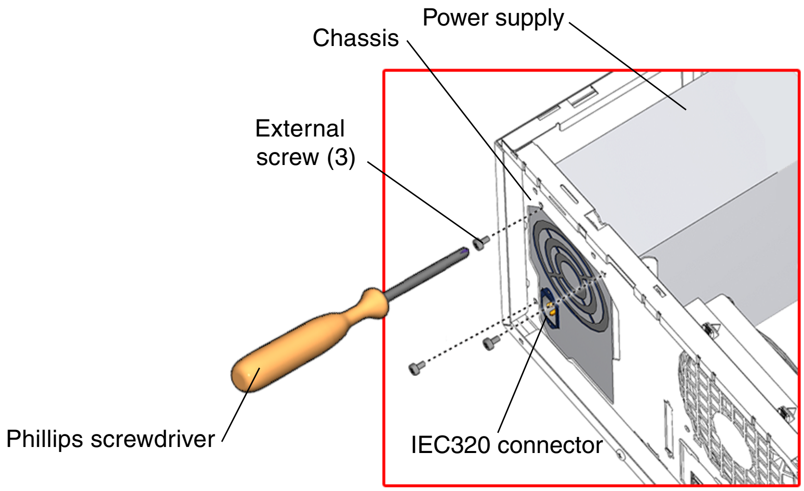



**FIGURE 13-4** Power Supply External Screws

11. **Using a No. 2 Phillips screwdriver, remove both screws that secure the power supply to the system chassis top.**

    See FIGURE 13-5.

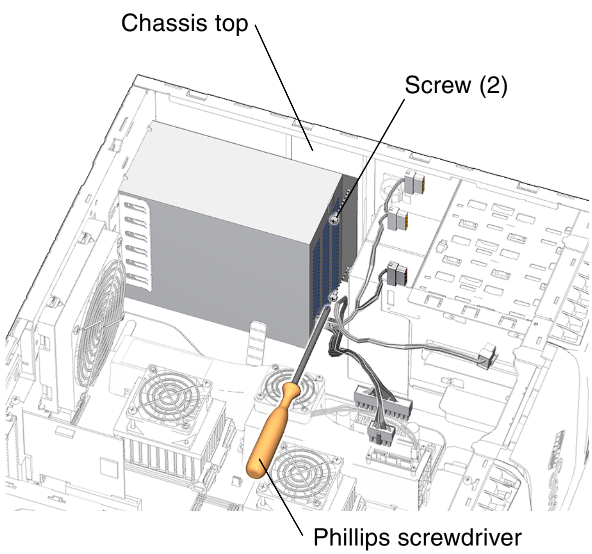



**FIGURE 13-5** Power Supply Internal Screws

12. **Shift the power supply toward the front of the chassis, lift it up and out of the chassis.**

    See FIGURE 13-6.

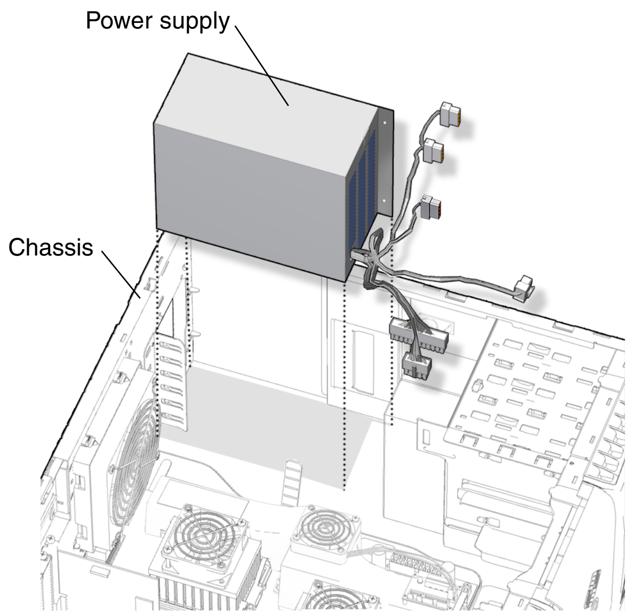



**FIGURE 13-6** Removing the Power Supply from the Chassis

13. **Set the power supply aside on an antistatic mat.**

    Proceed to: "Installing the Power Supply" on page 13-7.

---

**Note –** The workstation cannot operate without the power supply.

---

## 13.1.3 Installing the Power Supply

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12
   - "Positioning the Chassis" on page 10-18

2. **Remove the new power supply from its packaging.**

3. **Locate where the power supply is to be installed.**

   See FIGURE 13-3.

4. **Align the power supply with the chassis power supply bracket and slide the power supply all the way to the back of the chassis.**

   See FIGURE 13-7.

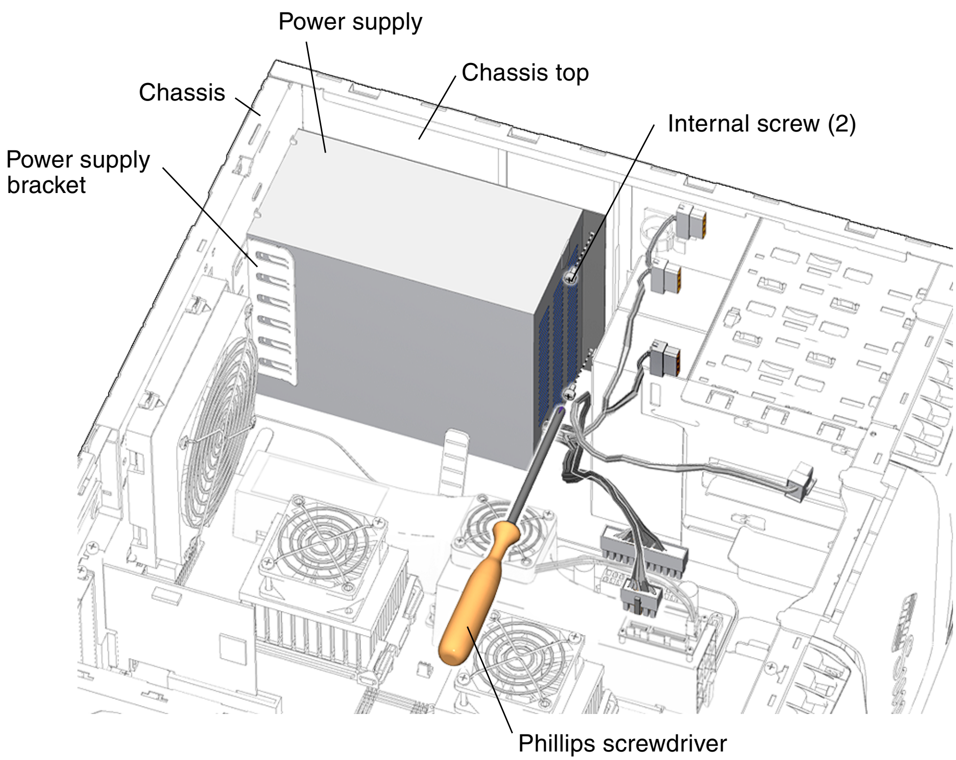



**FIGURE 13-7** Aligning the Power Supply to the Chassis

5. **Using a No. 2 Phillips screwdriver, replace the internal screws that secure the power supply to the chassis.**

   See FIGURE 13-7.

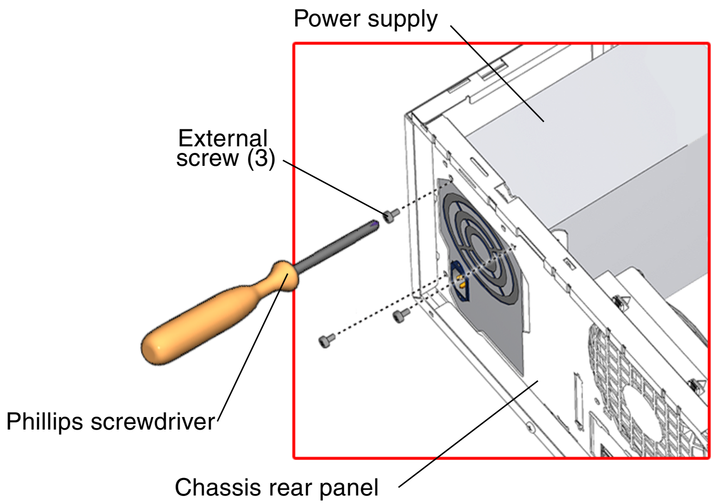



**FIGURE 13-8** External Screws for the Power Supply

6. **Using a No. 2 Phillips screwdriver, install the three external screws that secure the power supply to the chassis rear panel.**

   See FIGURE 13-8.

7. **Connect power supply connectors** `PS1` **and** `PS2` **to the motherboard connectors** `PS1` **and** `PS2`**.**

   See FIGURE 13-9. The power supply cables might have routing clips that fasten them to the chassis. If so, route the cables through the clips.

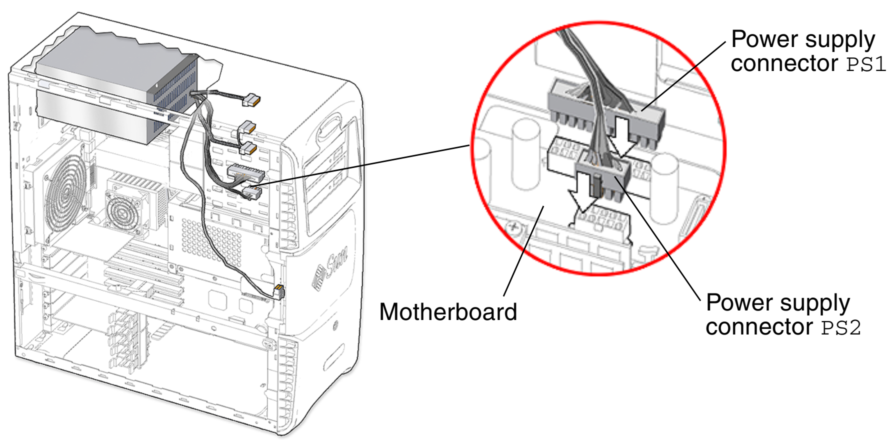



**FIGURE 13-9** Installing Power Supply Connectors `PS1` and `PS2` to the Motherboard

8. **Connect power supply and cable connector `P5` to the SCSI backplane.**

   See FIGURE 13-10.

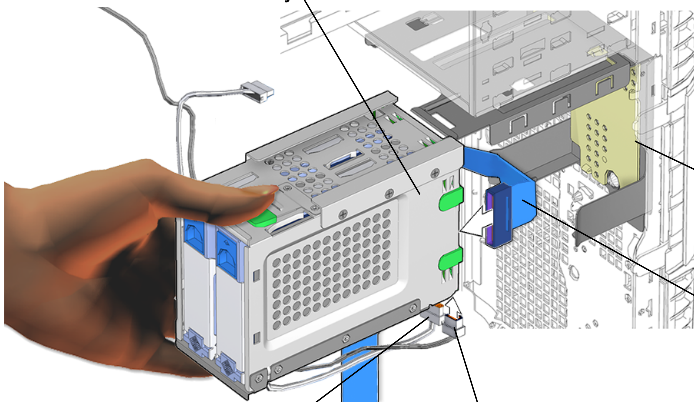



**FIGURE 13-10** Installing and Verifying Installation of Hard Drive Assembly Cables

9. **Install the power cable into the two routing clips on the bottom and back of the hard drive assembly.**

---

**Note –** If there is more than one media drive connected the power supply, connectors `P7`, `P8`, or `P9` might be used to supply power to the additional media drives.

---

10. **Install the hard drive assembly.**

    See "Installing the Hard Drive Assembly" on page 15-2.

11. **Reposition the chassis.**

    See "Repositioning the Chassis" on page 15-2.

12. **Inspect the power supply fasteners to verify that:**

    - The power supply screws are in place and tight.
    - The power supply is seated on the power supply bracket.

13. **Inspect the power supply and related component cabling to verify that:**

    - The power supply connectors `PS1` and `PS2` are firmly connected to the motherboard.

- The power supply and cable connector `P5` is connected to the hard drive assembly.
- The SCSI to optical drive power cable connector is plugged into both the optical drive and the hard drive assembly.

**14. Replace the access panel, power on the system, and verify the component installation.**

See:

- "Installing the Access Panel" on page 15-6
- "Powering On the Workstation" on page 15-7
- "Verifying an Installation" on page 15-10

## 13.2 Replacing the Front Fan

This section describes removal and installation of the front fan. Topics include:

- "Identifying the Front Fan" on page 13-11
- "Removing the Front Fan" on page 13-12
- "Installing the Front Fan" on page 13-14

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

### 13.2.1 Identifying the Front Fan

The front fan for the Sun Blade 2500 system is housed in a green bracket that also contains the speaker. See FIGURE 13-11. To adequately cool the workstation, both front and rear fans must correctly operate. The front fan is connected to the motherboard at connector `FAN2`. See FIGURE 13-12.

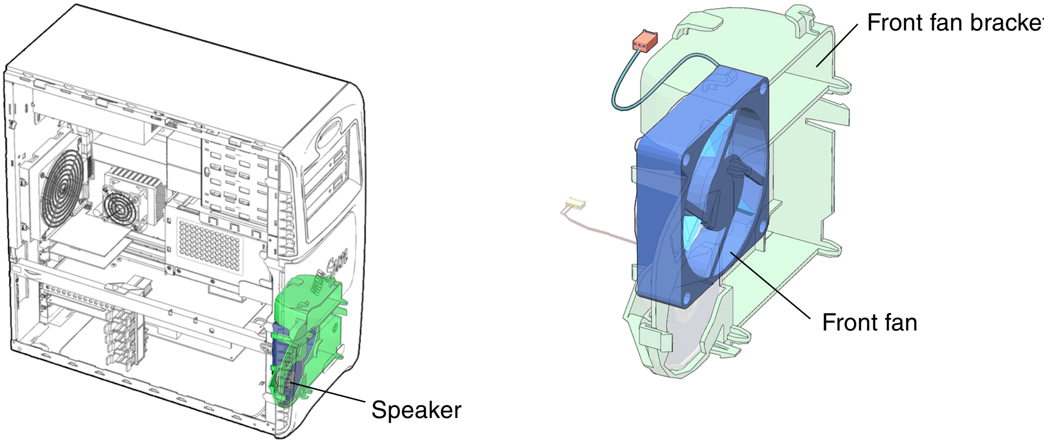



**FIGURE 13-11** Front Fan Location and Identification

TABLE 13-2 lists the front fan specifications.

**TABLE 13-2** Front Fan Specifications

| Specification | Value |
|---|---|
| Voltage | 8-12 VDC |
| Current | .016A |
| Speed | 500-3000 RPM |
| Flow Rate | 3-18 CFM |

## 13.2.2 Removing the Front Fan

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12

2. **Locate the front fan.**

   See FIGURE 13-11. The front fan and speaker are housed in the green front fan bracket.

3. **Disconnect the front fan cable from the motherboard connector `FAN2`.**

   See FIGURE 13-12.

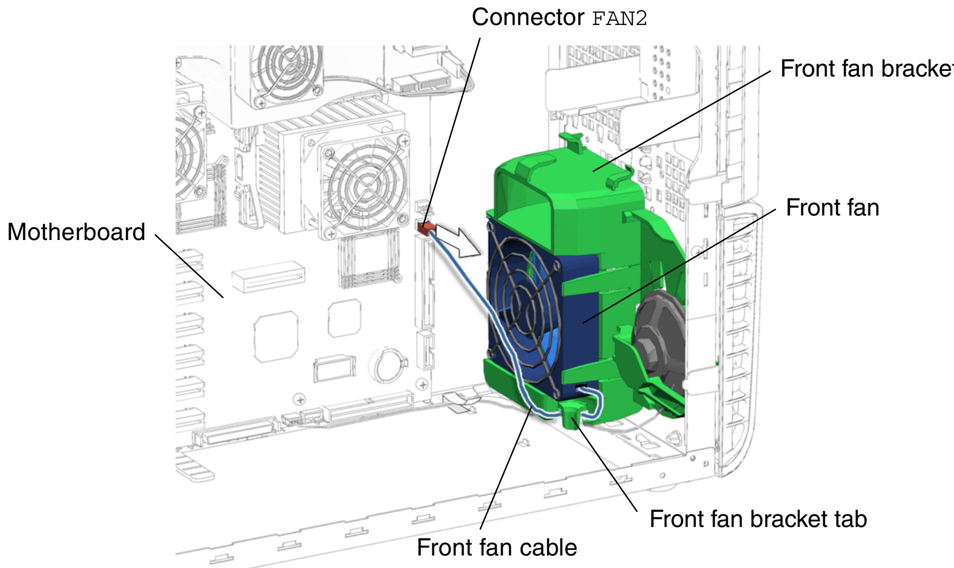



**FIGURE 13-12** Disconnecting the Front Fan Cable

4. **Guide the front fan cable through and out of the front fan bracket tab.**

   See FIGURE 13-12.

5. **Pull back slightly on the tabs and tilt the near edge of the fan away from the near edge of the bracket.**

   See FIGURE 13-13.

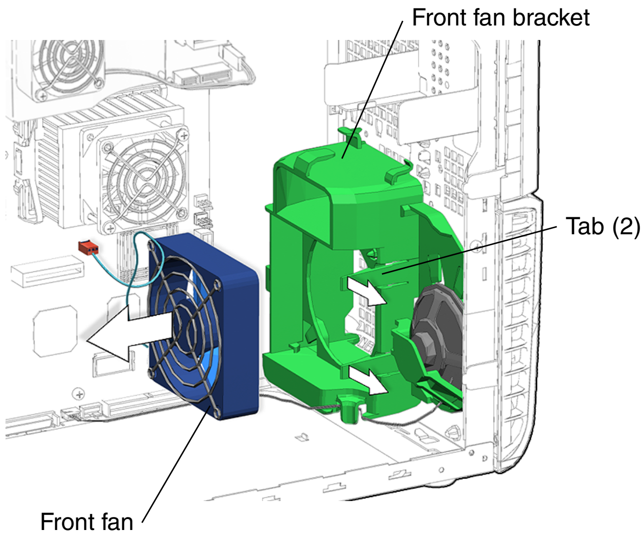



**FIGURE 13-13** Removing the Front Fan

6. **Lift the fan out of the front fan bracket chassis and set it aside.**

   Proceed to "Installing the Front Fan" on page 13-14.

---

**Caution –** Do not power on the system if the front fan is not installed.

---

## 13.2.3 Installing the Front Fan

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

   See:

   ■ "Powering Off the Workstation" on page 10-4
   ■ "Removing the Access Panel" on page 10-12

2. **Locate the front fan bracket.**

   See FIGURE 13-14.

3. **Remove the fan from its packaging.**

4. **Holding the fan upright, with the fan cable at the bottom corner farthest from you, slide the fan into the fan bracket at an angle so that the far side enters the bracket first.**

   See FIGURE 13-14.

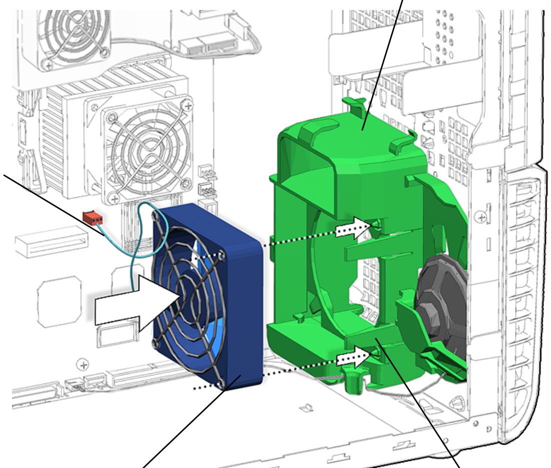



**FIGURE 13-14** Aligning the Front Fan to the Front Fan Bracket

5. **Press the fan into the fan bracket until the two tabs click.**

   See FIGURE 13-14.

6. **Guide the fan cable through the front fan bracket tab.**

   See FIGURE 13-15.

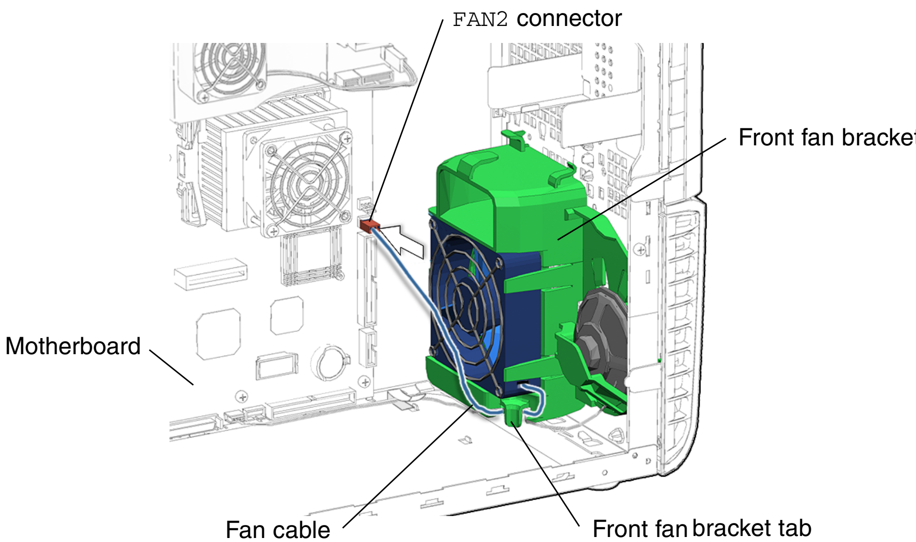



**FIGURE 13-15** Routing and Connecting the Front Fan Cable

7. **Connect the front fan cable to motherboard connector `FAN2`.**

8. **Inspect the front fan fasteners to verify that:**
   - The front fan bracket tabs that hold the front fan in place are secure and flat.
   - The front fan is seated in the front fan bracket.

9. **Inspect the front fan and related component cabling to verify that:**
   - The front fan cable is routed through the front fan bracket tab.
   - The front fan signal cable is securely plugged into motherboard connector `FAN2`.

10. **Replace the access panel, power on the system, and verify the component installation.**

    See:
    - "Installing the Access Panel" on page 15-6
    - "Powering On the Workstation" on page 15-7
    - "Verifying an Installation" on page 15-10

## 13.3 Replacing the Rear Fan

This section describes removal and installation of the rear fan. Topics include:

- "Identifying the Rear Fan" on page 13-17

- “Removing the Rear Fan” on page 13-18
- “Installing the Rear Fan” on page 13-19

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

## 13.3.1 Identifying the Rear Fan

The rear fan for the Sun Blade 2500 system is housed in the rear fan bracket. See FIGURE 13-16. To adequately cool the workstation, both front and rear fans must correctly operate. The rear fan is connected to the motherboard at connector `FAN0`. See FIGURE 13-17.

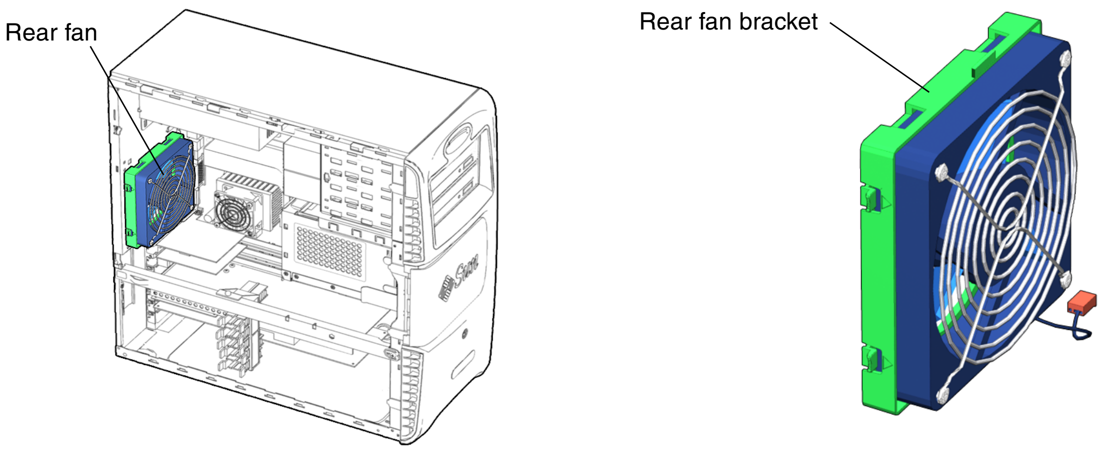



**FIGURE 13-16** Rear Fan Location and Identification

TABLE 13-3 lists rear fan specifications.

**TABLE 13-3** Rear Fan Specifications

| Specification | Value |
|---|---|
| Voltage | 12 VDC |
| Current0 | 0.45A |
| Speed | 500-3000 RPM |
| Flow Rate | 3-18 CFM |

## 13.3.2 Removing the Rear Fan

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12

2. **Locate the rear fan.**

   See FIGURE 13-16.

3. **Disconnect the rear fan cable from motherboard connector `FAN0`.**

   See FIGURE 13-17.

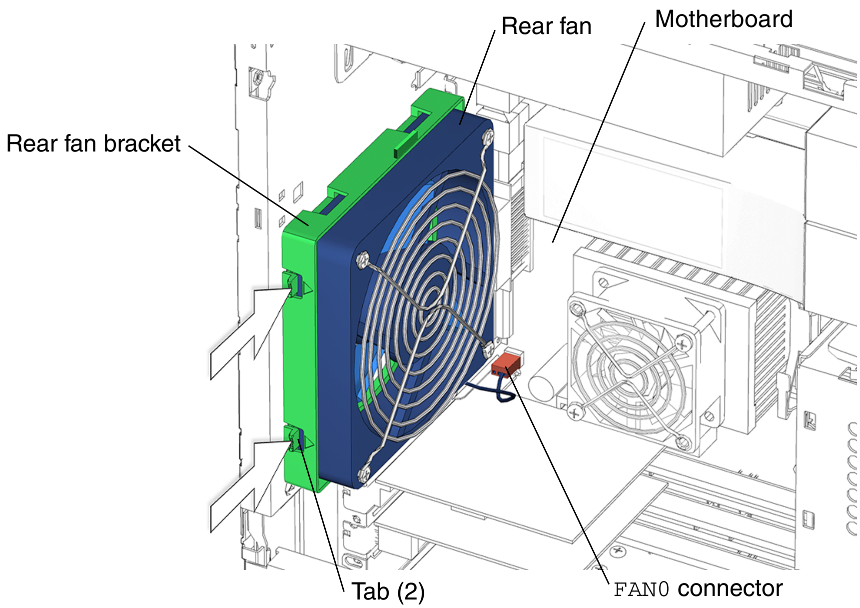



**FIGURE 13-17** Releasing the Rear Fan Assembly

4. **Squeeze and hold both rear fan bracket tabs and while holding the tabs, pull the rear fan bracket toward the chassis opening.**

   See FIGURE 13-17.

5. **Lift the rear fan bracket and rear fan out of the chassis.**

6. **Flex an edge of the fan bracket away from the fan while lifting on the fan, repeating for all edges until the fan is released from the bracket.**

   See FIGURE 13-18.

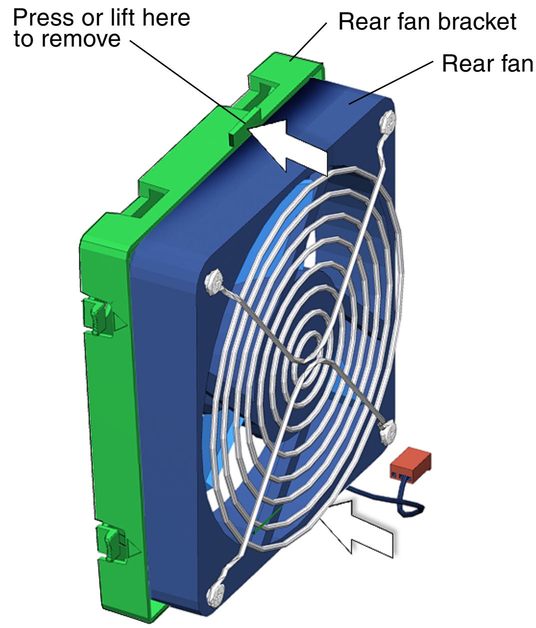



**FIGURE 13-18** Releasing the Rear Fan

7. **Set the fan and bracket aside.**

   Proceed to "Installing the Rear Fan" on page 13-19 to install the new rear fan.

---

**Caution –** Do not power on the system if the rear fan is not installed.

---

## 13.3.3 Installing the Rear Fan

1. **Open the chassis.**

   See "Removing the Access Panel" on page 10-12.

2. **Locate where the rear fan is to be installed.**

   See FIGURE 13-16.

3. **Remove the rear fan from its packaging.**

4. **Insert all four tabs of the rear fan bracket into the matching D-shaped holes in the chassis rear panel.**

   See FIGURE 13-19.

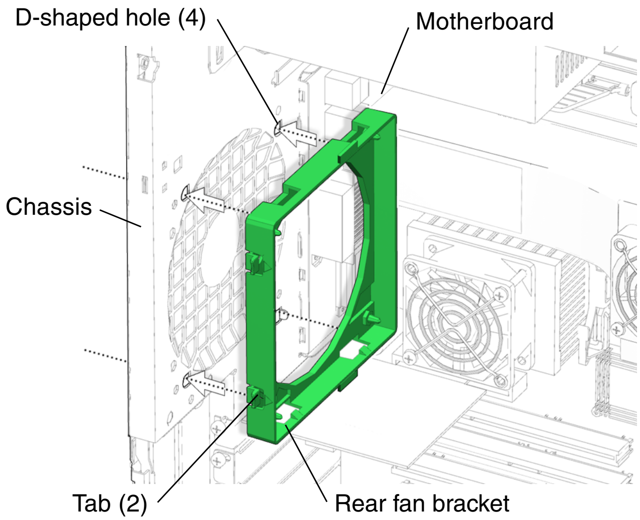



**FIGURE 13-19** Installing the Rear Fan Bracket

5. **Slide the bracket toward the motherboard until the fan bracket latches click.**

   See FIGURE 13-19.

6. **Align the rear fan cable to the bottom corner of the rear fan bracket and press the rear fan into the rear fan bracket until it clicks in place.**

   See FIGURE 13-20.

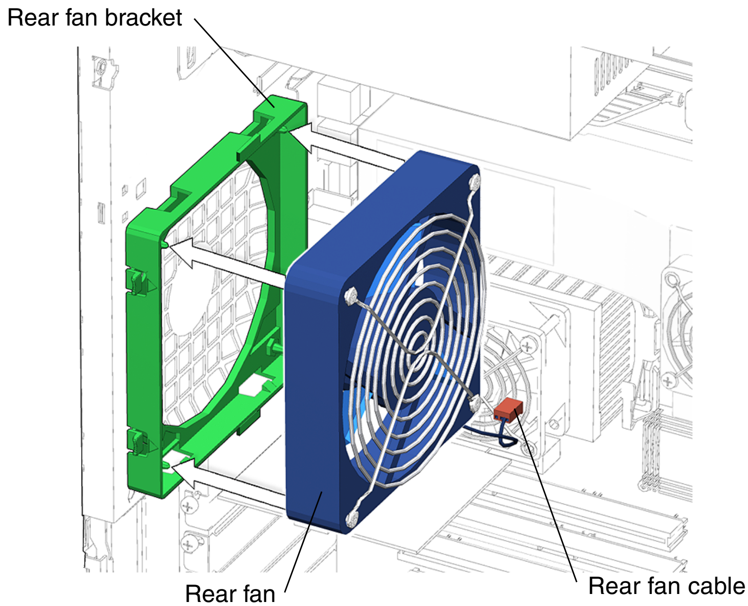



**FIGURE 13-20** Installing the Rear Fan Into the Rear Fan Bracket

7. **Connect the rear fan cable to the motherboard rear fan connector `FAN0`.**

   See FIGURE 13-21.

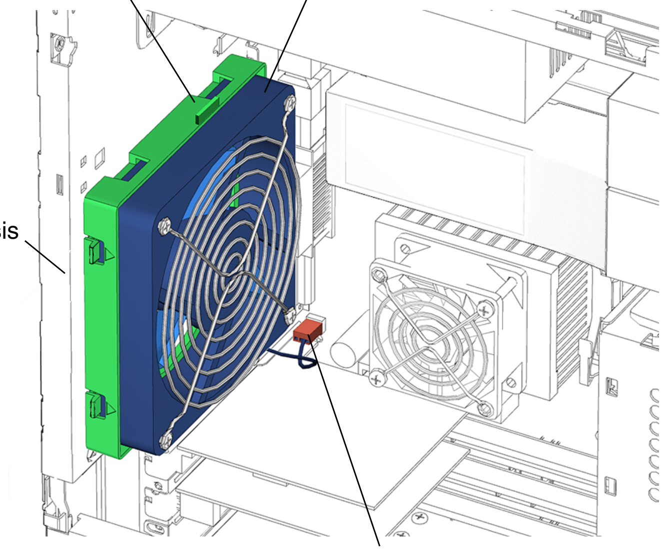



**FIGURE 13-21** Connecting the `FAN0` Connector

8. **Verify the fan and bracket are securely seated into the chassis.**

9. **Verify the rear fan cable is firmly connected to the motherboard at connector `FAN0`.**

10. **Choose your next step:**

- If you removed the rear fan prior to removing motherboard, return to "Removing the Motherboard" on page 11-57, Step 5 to continue the motherboard removal.
- If you removed the rear fan prior to removing DIMMs for `CPU0`, return to "Removing the DIMMs" on page 11-4, Step 3 to continue the DIMM removal.
- If you removed the rear fan prior to removing the CPU fan and heat sink assembly, return to "Removing the CPU Fan and Heat Sink Assembly" on page 11-25, Step 3 to continue the CPU fan and heat sink assembly removal.
- If you are only replacing the rear fan, proceed to Step 11 of this procedure.

11. **Replace the access panel, power on the system, and verify the component installation.**

See:


- "Installing the Access Panel" on page 15-6
- "Powering On the Workstation" on page 15-7
- "Verifying an Installation" on page 15-10


# 13.4 Replacing the Hard Drive Fan

This section describes removal and installation of the hard drive fan. Topics include:


- "Identifying the Hard Drive Fan" on page 13-23
- "Removing the Hard Drive Fan" on page 13-24
- "Installing the Hard Drive Fan" on page 13-25


## 13.4.1 Identifying the Hard Drive Fan

The hard drive fan is mounted to the bottom of the hard drive bracket with four screws. Connector `P7` of the power supply provides 12 VDC to the fan. See FIGURE 13-22.

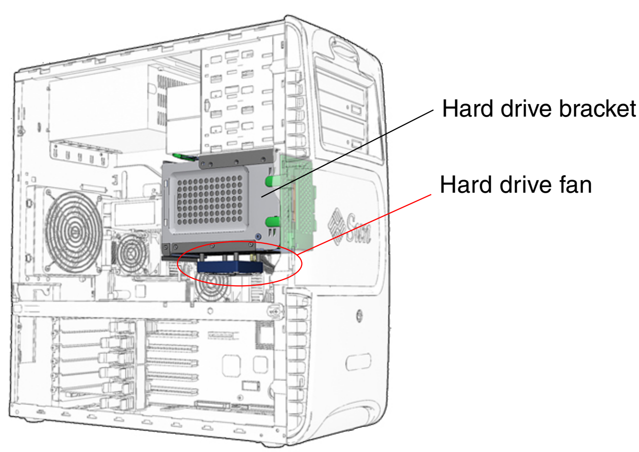



**FIGURE 13-22** Hard Drive Fan Location and Identification

## 13.4.2 Removing the Hard Drive Fan

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12

2. **Locate the hard drive fan.**

   See FIGURE 13-22.

3. **Remove the PCI card support and the chassis cross brace.**

   See "Removing the PCI Card Support and Chassis Cross Brace" on page 13-42.

4. **Disconnect the hard drive fan cable from power supply connector `P7`.**

   The cable might be connected to `P8` or `P9`.

5. **Using a No. 2 Phillips screwdriver, remove the four screws that mount the hard drive fan to the hard drive bracket.**

   See FIGURE 13-23. Set the screws aside in a container.

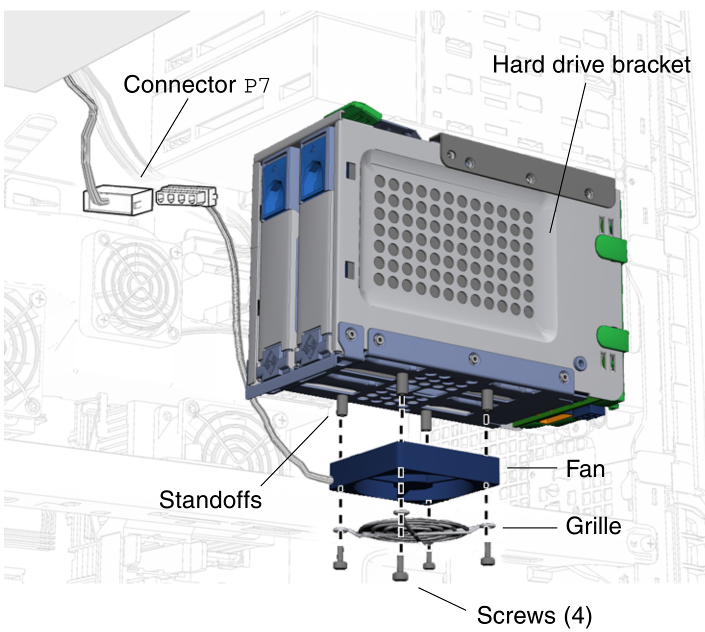



**FIGURE 13-23** Removing the Hard Drive Fan

6. **Remove the grille and fan from the standoffs of the hard drive bracket and set them aside.**

   Proceed to "Installing the Hard Drive Fan" on page 13-25.

---

**Note –** Operating the Sun Blade 2500 workstation without the hard drive fan is not advised.

---

## 13.4.3 Installing the Hard Drive Fan

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12

2. **Locate where to install the new hard drive fan.**

   See FIGURE 13-22.

3. **Remove the fan from its packaging.**

---

**Note –** Molded into the body of the fan are two arrows. One arrow points the airflow direction, the other arrow points the fan rotation.

---

4. **Align the fan under the standoffs with the cable towards the power supply and the airflow arrow on the body of the fan pointing up.**

5. **Insert one screw through the grille and into one corner of the fan.**

6. **Thread the screw into the standoff enough to bear the weight of the fan.**

7. **Thread the remaining three screws through the grille, through the fan corners, and into the respective standoffs.**

   See FIGURE 13-24.

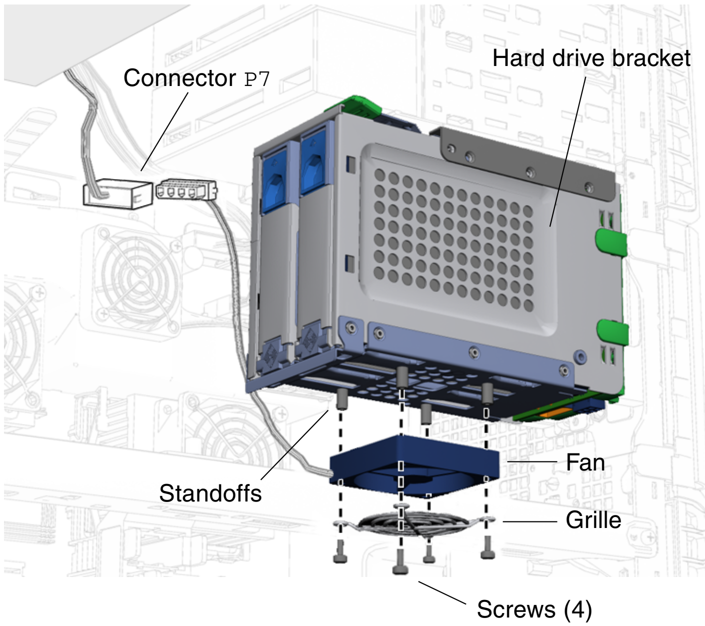



**FIGURE 13-24** Installing the Hard Drive Fan

8. **Using the No. 2 Phillips screwdriver, tighten the four screws.**

9. **Connect the hard drive fan cable to power supply connector `P7`.**

   If `P7` is not available, use `P8` or `P9`.

10. **Install the PCI card support and chassis cross brace.**

    See "Installing the PCI Card Support and Chassis Cross Brace" on page 13-44.

11. **Inspect the hard drive fan to verify that:**

    - The four screws are tight.
    - The grille is located below the fan.
    - The hard drive fan cable is firmly connected to power supply connector `P7`.

12. **Replace the access panel and power on the system.**

    See:

    - "Installing the Access Panel" on page 15-6
    - "Powering On the Workstation" on page 15-7

# 13.5 Replacing the SCSI Backplane

This section describes removal and installation of the SCSI backplane. Topics include:


- "Identifying the SCSI Backplane" on page 13-27
- "Removing the SCSI Backplane" on page 13-28
- "Installing the SCSI Backplane" on page 13-29


## 13.5.1 Identifying the SCSI Backplane

The SCSI backplane is located between the hard drives and the green SCSI backplane cover. See FIGURE 13-25. The SCSI backplane, the SCSI backplane cover, the hard drives, and the hard drive bracket are collectively the hard drive assembly. The hard drive assembly is installed in the hard drive bay. The hard drive power and interface cables connect to the hard drives through the SCSI backplane. The power and interface connectors from the SCSI backplane to the motherboard are directly accessible when the access panel is removed.

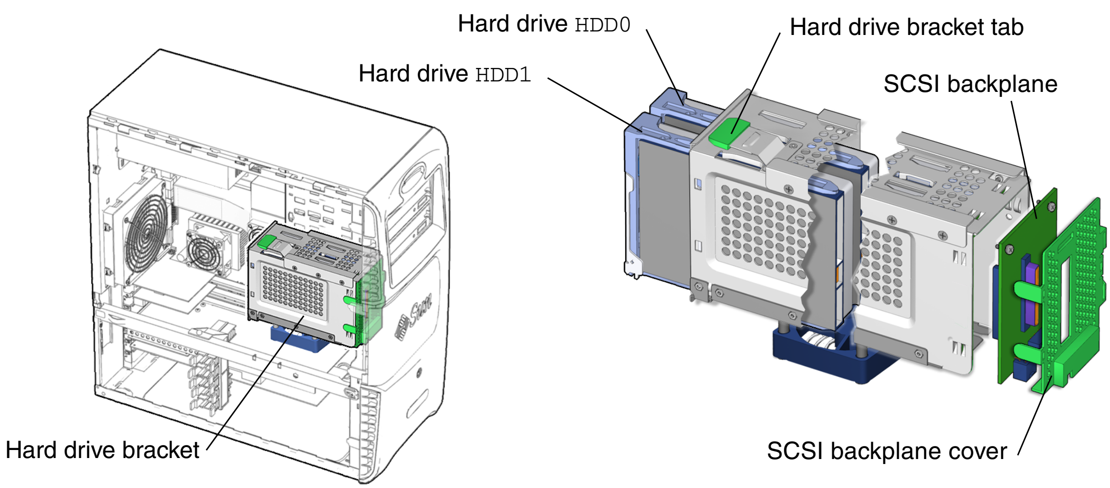



**FIGURE 13-25** SCSI Backplane Location and Identification

## 13.5.2 Removing the SCSI Backplane

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12

2. **Locate the SCSI backplane.**

   See FIGURE 13-25.

3. **Remove all installed hard drives.**

   See "Removing the Hard Drive" on page 12-3.

   Set the hard drive(s) on an antistatic mat.

4. **Remove the hard drive assembly.**

   See "Removing the Hard Drive Assembly" on page 10-19.

5. **Unclip the SCSI backplane cover tab from the left side and both tabs from the right side of the hard drive bracket.**

   See FIGURE 13-26.

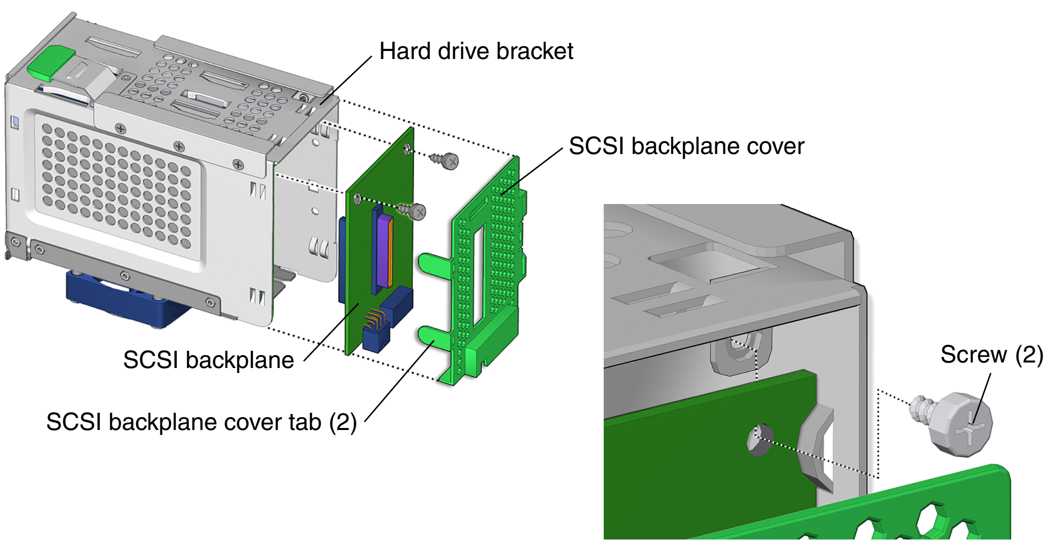



**FIGURE 13-26** Removing the SCSI Backplane Cover

6. **Lift the backplane cover from the hard drive bracket and set it aside.**

7. **Using a No. 2 Phillips screwdriver, remove both screws that secure the SCSI backplane to the hard drive bracket.**

   See FIGURE 13-26. Set the screws aside in a container.

8. **Slide the SCSI backplane out of the hard drive bracket and set it aside.**

   Proceed to "Installing the SCSI Backplane" on page 13-29 to install the new SCSI backplane.

---

**Note –** Do not operate the workstation with the SCSI backplane removed.

---

## 13.5.3 Installing the SCSI Backplane

1. **Open the chassis.**

   See "Removing the Access Panel" on page 10-12.

2. **Position the hard drive bracket.**

   Set the hard drive bracket on an antistatic mat.

3. **Remove the new SCSI backplane from its packaging.**

4. **Slide the SCSI backplane into the hard drive bracket channels.**

   See FIGURE 13-27. The single SCSI connector should face out from the interior of the hard drive bracket. The two SCSI backplane power connectors should face toward the bottom of the hard drive bracket.

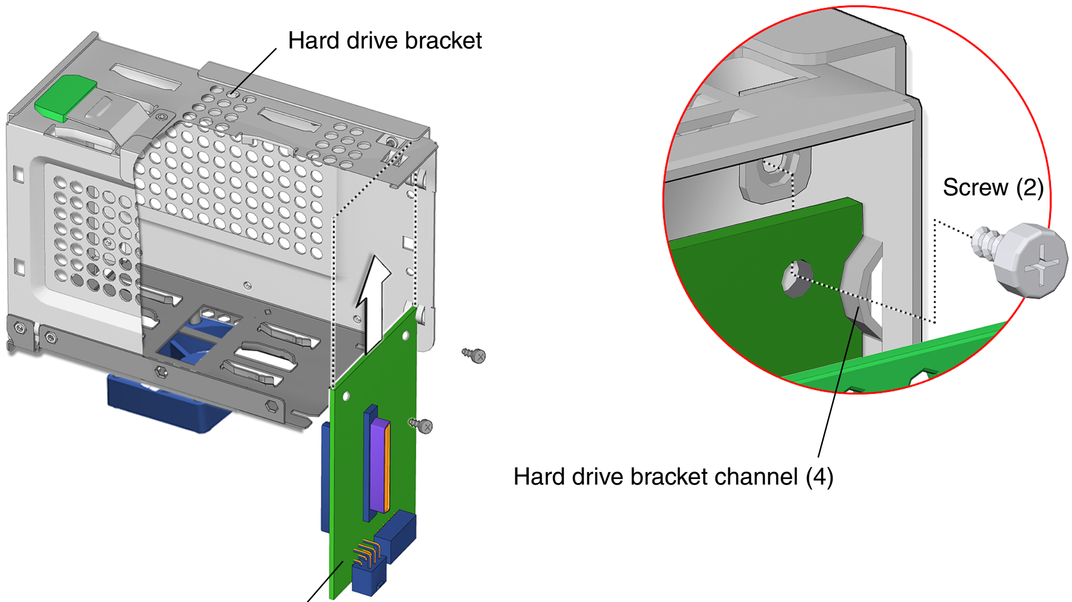



**FIGURE 13-27** Aligning the SCSI Backplane to Hard Drive Bracket

5. **Using a No. 2 Phillips screwdriver, install the two screws that secure the SCSI backplane to the hard drive bracket.**

   See FIGURE 13-27.

6. **Align the left side SCSI backplane cover tabs with the left side slots on the hard drive bracket.**

   See FIGURE 13-28.

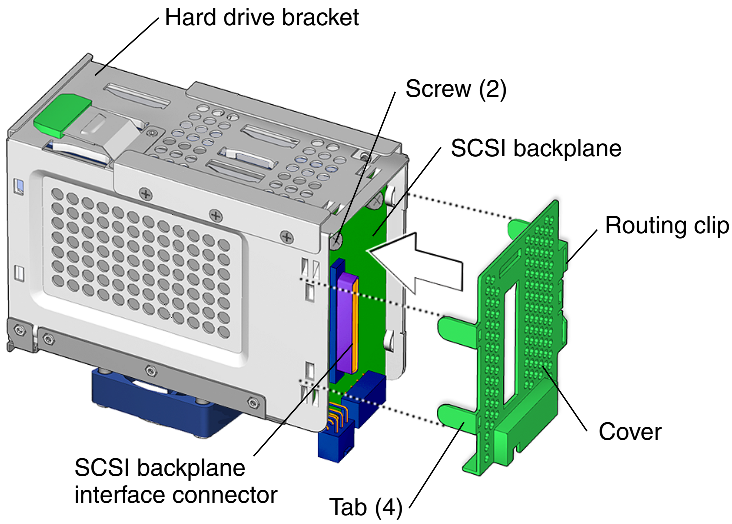



**FIGURE 13-28** Installing the SCSI Backplane Cover

7. **Set the cover over the hard drive bracket and press until the tabs click on both sides of the SCSI backplane cover.**

   See FIGURE 13-28.

8. **Install the hard drive assembly.**

   See "Installing the Hard Drive Assembly" on page 15-2.

9. **Inspect the SCSI backplane and related component fasteners to verify that:**

   - The SCSI backplane tabs are all secure and flat.
   - The hard drive handles are flush and locked.
   - The hard drives are tight into the SCSI backplane
   - The hard drive bracket is locked into the hard drive bay.

10. **Inspect the SCSI backplane and related component cabling to verify that:**

    - Both power cables are seated in the SCSI backplane.
    - The SCSI interface cable is tight into the SCSI backplane.
    - The interface cable is routed through the routing clip on the SCSI backplane cover.

11. **Replace the access panel, power on the system, and verify the component installation.**

    See:

    - "Installing the Access Panel" on page 15-6
    - "Powering On the Workstation" on page 15-7
    - "Verifying an Installation" on page 15-10

# 13.6 Replacing the Speaker

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


- "Identifying the Speaker" on page 13-32
- "Removing the Speaker" on page 13-33
- "Installing the Speaker" on page 13-34


## 13.6.1 Identifying the Speaker

The speaker is installed in the front of the chassis in a bracket that also contains the front fan. The speaker cable is connected to the motherboard connector `J16`.

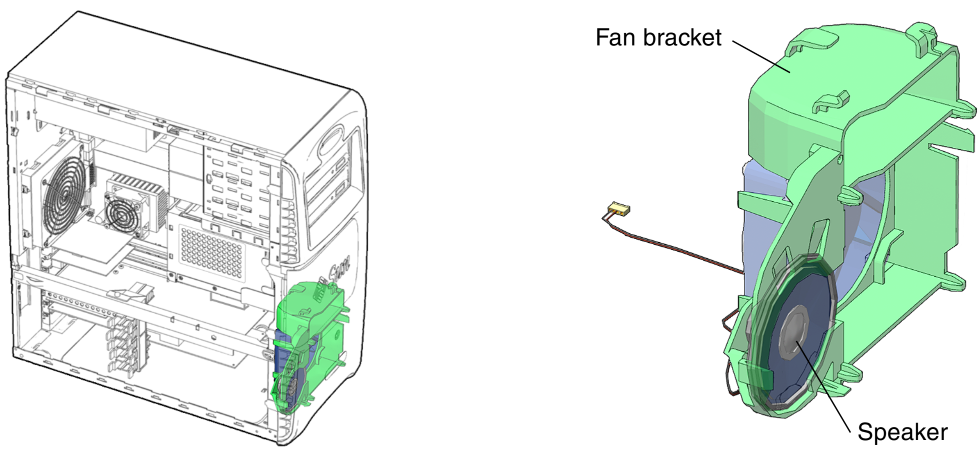



**FIGURE 13-29** Speaker Location and Identification

TABLE 13-4 lists speaker specifications.

**TABLE 13-4** Speaker Specifications

| Specification | Value |
|---|---|
| Impedance | 8 Ohm |
| Wattage (maximum power handling) | 3.5W |

## 13.6.2 Removing the Speaker

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12

2. **Locate the speaker.**

   See FIGURE 13-29.

3. **Disconnect the speaker cable from motherboard connector `J16`.**

   See FIGURE 13-30.

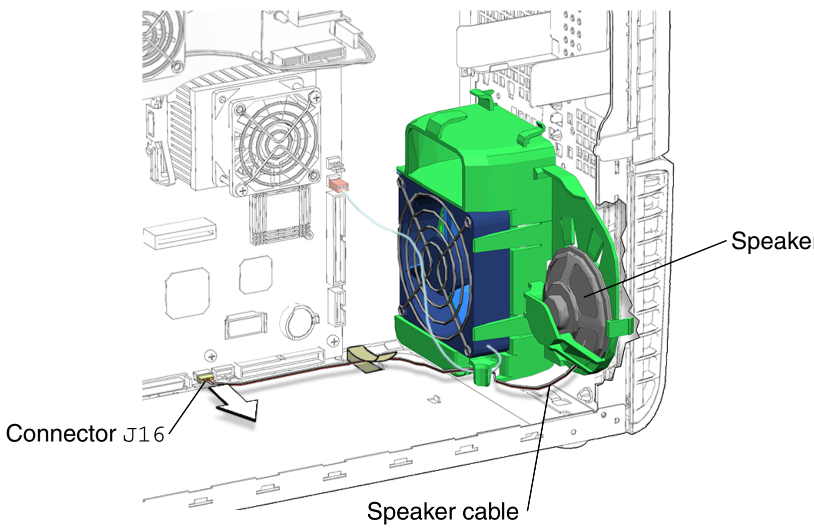



**FIGURE 13-30** Disconnecting the Speaker Cable

---

**Note –** Check the speaker cable routing through the fan bracket and chassis. When you reinstall the speaker you must correctly route the cable through the chassis.

---

4. **Press down on the two speaker clips and pull the metal frame of the speaker to the right until the speaker comes out of the front fan bracket.**

   See FIGURE 13-31.

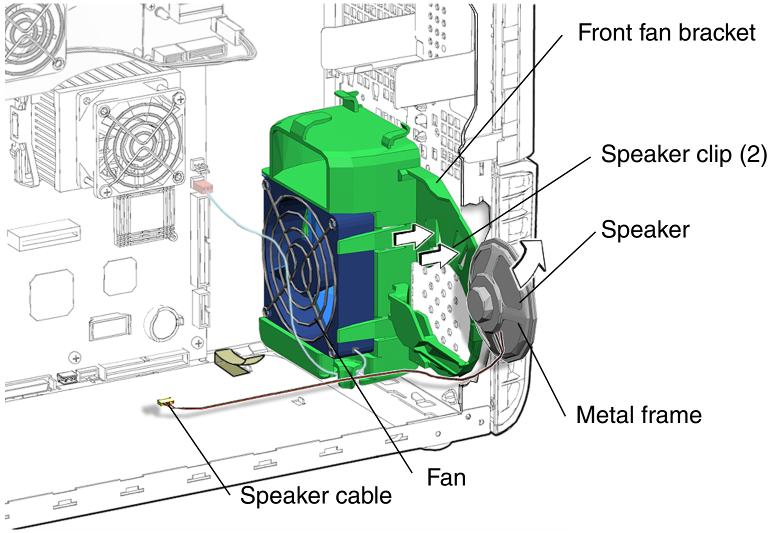



**FIGURE 13-31** Removing the Speaker

Proceed to "Installing the Speaker" on page 13-34.

---

**Note –** Do not operate the workstation without the speaker installed.

---

## 13.6.3 Installing the Speaker

1. **Open the chassis.**

   See "Removing the Access Panel" on page 10-12.

2. **Locate where the speaker is to be installed.**

   See FIGURE 13-29.

3. **Remove the speaker from its packaging.**

4. **Align the speaker so that the speaker signal cable is down and to the left of the speaker.**

   See FIGURE 13-32.

5. **Push sideways on the metal frame of the speaker until it slides into the bracket and seats.**

   See FIGURE 13-32.

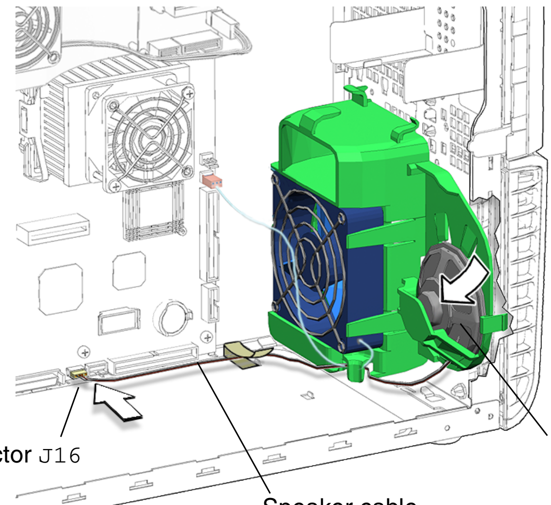



**FIGURE 13-32** Aligning and Installing the Speaker and Cable

6. **Connect the speaker signal cable to the speaker connector `J16` on the motherboard.**
7. **Verify the speaker is locked into position in the front fan bracket clips.**
8. **Verify the speaker cable is routed through the fan bracket and chassis.**
9. **Replace the access panel, power on the system, and verify component installation.**

   See:

   - "Installing the Access Panel" on page 15-6
   - "Powering On the Workstation" on page 15-7
   - "Verifying an Installation" on page 15-10

# 13.7 Replacing the Front Fan Bracket

This section describes removal and installation of the front fan bracket. Topics include:

- "Identifying the Front Fan Bracket" on page 13-36
- "Removing the Front Fan Bracket" on page 13-36
- "Installing the Front Fan Bracket" on page 13-38

## 13.7.1 Identifying the Front Fan Bracket

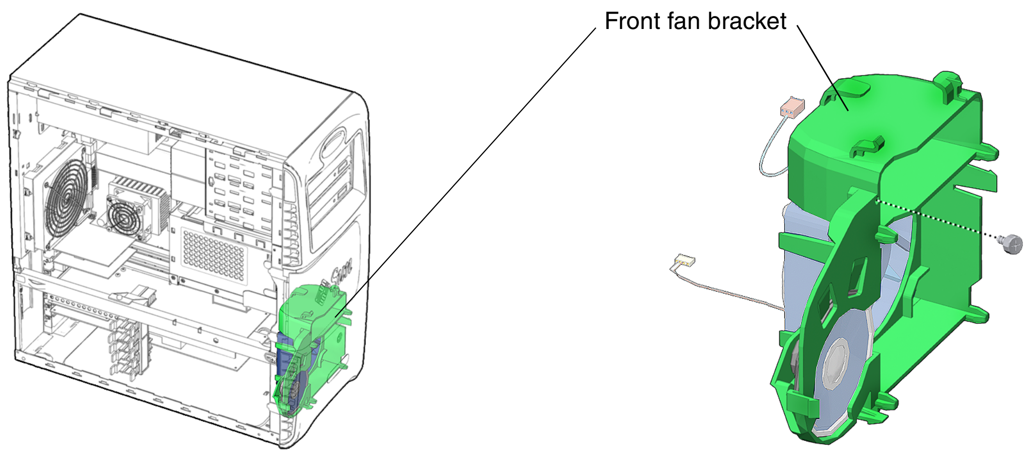



**FIGURE 13-33** Front Fan Bracket Location and Identification

## 13.7.2 Removing the Front Fan Bracket

1. **Power off the system, open the chassis, and remove the bezel.**

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12
   - "Removing the Bezel" on page 10-15.

2. **Locate the front fan bracket.**

   See FIGURE 13-33.

3. **Remove the front fan and the speaker.**

   See:

   - "Removing the Front Fan" on page 13-12
   - "Removing the Speaker" on page 13-33.

4. **Using a No. 2 Phillips screwdriver, remove the screw that secures the power switch and LED cable assembly to the front panel.**

   See FIGURE 13-34.

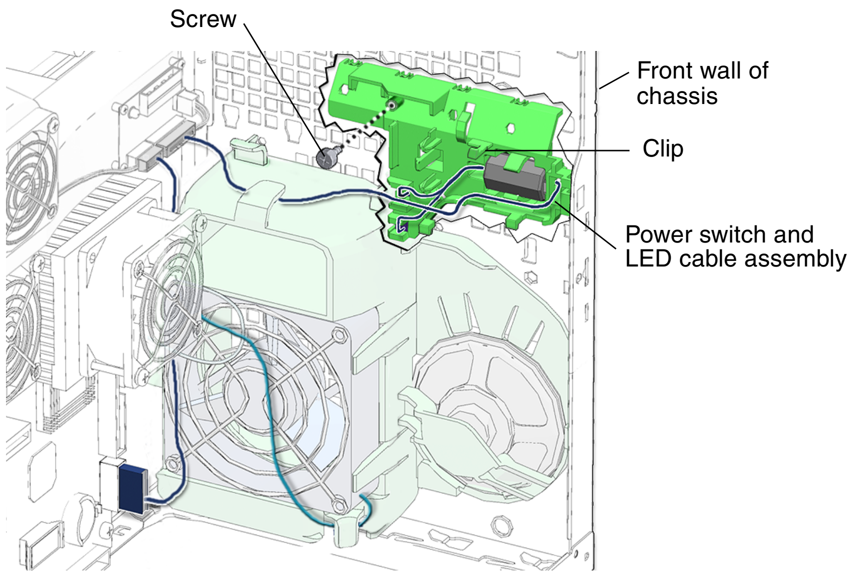



**FIGURE 13-34** Loosening the Power Switch and LED Cable Assembly From the Chassis

5. **Press the clip and pivot the power switch and LED cable assembly down and away from the chassis front panel.**

6. **Unhook the power switch and LED cable assembly from the chassis front panel and allow it to hang by its cables.**

   See FIGURE 13-35.

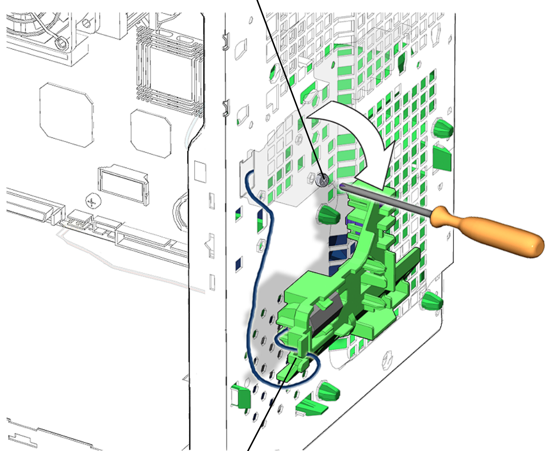



**FIGURE 13-35** Removing the Screw That Secures the Fan Bracket to the Chassis

---

**Note –** It is not necessary to completely remove the power switch and LED cable assembly from the chassis. You are only trying to gain access to the screw that attaches the fan bracket to the chassis.

---

7. **Remove the** screw that secures the fan bracket to the chassis**.**

   See FIGURE 13-35.

8. **Squeeze the three tabs that secure the front fan bracket to the chassis.**

9. **Pull the front fan bracket back, lift it up and out of the chassis.**

   Proceed to "Installing the Front Fan Bracket" on page 13-38.

## 13.7.3 Installing the Front Fan Bracket

1. **Open the chassis.**

   See "Removing the Access Panel" on page 10-12.

2. **Locate where the front fan bracket is to be installed.**

   See FIGURE 13-33.

3. Align the three front fan bracket tabs with the inside of the chassis front panel and press the front fan bracket forward until it snaps into the chassis.

   See FIGURE 13-36.

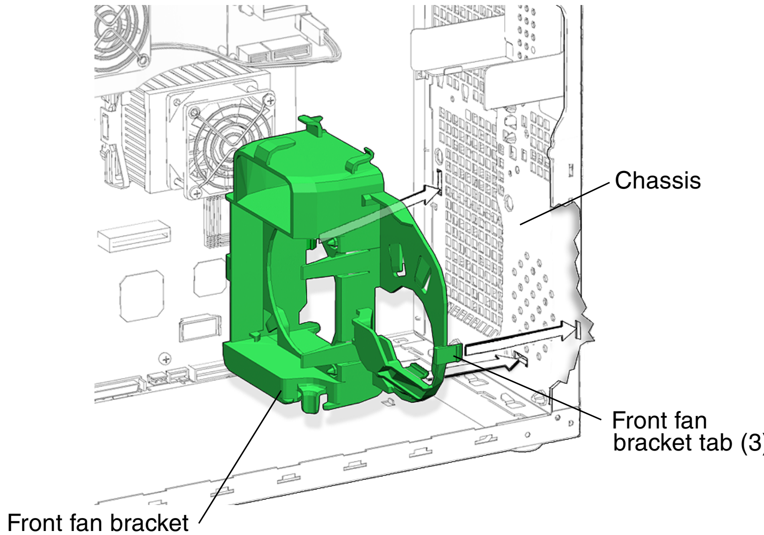



**FIGURE 13-36** Installing the Front Fan Bracket

4. **Install and t**ighten the screw that secures the fan bracket to the chassis.

   See FIGURE 13-37.

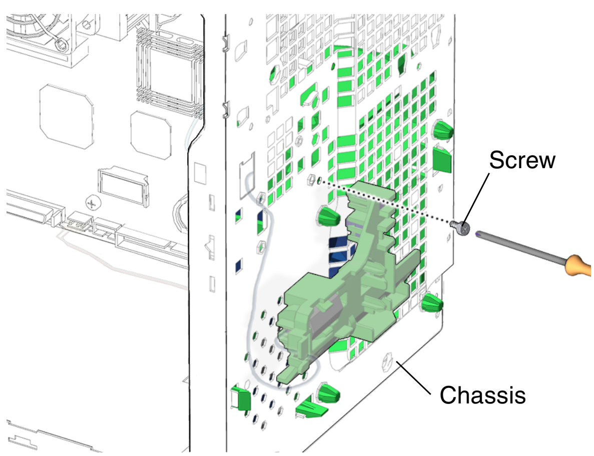



**FIGURE 13-37** Installing the Screw for the Front Fan Bracket

5. **Align the power switch and LED cable assembly tabs with the chassis cutouts and press the assembly into place.**

   See FIGURE 13-38.

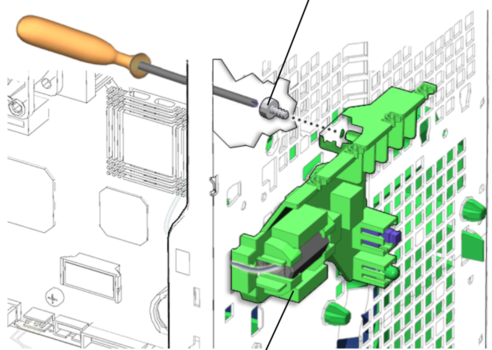



**FIGURE 13-38** Installing the Power Switch and LED Cable Assembly

6. **Install the screw for the power switch and LED cable assembly.**

   See FIGURE 13-38.

7. **Install the front fan and the speaker.**

   See:

   - "Installing the Front Fan" on page 13-14
   - "Installing the Speaker" on page 13-34

8. **Replace the bezel.**

   See "Installing the Bezel" on page 15-5.

9. **Replace the access panel and power on the system.**

   See:

   - "Installing the Access Panel" on page 15-6
   - "Powering On the Workstation" on page 15-7

# 13.8 Replacing the PCI Card Support and Chassis Cross Brace

This section describes removal and installation of the PCI card holder. Topics include:


- "Identifying the PCI Card Support and Chassis Cross Brace" on page 13-41
- "Removing the PCI Card Support and Chassis Cross Brace" on page 13-42
- "Installing the PCI Card Support and Chassis Cross Brace" on page 13-44


## 13.8.1 Identifying the PCI Card Support and Chassis Cross Brace

The PCI card support provides shock and vibration protection for long PCI cards. It supports the PCI cards with spring loaded tabs, one for each PCI card. It is fastened to the chassis cross brace.

---

**Note –** The chassis cross brace provides structural support to the chassis. Do *not* use it as a handle.

---

The PCI card support has two pins that are used to align the PCI card support with the bottom of the chassis. See FIGURE 13-39.

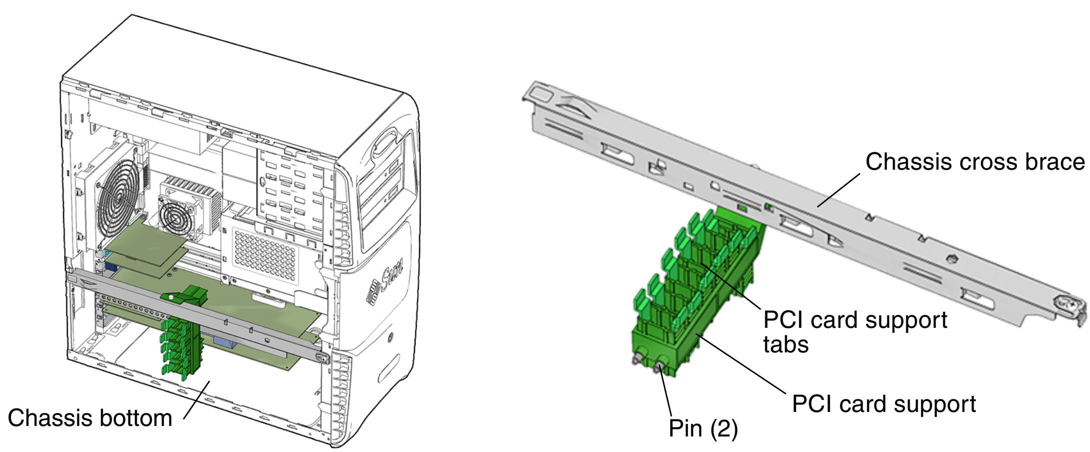



**FIGURE 13-39** PCI Card Support Location and Identification

## 13.8.2 Removing the PCI Card Support and Chassis Cross Brace

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

   See:

   - “Powering Off the Workstation” on page 10-4
   - “Removing the Access Panel” on page 10-12

2. **Locate the PCI card support and the chassis cross brace.**

   See FIGURE 13-39. 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 is fastened to the chassis front panel with a screw.

3. **Squeeze and pull the PCI card support tabs away from the PCI cards.**

   See FIGURE 13-40.

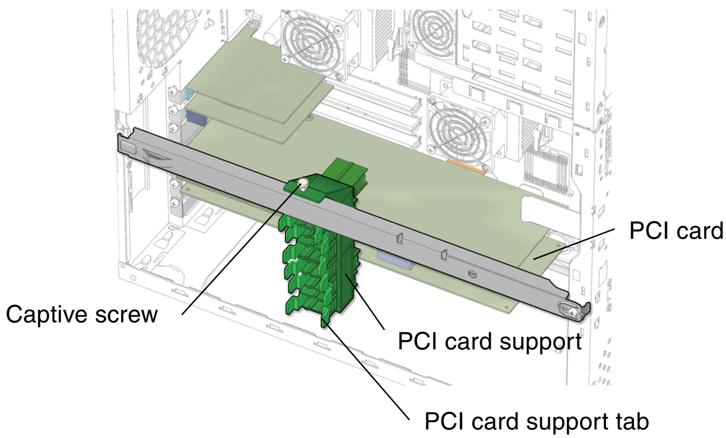



**FIGURE 13-40** Releasing the PCI Card Tabs

4. **Loosen the captive screw that secures the PCI card support to the chassis cross brace.**

   See FIGURE 13-40. If necessary, use a No. 2 Phillips screwdriver to loosen the screw.

5. **Using a No. 2 Phillips screwdriver, remove the screw that secures the chassis cross brace to the chassis.**

   See FIGURE 13-41. Set the screw aside in a container.

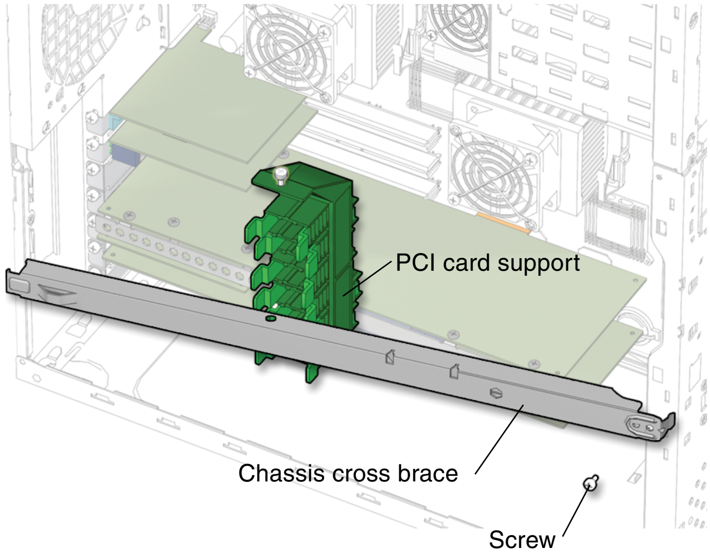



**FIGURE 13-41** Unfastening the Chassis Cross Brace

6. **Lift the chassis cross brace up and off of the chassis.**

   See FIGURE 13-42. Set the chassis cross brace aside.

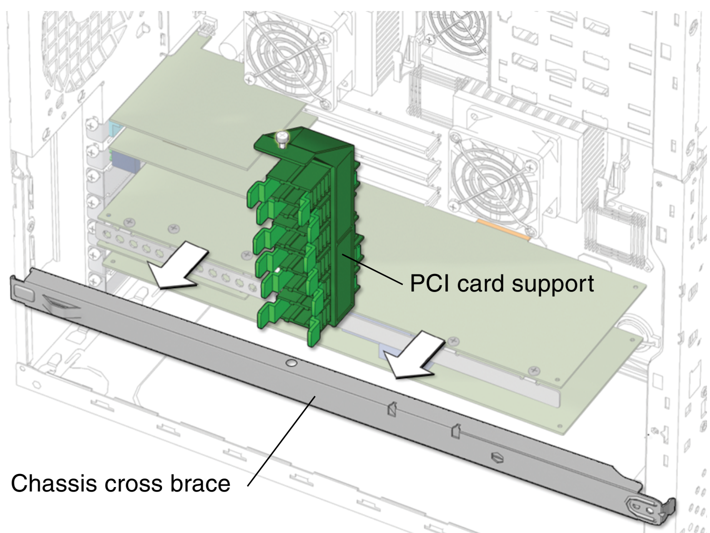



**FIGURE 13-42** Removing Chassis Cross Brace and PCI Card Support

7. **Remove the PCI card support from the chassis.**

   See FIGURE 13-42.

8. **Choose your next step:**
   - If you removed the PCI card support and chassis cross brace prior to removing the motherboard, return to "Removing the Motherboard" on page 11-57, Step 4 to continue the motherboard removal.
   - If you removed the PCI card support and chassis cross brace prior to removing a PCI card, return to "Removing a PCI Card" on page 11-44, Step 2 to continue the PCI card removal.
   - Otherwise, proceed to "Installing the PCI Card Support and Chassis Cross Brace" on page 13-44.

---

**Note –** Do not operate the workstation without the PCI card support or chassis cross brace installed.

---

## 13.8.3 Installing the PCI Card Support and Chassis Cross Brace

1. **Open the chassis.**

   See "Removing the Access Panel" on page 10-12.

2. **Locate where the PCI card support is to be installed.**

   See FIGURE 13-39.

3. **Insert the cross brace tab into the slot on the left side of the chassis.**

   See FIGURE 13-43.

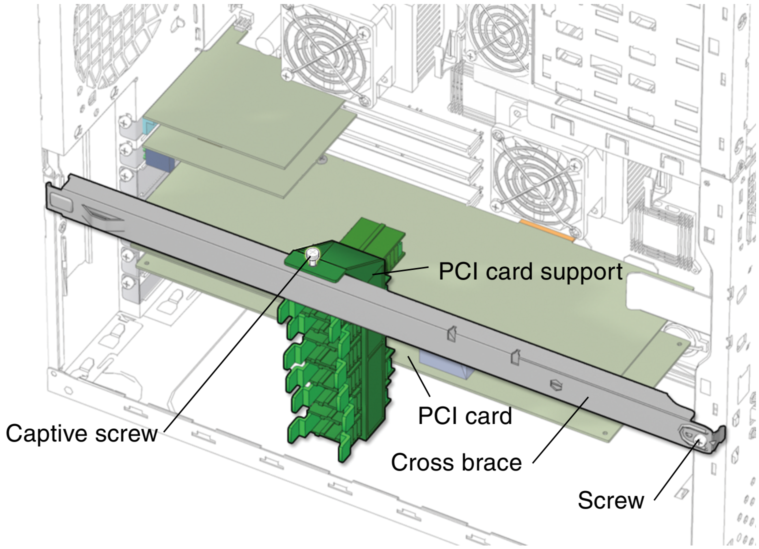



**FIGURE 13-43** Installing the Chassis Cross Brace

4. **Set the cross brace across the chassis and firmly seat the cross brace into the chassis.**

   See FIGURE 13-43.

5. **Using a No. 2 Phillips screwdriver, fasten the screw that secures the chassis cross brace to the chassis.**

   See FIGURE 13-43

6. **Insert the PCI card support between the chassis cross brace and the PCI cards.**

   See FIGURE 13-43

7. **Align the PCI card support pins with the matching holes in the chassis.**

   See FIGURE 13-43

---

**Note –** There are two pairs of holes in the chassis bottom. These holes are used to align the PCI card support for short or long PCI cards.

---

8. **Tighten the captive screw that secures the PCI card support to the chassis cross brace.**

   See FIGURE 13-44.

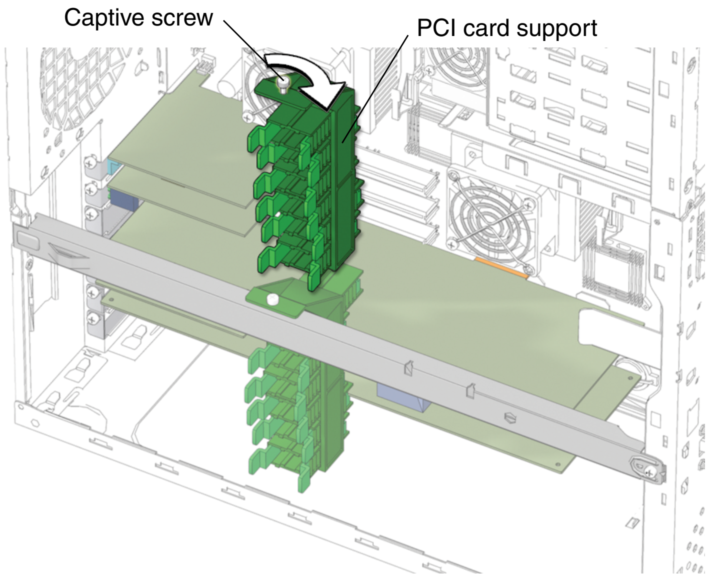



**FIGURE 13-44** Fastening the PCI Card Support

9. **Squeeze each PCI card support tab and move the tabs toward the installed PCI cards while aligning the PCI cards with the respective PCI card support fingers.**

   See FIGURE 13-45.

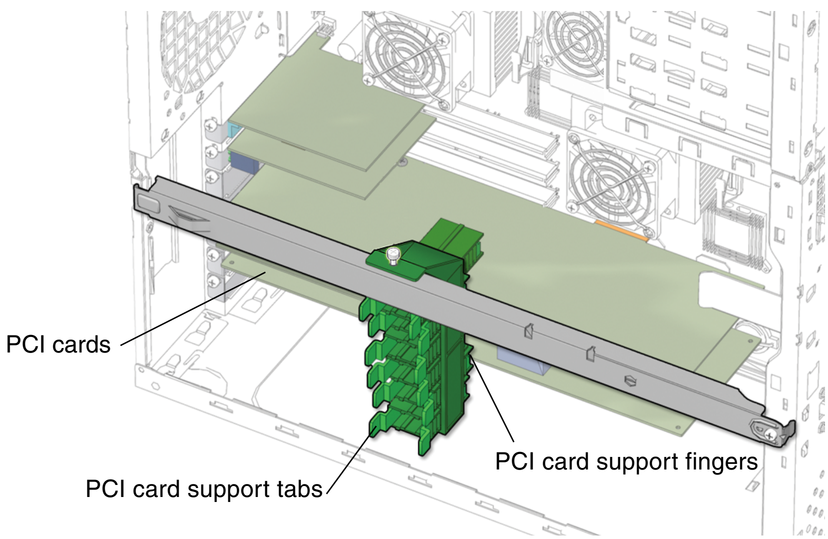



**FIGURE 13-45** Aligning the PCI Card Support Tabs

10. **Inspect the PCI card support and related component fasteners to verify that:**
    - The PCI card support is fastened tight to the chassis cross brace.
    - The chassis cross brace is fastened tight to the chassis.
    - The PCI card support fingers are snug against each respective PCI card.
11. **Choose your next step:**
    - If you removed the PCI card support and chassis cross brace prior to removing motherboard, return to "Removing the Motherboard" on page 11-57, Step 4 to continue the motherboard removal.
    - Otherwise, replace the access panel and power on the system.

      See:
      - "Installing the Access Panel" on page 15-6
      - "Powering On the Workstation" on page 15-7

# 13.9 Replacing the System Drive Rails

This section describes removal and installation of the drive rails. Topics include:



## 13.9.1 Identifying the System Drive Rails

The Sun Blade 2500 workstation supports up to two media drives. The drive rails guide the media drives into the removable media drive bay. See FIGURE 13-46. When you are not using a media bay, the corresponding drive rails are stored on the side of the hard drive bay.

---

**Note –** The instructions in this section apply to any removable media drive, such as a DVD+-RW or tape drive.

---

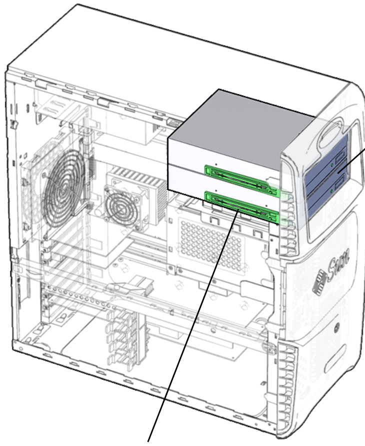



**FIGURE 13-46** Drive Rails Location and Identification

## 13.9.2 Removing System Drive Rails

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12

2. **Locate the drive rails.**

   See FIGURE 13-47. The drive rails are on the side of the removable media drive bay.

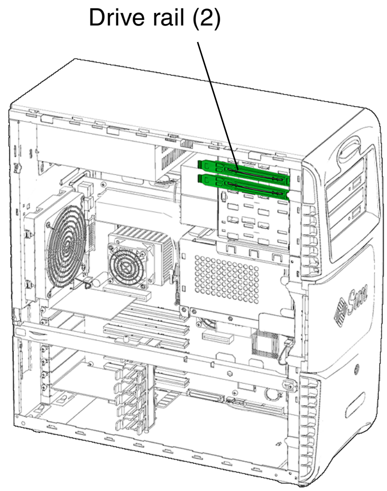



**FIGURE 13-47** Location of Drive Rails

3. **Lift the tabs to remove the rail(s).**

   See FIGURE 13-48.

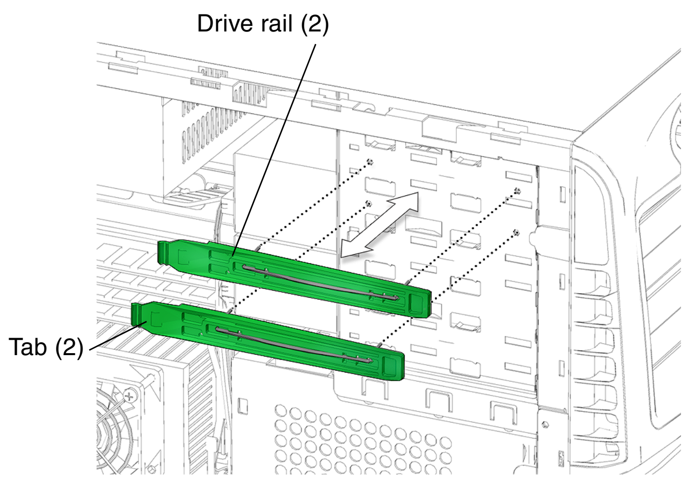



**FIGURE 13-48** Removing the Drive Rails

4. **Choose your next step:**

   - If you removed the workstation drive rails to install them on a new media drive proceed to Step 3, "Installing System Drive Rails" on page 13-50.
   - Otherwise, replace the access panel, and power on the system.

     See:

- “Installing the Access Panel” on page 15-6
- “Powering On the Workstation” on page 15-7

## 13.9.3 Installing System Drive Rails

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

   See:

   - “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.**

   See FIGURE 13-46. The drive rails are stored on the side of the inside of the removable media drive bay.

3. **Install the drive rails into the lower pair of holes on both sides of the media drive.**

   See FIGURE 13-49. The drive rail squeeze tabs are toward the front of the media drive slot.

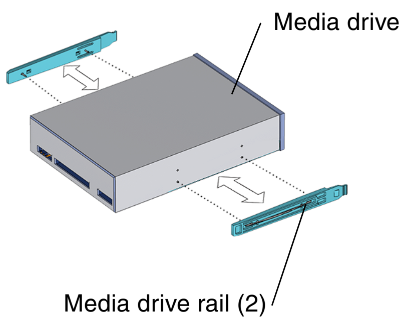



**FIGURE 13-49** Installing Drive Rails on a Media Drive

CHAPTER **14**

# Replacing Internal Cables

This chapter describes the replacement procedures for the Sun Blade 2500 replaceable internal cables.

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

This section contains the following topics:



---

**Caution –** Follow the cautions, warnings, and instructions in the *Sun Blade 2500 Safety and Compliance Guide* (817-5120). The document is available at: `http://www.sun.com/documentation`

---

**Caution –** The procedures in this chapter are described with the chassis in an upright position. If you perform any of the procedures in this chapter with the chassis in its upright position, use care to ensure 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 2500 replaceable cables come as set. See FIGURE 14-1. The replaceable cable set includes:

- Optical drive interface cable, from `IDE1` to the optical drive (media drives)

- `SCSI0` backplane interface cable, from `SCSI0` on the motherboard to the SCSI backplane
- Power switch and LED cable assembly, from connector `J3` on the interposer board to the power switch and LED
- Smart card reader interface cable, from connector `SCR0` to the smart card reader
- SCSI to optical drive power cable, from SCSI backplane to optical drive

---

**Note –** Power for the optical drive is provided by a 4-pin power cable from the SCSI backplane to the optical drive.

---

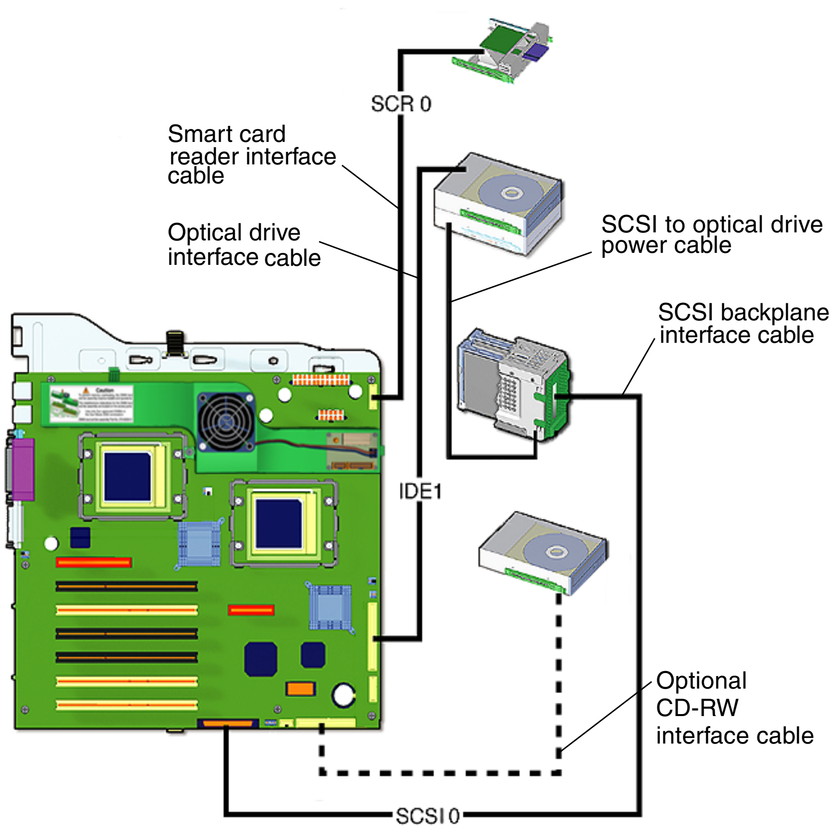



**FIGURE 14-1** Sun Blade 2500 Interface and Power Cables

# 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 14-3
- "Removing the Smart Card Reader Cable" on page 14-3
- "Installing the Smart Card Reader Cable" on page 14-4


## 14.1.1 Identifying the Smart Card Reader Cable

The smart card cable connects the smart card reader to the motherboard. It is a 10-conductor, signal (data) ribbon cable. See FIGURE 14-2.

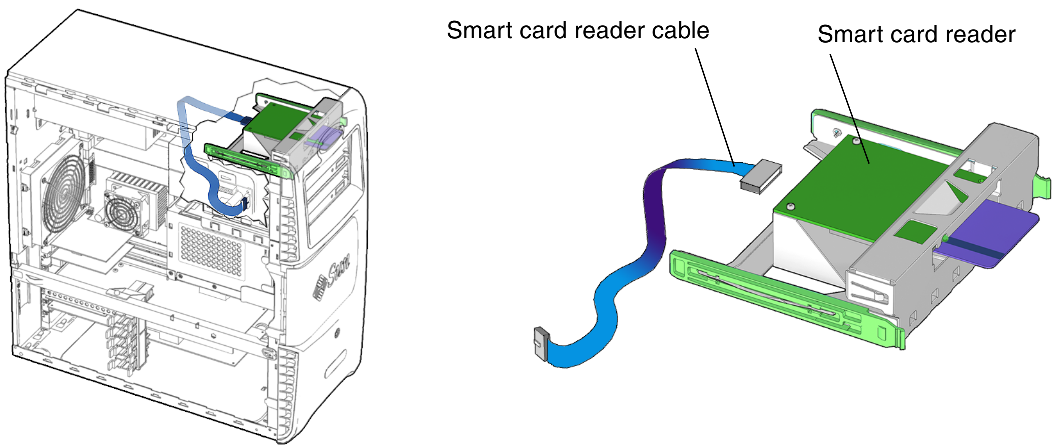



**FIGURE 14-2** Smart Card Reader Location and Identification

## 14.1.2 Removing the Smart Card Reader Cable

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

   See:


   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12

2. **Locate the smart card reader interface cable.**

   See FIGURE 14-3. The smart card reader is located in the front of the chassis and has a single interface cable.

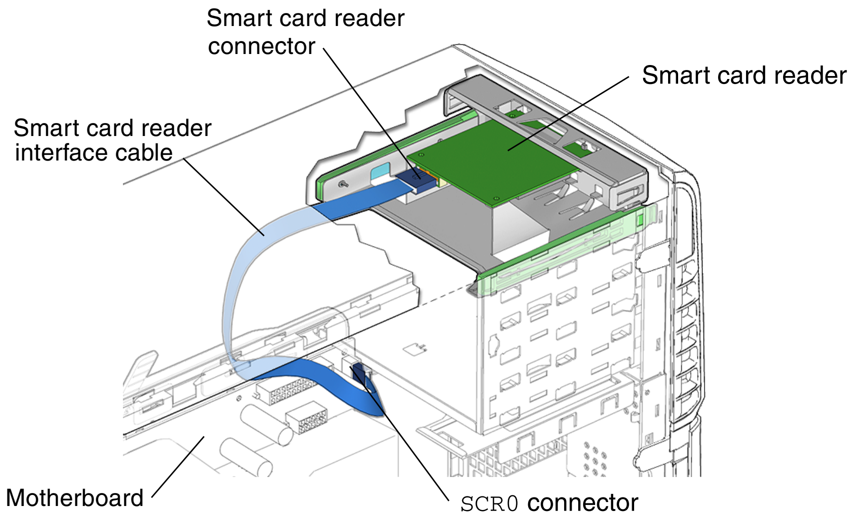



**FIGURE 14-3** Removing the Smart Card Reader Cable

---

**Note –** Before removing the smart card reader cable, note its routing in the chassis.

---

3. **Disconnect the interface cable from the motherboard at connector `SCR0` and at the back of the smart card reader.**

4. **Remove the cable from the chassis and set it aside.**

   Proceed to "Installing the Smart Card Reader Cable" on page 14-4.

---

**Note –** The smart card reader cannot operate without the interface cable.

---

## 14.1.3 Installing the Smart Card Reader Cable

1. **Open the chassis.**

   See "Removing the Access Panel" on page 10-12.

2. **Locate where the smart card reader cable is to be installed.**

   See FIGURE 14-2. The smart card reader cable connects to the back of the smart card reader and to the motherboard at connector `SCR0`.

3. **Remove the smart card reader cable from its packaging.**

4. **Connect the interface cable to the smart card reader.**

   See FIGURE 14-3.

   Connect the interface cable to the smart card reader connector.

5. **Route the interface cable** to the upper front corner of the motherboard**.**

---

**Note –** The interface cable is a flat cable. It can be bent to fit, but use caution not to twist the cable unnecessarily.

---

6. **Connect the interface cable to the motherboard at connector** `SCR0`**.**

7. **Inspect the cabling to verify that:**

   - The interface cable is routed correctly, with no of kinks.
   - The hard interface cable is secure in the smart card reader connector.
   - The hard interface cable is secure in the motherboard connector `SCR0`.

8. **Replace the access panel and power on the system.**

   See:


   - "Installing the Access Panel" on page 15-6
   - "Powering On the Workstation" on page 15-7
   - "Verifying an Installation" on page 15-10


# 14.2 Replacing the Optical Drive Cables

This section describes removal and installation of the optical drive interface and power cables. Topics include:


- "Identifying Optical Drive Cables" on page 14-6
- "Removing the Optical Drive Cables" on page 14-6
- "Installing the Optical Drive Cables" on page 14-9

## 14.2.1 Identifying Optical Drive Cables

The optical drive has separate power and interface cables. The power cable is routed from the 4-pin connector on the SCSI backplane to the optical drive. See FIGURE 14-4.

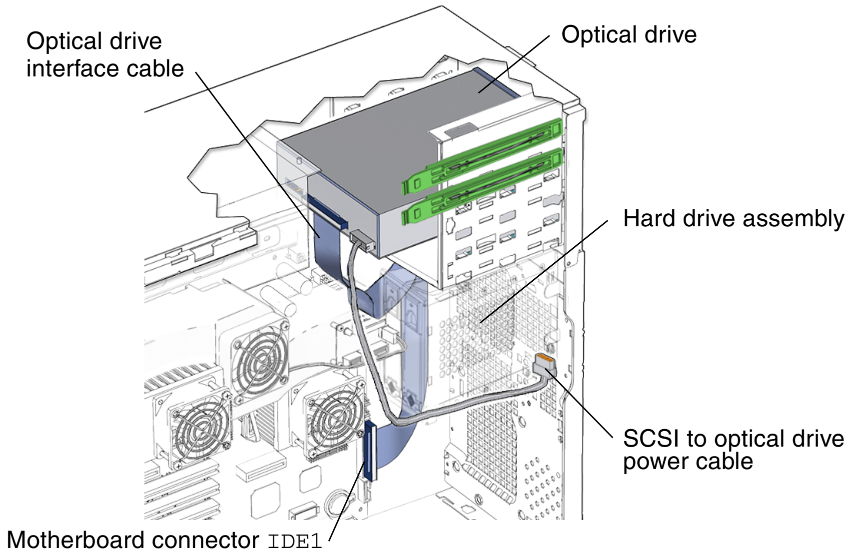



**FIGURE 14-4** Optical Drive Power and Interface Cables Location and Identification

The interface cable for the optical drive connects the removable media drive to the motherboard. The interface cable is a 40-conductor ribbon cable that is routed through the chassis from `IDE1` to the optical drive.

---

**Note –** The instructions in this section apply to any removable media drive, such as an optical or tape drive.

---

## 14.2.2 Removing the Optical Drive Cables

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

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12

2. **Locate the optical drive interface cable.**

   See FIGURE 14-4. The optical drive interface cable is located at the back of the optical drive.

3. **Disconnect the optical drive interface cable from the optical drive.**

---

**Note –** Before removing the optical drive cables, note their routing in the chassis.

---

4. **Remove the front fan bracket.**

   See "Removing the Front Fan Bracket" on page 13-36.

5. **Disconnect the optical drive interface cable from motherboard connector `IDE1`.**

   See FIGURE 14-4.

6. **Remove the interface cable from the chassis.**

---

**Note –** The interface cable is a preformed flat cable. Do not to twist the cable unnecessarily.

---

   The interface cable is routed along the back of the chassis, under the front fan assembly and up into the optical drive. See FIGURE 14-4.

7. **Disconnect the 4-pin SCSI to optical drive power cable from the optical drive.**

   See FIGURE 14-4.

8. **Using a No. 2 Phillips screwdriver, remove the two screws for the hard drive assembly.**

   See FIGURE 14-5.

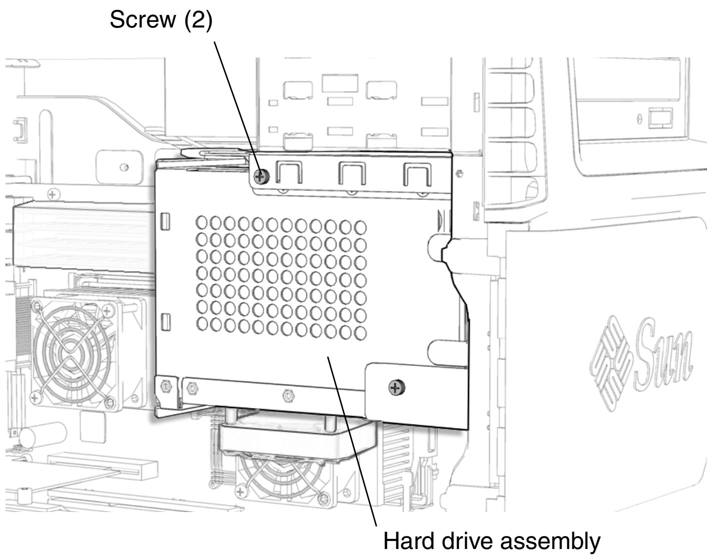



**FIGURE 14-5** Removing the Two Screws for the Hard Drive Assembly

9. **Press down on the green plastic latch at the top of the hard drive assembly, and slide the hard drive assembly out of the hard drive bay.**

   See FIGURE 14-6.

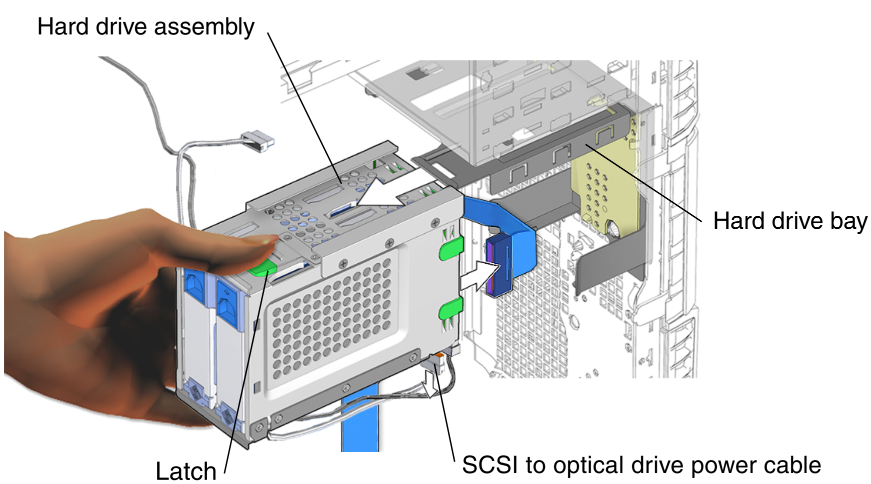



**FIGURE 14-6** Removing the Hard Drive Bracket Assembly

10. **Remove the SCSI to optical drive power cable from the hard drive bracket clips.**

   See FIGURE 14-7. The SCSI to optical drive power cable is routed through the two hard drive bracket clips on back and bottom of the hard drive assembly.

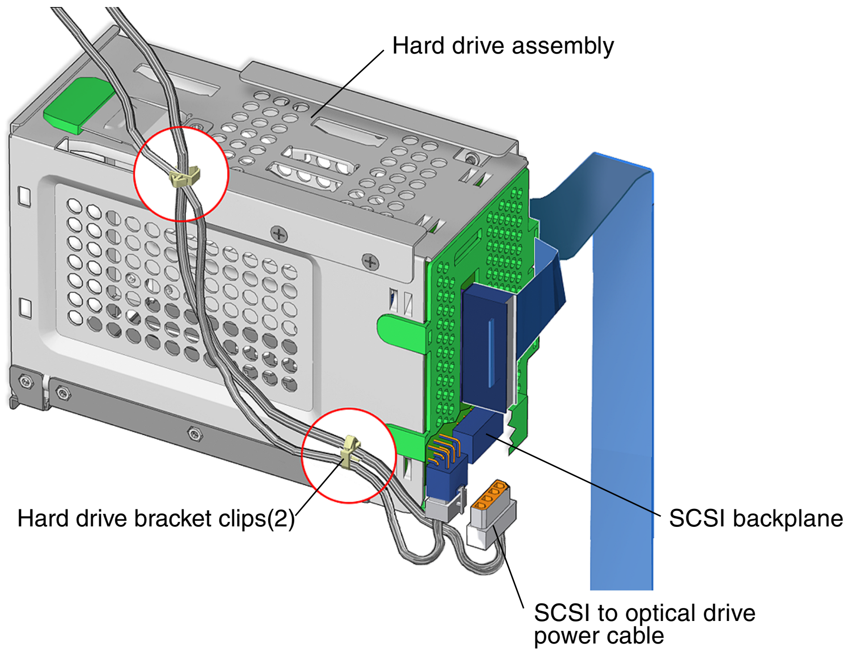



**FIGURE 14-7** Removing the SCSI to Optical Drive Cable from the Hard Drive Bracket Clips

11. **Disconnect the SCSI to optical drive cable from the SCSI backplane.**

   Proceed to "Installing the Optical Drive Cables" on page 14-9.

---

**Note –** The optical drive cannot operate without the interface cable.

---

## 14.2.3 Installing the Optical Drive Cables

1. **Open the chassis.**

   See "Removing the Access Panel" on page 10-12.

2. **Locate where the optical drive interface cable is to be installed.**

   See FIGURE 14-4. The optical drive has an interface cable and a power cable.

3. **Connect the interface cable to the optical drive interface connector.**

   See FIGURE 14-4.

4. **Route the interface cable along the back of the chassis, under the front fan assembly and up to the motherboard connector `IDE1`.**

---

**Note –** The interface cable is a preformed flat cable. Do not to twist the cable unnecessarily.

---

5. **Connect the interface cable into the motherboard connector `IDE1`.**

   See FIGURE 14-4.

6. **Install the fan bracket.**

   See, "Installing the Front Fan Bracket" on page 13-38.

7. **Connect the 4-pin SCSI to optical drive power cable to the SCSI backplane.**

   See FIGURE 14-7.

8. **Install the SCSI to optical drive power cable assembly into the hard drive bracket clips.**

   See FIGURE 14-7.

9. **Install the hard drive assembly into the hard drive bay.**

   See FIGURE 14-8.

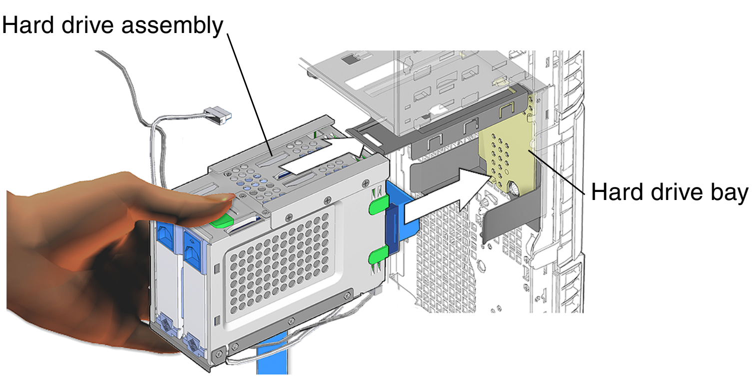



**FIGURE 14-8** Installing the Hard Drive Assembly Into the Hard Drive Bay

10. **Using a No. 2 Phillips screwdriver, install the two screws to secure the hard drive assembly.**

    See FIGURE 14-9.

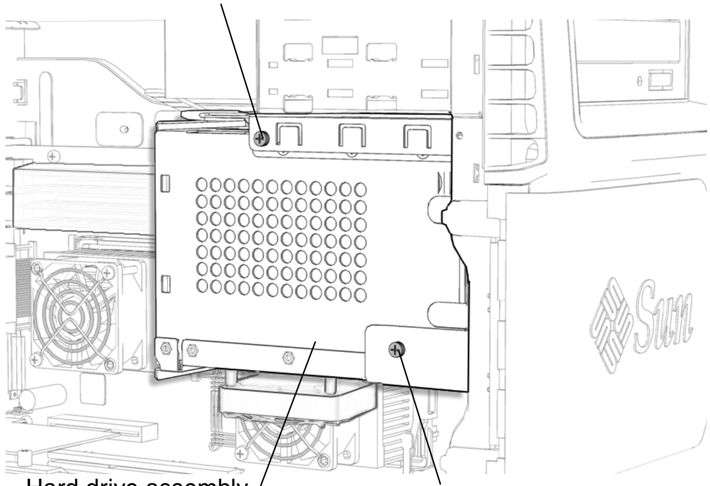



**FIGURE 14-9** Installing the Hard Drive Assembly Screws

11. **Inspect the cabling to verify that:**
    - The optical drive interface cable is routed correctly, with no kinks.
    - The optical drive interface cable is secure in the optical drive connector and in motherboard connector `IDE1`.
    - The SCSI to optical drive power cable is routed correctly through the hard drive bracket clips.
    - The SCSI to optical drive power cable is securely attached to the SCSI backplane and to the optical drive.

12. **Replace the access panel and power on the system.**

    See:
    - "Installing the Access Panel" on page 15-6
    - "Powering On the Workstation" on page 15-7
    - "Verifying an Installation" on page 15-10

# 14.3 Replacing the SCSI Backplane Cables

This section describes removal and installation of the SCSI interface and power cables. Topics include:

- "Identifying the SCSI Backplane Cables" on page 14-12

- “Removing SCSI Backplane Cables” on page 14-12
- “Installing the SCSI Backplane Cables” on page 14-13

## 14.3.1 Identifying the SCSI Backplane Cables

The hard drives have separate power and interface cables:

- A 68-pin interface cable is used to connect the `SCSI0` connector on the motherboard to the SCSI backplane connector. This ribbon cable is routed from the motherboard through the chassis to the SCSI backplane.
- A 4-pin power cable connects the SCSI backplane to the optical drive.
- A second, 6-pin power supply cable and connector `P5` is hard wired at the power supply. Replacing this cable means replacing the power supply.

See FIGURE 14-10.

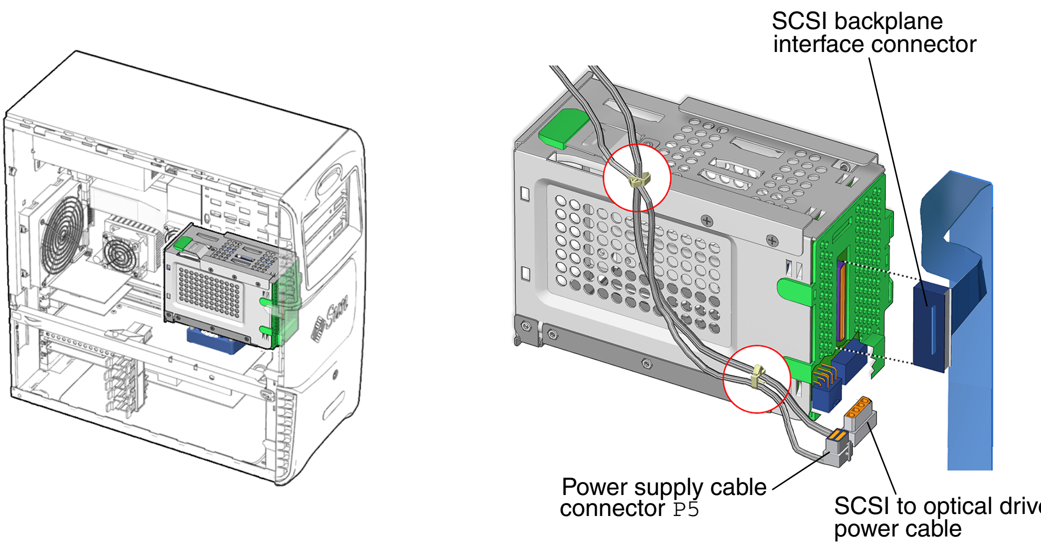



**FIGURE 14-10** Hard Drive Cable Location and Identification

## 14.3.2 Removing SCSI Backplane Cables

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

   See:

   - “Powering Off the Workstation” on page 10-4
   - “Removing the Access Panel” on page 10-12

2. **Remove the hard drive assembly.**

   See "Removing the Hard Drive Assembly" on page 10-19.

3. **Remove the front fan bracket.**

   See, "Removing the Front Fan Bracket" on page 13-36.

4. **Disconnect the SCSI interface cable from the motherboard connector `SCSI0`.**

   See FIGURE 14-11.

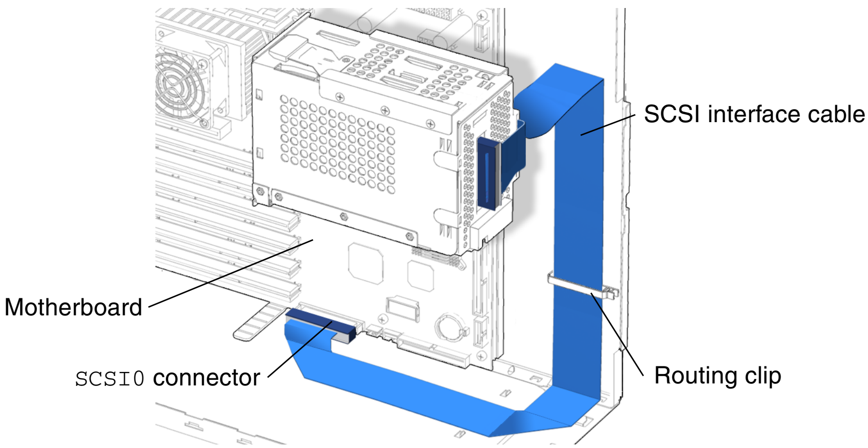



**FIGURE 14-11** Disconnecting the SCSI Interface Cable From the Motherboard

5. **Open the routing clip and remove the SCSI interface cable from the chassis.**

   See FIGURE 14-11.

   Proceed to "Installing the SCSI Backplane Cables" on page 14-13.

---

**Note –** The hard drive cannot operate without the interface and power cables.

---

## 14.3.3 Installing the SCSI Backplane Cables

---

**Note –** The hard drive interface cable is also known as the SCSI interface cable.

---

1. **Open the chassis.**

   See "Removing the Access Panel" on page 10-12.

2. **Locate where the SCSI backplane cables are to be installed.**

   See FIGURE 14-8. The hard drive assembly has three cables:

   - SCSI interface cable
   - SCSI to optical drive power cable
   - Power supply and cable connector `P5`

3. **Connect the SCSI interface cable to the motherboard connector `SCSI0`.**

   See FIGURE 14-12.

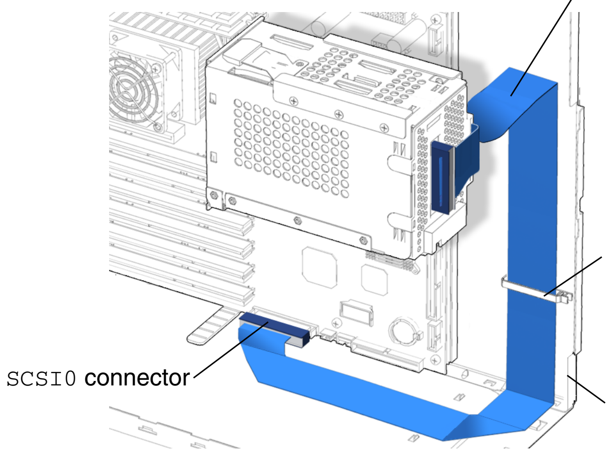



**FIGURE 14-12** Routing the SCSI Interface Cable Through the Chassis

4. **Route the SCSI interface cable through the routing clip and secure the clip closed.**

   See FIGURE 14-12.

5. **Install the front fan bracket.**

   See "Installing the Front Fan Bracket" on page 13-38.

6. **Install the hard drive assembly.**

   See "Installing the Hard Drive Assembly" on page 15-2.

7. **Inspect the cabling and connectors to verify that:**

   - The interface cable is routed correctly through the routing clips, with no kinks.
   - The interface cable is secure in the SCSI backplane connector and the motherboard connector `SCSI0`.
   - The SCSI to optical drive power cable is routed correctly through the routing clips, with no kinks.

- The SCSI to optical drive power cable is securely connected to the SCSI backplane connector and to the optical drive.
- The power supply cable is routed correctly, with no kinks.
- The power supply cable connector P5 is securely connected to the SCSI backplane.

8. **Replace the access panel and power on the system.**

   See:



- "Installing the Access Panel" on page 15-6
- "Powering On the Workstation" on page 15-7
- "Verifying an Installation" on page 15-10


# 14.4 Replacing the Power Switch and LED Cable Assembly

This chapter describes removal and installation of the power switch and LED cable assembly. Topics include:



- "Identifying the Power Switch and LED Cable Assembly" on page 14-15
- "Removing the Power Switch and LED Cable Assembly" on page 14-17
- "Installing the Power Switch and LED Cable Assembly" on page 14-19


## 14.4.1 Identifying the Power Switch and LED Cable Assembly

The power switch and LED cable assembly consists of a ferrite core, a power switch, and a power switch LED. See FIGURE 14-13. The power switch and LED cable assembly has a single LED to indicate power status of the system.

Power for the power switch and LED cable assembly is routed through connector J3 on the interposer board.

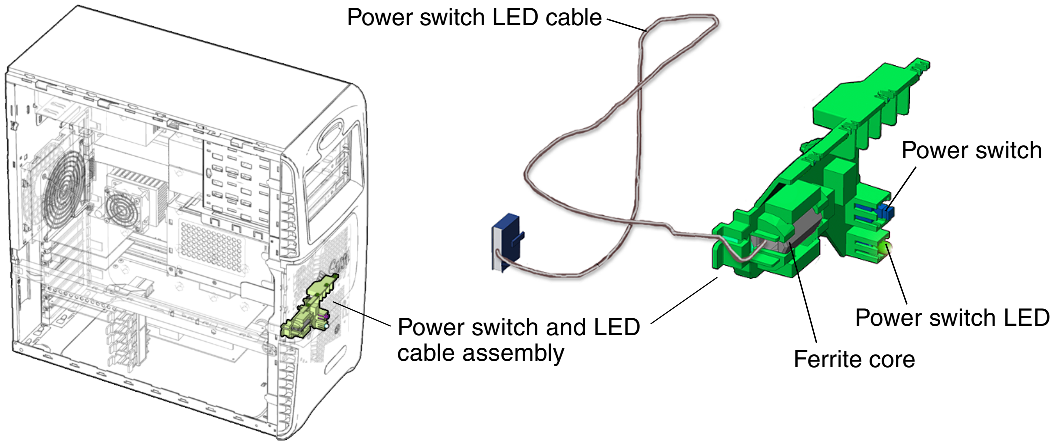



**FIGURE 14-13** Power Switch and LED Cable Assembly Location and Identification

TABLE 14-1 lists the power switch and LED cable assembly specifications.

**TABLE 14-1** Power Switch and LED Cable Assembly Specifications

| Specification | Value |
|---|---|
| Voltage | 1-20V |
| Current | 5A |
| Type | SPST |

## 14.4.2 Removing the Power Switch and LED Cable Assembly

1. **Power off the system, open the chassis, and remove the bezel.**

   See:

   - "Powering Off the Workstation" on page 10-4
   - "Removing the Access Panel" on page 10-12
   - "Removing the Bezel" on page 10-15

2. **Locate the power switch and LED cable assembly.**

   See FIGURE 14-13. The power switch and LED cable assembly is fed through the front of the chassis, above the front fan, and is fastened to the chassis with a green bracket.

3. **Disconnect the power switch and LED cable assembly from the interposer board at connector `J3`.**

   See FIGURE 14-14.

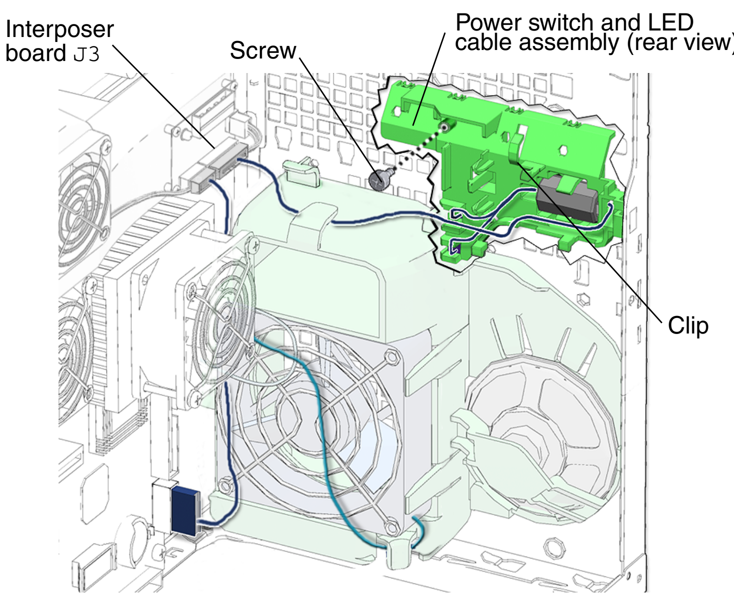



**FIGURE 14-14** Disconnecting the Power Switch and LED Cable Assembly

---

**Note –** Before removing the power switch and LED cable assembly, note its routing in the chassis.

---

4. **Unclip the power switch and LED cable assembly from the routing clips in the front fan bracket.**

   See FIGURE 14-14.

5. **Using a No. 2 Phillips screwdriver, remove the screw that secures the power switch and LED cable assembly to the front panel.**

   See FIGURE 14-14.

6. **Press the clip and pivot the power switch and LED cable assembly down and away from the chassis front panel.**

   See FIGURE 14-14.

7. **Unhook the power switch and LED cable assembly from the chassis front panel and lift it away.**

   See FIGURE 14-15. Carefully route the cable assembly through the chassis opening.

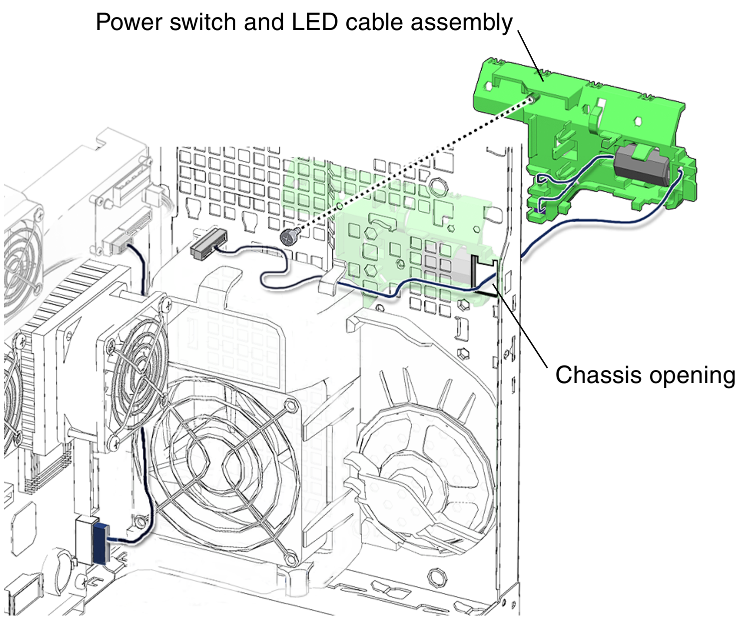



**FIGURE 14-15** Releasing the Power Switch and LED Cable Assembly

Proceed to "Installing the Power Switch and LED Cable Assembly" on page 14-19.

---

**Note –** The workstation cannot operate without the power switch cable assembly.

---

## 14.4.3 Installing the Power Switch and LED Cable Assembly

1. **Open the chassis and remove the bezel.**

   See:

   - "Removing the Access Panel" on page 10-12
   - "Removing the Bezel" on page 10-15

2. **Locate where the power switch and LED cable assembly is to be installed.**

   See FIGURE 14-13.

3. **Remove the new power switch and LED cable assembly from its packaging.**

4. **Route the power switch and LED cable assembly through the rectangular hole on the front of the chassis.**

   See FIGURE 14-16.

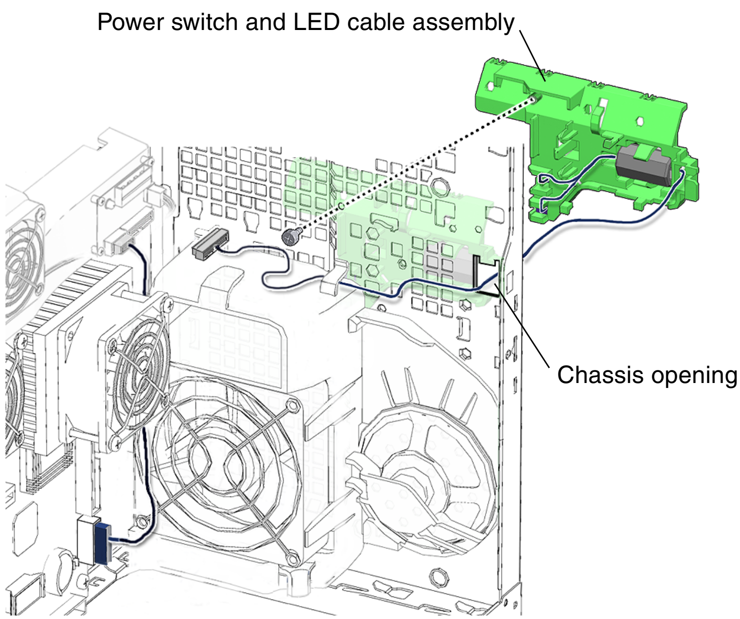



**FIGURE 14-16** Routing the Power Switch and LED Cable Through the Front of the Chassis

5. **Align the power switch and LED cable assembly tabs with the chassis cutouts and press the assembly into place.**

   See FIGURE 14-17.

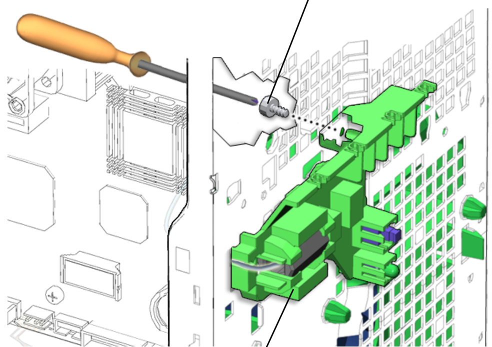



**FIGURE 14-17** Installing the Power Switch and LED Cable Assembly

6. **Using a No. 2 Phillips screwdriver, install the screw for the power switch and LED cable assembly.**

   See FIGURE 14-17.

7. **Connect the power switch and LED cable assembly to the interposer board at connector `J3`.**

   See FIGURE 14-18.

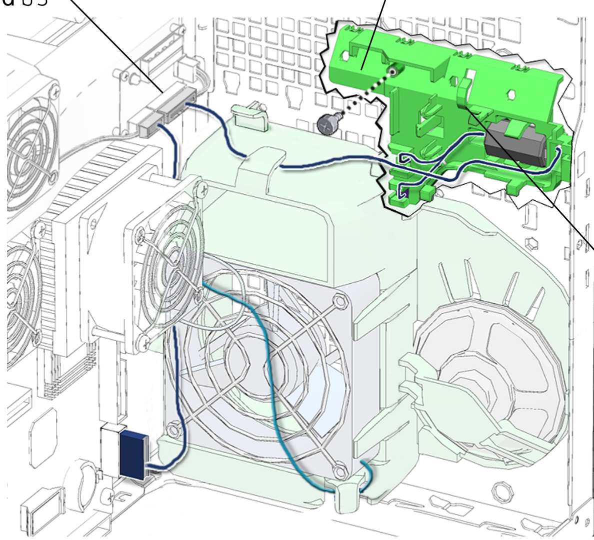



**FIGURE 14-18** Connecting the Power Switch and LED Cable Assembly

8. **Verify the power switch and LED cable assembly is seated in the chassis.**

9. **Verify that the power switch and LED cable assembly cable is firmly connected to the interposer board at `J3`.**

10. **Replace the access panel and the bezel, power on the system, and verify the component installation.**

    See:

    
    - "Installing the Bezel" on page 15-5
    - "Installing the Access Panel" on page 15-6
    - "Powering On the Workstation" on page 15-7
    - "Verifying an Installation" on page 15-10
    

CHAPTER 15

# Finishing Component Replacement

This chapter describes how to complete 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:



---

**Caution –** Follow the cautions, warnings, and instructions in the *Sun Blade 2500 Safety and Compliance Guide* (817-5120). The document is available at: `http://www.sun.com/documentation`

---

**Caution –** The procedures in this chapter are described with the chassis in an upright position. If you perform any of the procedures in this chapter with the chassis in its upright position, use care to ensure 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.

---

## 15.1 Repositioning the Chassis

After completing any procedures that required the chassis be on its side, reposition the chassis to it normal upright stance.

- **Set the chassis upright.**

  Using both hands, lift the system chassis from its side, with the opening facing out.

---

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

---

## 15.2 Installing the Hard Drive Assembly

1. **Connect the SCSI interface cable to the SCSI backplane through the SCSI backplane cover.**

   See FIGURE 15-1.

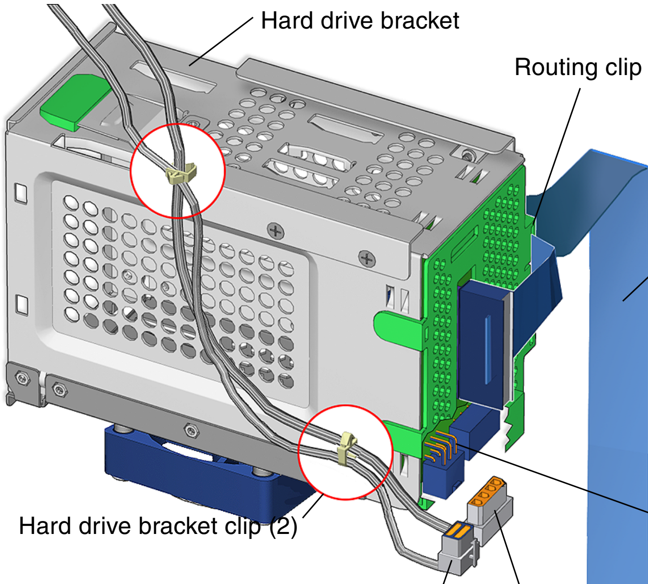



**FIGURE 15-1** Installing the Power and Signal Cables for the Hard Drive Assembly

2. **Route the SCSI interface cable through the routing clip.**

   See FIGURE 15-1.

---

**Caution –** The routing clip for the SCSI interface cable is fragile.

---

3. **Connect power supply and cable connector `P5` and the SCSI to optical drive power cable to the SCSI backplane on the underside of the hard drive assembly.**

   See FIGURE 15-1.

4. **Route the two power cables through the two hard drive bracket clips.**

   See FIGURE 15-1. The hard drive bracket clips are located on the bottom of the hard drive bracket and the back side of the hard drive bracket.

5. **Slide the hard drive assembly into the hard drive bay.**

   See FIGURE 15-2.

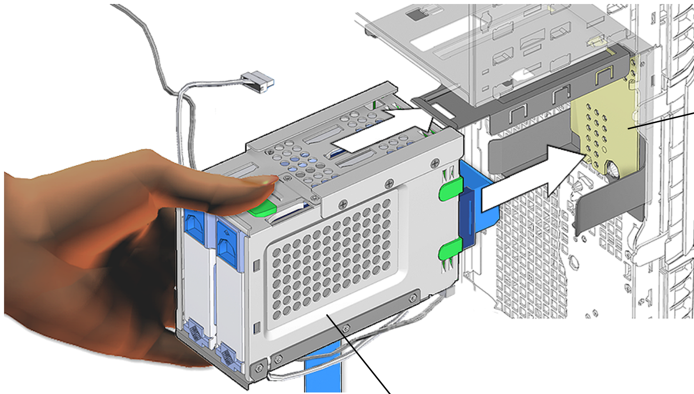



**FIGURE 15-2** Sliding the Hard Drive Assembly Into the Hard Drive Bay

6. **Install the two screws for the hard drive assembly.**

   See FIGURE 15-3.

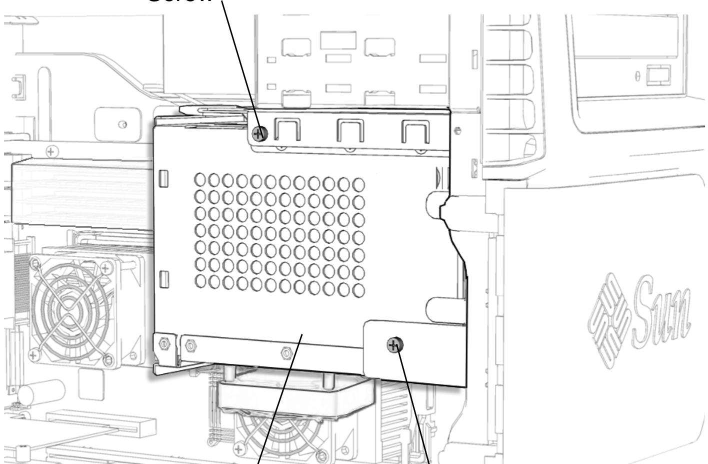



**FIGURE 15-3** Installing the Hard Drive Assembly Screws

---

**Note –** If you installed the hard drive assembly as part of an installation procedure, return to that procedure.

---

# 15.3 Installing the Bezel

1. **Place the chassis into its upright position.**

   See “Repositioning the Chassis” on page 15-2.

2. **Locate where the bezel is to be installed.**

   See FIGURE 15-4. The bezel installs at the front face of the chassis, Sun logo upright.

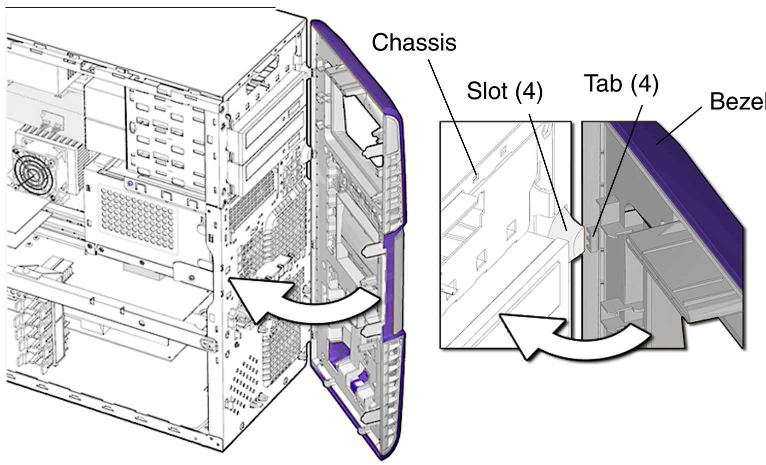



**FIGURE 15-4** Aligning the Bezel

3. **Align the tabs on the side of the bezel with the matching rectangular slots on the upper front of the chassis.**

   See FIGURE 15-4.

4. **Place the tabs in the slots and swing the bezel shut.**

   See FIGURE 15-4.

5. **Carefully press the middle and bottom tabs of the bezel into the front of the chassis until the bezel tabs click.**

   See FIGURE 15-5.

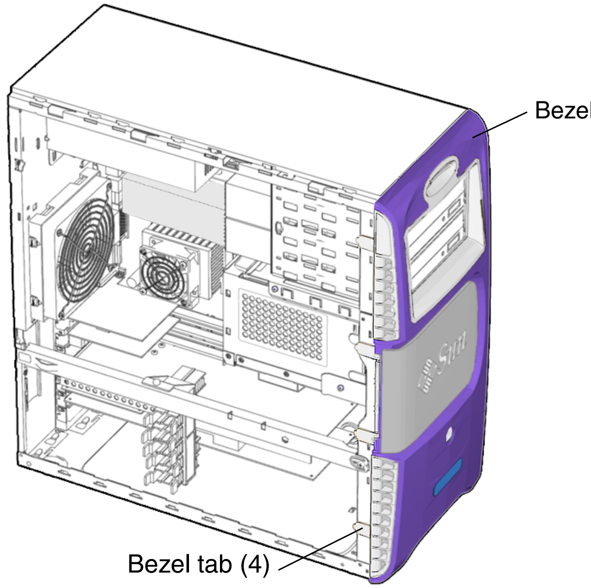



**FIGURE 15-5** Bezel and Bezel Tabs

6. **Inspect the bezel tabs to verify that:**
   - The bezel tabs are tight against the chassis.
   - The bezel and chassis sides align.

# 15.4 Installing the Access Panel

1. **Place the chassis into its upright position.**

   See "Repositioning the Chassis" on page 15-2.

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 is fits into the bottom groove of the chassis.**

   See FIGURE 15-6.

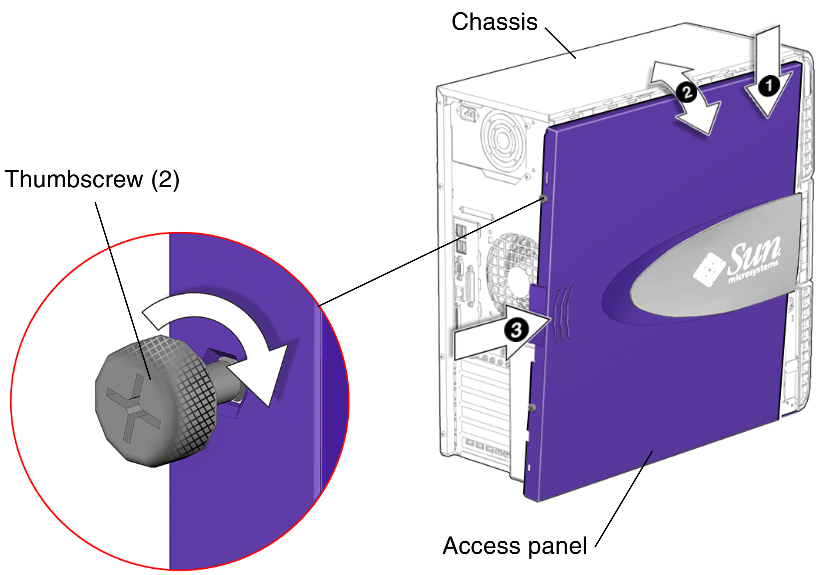



**FIGURE 15-6** Installing the Access Panel

8. **Align the arrows on the top of the access panel with the arrows on the chassis.**

9. **Slide the access panel toward the front of the system chassis until it stops.**

   See FIGURE 15-6.

10. **Tighten the access panel thumbscrews.**

    See FIGURE 15-6.

---

**Note –** Do not use a screwdriver to tighten the thumbscrews. Tighten the thumbscrews only finger tight.

---

# 15.5 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 15-9

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

## 15.5.1 Reconnecting Power and External Peripherals

After completing any replacement procedure, the external cabling must be replaced.

1. **Reconnect the keyboard, mouse, monitor, and network connections.**

   See FIGURE 15-7.

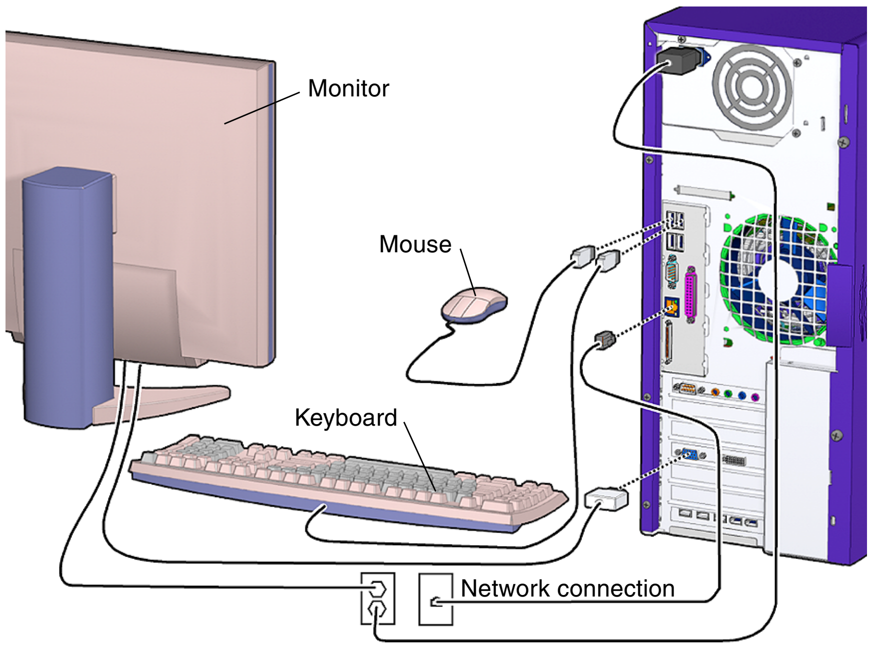



**FIGURE 15-7** Reconnecting the Keyboard, Mouse, Monitor, and Network

2. **Reconnect any other external peripherals.**

3. **Power on those peripherals.**

---

**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 15-8.

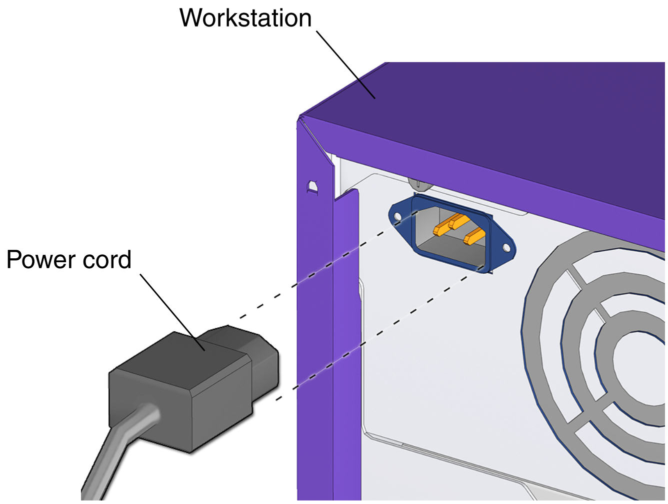



**FIGURE 15-8** Reconnecting the Power Cord

## 15.5.2 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 front cover of the workstation. See FIGURE 15-9. You should hear the internal fans or the hard drive spin up.

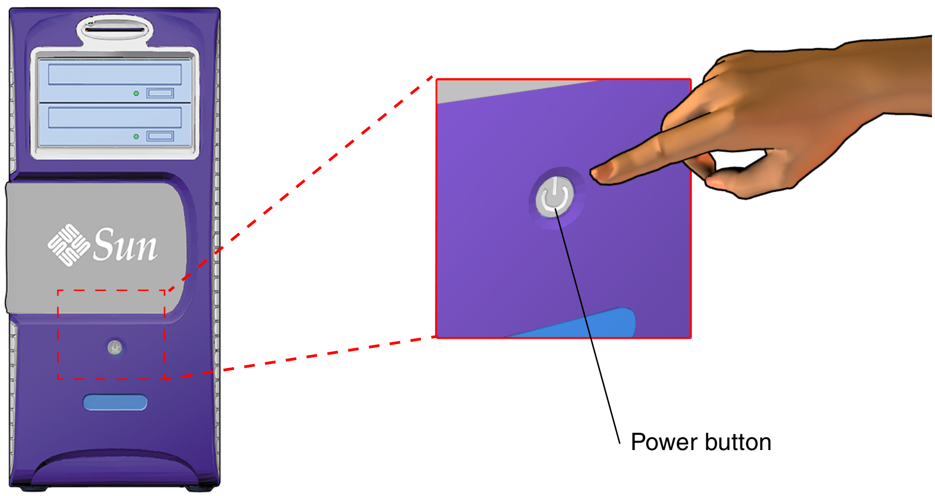



**FIGURE 15-9** Powering Up the Workstation

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.

## 15.6 Verifying an Installation

You can verify the functionality of the component you replaced or installed using the following procedure.

1. **Power on the system.**

   See "Powering On the Workstation" on page 15-7.

2. **Follow the power-on flowchart.**

   See "Power-On Flowchart" on page 4-2.

3. **Monitor the boot messages.**

   If any warning messages are found, see "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, see "Troubleshooting Flowcharts" on page 4-1, or consider these alternatives:**

   - Use the `post` command to perform the Power-On Self-Test (POST).

     See "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.

     See "OpenBoot PROM" on page 8-1 for information on availability and implementation of tests.

   - Run the SunVTS (Validation Test Suite) software.

     See "SunVTS" on page 9-1 for information on running the SunVTS software and interpreting the results.

CHAPTER 16

# Customizing Your System

This chapter describes optional PCI card and component upgrades to customize your Sun Blade 2500 workstation.

Topics include:


- "Optional PCI Cards" on page 16-1
- "Internal Component Upgrades" on page 16-5
- "External Peripherals" on page 16-6


## 16.1 Optional PCI Cards

In its standard configuration, the Sun Blade 2500 workstation has three 33 MHz PCI slots and three 66 MHz PCI slots. Each has a 64-bit data width. TABLE 16-1 lists the speed for each slot.

**TABLE 16-1** PCI Card Slot Specifications

| PCI Card Slot | Speed and Data Width |
|---|---|
| `ARC0/RSC0` | dedicated audio module |
| `PCI5` | 66 MHz/33 MHz |
| `PCI4` | 33 MHz |
| `PCI3` | 66 MHz/33 MHz |
| `PCI2` | 66 MHz/33 MHz |
| `PCI1` | 33 MHz |
| `PCI0` | 33 MHz |

The top slot, `ARC0/RSC0`, is preconfigured with the audio module.

**Caution –** The ARC0/RSC0 slot is designed for and dedicated to the audio module. Do not insert any other type of card into this slot.

The second from the top slot, PCI5, is preconfigured with a 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 64-bit slot.

Sun Microsystems provides many optional PCI cards that are supported by the Sun Blade 2500 workstation. TABLE 16-2 lists the supported cards and conditions to their installation and use.

**TABLE 16-2** Conditions for Installing Optional PCI Cards

| Card Type | Product | Conditions for Installation |
|---|---|---|
| Graphics accelerators | Sun XVR-600<br>Sun XVR-100<br>Sun XVR-1200 | There are no special conditions for basic installation.<br>**To configure for 24-bit color depth:**<br>1. Create this directory:<br>`% `**`mkdir /etc/dt/config`**<br>2. Copy the `Xservers` file<br>`% `**`cp /usr/dt/config/Xservers /etc/dt/config`**<br>3. Edit `/etc/dt/config/Xservers` to have this line:<br>`:0   Local local_uid@console root /usr/openwin/bin/Xsun`<br>4. Edit `/etc/dt/config/Xservers` to have the following line respective of the graphics accelerator:<br>`:0 -nobanner -dev /dev/fbs/jfb0 defdepth 24 (XVR-600)`<br>`:0 -nobanner -dev /dev/fbs/pfb0 defdepth 24 (XVR-100)`<br>`:0 -nobanner -dev /dev/fbs/jfb0 defdepth 24 (XVR-1200)`<br>5. Save the file.<br>6. Log out then log in again. |

**TABLE 16-2** Conditions for Installing Optional PCI Cards *(Continued)*

| Card Type | Product | Conditions for Installation |
|---|---|---|
| SCSI host adapters | Sun StorEdge™ PCI Dual Ultra3 SCSI Adapter | Install the following packages:<br>• `SUNWqus`<br>• `SUNWqusu`<br>• `SUNWqusux`<br>• `SUNWqusx`<br>Install the following qpatches:<br>• `Q905806`<br>• `Q905807` |
| | Dual-Channel Differential Ultra/Wide SCSI PCI adapter<br>Dual-Channel Single Ended Ultra/Wide SCSI PCI adapter<br>Single-Ended 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 `probe-scsi` command. |
| | Dual FastEthernet and Dual SCSI PCI Adapter<br>SunSwift™ PCI | When used with Sun StorEdge Multipacks containing Fujitsu drives having MAA/MAB series identifiers, read/write errors might occur.<br>The SunSwift PCI card might not fit properly upon first insertion into the PCI slot. Recheck installation before powering on. |
| Fibre channel host adapters | Single-Loop PCI FC-AL Host Adapter<br>Dual-Loop PCI FC-AL Host Adapter | There are no special conditions for basic installation. |
| | 2GB PCI Single Fiber Channel Network Host Bus Adapter<br>2GB PCI Dual Fiber Channel Network Host Bus Adapter | Install the following packages:<br>• `SUNWsan`<br>• `SUNWcfpl`<br>• `SUNWcfplx`<br>Install the following qpatches:<br>• `Q958611`<br>• `Q958612` |

**TABLE 16-2** Conditions for Installing Optional PCI Cards *(Continued)*

| Card Type | Product | Conditions for Installation |
|---|---|---|
| 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.<br>Install the following packages from the supplemental software CD-ROM:<br>• `SUNWhsip`<br>• `SUNWhsipm`<br>• `SUNWhsipu` |
| | 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 *SunSAI/P User's Guide*, 806-4206, for more information.<br>Install the following packages:<br>• `SUNWsaip`<br>• `SUNWsaipu` |
| Ethernet interfaces | GigaSwift Ethernet<br>Gigabit Ethernet 3.0<br>SunFastEthernet™ | There are no special conditions for basic installation. |
| | Sun Quad FastEthernet™ | PCI card to Sun Blade 2500 chassis tolerances are tight. Connecting some network cables might require additional effort.<br>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.<br>Install the following packages:<br>• `SUNWspci3`<br>• `SUNWspvn3`<br>For Microsoft Windows functionality, a licensed version of Windows must be installed. |
| Cryptographic | Sun Crypto Accelerator 1000 | Install the following packages from the supplemental software CD-ROM:<br>• `SUNWcrypm`<br>• `SUNWcrypr`<br>• `SUNWcrypu`<br>• `SUNWcrysl`<br>• `SUNWcrysu`<br>• `SUNWdcamn`<br>• `SUNWdcar`<br>• `SUNWdcav` |

**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: fcsm: _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 2500 system with additional memory and drives. TABLE 16-3 lists upgrades, conditions for installation, and where to find the installation instructions.

**TABLE 16-3** Sun Blade 2500 Internal Component Upgrades

| Component | Conditions for Installation | Procedure |
|---|---|---|
| 2 GB DIMM | Install in pairs (DIMM0 and DIMM1, DIMM2 and DIMM3, DIMM4 and DIMM5, DIMM6 and DIMM7). | "Installing DIMMs" on page 11-7 |
| 1 GB DIMM | Install in pairs (DIMM0 and DIMM1, DIMM2 and DIMM3, DIMM4 and DIMM5, DIMM6 and DIMM7). | "Installing DIMMs" on page 11-7 |
| 512 MB DIMM | Install in pairs (DIMM0 and DIMM1, DIMM2 and DIMM3, DIMM4 and DIMM5, DIMM6 and DIMM7). | "Installing DIMMs" on page 11-7 |
| 146 GB hard drives | First drive installs in HDD0, second drive installs in HDD1. | "Installing the Hard Drive" on page 12-6 |
| DVD-+RW drive | Removable media drive is installed into lower bay.<br>Drive is set as "Master" or "MA." | "Replacing the Optical Drive" on page 12-9 |

**TABLE 16-3** Sun Blade 2500 Internal Component Upgrades *(Continued)*

| Component | Conditions for Installation | Procedure |
| --- | --- | --- |
| DDS-4 tape drive | Tape drive is installed into lower bay. Internal SCSI connection to SCSI host adapter. Configuration checked with Single-Ended Ultra/Wide SCSI PCI adapter. See condition in TABLE 16-2. | "Replacing the Optical Drive" on page 12-9 |

# 16.3 External Peripherals

The Sun Blade 2500 workstation supports external Sun peripherals. TABLE 16-4 lists peripherals and their conditions of use.

**TABLE 16-4** 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.<br>Loop with Multipack FC-AL is Multipack FC-AL exclusive. |
| | Sun StorEdge A5x00 | Only supported with the Dual Loop PCI FC-AL Host Adapter.<br>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. |
| SCSI tape drives | Sun StorEdge L1000<br>Sun StorEdge L11000 | There are no special conditions for use. |
| | 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. |

**TABLE 16-4** Conditions for Attaching External Peripherals *(Continued)*

| Peripheral | Product | Conditions for Use |
|---|---|---|
| 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<br>Texas Instruments | There are no special conditions for use. |
| Smart cards | payflex<br>cyberflex | There are no special conditions for use. |

APPENDIX **A**

# Product Specifications

This appendix provides product specifications for the Sun Blade 2500 workstation including:


- "Physical Specifications" on page A-1
- "Electrical Specifications" on page A-2
- "Acoustic Specifications" on page A-2
- "Environmental Specifications" on page A-3
- "Shock and Vibration Specifications" on page A-3


## A.1 Physical Specifications

**TABLE A-1** Physical Specifications

| Specification | English | Metric |
|---|---|---|
| Height | 19.0 in. | 483 mm |
| Width | 8.3 in. | 210 mm |
| Depth | 19.3 in. | 490 mm |
| Weight (approximate) | 49.6 lbs | 22.5 Kg |

# A.2 Electrical Specifications

**TABLE A-2** Electrical Specifications

| Parameter | Value |
|---|---|
| AC input | 100 to 240 VAC, 47 to 63 Hz |
| DC output | 600 W |
| Output 1 | +3.3 VDC @ 30 A |
| Output 2 | -12 VDC @ 0.8 A |
| Output 3 | +5 VDC @ 30 A |
| Output 4 | +12 Va @ 17 A |
| Output 5 | +12 Vb @ 15 A |
| Output 6 | +5 Vsb @ 2 A |
| Current in rush | 80 A RMS max |

# A.3 Acoustic Specifications

**TABLE A-3** Acoustic Specifications

| Parameter | Operating | Idling | Position |
|---|---|---|---|
| LPAm (Sound Power) | 5.9 B | 5.8 B | |
| LPAm (Sound Pressure) | 45 dBA | 44 dBA | 0.50 M |
| LPAd (Sound Pressure Mean) | 35 dBA | 30 dBA | 1.0 M |

Measurements are taken at floor level.

# A.4 Environmental Specifications

**TABLE A-4** Environmental Requirements

| | | |
|---|---|---|
| Temperature (with tape drive) | 41º to 95º F (5º to 35º C) | -40º to 158º F (-40º to 70º C) |
| Temperature (without tape drive) | 32º to 104º F (0º to 40º C) | -40º to 158º F (-40º to 70º C) |
| Humidity | 10 to 93% at 81º F (27º C) noncondensing | 93% at 101º F (38º C) |
| Heat dissipation | E-star mode 232 BTU/hr.,<br>workstation + XVR500 graphics accelerator 683 BTU/hr.<br>Heat dissipation 1570 BTU/hr. (maximum) | |
| Altitude | 9842.5 ft (3 km) | 39,370 ft (12 km) |

# A.5 Shock and Vibration Specifications

**TABLE A-5** Operating Vibration Specifications

| Test | Specification |
|---|---|
| Operating shock | 5.0G, 11 msec. half-sine wave, IEC 60068-2-27, Test Ea |
| Non-operating shock | 30.0G, 11 msec. half-sine wave, 60068-2-27, Test Ea |
| Operating vibration | 0.20G, in all axes, 5-500 Hz sine wave, IEC 60068-2-6, Test Fc |
| Non-operating vibration | 1.0G, in all axes, 5-500 Hz sine wave, IEC 60068-2-6, Test Fc |
| Non-operating drop and topple | 50 mm. (1.96 in.) drop height, two face drops per edge, 4 edges, bottom face only. Two corner drops per corner, 4 corners, bottom corners only. IEC60068-2-31. |
| Operating inclination | ±15 degrees wrt gravity, left, right, front, and rear (4 tests total), ETE-1011-01 |

APPENDIX **B**

# Signal Descriptions

This appendix describes the system external and internal motherboard connectors and pin assignments.

External connectors:



Internal connectors:

# B.1 External Connectors

## B.1.1 Audio Module Connectors

The audio connectors are located on the audio module card. The connectors use EIA standard 3.175-mm (0.125-inch) jacks.

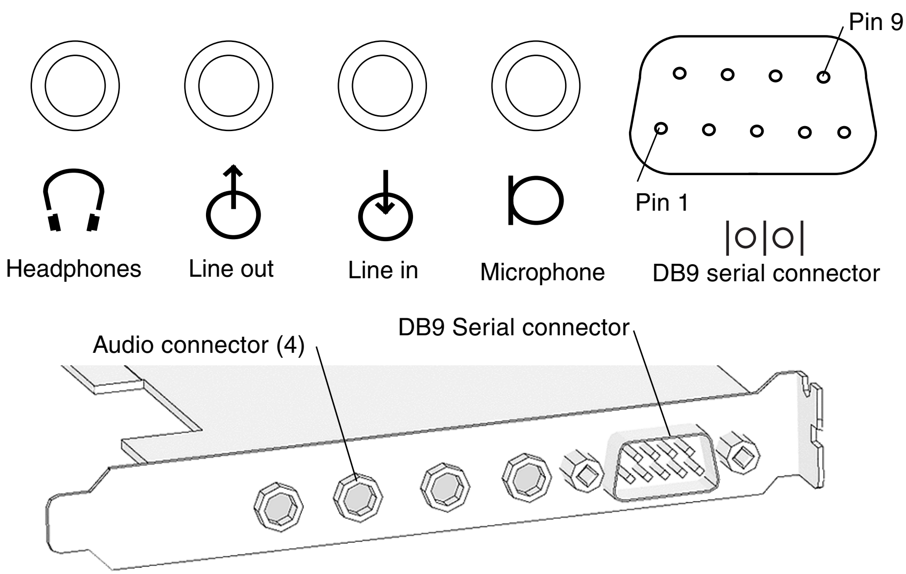



**FIGURE B-1** Audio Connector Configuration

**TABLE B-1** Audio Connector Pin Assignments

| Pin | Headphones | Line Out | Line In | Microphone |
|---|---|---|---|---|
| Tip | Left channel | Left channel | Left channel | Left channel |
| Ring (center) | Right channel | Right channel | Right channel | Right channel |
| Shield | Ground | Ground | Ground | Ground |

**TABLE B-2** Audio Module DB9 Connector Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | CD | Carrier detect |
| 2 | RD | Receive data |
| 3 | TD | Transmit data |
| 4 | DTR | Data terminal ready |
| 5 | GND | Ground |
| 6 | DSR | Data set ready |
| 7 | RTS | Request to send |
| 8 | CTS | Clear to send |
| 9 | RI | Ring indicator |

## B.1.2 IEEE 1394/USB 2.0 Combination Card Connectors

Two external IEEE 1394a connectors and three USB v2.0 connectors are located on the IEEE 1394/USB 2.0 combination card.

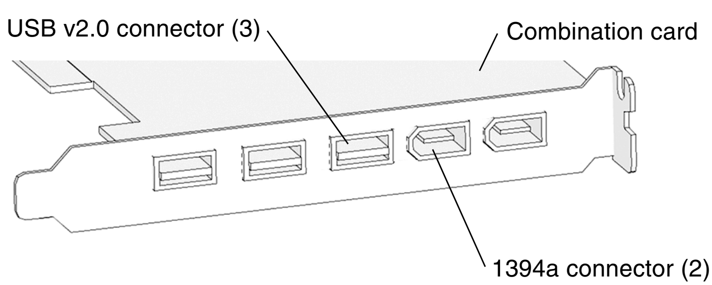



**FIGURE B-2** IEEE 1394a/USB 2.0 Combination Card

The IEEE 1394a connectors have the following pin configuration.

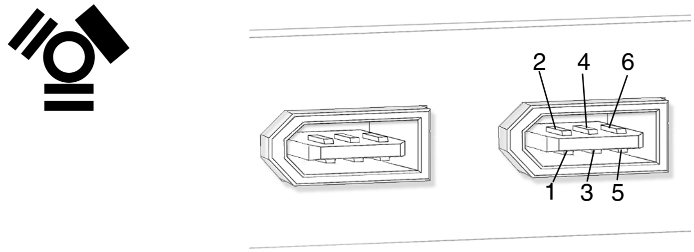



**FIGURE B-3** IEEE 1394a Connector Pin Configuration

**TABLE B-3** IEEE 1394a Connector Pin Assignments

| Pin | Signal Name | Description |
|---|---|---|
| 1 | POWER | +12 VDC |
| 2 | GND | Ground |
| 3 | TPB- | |
| 4 | TPB+ | |
| 5 | TPA- | |
| 6 | TPA+ | |

The external and internal USB v2.0 connectors have the following pin configuration.

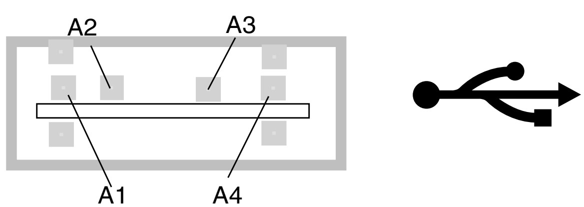



**FIGURE B-4** USB v2.0 Connector Pin Configuration

**TABLE B-4** USB Connector Pin Assignments

| Pin | Signal Name | Description |
|---|---|---|
| A1 | USB_ PWR | +5 VDC |
| A2 | USBP- | |
| A3 | USBP+ | |
| A4 | USB_GND | Ground |

## B.1.3 Parallel Port Connector PARALLEL0

The parallel port connector PARALLEL0 is a DB-25 connector located on the motherboard rear panel.

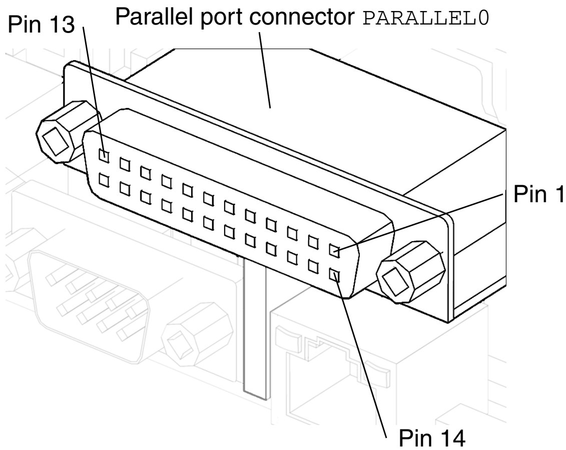



**FIGURE B-5** Parallel Port Connector Pin Configuration

**TABLE B-5** Parallel Port Connector Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | PTR STB# | |
| 2 | PTR D0 | |
| 3 | PTR D1 | |
| 4 | PTR D2 | |

**TABLE B-5** Parallel Port Connector Pin Assignments *(Continued)*

| Pin | Signal | Description |
|---|---|---|
| 5 | PTR D3 | |
| 6 | PTR D4 | |
| 7 | PTR D5 | |
| 8 | PTR D6 | |
| 9 | PTR D7 | |
| 10 | PTR RACK# | |
| 11 | PTR BUSY | |
| 12 | PTR PE | |
| 13 | PTR SLCT | |
| 14 | PTR AFD# | |
| 15 | PTR ERR# | |
| 16 | PTR INIT# | |
| 17 | PTR SLT# | |
| 18 | GND | Signal ground |
| 19 | GND | Signal ground |
| 20 | GND | Signal ground |
| 21 | GND | Signal ground |
| 22 | GND | Signal ground |
| 23 | GND | Signal ground |
| 24 | GND | Signal ground |
| 25 | GND | Signal ground |

## B.1.4 Serial Port Connector

Serial port connector `TTYA` is a DB-9 connector located on the motherboard rear panel.

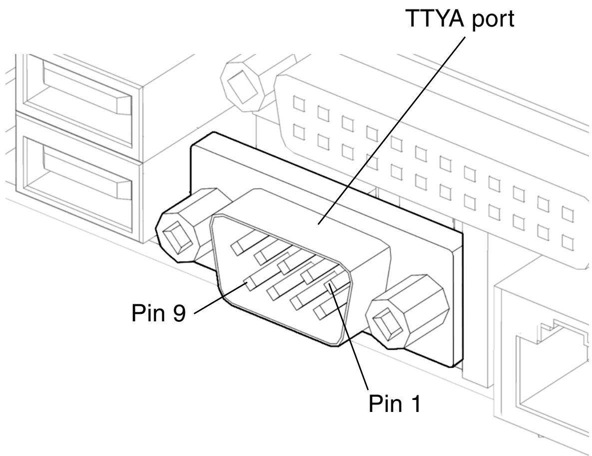



**FIGURE B-6** Serial Port Connector `TTYA` Pin Configuration

**TABLE B-6** Serial Port Connector `TTYA` Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | CD | Carrier detect |
| 2 | RD | Receive data |
| 3 | TD | Transmit data |
| 4 | DTR | Data terminal ready |
| 5 | GND | Ground |
| 6 | DSR | Data set ready |
| 7 | RTS | Request to send |
| 8 | CTS | Clear to send |
| 9 | RI | Ring indicator |

## B.1.5 Sun XVR-100 Connectors

FIGURE B-7 shows the Sun XVR-100 graphics accelerator connectors.

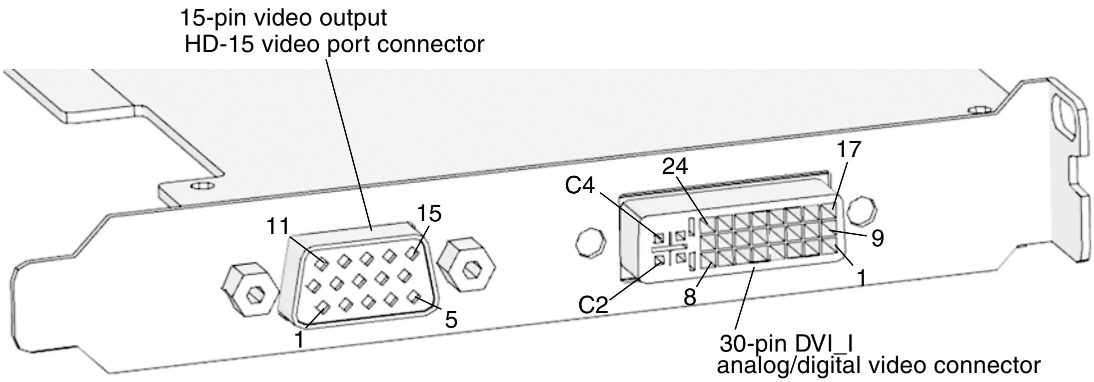



**FIGURE B-7** Sun XVR-100 Graphics Accelerator Connectors Pin Configuration

**TABLE B-7** Sun XVR-100 HD-15 Video Connector Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | Red analog video | |
| 2 | Green analog video | |
| 3 | Blue analog video | |
| 4 | NC | No connection |
| 5 | GND | Ground |
| 6 | GND | Ground |
| 7 | GND | Ground |
| 8 | GND | Ground |
| 9 | +5 VDC supply | |
| 10 | GND | |
| 11 | NC | No connection |
| 12 | DDC bi-directional data (SDA) | |
| 13 | Horizontal/ composite sync | |
| 14 | Vertical sync | |
| 15 | DDC data clock (SCL) | |

**TABLE B-8** Sun XVR-100 DVI Video Connector Pin Assignments

| Pin | Signal Name | Description |
|---|---|---|
| 1 | TMDS Data 2- | |
| 2 | TMDS Data2+ | |
| 3 | TMDS Data2/4 Shield | |
| 4 | TMDS 4- | |
| 5 | TMDS 4+ | |
| 6 | DDC Clock | |
| 7 | DDC Data | |
| 8 | Analog Vertical Sync | |
| 9 | TMDS Data 1- | |
| 10 | TMDS Data1+ | |
| 11 | TMDS Data 1/3 Shield | |
| 12 | TMDS 3- | |
| 13 | TMDS 3+ | |
| 14 | +5V power | |
| 15 | GND | +5Vdc, analog vertical/horizontal sync |
| 16 | Hot Plug Detect | |
| 17 | TMDS Data0- | |
| 18 | TMDS Data 0+ | |
| 19 | TMDS Data 0/5 shield | |
| 20 | TMDS Data 5- | |
| 21 | TMDS Data 5+ | |
| 22 | TMDS Clock shield | |
| 23 | TMDS Clock+ | |
| 24 | TMDS Clock-C1 | |
| C1 | Analog Red Video | |
| C2 | Analog Green Video | |

**TABLE B-8** Sun XVR-100 DVI Video Connector Pin Assignments *(Continued)*

| Pin | Signal Name | Description |
|---|---|---|
| C3 | Analog Blue Video | |
| C4 | Analog H Sync | |
| C5 | Analog GND | R,G, and B return |

---

**Note –** For additional information see the *Sun XVR-100 Graphics Accelerator Installation Guide*, 816-7560.

---

## B.1.6 Sun XVR-600 Connectors

FIGURE B-8 shows the Sun XVR-600 graphics accelerators connectors.

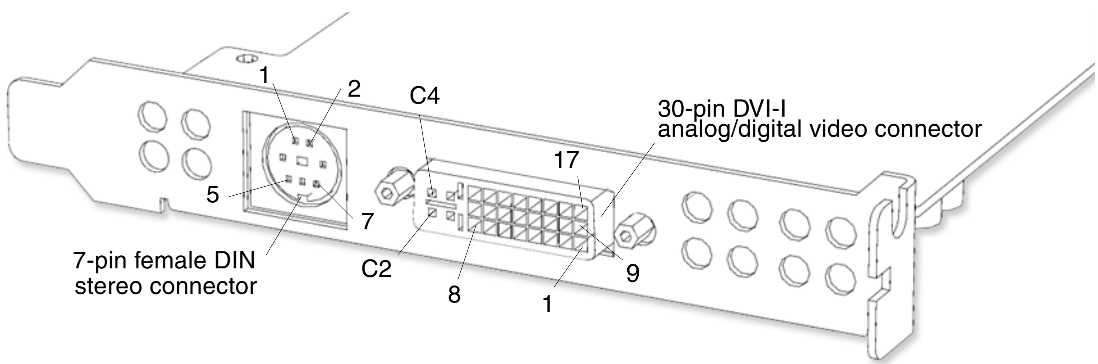



**FIGURE B-8** Sun XVR-600 Graphics Accelerator Connectors Pin Configuration

**TABLE B-9** Sun XVR-600 Stereo/Framelock Connector Pin Assignments

| Pin | Signal Name | Description |
|---|---|---|
| 1 | Signal ground | Ground |
| 2 | 5V | Fused, supplies up to 300 mA, limited to 1A |
| 3 | 12V | Fused, supplies up to 300 mA, limited to 1A |

**TABLE B-9** Sun XVR-600 Stereo/Framelock Connector Pin Assignments *(Continued)*

| Pin | Signal Name | Description |
|---|---|---|
| 4 | Master stereo field Select Out | |
| 5 | Slave stereo field Select In | |
| 6 | NC | No connection |
| 7 | NC | No connection |

**TABLE B-10** Sun XVR-600 DVI Connector Pin Assignments

| Pin | Signal Name | Description |
|---|---|---|
| 1 | TMDS Data 2- | |
| 2 | TMDS Data2+ | |
| 3 | TMDS Data2/4 Shield | |
| 4 | NC | No connection |
| 5 | NC | No connection |
| 6 | DDC Clock (SCL) | |
| 7 | DDC bi-directional data (SDA) | |
| 8 | Analog vertical sync | |
| 9 | TMDS Data 1- | |
| 10 | TMDS Data1+ | |
| 11 | TMDS Data 1/3 Shield | |
| 12 | NC | No connection |
| 13 | NC | No connection |
| 14 | +5V DC power | |
| 15 | GND return | +5Vdc, analog vertical/horizontal sync |
| 16 | Hot Plug Detect | |
| 17 | TMDS Data0- | |
| 18 | TMDS Data 0+ | |
| 19 | TMDS Data 0/5 shield | |
| 20 | NC | No connection |

**TABLE B-10** Sun XVR-600 DVI Connector Pin Assignments *(Continued)*

| Pin | Signal Name | Description |
|---|---|---|
| 21 | NC | No connection |
| 22 | TMDS Clock shield | |
| 23 | TMDS Clock+ | |
| 24 | TMDS Clock- | |
| C1 | Analog Red Video | |
| C2 | Analog Green Video | |
| C3 | Analog Blue Video | |
| C4 | Analog H Sync | |
| C5 | Analog GND return | Analog R,G, and B return |

## B.1.7 Sun XVR-1200 Connectors

FIGURE B-9 shows the Sun XVR-1200 graphics accelerator connectors.

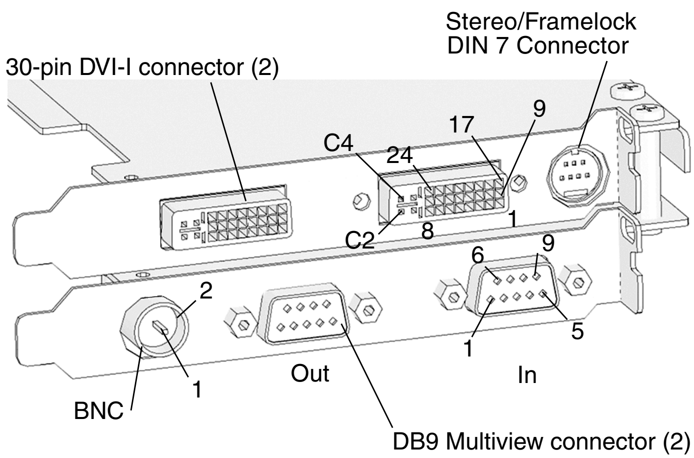



**FIGURE B-9** Sun XVR-1200 Graphics Accelerator Connectors Pin Configuration

**TABLE B-11** Sun XVR-1200 BNC Connector Pin Assignments

| Pin | Signal Name | Description |
|---|---|---|
| 1 | Signal | |
| 2 | Ground | |

**TABLE B-12** Sun XVR-1200 DVI Connector Pin Assignments

| Pin | Signal Name |
|---|---|
| 1 | TMDS Data 2 - |
| 2 | TMDS Data 2 + |
| 3 | TMDS Data 2/4 shield |
| 4 | No connect |
| 5 | No connect |
| 6 | DDC clock (SCL) |
| 7 | DDC bi-directional data (SDA) |
| 8 | Analog vertical sync |
| 9 | TMDS datal- |
| 10 | TMDS datal+ |
| 11 | TMDS datal/3 shield |
| 12 | No connect |
| 13 | No connect |
| 14 | +5 VDC power |
| 15 | Gnd return: +5V, Hsync, Vsync |
| 16 | Hot plug detect |
| 17 | TMDS data 0- |
| 18 | TMDS data0+ |
| 19 | TMDS data0/5 shield |

**TABLE B-12** Sun XVR-1200 DVI Connector Pin Assignments *(Continued)*

| Pin | Signal Name |
|---|---|
| 20 | No connect |
| 21 | No connect |
| 22 | TMDS clock shield |
| 23 | TMDS clock+ |
| 24 | TMDS clock- |
| C1 | Analog red |
| C2 | Analog green |
| C3 | Analog blue |
| C4 | Analog horizontal sync |
| C5 | Analog gnd return (analog R, G, B) |

**TABLE B-13** Sun XVR-1200 DB9 Multiview In Connector Pin Assignments

| Pin | Signal Name |
|---|---|
| 1 | Slave sense |
| 2 | Gnd |
| 3 | RefClk input |
| 4 | RefClk input |
| 5 | Gnd |
| 6 | Release input |
| 7 | Pixel align input |
| 8 | Gnd |
| 9 | Done input |

**TABLE B-14** Sun XVR-1200 DB9 Multiview Out Connector Pin Assignments

| Pin | Signal Name | Description |
|---|---|---|
| 1 | 3.3 V | Fuse - 0.5A current limited |
| 2 | Gnd | |
| 3 | RefClk | |
| 4 | RefClk | |
| 5 | Gnd | |
| 6 | Release output | |
| 7 | Pixel align output | |
| 8 | Gnd | |
| 9 | Done output | |

**TABLE B-15** Sun XVR-1200 Stereo/Framelock DIN7 Connector Pin Assignments

| Pin | Signal Name | Description |
|---|---|---|
| 1 | Signal gnd | |
| 2 | 5.0 V | Fused, supplies up to 300mA, current limited to 1.0A |
| 3 | 12.0 V | Fused, supply up to 300mA, current limited to 1.0A |
| 4 | Stereo sync | |
| 5 | Framelock in | |
| 6 | No connect | |
| 7 | No connection | |

## B.1.8 Twisted-Pair Ethernet Connector

The twisted pair Ethernet (TPE) connector `TPE0` is an RJ-45 connector located on the motherboard rear panel.

**Caution –** Connect only TPE cables to the TPE connector.

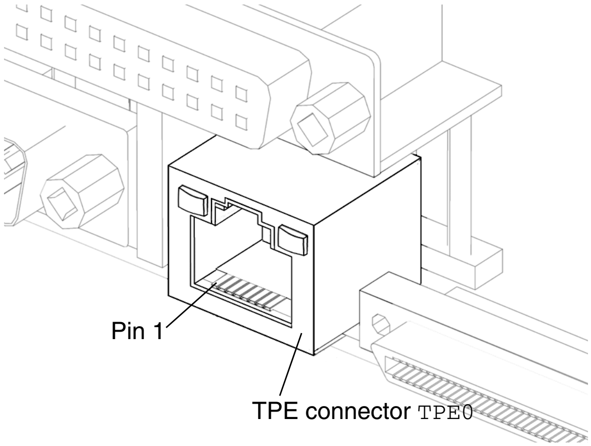



**FIGURE B-10** Twisted-Pair Ethernet Connector `TPE0` Pin Configuration

**TABLE B-16** Twisted-Pair Ethernet Connector TPE0 Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | TRD0+ | Transmit/receive data |
| 2 | TRD0- | |
| 3 | TRD1+ | |
| 4 | TRD2+ | |
| 5 | TRD2- | |
| 6 | TRD1- | |
| 7 | TRD3+ | |
| 8 | TRD3- | |

### B.1.8.1 TPE Cable-Type Connectivity

For 10BASE-T applications, unshielded twisted-pair (UTP) cable, the following types of TPE cables can be connected to the TPE connector.

- Category 3 (UTP-3, voice grade)
- Category 4 (UTP-4)

- Category 5 (UTP-5, data grade)

**Note –** For 100BASE-T applications, UTP cable, UTP-5, data grade (requires pairs 0 and 1)

**Note –** For 1000BASE-T applications, UTP cable, UTP-5, data grade (requires all 4 pairs)

### B.1.8.2 UTP-5 (Data Grade) Cable Lengths

The following table lists TPE UTP-5 types, applications, and maximum lengths.

**TABLE B-17** TPE UTP-5 Cables

| Cable Type | Application(s) | Maximum Length (Metric) | Maximum Length (English) |
|---|---|---|---|
| UTP-5, data grade | 10BASE-T or 100BASE-T | 100 meters | 109 yards |

## B.1.9 UltraSCSI Connector

UltraSCSI connector `SCSI1` is located on the motherboard rear panel.

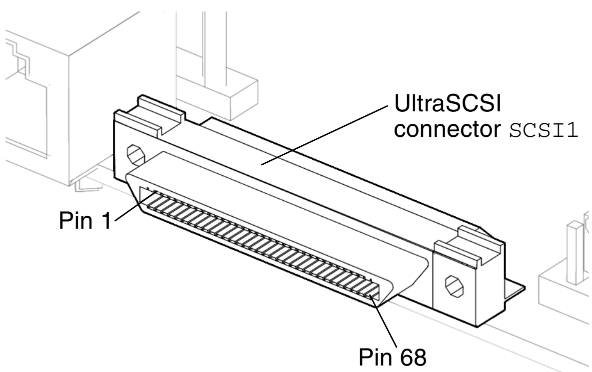



**FIGURE B-11** UltraSCSI Connector `SCSI1` Pin Configuration

**TABLE B-18** UltraSCSI Connector `SCSI1` Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | BSD +12 | |
| 2 | BSD +13 | |
| 3 | BSD +14 | |
| 4 | BSD +15 | |
| 5 | BSDP +1 | |
| 6 | BSD +0 | |
| 7 | BSD +1 | |
| 8 | BSD +2 | |
| 9 | BSD +3 | |
| 10 | BSD +4 | |
| 11 | BSD +5 | |
| 12 | BSD +6 | |
| 13 | BSD +7 | |
| 14 | BSDP +0 | |
| 15 | GND | Ground |
| 16 | BDIFFSENS | |
| 17 | TERMPOWER_B | Termpower_B |
| 18 | TERMPOWER_B | Termpower_B |
| 19 | NC | Not connected |
| 20 | GND | Ground |
| 21 | BSATN + | |
| 22 | GND | Ground |
| 23 | BSBSY + | |
| 24 | BSBSY + | |
| 25 | BSACK + | |
| 26 | BSMSG + | |
| 27 | BSSEL + | |
| 28 | BSCD + | |
| 29 | BSREQ + | |

**TABLE B-18** UltraSCSI Connector `SCSI1` Pin Assignments *(Continued)*

| Pin | Signal | Description |
|---|---|---|
| 30 | BSIO + | |
| 31 | BSD +8 | |
| 32 | BSD +9 | |
| 33 | BSD +10 | |
| 34 | BSD +11 | |
| 35 | BSD -12 | |
| 36 | BSD -13 | |
| 37 | BSD -14 | |
| 38 | BSD -15 | |
| 39 | BADP -1 | |
| 40 | BSD -0 | |
| 41 | BSD -1 | |
| 42 | BSD -2 | |
| 43 | BSD -3 | |
| 44 | BSD -4 | |
| 45 | BSD -5 | |
| 46 | BSD -6 | |
| 47 | BSD -7 | |
| 48 | BSDP -0 | |
| 49 | GND | Ground |
| 50 | GND | Ground |
| 51 | TERMPOWER_B | Terminal B power |
| 52 | TERMPOWER_B | Terminal B power |
| 53 | NC | Not connected |
| 54 | GND | Ground |
| 55 | BSATN - | |
| 56 | GND | Ground |
| 57 | BSBSY - | |
| 58 | BSACK - | |

## B.1.10 Universal Serial Bus Connectors `USB0` and `USB1`

The two universal serial bus (USB) connectors `USB0` and `USB1` are located on the motherboard rear panel. The two connectors are USB v1.x compliant.

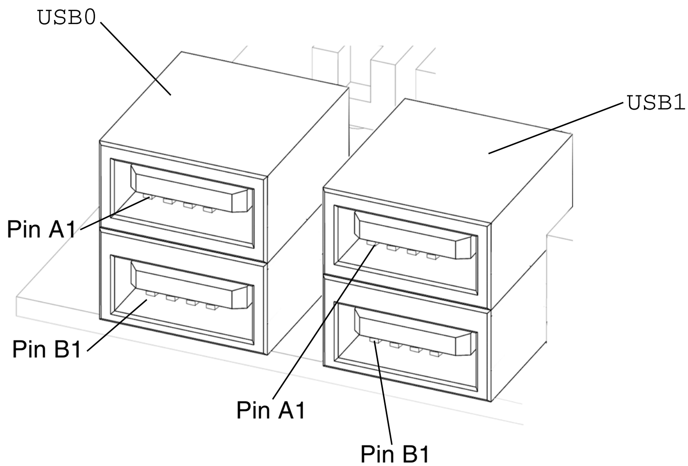



**FIGURE B-12** USB Connector Pin Configuration

**TABLE B-19** USB Connector `USB0` Pin Assignments

| Pin | Signal Name | Description |
|---|---|---|
| A1 | USB_ PWR2 | +5 VDC |
| A2 | | USBP2- |
| A3 | | USBP2+ |
| A4 | USB_GND2 | Ground |
| B1 | USB_PWR3 | +5 VDC |
| B2 | | USBP3- |
| B3 | | USBP3+ |
| B4 | USB_GND3 | Ground |

**TABLE B-20** USB Connector `USB1` Pin Assignments

| Pin | Signal Name | Description |
|---|---|---|
| A1 | USB_ PWR0 | +5 VDC |
| A2 | | USBP0- |
| A3 | | USBP0+ |
| A4 | USB_GND0 | Ground |
| B1 | USB_PWR1 | +5 VDC |
| B2 | | USBP1- |
| B3 | | USBP1+ |
| B4 | USB_GND1 | Ground |

---

**Note –** Three additional USB connectors are located on the IEEE 1394/USB 2.0 combination card. The USB connectors on this card are USB version 2.0 compliant.

---

# B.2 Internal Connectors

## B.2.1 Fan Connector FAN0

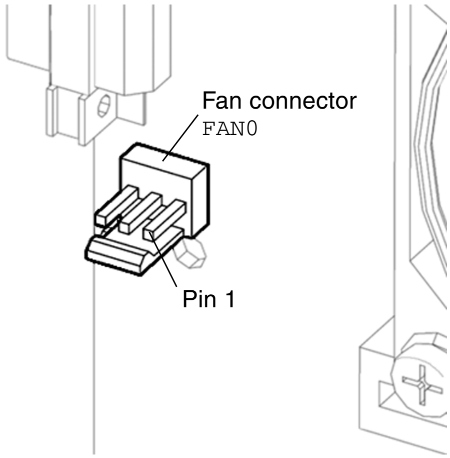



**FIGURE B-13** Fan Connector FAN0 Pin Configuration

**TABLE B-21** Fan Connector FAN0 Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | TACH | Fan tachometer |
| 2 | +12 VDC | 12 VDC fan power |
| 3 | PWM | Fan control |

## B.2.2 Fan Connector `FAN1`

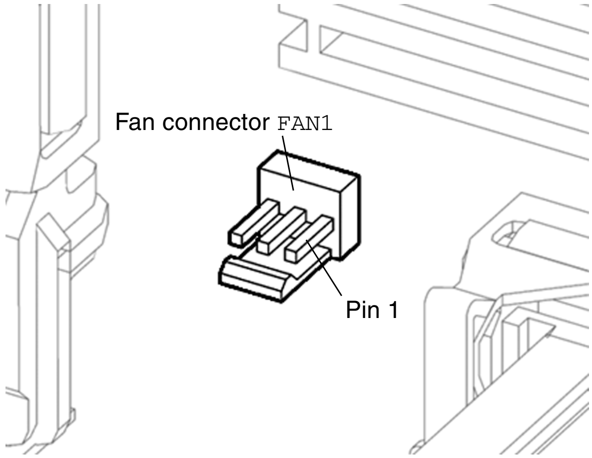



**FIGURE B-14** Fan Connector `FAN1` Pin Configuration

**TABLE B-22** Fan Connector `FAN1` Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | TACH | Fan tachometer |
| 2 | +12 VDC | +12 VDC fan power |
| 3 | PWM | Fan control |

## B.2.3 Fan Connector FAN2

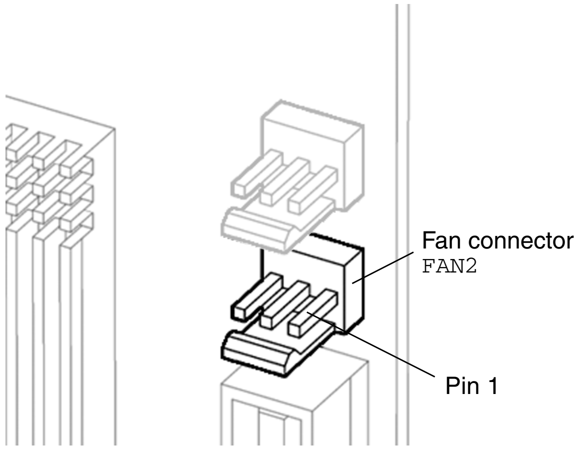



**FIGURE B-15** Fan Connector FAN2 Pin Configuration

**TABLE B-23** Fan Connector FAN2 Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | TACH | Fan tachometer |
| 2 | +12 VDC | 12 VDC fan power |
| 3 | PWM | Fan control |

## B.2.4 Fan Connector FAN3

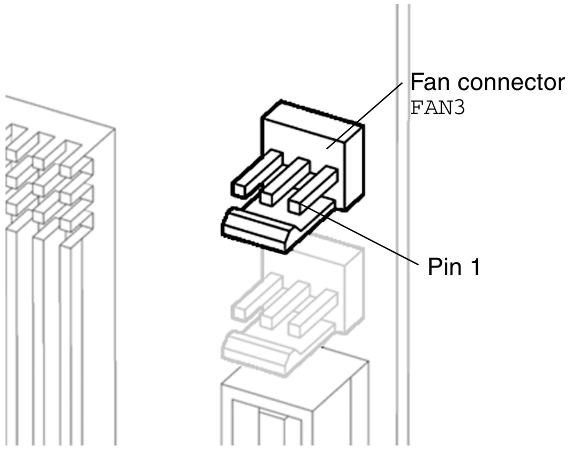



**FIGURE B-16** Fan Connector FAN3 Pin Configuration

**TABLE B-24** Fan Connector FAN3 Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | TACH | Fan tachometer |
| 2 | +12 VDC | 12 VDC fan power |
| 3 | PWM | Fan control |

## B.2.5 IDE Connector `IDE0`

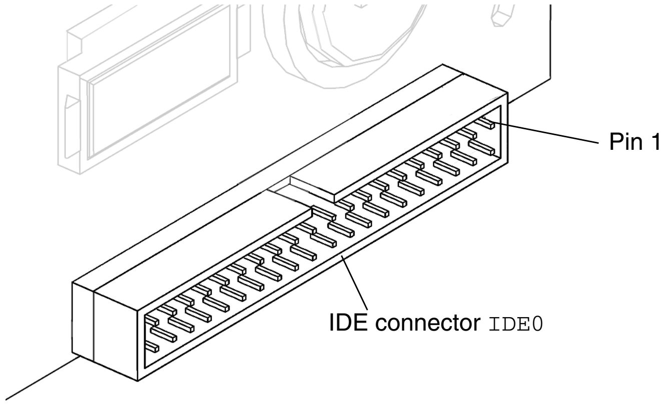



**FIGURE B-17** IDE Connector `IDE0` Pin Configuration

**TABLE B-25** IDE Connector `IDE0` Pin Assignments

| Pin | Signal |
|---|---|
| 1 | HDRST# |
| 2 | GND |
| 3 | PIDED7 |
| 4 | PIDED8 |
| 5 | PIDED6 |
| 6 | PIDED9 |
| 7 | PIDED5 |
| 8 | PIDED10 |
| 9 | PIDED4 |
| 10 | PIDED11 |
| 11 | PIDED3 |
| 12 | PIDED12 |
| 13 | PIDED2 |
| 14 | PIDED13 |
| 15 | PIDED1 |

**TABLE B-25** IDE Connector `IDE0` Pin Assignments *(Continued)*

| Pin | Signal |
|---|---|
| 16 | PIDED14 |
| 17 | PIDED0 |
| 18 | PIDED15 |
| 19 | GND |
| 20 | NC |
| 21 | PIDEDRQ |
| 22 | GND |
| 23 | PIDEIOW# |
| 24 | GND |
| 25 | PIDEIOR# |
| 26 | GND |
| 27 | PIDEIURDY |
| 28 | GND |
| 29 | PIDEDACK# |
| 30 | GND |
| 31 | PIDEIRQ |
| 32 | NC |
| 33 | PIDEA1 |
| 34 | PIDECBLID |
| 35 | PIDEA0 |
| 36 | PIDEA2 |
| 37 | PIDECS1 |
| 38 | PIDECS3# |
| 39 | NC |
| 40 | GND |

## B.2.6 IDE Connector IDE1

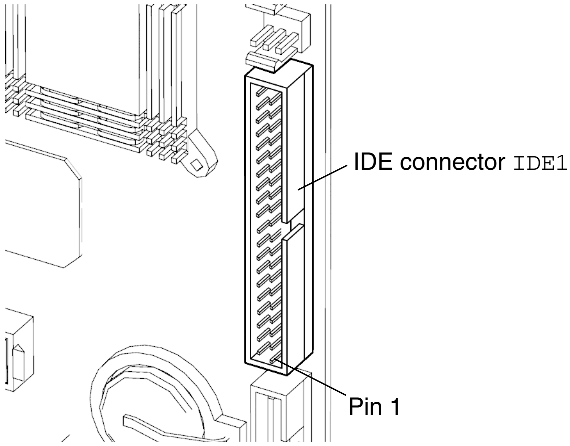



**FIGURE B-18** IDE Connector IDE1 Pin Configuration

**TABLE B-26** IDE Connector IDE1 Pin Assignments

| Pin | Signal |
|---|---|
| 1 | HDRST# |
| 2 | GND |
| 3 | SIDED7 |
| 4 | SIDED8 |
| 5 | SIDED6 |
| 6 | SIDED9 |
| 7 | SIDED5 |
| 8 | SIDED10 |
| 9 | SIDED4 |
| 10 | SIDED11 |
| 11 | SIDED3 |
| 12 | SIDED12 |
| 13 | SIDED2 |
| 14 | SIDED13 |
| 15 | SIDED1 |

**TABLE B-26** IDE Connector `IDE1` Pin Assignments *(Continued)*

| Pin | Signal |
|---|---|
| 16 | SIDED14 |
| 17 | SIDED0 |
| 18 | SIDED15 |
| 19 | GND |
| 20 | NC |
| 21 | SIDEDRQ |
| 22 | GND |
| 23 | SIDEIOW# |
| 24 | GND |
| 25 | SIDEIOR# |
| 26 | GND |
| 27 | SIDEIORDY |
| 28 | GND |
| 29 | SIDEDACK# |
| 30 | GND |
| 31 | SIDEIRQ |
| 32 | SC |
| 33 | SIDEA1 |
| 34 | SIDECLBID |
| 35 | SIDEA0 |
| 36 | SIDEA2 |
| 37 | SIDECS1# |
| 38 | SIDECS3# |
| 39 | NC |
| 40 | GND |

# B.2.7 Interposer Board Connectors J2, J3, and JP5

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**Note –** J3 of the interposer board on the DIMM fan assembly is the primary power switch and LED cable connector.

---

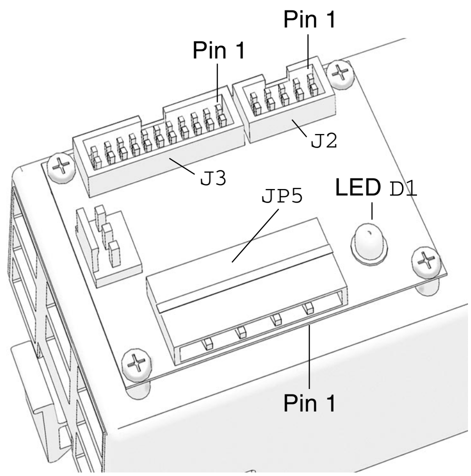


**FIGURE B-19** Interposer Board Connectors and Pin Configuration

**TABLE B-27** Interposer Board Connector J2 Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | FP_LED | |
| 2 | RSCIRQ# | Ground |
| 3 | GND | Ground |
| 4 | PWRBTN# | |
| 5 | SCL0 | |
| 6 | +5VSB | |
| 7 | GND | |
| 8 | PWRGD | |
| 9 | SDA0 | |
| 10 | KEY_OFF# | |

**TABLE B-28** Interposer Board Connector `J3` Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | FP_LED | |
| 2 | +5 VDC | Power |
| 3 | GND | Ground |
| 4 | PWRBTN# | |

**TABLE B-29** Interposer Board Connector `JP5` Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | +12 VDC | |
| 2 | GND | Ground |
| 3 | GND | Ground |
| 4 | +5 VDC | |

## B.2.8 Power Supply Connector `P5`

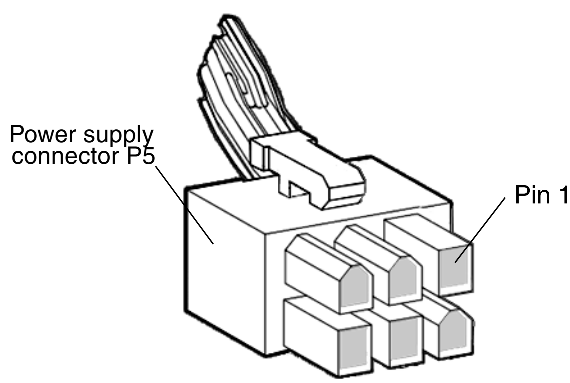


**FIGURE B-20** Power Supply Connector `P5` Pin Configuration

**TABLE B-30** Power Supply Connector `P5` Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | +12 VDC | |
| 2 | +12 VDC | |
| 3 | +5 VDC | |
| 4 | GND | Ground |
| 5 | GND | Ground |
| 6 | GND | Ground |

## B.2.9 Power Supply Connectors `P7`, `P8`, and `P9`

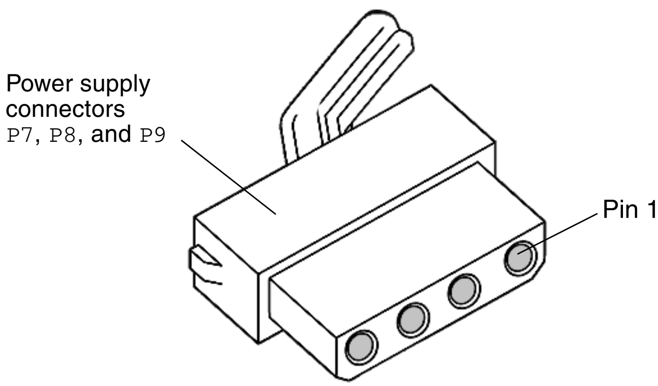


**FIGURE B-21** Power Supply Connectors `P7`, `P8`, and `P9` Pin Configuration

**TABLE B-31** Power Supply Connector `P7`, `P8`, and `P9` Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | +12 VDC | |
| 2 | GND | Ground |
| 3 | GND | Ground |
| 4 | +5 VDC | |

## B.2.10 Power Supply Connector PS1

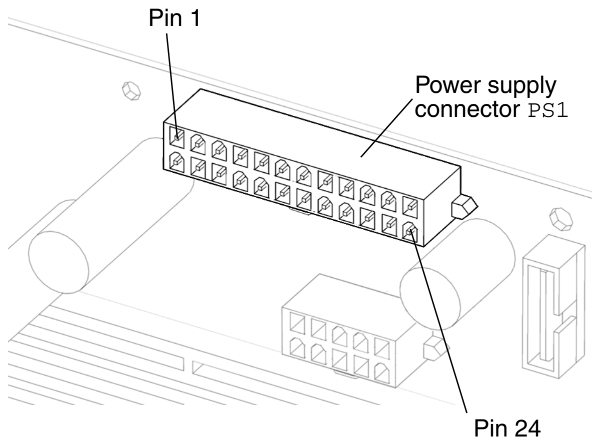


**FIGURE B-22** Power Supply Connector PS1 Pin Configuration

**TABLE B-32** Power Supply Connector PS1 Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | +3.3 VDC | |
| 2 | +3.3 VDC | |
| 3 | GND | Ground |
| 4 | +5V Sense | |
| 5 | GND | Ground |
| 6 | +5 VDC | |
| 7 | GND | Ground |
| 8 | Pwg | Power good |
| 9 | +5VSB | |
| 10 | +12 VDC | |
| 11 | +12 VDC | |
| 12 | +3.3 VDC | |
| 13 | +3.3 Sense | |
| 14 | -12 VDC | |

**TABLE B-32** Power Supply Connector `PS1` Pin Assignments *(Continued)*

| Pin | Signal | Description |
|---|---|---|
| 15 | GND | Ground |
| 16 | PS-ON | |
| 17 | GND | Ground |
| 18 | GND | Ground |
| 19 | GND | Ground |
| 20 | NC | No connection |
| 21 | +5 VDC | |
| 22 | +5 VDC | |
| 23 | +5 VDC | |
| 24 | GND | Ground |

## B.2.11 Power Supply Connector `PS2`

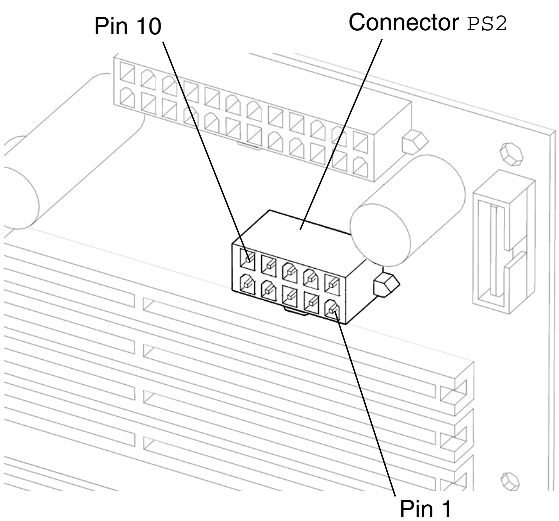


**FIGURE B-23** Power Supply Connector `PS2` Pin Configuration

**TABLE B-33** Power Supply Connector `PS2` Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | GND | Ground |
| 2 | GND | Ground |
| 3 | GND | Ground |
| 4 | GND | Ground |
| 5 | GND | Ground |
| 6 | +3.3 VDC | |
| 7 | +3.3 VDC | |
| 8 | +3.3 VDC | |
| 9 | +12 VDC | |
| 10 | +12 VDC | |

## B.2.12 SCSI Backplane to Optical Drive Power Cable Connector

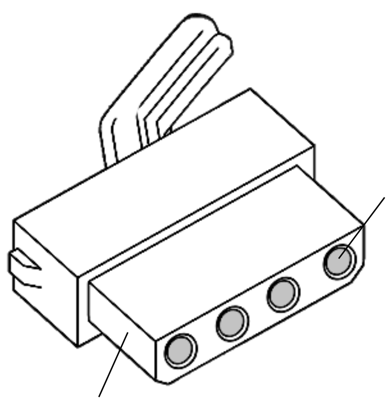


**FIGURE B-24** SCSI Backplane to Optical Drive Power Cable Connector Pin Configuration

**TABLE B-34** SCSI Backplane to Optical Drive Power Cable Connector Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | +12 VDC | |
| 2 | GND | Ground |
| 3 | GND | Ground |
| 4 | +5 VDC | |

## B.2.13 Secondary Power Switch and LED Cable Connector `J15`

---

**Note –** `J15` is the secondary power switch and LED cable connector as `J3` on the DIMM fan assembly interposer board is the primary power switch and LED cable connector.

---

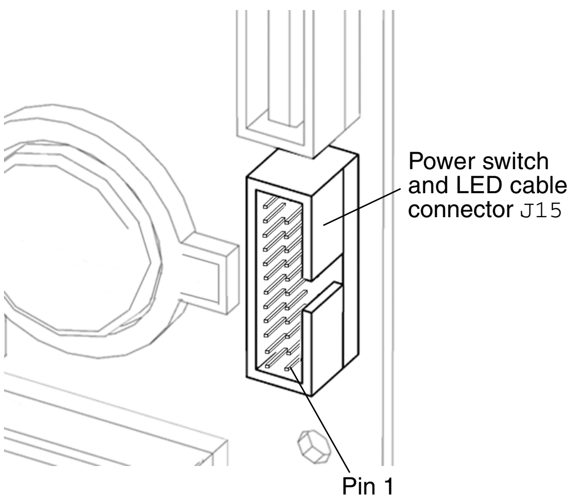


**FIGURE B-25** Power Switch and LED Cable Connector `J15` Pin Configuration

---

**Note –** Only four pins of connector `J15` are used for the power switch and power switch LED.

---

**TABLE B-35** Power Switch and LED Cable Connector `J15` Pin Assignments

| Pin | Signal | Description |
|---|---|---|
| 1 | FP_PWR_LED# | Front panel power LED |
| 2 | +5 VDC | +5 VDC |
| 5 | GND | Signal ground |
| 8 | FP_PWRBTN | Power switch |

## B.2.14 Smart Card Reader Connector `SCR0`

The smart card reader connector `SCR0` is located on the motherboard.

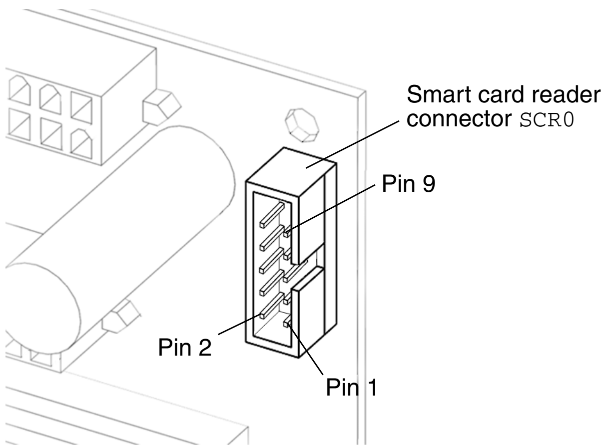


**FIGURE B-26** Smart Card Reader Connector `SCR0` Pin Configuration

**TABLE B-36** Smart Card Reader Connector `SCR0` Pin Assignments

| Pin | Signal Name | Description |
|---|---|---|
| 1 | +12 VDC | +12VDC power |
| 2 | GND | Ground |
| 3 | GND | Ground |

**TABLE B-36** Smart Card Reader Connector `SCR0` Pin Assignments *(Continued)*

| Pin | Signal Name | Description |
|---|---|---|
| 4 | SC_SCL | I2C _ clock |
| 5 | +5 VDC | +5 VDC power |
| 6 | I2C_SDA | I2C _data |
| 7 | GND | Ground |
| 8 | GND | Ground |
| 9 | SMCARD_INT# | |
| 10 | NC | No connection |

## B.2.15 UltraSCSI Connector `SCSI0`

UltraSCSI connector `SCSI0` is located on the motherboard.

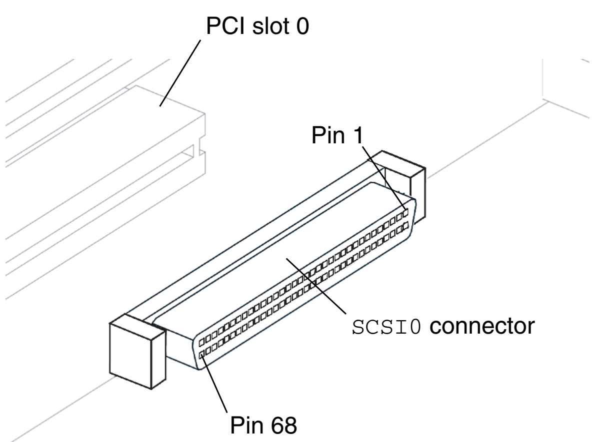


**FIGURE B-27** UltraSCSI Connector `SCSI0` Pin Configuration

**TABLE B-37** UltraSCSI Connector `SCSI0` Pin Assignments

| Pin | Signal |
|---|---|
| 1 | ASD +12 |
| 2 | ASD +13 |
| 3 | ASD +14 |
| 4 | ASD +15 |
| 5 | ASDP +1 |
| 6 | ASD +0 |
| 7 | ASD +1 |
| 8 | ASD +2 |
| 9 | ASD +3 |
| 10 | ASD +4 |
| 11 | ASD +5 |
| 12 | ASD +6 |
| 13 | ASD +7 |
| 14 | ASDP +0 |
| 15 | GND |
| 16 | ADIFFSENS |
| 17 | TERMPOWER_A |
| 18 | TERMPOWER_A |
| 19 | 3V_SCL1 |
| 20 | GND |
| 21 | ASATN + |
| 22 | GND |
| 23 | ASBSY + |
| 24 | ASACK + |
| 25 | ASRST + |
| 26 | ASMSG + |
| 27 | ASSEL + |
| 28 | ASCD + |
| 29 | ASREQ + |

**TABLE B-37** UltraSCSI Connector `SCSI0` Pin Assignments *(Continued)*

| Pin | Signal |
|---|---|
| 30 | ASIO + |
| 31 | ASD +8 |
| 32 | ASD +9 |
| 33 | ASD +10 |
| 34 | ASD +11 |
| 35 | ASD -12 |
| 36 | ASD -13 |
| 37 | ASD -14 |
| 38 | ASD -15 |
| 39 | ASDP -1 |
| 40 | ASD -0 |
| 41 | ASD -1 |
| 42 | ASD -2 |
| 43 | ASD -3 |
| 44 | ASD -4 |
| 45 | ASD -5 |
| 46 | ASD -6 |
| 47 | ASD -7 |
| 48 | ASDP -0 |
| 49 | GND |
| 50 | GND |
| 51 | TERMPOWER_A |
| 52 | TERMPOWER_A |
| 53 | 3V_SDA1 |
| 54 | GND |
| 55 | BSATN - |
| 56 | GND |
| 57 | ASBSY - |
| 58 | ASACK - |
| 59 | ASRST - |

**TABLE B-37** UltraSCSI Connector `SCSI0` Pin Assignments *(Continued)*

| Pin | Signal |
|---|---|
| 60 | ASMSG |
| 61 | ASSEL - |
| 62 | ASCD - |
| 63 | ASREQ - |
| 64 | ASIO - |
| 65 | ASD -8 |
| 66 | ASD -9 |
| 67 | ASD -10 |
| 68 | ASD -11 |

APPENDIX **C**

# Functional Description

This appendix provides a functional description of the hardware architecture for the Sun Blade 2500 workstation. This functional description covers the following topics:



## C.1 Hardware Architecture

### C.1.1 System Overview

The Sun Blade 2500 workstation is a dual processor desktop workstation that uses the UltraSPARC IIIi CPU. The UltraSPARC IIIi uses its distributed shared-memory multiprocessor architecture with both CPUs installed on a single motherboard. See FIGURE C-1 for a graphic description of the hardware architecture used in the Sun Blade 2500 workstation.

The memory controller is physically part of each UltraSPARC IIIi processor. That is, it is on the chip. Both CPUs have their own local physical address space.

The I/O subsystem is designed around two I/O bridge ASICs that bridge between the system JBus and the PCI buses. Each I/O bridge has two PCI leaves. The master I/O bridge0 supports two PCI buses: 33 MHz on the PCI-A leaf and 66 MHz on the PCI-B leaf. The slave I/O bridge1 supports two 66 MHz PCI buses out of PCI-A leaf and PCI-B leaf.

The leaf for the master I/O bridge0, PCI-2A, connects to the Southbridge. The Southbridge interfaces with IDE (ATA-100), USB, audio module, XBus, and Super I/O functions (for example, serial port, parallel port). The PCI-2A leaf is also part of the boot path. The boot path is:

- CPU
- JBus
- Master I/O bridge0
- PCI-2A leaf
- Southbridge
- XBus
- Flash PROM

The XBus off the Southbridge is used as an interface to the I2C controller and bus.

A single G-bit Ethernet controller is connected to the PCI-A leaf of I/O bridge1 and the SCSI controller is connected to the PCI-B leaf of I/O bridge1.

## C.1.2 System Block Diagram

The following is the system block diagram for the Sun Blade 2500 workstation. See FIGURE C-1.

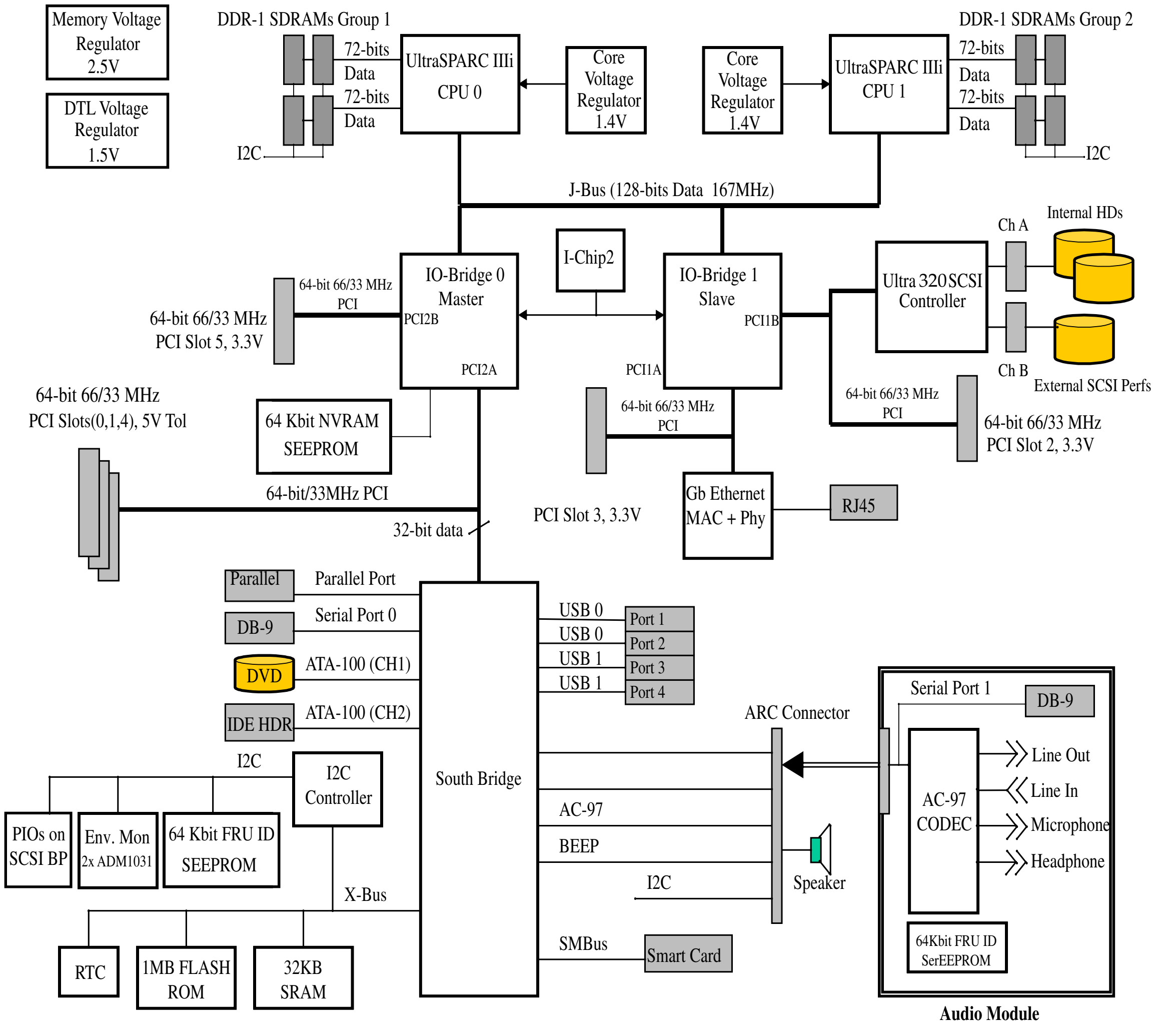


**FIGURE C-1** Sun Blade 2500 System Block Diagram

### C.1.3 Enclosure

The Sun Blade 2500 chassis is a vertical tower optimized for ease of installation and service. The overall dimensions and weight of the enclosure are as shown in TABLE C-1.

**TABLE C-1** Overall Dimensions and Weight of the Sun Blade 2500 Chassis

| Height | Width | Depth | Weight |
|---|---|---|---|
| 19.13 in. (486.00 mm) | 8.49 in. (215.88 mm) | 19.27 in. (489.52 mm) | 49.6 lbs. (22.5 kg max.) |

Major components such as CPUs, PCI cards, DIMMs, and hard drives, are easily accessible for improved serviceability. See "Removing the Access Panel" on page 10-12.

## C.2 Motherboard

### C.2.1 Hardware Features

The motherboard used in the Sun Blade 2500 workstation has the following platform-specific features:

- Extended ATX (12 in.by 13 in.) form factor
- Two Micro PGA 959-pin CPU sockets
- Four 184-pin DDR DIMM sockets for each CPU
- On-board voltage regulators for CPU core, memory, and JBus
- Two input power connectors (`PS1` and `PS2`)
- Six 64-bit PCI connectors
- A Southbridge with integrated ATA100, XBus (ISA), USB, AC97, serial ports, parallel port, and I2C controller
- G-bit (10/100/1000 Ethernet controller)
- Dual-channel UltraSCSI IV 320 controller, channel A for internal drives and channel B for external peripherals
- Audio module connector ARC0/RSC0

### C.2.2 Motherboard Components

FIGURE C-2 and FIGURE C-3 show the location of the major motherboard components and connectors.

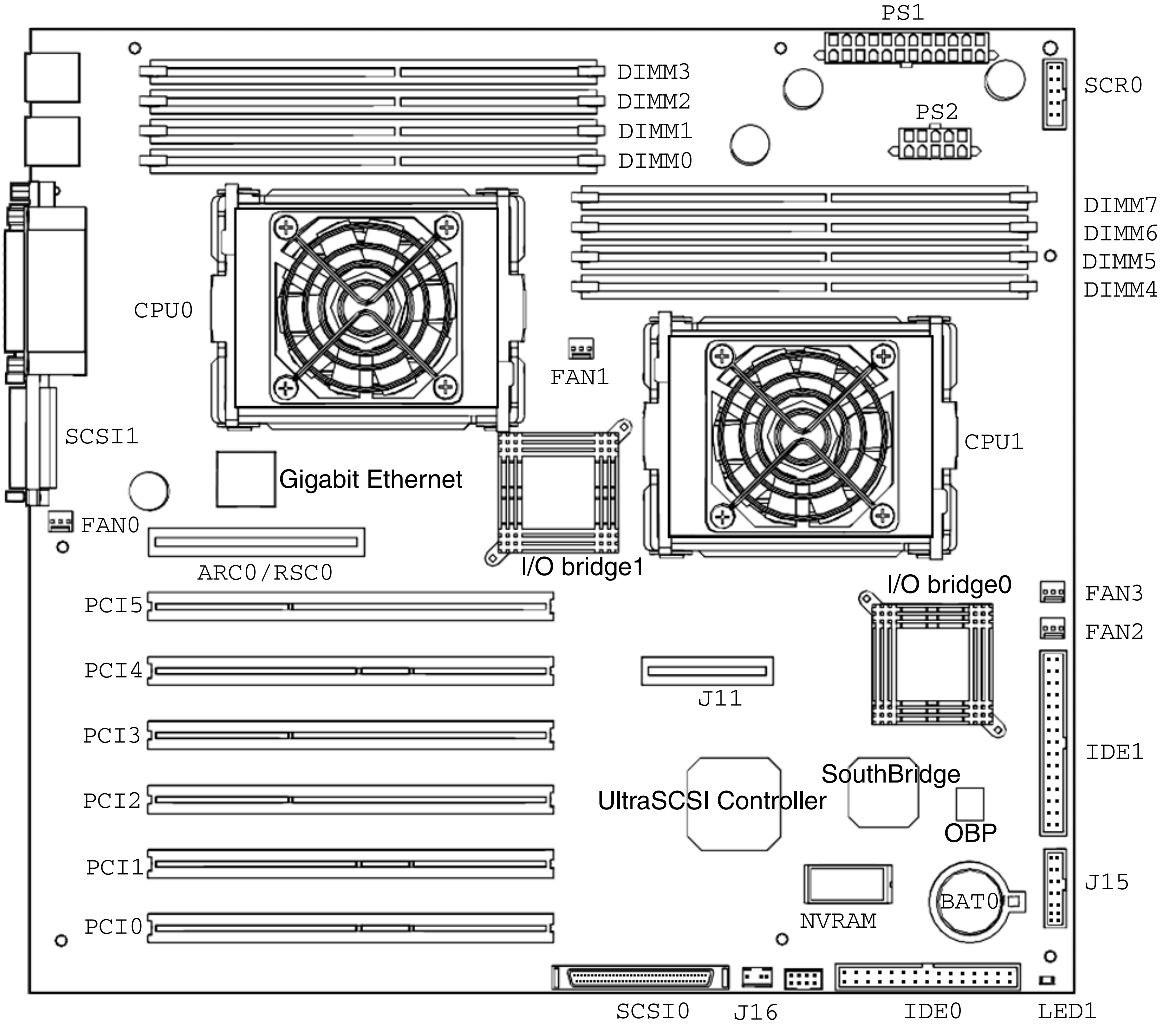


**FIGURE C-2** Diagram of Major Motherboard Components

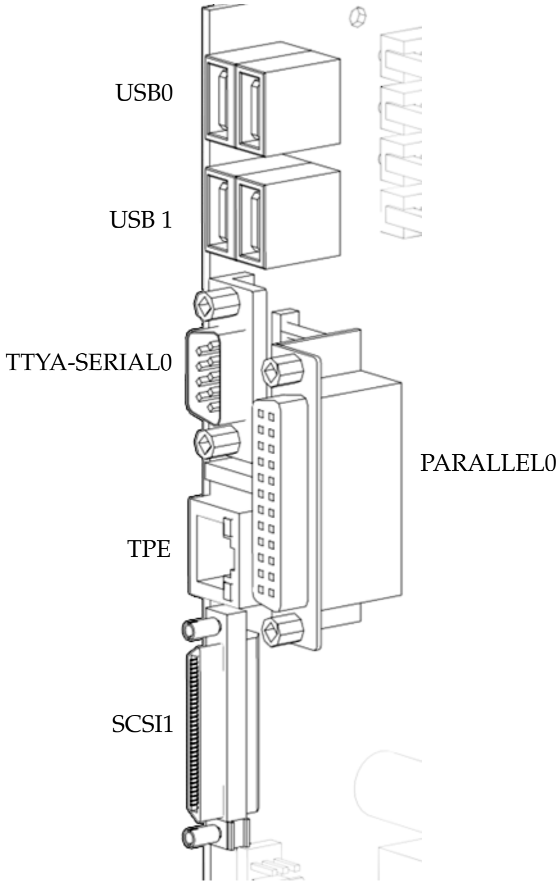


**FIGURE C-3** Motherboard Rear Connectors

# C.3 UltraSPARC IIIi CPU and Memory Subsystem

The Sun Blade 2500 system supports two CPUs and up to eight Double Data Rate (DDR) memory DIMMs. Each CPU is connected through a JBus. See FIGURE C-1.

## C.3.1 UltraSPARC IIIi CPU

The UltraSPARC IIIi processor is a high-performance, highly integrated superscalar processor implementing the 64-bit SPARC V9 RISC architecture. It is capable of sustaining the execution of up to four instructions for each cycle, even in the presence of conditional branches and cache misses. Instructions to multiple functional units are issued in program order and executed in parallel. In order to further increase the number of instructions executed for each cycle, instructions from two basic blocks can be issued in the same group.

The UltraSPARC IIIi CPU supports full implementation of the 64-bit SPARC V9 architecture. It supports a 64-bit virtual address space and a 43-bit physical address space. The core instruction set has been extended to include 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.3.1.1 UltraSPARC IIIi Key Features

- UltraSPARC IIIi CPU running at 1.6 GHz
- EPIC-7 Cu
- UltraSPARC III-Plus core
- JBus for system bus
- Integrated L1 caches (data, instruction, prefetch)
- Integrated 1 MB L2 data cache
- Integrated DDR-1 memory controller

### C.3.1.2 L1 and L2 Caches

#### *L1 Data Cache*

- 64 Kbytes
- Four-way set associative
- Write-through
- Nonallocating (no write allocate)
- Virtually indexed (does not go through D-TLB), physically tagged (goes through D-TLB)
- Address aliasing as side effect
- 32-byte line size, no sublines
- Parity-protected data and tags
- Not included in L2 cache, but snooped in parallel with L2
- Need to flush if alias is created

### *L1 Instruction Cache*

- 32 Kbytes
- Pseudo four-way set associative
- Physically indexed and physically tagged (goes through I-TLB)
- Write invalidate
- 32-byte line size, no sublines
- Parity-protected data and tags
- Not included in L2 cache, but snooped in parallel with L2
- No flushing required

### *L1 Prefetch Cache*

- Used by software prefetch instruction and autonomous hardware prefetch from L2 cache
- 2 Kbytes
- Four-way set associative
- Physically indexed and tagged through D-TLB
- Write invalidate
- 64-byte line size, two 32-byte sublines
- Not included in L2 cache, but snooped in parallel with L2
- No flushing required

### *L2 Data Cache*

- 1 MB
- Four-way set associative
- Physically indexed and tagged through D-TLB
- Write back, allocating
- 64-byte line size
- Data ECC protected, tag parity protected
- L2 tag address able to cache 16 GBytes of local memory
- Required flushing for stable storing

### *L2 Write Cache*

- Reduces 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 sublines
- Physically indexed and tagged through D-TLB
- Included in L2 cache
- Required flushing for stable storing

### C.3.1.3 UltraSPARC IIIi Memory Controller

The memory system consists of the memory control unit (MCU) in the CPU and two physical banks (1A/1B and 2A/2B) of DDR-1 SDRAM memory. See FIGURE C-4. Only registered DIMMS are supported.

---

**Note –** At the time of product development the physical banks were labeled 1A/1B and 2A/2B. This has changed see "OpenBoot PROM Memory Message" on page 11-12.

---

Clock buffering with a PLL is provided on the DIMMs. Each physical bank consists of two 72-bit DDR-1 SDRAM DIMMs. Both banks share a 16-byte data bus plus ECC data bus. All DIMMs have shared address/control bus. Since each DIMM could be dual sided (upper and lower banks), there are maximum of four data loads for each physical bank. Both banks are controlled by the memory controller.

---

**Note –** DIMMs must always be loaded in pairs. See "Installing the DIMMs" on page 11-7 for detailed DIMM installation information.

---

A memory controller pipelines requests, making use of 16 memory banks when fully loaded.

The key features of the memory controller are:

- Maximum SDRAM clock frequency of 133 MHz
- DDR-1 (Double Data Rate)
- Supports single bank or dual bank SDRAM DIMMs
- Memory controller supports two physical banks of 128 bits of data plus 9 bits of error checking correction (see "ECC Checking and Generation" on page C-11)
- Supports 256 MB, 512 MB and 1 GB DDR-1 SDRAMs, x 4 or x 8 concurrently
- Supports four SDRAM DIMM slots
- Supports four internal SDRAM device banks
- Supported memory space from 256 MB to 16 GB for each memory controller
- Peak memory bandwidth of 4.2 GB per second @ 133 MHz
- Three interleaving modes:
  - Rank interleaving
  - Bank interleaving
  - DIMM-to-DIMM interleaving
- SSTL_2 inputs and outputs

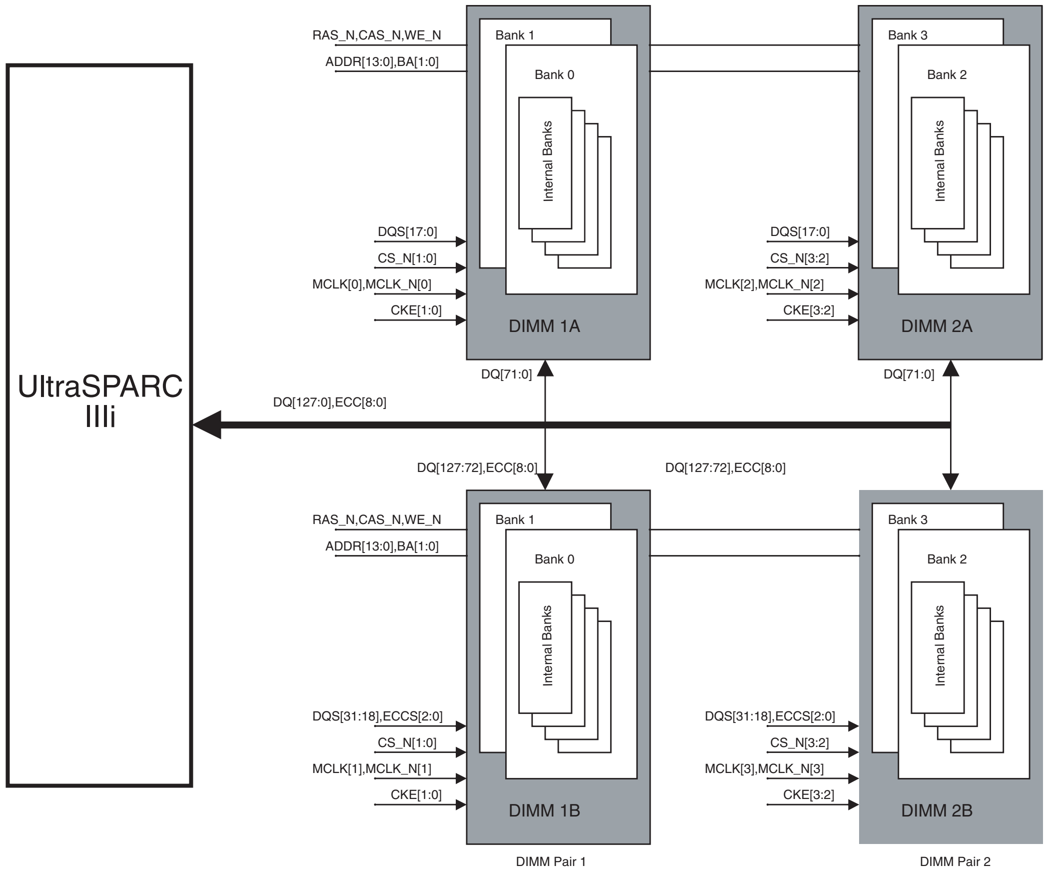


**FIGURE C-4** Memory Subsystem Block Diagram

## *UltraSPARC IIIi Clock*

The system clock generator chip generates a 3.3V LVPECL differential clock that is converted to 1.5V HSTL-levels before being sent to the CPU. An AC coupling circuit in conjunction with a bias voltage is used to effect the level shifting.

### *ECC Checking and Generation*

All memory transfers have error checking and correction (ECC). The UltraSPARC IIIi memory controller unit performs ECC generation and checking.

The UltraSPARC IIIi uses the same ECC logic as the UltraSPARC-III. A 9-bit syndrome is generated using the Hsiaos algorithm for each 128 bits of data. This 9-bit syndrome enables single-bit error correction and multiple-bit error detection. The memory controller generates the ECC bits based on the modified Hsiaos algorithm and writes it out to memory along with the 128 bits of data. When data is read from memory, the data and ECC bits generate the syndrome bits to indicate the correctness of the data. A syndrome value of 0 means no errors. A syndrome value of non-zero indicates single- or multiple-bit errors. If the data is for a foreign request, the uncorrectable error and correctable error information is sent along with it on the J_ADTYPE bus.

### *Core Power Regulators*

The Sun Blade 2500 motherboard uses two core voltage regulators, one for each CPU. Each core voltage regulator has the following requirements:

- Programmable output voltage from 0.80V to 1.550V through VID bits
- 12V input source
- Input voltage tolerance of ±5%
- Maximum output current of 40A @ 1.4V
- Output voltage tolerance of ±3%
- 85% efficiency at full load

The voltage sense line is connected directly from the sense pin of the CPU.

## C.3.2 Memory Subsystem

### C.3.2.1 DDR Memory

The Sun Blade 2500 motherboard supports two CPUs and up to eight memory DIMMs. Each CPU is connected through a JBus. Each CPU interfaces directly to memory. See FIGURE C-5. The CPU/memory subsystem consists of the following functions:

- UltraSPARC IIIi CPU
- Four 184-pin DIMMs
- Voltage regulators for core voltage, memory voltage (common for all memory), DDR termination voltage, and DTL voltage (common for both CPUs)

## C.3.2.2 DDR Memory Block Diagram

Each CPU interfaces directly to memory as shown in FIGURE C-5. `CPU0` interfaces directly with:

- `DIMM0`
- `DIMM1`
- `DIMM2`
- `DIMM3`

`CPU1` interfaces directly with:

- `DIMM4`
- `DIMM5`
- `DIMM6`
- `DIMM7`

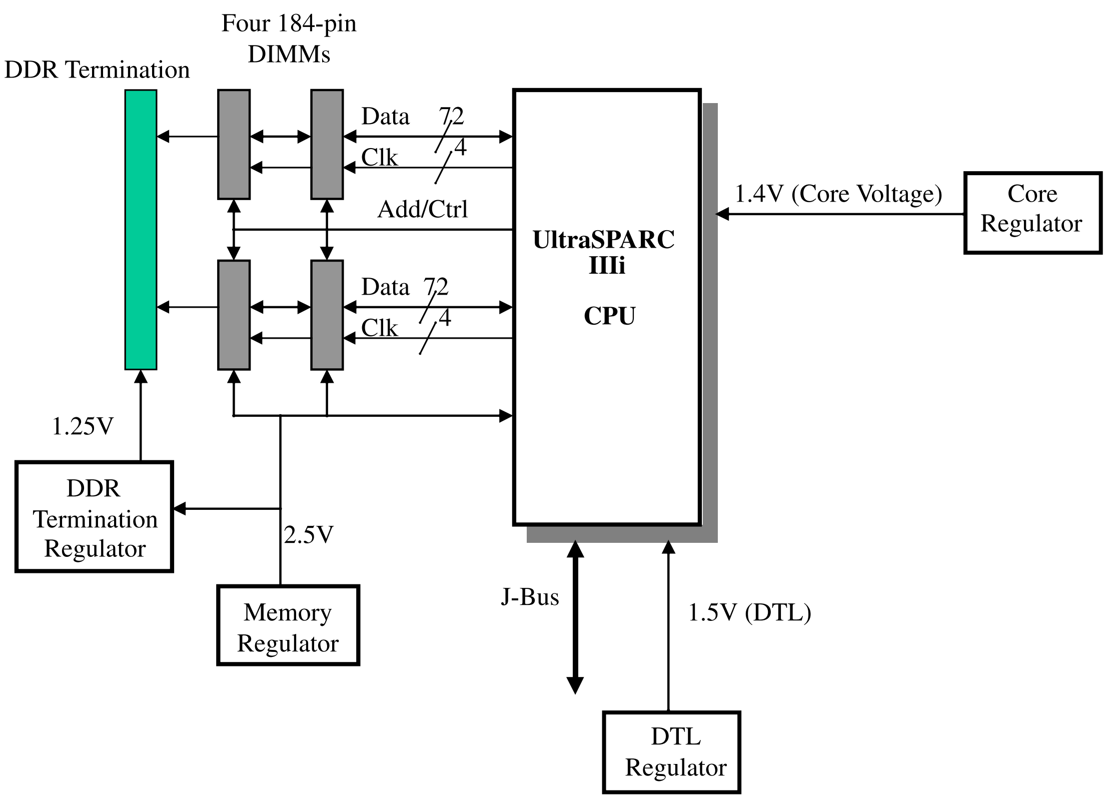


**FIGURE C-5** CPU/Memory Subsystem Block Diagram

## C.3.2.3 Memory Architecture

The memory controller unit (MCU) is embedded within the UltraSPARC IIIi processor. All address, clock, and control signals originate from the processor. These signals are then transferred to DRAMs on the DIMMs. The data path is 144 bits (2 x 72 bits) wide. Data is directly driven to and from the processor pins.

To minimize latency, the memory controller is integrated on the same chip as the processor. In a single-processor environment, this allows immediate access on a cache miss, without having to forward the address over the JBus interconnect.

TABLE C-2 describes the interface between the UltraSPARC IIIi memory controller unit (MCU) and the DIMMs.

**TABLE C-2** MCU Memory Signal Count

| Signal Name | Number of Copies | Signal Count |
|---|---|---|
| CLK+/CLK-[3:0] | 4 | 8 |
| Mem_Data[127:0] | 1 | 128 |
| Mem_ECC[8:0] | 1 | 9 |
| RAS_L | 1 | 1 |
| CAS_L | 1 | 1 |
| CS_L[3:0] | 1 | 4 |
| WE_L | 1 | 1 |
| DQS[31:0] | 1 | 32 |
| ECCS[2:0] | 1 | 3 |
| Mem_ADD[13:0] | 1 | 14 |
| BA[1:0] | 1 | 2 |
| CKE[3:0] | 1 | 4 |
| Total MCU signal count | | 207 |

## C.3.2.4 Memory DIMMs

DIMMs must be loaded in pairs. Each CPU supports four DIMMs. See TABLE C-3. The minimum number of DIMMs required for proper system operation is two. This is true for single- and dual-CPU configurations. The system operates properly if memory is only loaded on one of the CPU's two banks and the second CPU's memory banks are left empty. However, for better system performance, each CPU should have its own local memory. That is, DIMMs should be loaded on both CPUs.

## C.3.2.5 Supported DIMM Configurations

**TABLE C-3** Supported DIMM Configurations

| SDRAM Organization | | Number of DRAMs | Physical Banks for Each DIMM | DIMM Configurations | DIMM Capacity | Minimum Memory for Each CPU (2 DIMMs) | Maximum Memory for Each CPU (4 DIMMs) |
|---|---|---|---|---|---|---|---|
| 512 MB | 64 MBx8 | 9 | 1 | 64 MBx72 | 512 MB | 1 GB | 2 GB |
| | 128 MBx4 | 18 | 1 | 128 MBx72 | 1 GB | 2 GB | 4 GB |
| | 64 MBx8 | 18 | 2 | 2x(64 MBx72) | 1 GB | 2 GB | 4 GB |
| | Stacked ** 128 MBx4 (x2) | 18 (double dies) | 2 | 2x(128 MBx72) | 2 GB | 4 GB | 8 GB |
| 1 GB | 256 MBx4 | 18 | 1 | 256 MBx72 | 2 GB | 4 GB | 8 GB |
| | 128 MBx8 | 18 | 2 | 2x(128 MBx72) | 2 GB | 4 GB | 8 GB |

## C.3.2.6 DIMM Connector Pinout

**TABLE C-4** 184-Pin DDR1 SDRAM DIMM Pin Assignments

| Pin No. | Pin Name | Pin No. | Pin Name | Pin No. | Pin Name | Pin No. | Pin Name |
|---|---|---|---|---|---|---|---|
| 1 | VREF | 47 | NC | 93 | VSS | 139 | VSS |
| 2 | DQ0 | 48 | A0 | 94 | DQ4 | 140 | NC |
| 3 | VSS | 49 | NC | 95 | DQ5 | 141 | A10 |
| 4 | DQ1 | 50 | VSS | 96 | VDDQ | 142 | NC |
| 5 | DQS0 | 51 | NC | 97 | DM0/DQS9 | 143 | VDDQ |
| 6 | DQ2 | 52 | BA1 | 98 | DQ6 | 144 | NC |
| 7 | VDD | 53 | DQ32 | 99 | DQ7 | 145 | VSS |
| 8 | DQ3 | 54 | VDDQ | 100 | VSS | 146 | DQ36 |
| 9 | NC* | 55 | DQ33 | 101 | NC | 147 | DQ37 |
| 10 | /RESET | 56 | DQS4 | 102 | NC | 148 | VDD |

**TABLE C-4** 184-Pin DDR1 SDRAM DIMM Pin Assignments *(Continued)*

| Pin No. | Pin Name | Pin No. | Pin Name | Pin No. | Pin Name | Pin No. | Pin Name |
|---|---|---|---|---|---|---|---|
| 11 | VSS | 57 | DQ34 | 103 | A13 | 149 | DM4/DQ S13 |
| 12 | DQ8 | 58 | VSS | 104 | VDDQ | 150 | DQ38 |
| 13 | DQ9 | 59 | BA0 | 105 | DQ12 | 151 | DQ39 |
| 14 | DQS1 | 60 | DQ35 | 106 | DQ13 | 152 | VSS |
| 15 | VDDQ | 61 | DQ40 | 107 | DM1/DQ S10 | 153 | DQ44 |
| 16 | DU(CK1) | 62 | VDDQ | 108 | VDD | 154 | /RAS |
| 17 | DU(/CK1) | 63 | /WE | 109 | DQ14 | 155 | DQ45 |
| 18 | VSS | 64 | DQ41 | 110 | DQ15 | 156 | VDDQ |
| 19 | DQ10 | 65 | /CAS | 111 | CKE1 | 157 | /S0 |
| 20 | DQ11 | 66 | VSS | 112 | VDDQ | 158 | /S1 |
| 21 | CKE0 | 67 | DQS5 | 113 | BA2 | 159 | DM5/DQ S14 |
| 22 | VDDQ | 68 | DQ42 | 114 | DQ20 | 160 | VSS |
| 23 | DQ16 | 69 | DQ43 | 115 | A12 | 161 | DQ46 |
| 24 | DQ17 | 70 | VDD | 116 | VSS | 162 | DQ47 |
| 25 | DQS2 | 71 | NC,/S2 | 117 | DQ21 | 163 | NC,/S3 |
| 26 | VSS | 72 | DQ48 | 118 | A11 | 164 | VDDQ |
| 27 | A9 | 73 | DQ49 | 119 | DM2/DQ S11 | 165 | DQ52 |
| 28 | DQ18 | 74 | VSS | 120 | VDD | 166 | DQ53 |
| 29 | A7 | 75 | DU(CK2) | 121 | DQ22 | 167 | NC,FETE N |
| 30 | VDDQ | 76 | DU(CK2) | 122 | A8 | 168 | VDD |
| 31 | DQ19 | 77 | VDDQ | 123 | DQ23 | 169 | DM6/DQ S15 |
| 32 | A5 | 78 | DQS6 | 124 | VSS | 170 | DQ54 |
| 33 | DQ24 | 79 | DQ50 | 125 | A6 | 171 | DQ55 |
| 34 | VSS | 80 | DQ51 | 126 | DQ28 | 172 | VDDQ |
| 35 | DQ25 | 81 | VSS | 127 | DQ29 | 173 | NC |
| 36 | DQS3 | 82 | VDDIQ | 128 | VDDQ | 174 | DQ60 |

**TABLE C-4** 184-Pin DDR1 SDRAM DIMM Pin Assignments *(Continued)*

| Pin No. | Pin Name | Pin No. | Pin Name | Pin No. | Pin Name | Pin No. | Pin Name |
|---|---|---|---|---|---|---|---|
| 37 | A4 | 83 | DQ56 | 129 | DM3/DQ S12 | 175 | DQ61 |
| 38 | VDD | 84 | DQ57 | 130 | A3 | 176 | VSS |
| 39 | DQ26 | 85 | VDD | 131 | DQ30 | 177 | DM7/DQ S16 |
| 40 | DQ27 | 86 | DQS7 | 132 | VSS | 178 | DQ62 |

* NC = No connection, NU = Not usable, DU = Do not use

## C.3.2.7 Memory Clock Ratios

FIGURE C-6 shows the clock ratio for memory and core clocks derived from the JBus.

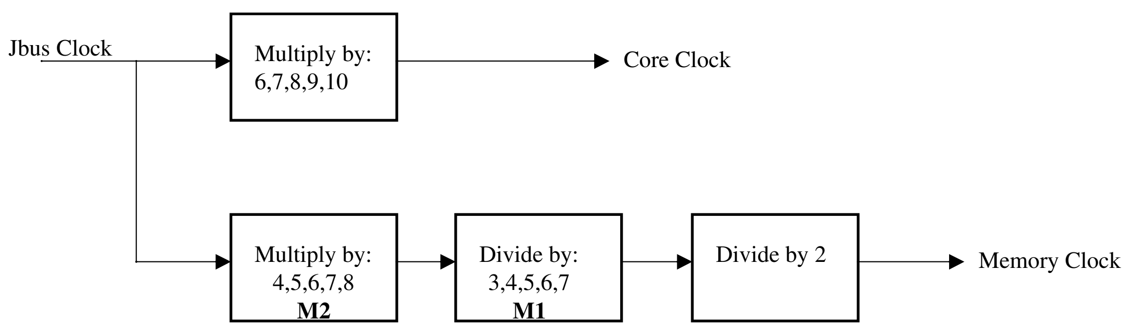


**FIGURE C-6** UltraSPARC IIIi Clock

‘UltraSPARC IIIi supports the following CPU core clock to memory clock ratios: 8, 8.5, 9, 9.5, 10, 10.5, 11, 11.5, 12, 12.5, 13, 13.5, 14, 14.5, and 15

To maximize system performance, the frequency ratios must meet the following criteria:

- JBus frequency of 150MHz or above
- Memory frequency of 120MHz or above

TABLE C-5 shows the divisors chosen to achieve the correct memory bus clock frequencies:

**TABLE C-5** CPU Core and Memory Clock Frequencies for Sun Blade 2500 System

| Core Clock MHz | JBus Clock MHz | JBus: Core Ratio | M2 | M1 | Memory Clock MHz | CPU: Memory Ratio |
|---|---|---|---|---|---|---|
| 720 | 120 | 6 | 4* | 3* | 80 | 9 |
| 960 | 160 | 6 | 6 | 4 | 120 | 8 |
| 1064 | 152 | 7 | 7 | 4 | 133 | 8 |
| 1280 | 160 | 8 | 8 | 5 | 128 | 10 |
| 1333 | 166.67 | 8 | 8 | 5 | 133 | 10 |
| 1500 | 166.67 | 9 | 8 | 5 | 133 | 11 |
| 1596 | 160 | 10 | 8 | 5 | 133 | 12 |

* CPU core and memory clock frequency possible in Sun Blade 2500 system default value of CPU. Not used in system. All ratios must meet the following formula: M2/M1 = JBus_ratio * 2/memory_ratio

## C.3.2.8 Memory Interleaving

The UltraSPARC IIIi supports four interleaving modes:

- Bank interleaving
- Rank interleaving
- DIMM interleaving
- XOR interleaving

### *Bank Interleaving*

Bank interleaving is interleaving within a single device on a DDR1 SDRAM DIMM. Each DDR1 SDRAM DIMM used by the workstation contains 18 devices. See FIGURE C-7. For example, bank interleaving can occur between devices 1 and 2 or devices 17 and 18.

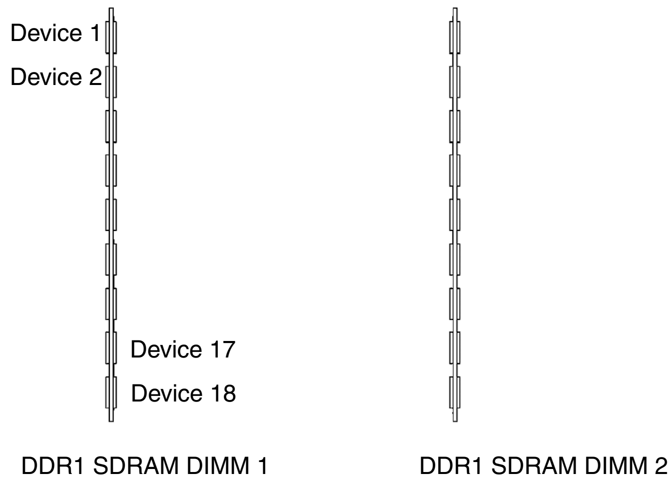


**FIGURE C-7** Bank Interleaving

---

**Note –** In this example, 18 memory devices are illustrated. DDR1 SDRAMs may contain 9 or 36 memory devices.

---

**Note –** Do not confuse bank interleaving with DIMM interleaving. For an explanation of DIMM interleaving see "DIMM Interleaving" on page C-19.

---

### *Rank Interleaving*

Rank interleaving is interleaving between pairs of memory devices on a single DIMM. Each DDR SDRAM used in 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. See FIGURE C-8. For example, rank interleaving can occur between device 2 and device 11 or between device 9 and 18.

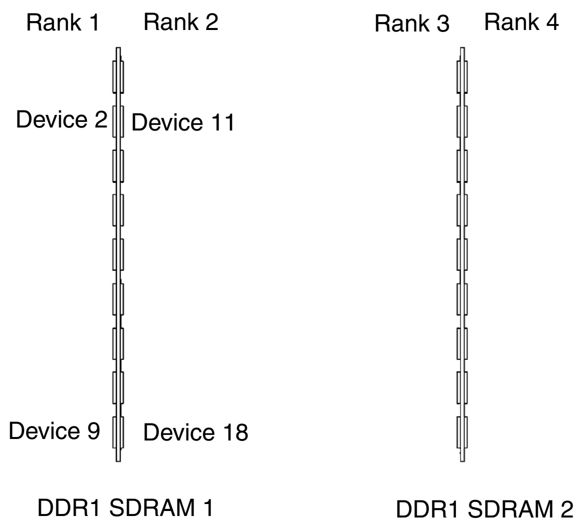


**FIGURE C-8** Rank Interleaving

### *DIMM Interleaving*

DIMM interleaving is interleaving between pairs of DIMMs. Interleaving between DIMMs can occur 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. See FIGURE C-9. For example, DIMM interleaving can occur between DDR1 SDRAM pair 1 and DDR1 SDRAM pair 2.

For maximum interleaving performance, all DDR1 SDRAM DIMMs need to be the same.

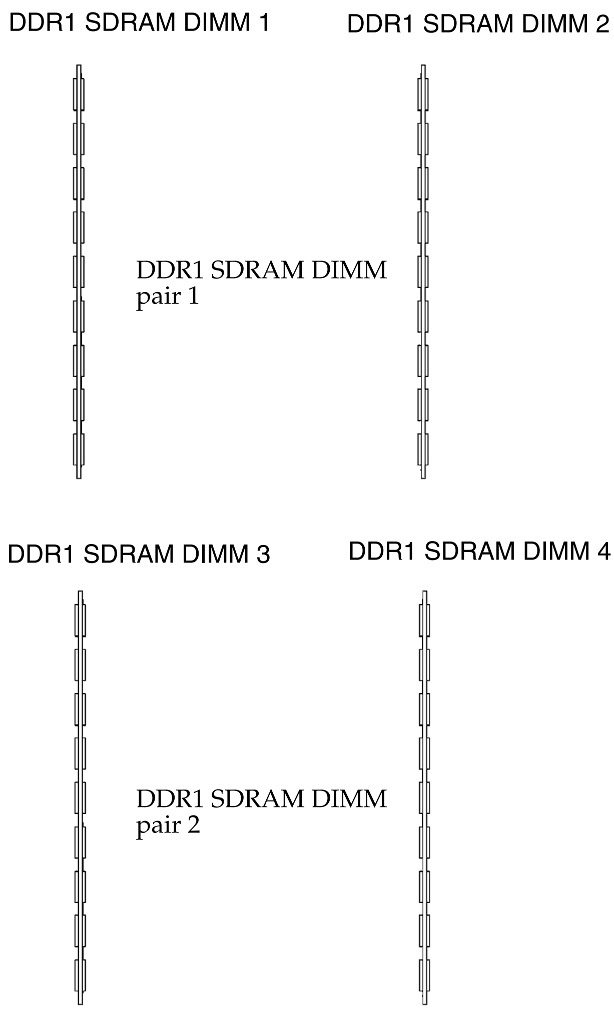


**FIGURE C-9** DIMM Interleaving

---

**Note –** There are no constraints for bank or rank interleaving within the same pair.

---

TABLE C-6 describes the different interleaving modes supported based on the memory DIMMs used.

### XOR Interleaving

The Sun Blade 2500 system also supports a fourth interleaving mode called XOR interleaving. This interleaving mode is used to distribute L2 cache conflict misses and L2 cache read/write pairs across more banks. To use XOR interleaving, all DIMMs in a CPU’s two banks must be identical. XOR interleaving is a special case not described in TABLE C-6.

**TABLE C-6** Interleaving Modes

| DIMM Pairs | DIMM Type | Interleaving Mode Support |
|---|---|---|
| 1 | Single bank | Bank |
| 1 | Dual bank | Bank/Rank |
| 2 | Different, single-single | Bank |
| 2 | Different, single-double | Bank/Rank, Bank/Rank |
| 2 | Different, 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 |
| 1 | Single bank | Bank |
| 1 | Dual bank | Bank/Rank |
| 2 | Different, single-single | Bank |

### Mixing DIMM Types

Within the same pair (1 or 2) DIMMs need to be exactly the same (same density, x4 or x8, single or double). DIMMs in different pairs can be different. For example:

- pair1 (2 DIMMs): double banks, 512 Mb devices, x4

### Main Memory Power Regulator

DDR memory requires a 2.5V voltage source. This voltage is generated through a memory regulator providing power to all the memory banks. The following is a listing of the power requirements for the memory regulator:

- 12V input source
- Input voltage tolerance of ±5%
- 2.5V output
- Maximum output current of 29A at 2.5V
- Output voltage tolerance of ±3%

- 85% efficiency at typical load

# C.4 JBus and XBus

## C.4.1 JBus

JBus is the system bus developed for the UltraSPARC IIIi series of processors.

### C.4.1.1 JBus Topology

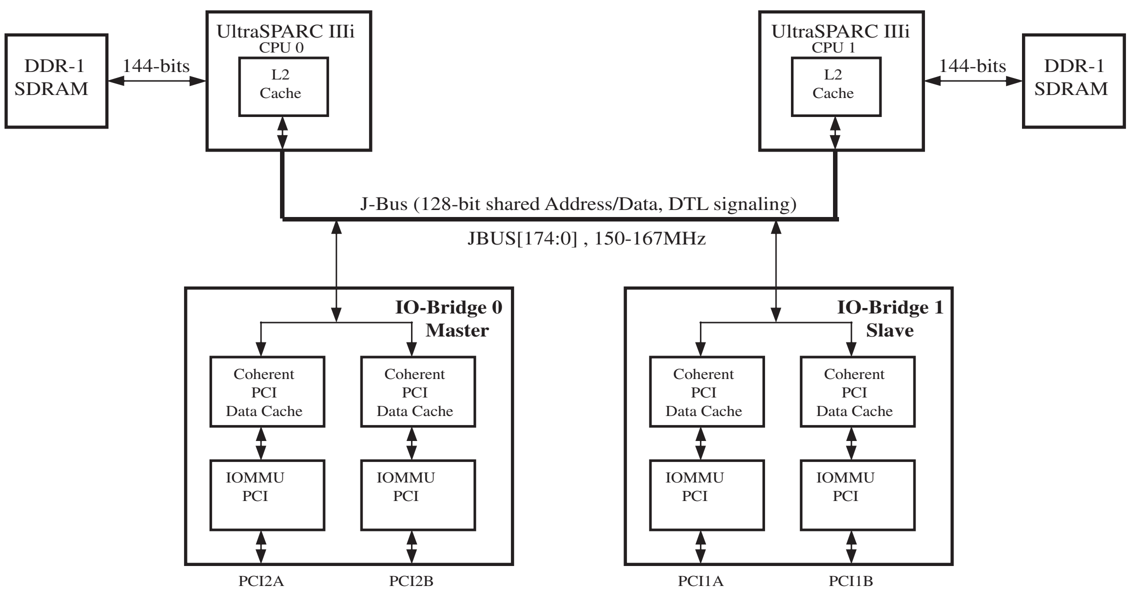


**FIGURE C-10** JBus Topology

#### *JBus Key Features*

The following are the key features of the JBus as seen in FIGURE C-10:

- Simple SMP protocol that is SPARC V9 and Sun4u correct, resulting in high performance for one to two CPUs
- 128-bit wide bus

- Full-duplex shared multidrop bus for 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, split 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.

---

**Note –** Data return implies completion of prior coherency events by the requestor. This is a minimal requirement.

---

- Four transIDs for each device ID

### C.4.1.2 DTL Configuration

DTL is a bus interface scheme that allows both point-to-point (2-node), and multi-drop communication on a common bus. DTL is a low-voltage, high-speed interface with very high signal integrity.

Two types of configurations are possible in DTL: DTL Scheme-1 and DTL Scheme-2. On UltraSPARC IIIi and other JBus devices, two signals (down_25 and up_open) are provided to configure DTL IOs of the devices upon power up. See TABLE C-7.

Because the Sun Blade 2500 system does not use a boot bus, the JBus needs to be ready for transactions (the first PROM fetch) as the processor comes out of reset state. The following table shows the configuration signals for both DTL schemes.

**TABLE C-7** DTL Configuration Control Signals

| Scheme | Number of Nodes in the System | Number of Devices | down_2 5 | up_open | Description |
|---|---|---|---|---|---|
| DTL-1 | 2-node | 2 | 0 | 0 | 50 pull-down, 50 pull-up; pull-up active in rcv mode |
| | 3 or more | End nodes | 0 | 0 | 50 pull-down, 50 pull-up; pull-up active in rcv mode |
| | | Intermediate node | 1 | 1 | 25 pull-down, 50 pull-up, high impedance in rcv mode |
| DTL-2 | 2 | End nodes | 0 | 0 | 50 pull-down, 50 pull-up; pull-up active in rcv mode |
| | 3 | End nodes | 1 | 0 | 25 pull-down, 50 pull-up; pull-up active in rcv mode |
| | | Intermediate node | 1 | 0 | 25 pull-down, 50 pull-up; pull-up active in rcv mode |

### *DTL Reference Voltage*

DTL reference voltages of 1.125V ±5% are generated on the motherboard from a discrete divider with 1% tolerance.

---

**Note –** There is no current drawn on the reference voltage.

---

*DTL IO Power*

All DTL IO power is generated on the system board through a DC-DC regulator and is delivered to the UltraSPARC IIIi processor. The IO voltage is 1.5V. The regulation of this regulator is ±3%.

### C.4.1.3 JBus Performance

The peak bandwidth for JBus is 2.56 GB per second at 200 MHz and is 2.13 GB per second on the Sun Blade 2500 motherboard since JBus is clocked at up to 167 MHz. JBus can insert a dead cycle between transaction of 2 different masters however, in a Sun Blade 2500 system, no dead cycles are needed.

## C.4.2 I/O Bridge

## C.4.3 I/O Subsystem

The I/O subsystem is designed around two I/O bridges and one Southbridge. The I/O bridge is a bridge between JBus and the PCI buses.

The Southbridge is the bridge between PCI, USB, IDE, XBus, and Super I/O functions.

### C.4.3.1 I/O Bridges

The Sun Blade 2500 workstation uses two I/O bridge ASICs as the bridge from JBus to PCI. See FIGURE C-11. One I/O bridge is configured as the master I/O bridge0 (JID[1]=1) supporting a 33 MHz PCI bus (PCI-A leaf) and a 66MHz PCI bus (PCI-B leaf). The other I/O bridge is configured as the slave I/O bridge 1 (JID[1]=0) supporting two 66 MHz PCI buses through PCI-A and the PCI-B leaves. The boot path is through the master I/O bridge0 via the PCI-A leaf. See the following I/O bridge block diagram.

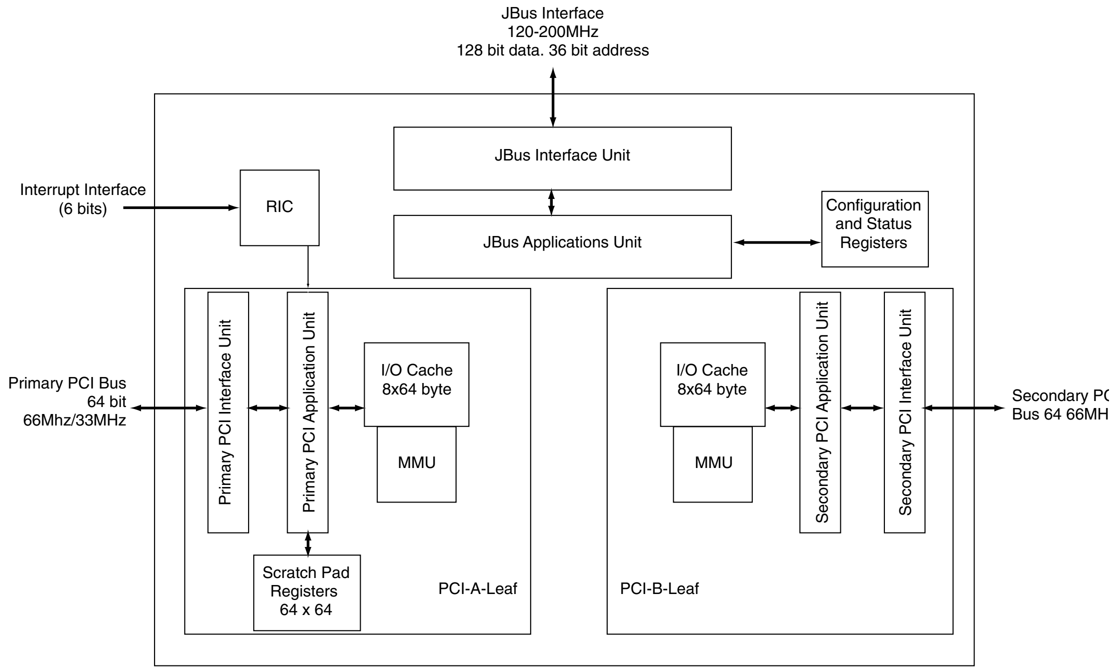


**FIGURE C-11** I/O Bridge Block Diagram

## C.4.3.2 I/O Bridge Key Features

- Bus Interface
- Two 64-bit/66 MHz PCI leaves
- I/O cache (8 x 64 bytes)
  - One for each leaf
  - Fully associative
  - In JBus coherency space
- I/O MMU
  - One for each leaf
  - Fully associative TLB
- Mondo Dispatch Unit
- Byte Twisting

I/O bridge is a companion core-logic ASIC to the UltraSPARC IIIi CPU. The I/O bridge and UltraSPARC IIIi communicate through the JBus. The central task of I/O bridge is to be the point of access to I/O and perform system interrupts. The main system interfaces I/O bridge offers are:

- JBus
- 66 MHz/64 bit or 33 Mhz/64 bit v2.2 PCI, capable of supporting up to eight external masters with internal arbiter.

### C.4.3.3 JBus Interface

The JBus interface detects transactions present on the JBus that are targeted for the I/O bridges. The interface accepts and queues those transactions and coordinates with the destination unit within the I/O bridge.

### C.4.3.4 PCI-A Leaf

The PCI-A leaf on I/O bridge0 is a 64 bit/66 MHz or 64-bit/33 MHz PCI version 2.2 compliant implementation. The interface has an internal arbiter that can support up to eight masters resident on the bus. Support for external arbitration is also present.

---

**Note –** This interface on the I/O bridge is PCI v2.2 compliant.

---

The PCI-A leaf includes an interrupt block that receives system interrupts from the external IChip2. This PCI leaf also controls interrupts generated from any activity within the PCI interface unit itself. The interrupt unit communicates with the JBus cluster to send out interrupts onto the JBus.

### C.4.3.5 PCI-B Leaf

The PCI-B interface is a 64 bit/66 MHz PCI leaf with an internal arbiter. An external arbiter is also supported. This is a fully functional standalone PCI bus.

### C.4.3.6 PCI I/O Cache

Each PCI leaf has an I/O cache to improve performance. The 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 aid in minimizing DMA read latency (I/O bridge is sending data out to the PCI bus). This prefetching can be disabled by software through configuration space registers (CSR). In addition, the entire cache can be bypassed or disabled effectively by software.

### C.4.3.7 PCI Configuration and I/O Space

The PCI configuration and I/O space correspond to those defined by the PCI Local Bus Specification Revision 2.2.

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 for each device. As accesses in this space generate specific PCI transactions called "configuration cycles", the PCI configuration spaces are decoded by the I/O bridge.

The PCI specification also defines a 32-bit I/O space for each device. The I/O space is accessed through dedicated transactions. The PCI specification recommends devices be mapped in the memory space and not in the I/O space. The I/O space is provided to support devices that are noncompliant with the intent of the PCI specification. Providing a full 32-bit space for each device is very costly, as such the Sun Blade 2500 system (through I/O bridge) supports only 16 MB of I/O space for each device.

The PCI configuration and I/O space in UltraSPARC IIIi-based systems are geographically partitioned through a software/firmware convention in which 32 MB of space is reserved for each PCI bus in the system. These 32 MB correspond to 16 MB (lower) for the PCI configuration space and 16 MB (upper) for the PCI I/O space.

## C.4.4 XBus

### C.4.4.1 PCI-ISA Bridge

The ISA bus is an I/O bus that runs at 8 MHz. The Sun Blade 2500 system uses only a subset of this bus called the XBus.

### C.4.4.2 Flash PROM

The Sun Blade 2500 motherboard contains 1 MB of flash memory connected to the XBus of the Southbridge ASIC. The flash PROM has an 8 Mbit, 5.0V flash memory.

The 1 MB of the PROM memory is divided into two halves, the OBP and the power-on self-test (POST). The OBP and POST image are in a separate address space off of the XBus space.

# C.5 System Clocks and Interrupt Processing

## C.5.1 IChip2

The Sun Blade 2500 motherboard uses the IChip2 as the interrupt concentrator. The IChip2:

- Processes all 11 major groups of the interrupts comprising a total of 48 different interrupt signals at the same time. The result of processing is a 6-bit code designating the source of the interrupt and its group.
- Supports all three types of interrupts: level high, level low, and pulse low.
- Provides equal priority to all interrupting devices. When two devices need servicing at the same time, the IChip2 prioritizes based on the round-robin scheduling scheme.
- Generates two groups of PCI clocks, Group A and Group B, from a 133 MHz crystal oscillator in PECL form.

---

**Note –** The clock-generation feature of the IChip 2 is not utilized in the Sun Blade 2500 workstation.

---

### C.5.1.1 PCI Clocks

The PCI clocks are driven by an off-the-shelf PC-style clock generator. The Sun Blade 2500 system turns off the clock to Energy Star capable slots. This is accomplished by having a PCI clock generator with has a serial I2C interface that selectively turns off outputs of the chip.

TABLE C-8 shows the number of PCI clocks needed in the Sun Blade 2500 workstation.

---

**Note –** Some devices, such as those in PCI slots, might share a single clock, depending on number of copies available from the PCI clock generator.

---

**TABLE C-8** Number of PCI Clocks Needed

| Component | 33 MHz | 66 MHz |
|---|---|---|
| I/O bridge0 (master) | 1 | 1 |
| I/O bridge1 (slave) | | 2 |
| IChip2 | 1 | |
| 33 MHz PCI expansion slots | 4 | |
| 66 MHz PCI expansion slots | | 3 |
| Test interface | 1 | 1 |
| G-bit Ethernet | | 1 |
| SCSI | | 1 |
| Southbridge | 1 | |
| CPLD | 1 | |
| Total number of PCI clocks | 9 | 9 |

### C.5.1.2 Real Time Clock

The Sun Blade 2500 motherboard uses a RTC and a CMOS chip.

### C.5.1.3 SCSI I/O Clock

The UltraSCSI IV 320 SCSI controller uses a 40 MHz clock driven by a discrete oscillator.

### C.5.1.4 Gigabit Ethernet Clock

The Gigabit Ethernet clock operates at 25 MHz.

### C.5.1.5 System Tick (Stick) Clock

The system clock operates at 12 MHz.

# C.6 Graphics Accelerators

The Sun Blade 2500 base configurations include one of the following graphics accelerators:

- "Sun XVR-600" on page C-31
- "Sun XVR-100" on page C-34
- "Sun XVR-1200" on page C-35

## C.6.1 Multiple Graphic Accelerators Installed in a Single Workstation

A single Sun Blade 2500 motherboard can support multiple Sun XVR-100, Sun XVR-600, and Sun XVR-1200 graphics accelerators. The PCI bus that these accelerators share can be reconfigured to allow the probe order of each console device to be changed. For additional information about multiple graphic accelerators installed in a single workstation See "Special Considerations for Multiple Graphic Accelerators Installed in a Single Workstation" on page 11-50.

## C.6.2 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$^2$, 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.6.2.1 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 × 1536 × 40 Hz at 24-bit color

- 1920 × 1200 screen support
- 1280 × 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.6.2.2 Screen Resolutions and Video Formats

TABLE C-9 lists the monitor screen resolutions and video formats supported by the Sun XVR-600 graphics accelerator:

**TABLE C-9** Sun XVR-600 Graphics Accelerator Monitor Screen Resolutions

| Display Resolution | Vertical Refresh Rate | Sync Standard | Aspect Ratio Format | SPP[1] 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 |

**TABLE C-9** Sun XVR-600 Graphics Accelerator Monitor Screen Resolutions *(Continued)*

| Display Resolution | Vertical Refresh Rate | Sync Standard | Aspect Ratio Format | SPP[1] Single Screen |
|---|---|---|---|---|
| 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 |
| 800 × 600 | 75 | VESA | 4:3 | 4 |
| 640 x 480 | 60 Hz | VESA | 4:3 | 8 |

1. Samples Per Pixel (SPP).

# C.6.3 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-10 lists the monitor screen resolutions and video formats supported by the Sun XVR-100 graphics accelerator.

**TABLE C-10** Sun XVR-100 Graphics Accelerator Monitor Screen Resolutions

| Display Resolution | Vertical Refresh Rate | Sync Standard | Aspect Ratio Format |
|---|---|---|---|
| 1920 x 1200 | 60 Hz (DVI-D port) See Note. | Sun | 16:10 |

**TABLE C-10** Sun XVR-100 Graphics Accelerator Monitor Screen Resolutions *(Continued)*

| Display Resolution | Vertical Refresh Rate | Sync Standard | Aspect Ratio Format |
|---|---|---|---|
| 1920 x 1200 | 60, 70, 75 Hz (HD-15 port) | Sun | 16:10 |
| 1920 x 1080 | 60, 72 Hz | Sun | 16:9 |
| 1600 x 1280 | 76 Hz | Sun | 5:4 |
| 1600 x 1200 | 65, 70, 75, 85 Hz | VESA | 4:3 |
| 1600 x 1000 | 66, 76 Hz | Sun | 16:10 |
| 1440 x 900 | 76 Hz | Sun | 16:10 |
| 1280 x 1024 | 60, 75, 85 Hz | VESA | 5:4 |
| 1280 x 1024 | 67, 76 Hz | Sun | 5:4 |
| 1280 x 800 | 76 Hz | Sun | 16:10 |
| 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.6.4 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$^2$, 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.6.4.1 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 × 1536 × 40 at 30-bit color
- Dual 1920 × 1200 screens support from a single board
- Dual 1280 × 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.6.4.2 Screen Resolutions and Video Formats

TABLE C-11 lists the monitor screen resolutions and video formats supported by the Sun XVR-1200 graphics accelerator. TABLE C-11 also includes the maximum samples per pixel (ssp) for single and dual display configurations.

**TABLE C-11** Sun XVR-1200 Graphics Accelerator Screen Resolutions

| Display Resolution | Vertical Refresh Rate | Sync Standard | Aspect Ratio Format | SPP[1] Single Screen | SPP[1] 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 |

**TABLE C-11** Sun XVR-1200 Graphics Accelerator Screen Resolutions *(Continued)*

| Display Resolution | Vertical Refresh Rate | Sync Standard | Aspect Ratio Format | SPP[1] Single Screen | SPP[1] Dual Screen |
|---|---|---|---|---|---|
| 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 |
| 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 × 600 | 75 | VESA | 4:3 | 8 | 4 |
| 640 x 480 | 60 Hz | VESA | 4:3 | 16 | 8 |

1. Samples Per Pixel (SPP).

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.7 System Interfaces

## C.7.0.1 Gigabit Ethernet

The Sun Blade 2500 system supports one on-board G-bit Ethernet controller. See FIGURE C-12. It is based on an integrated MAC/PHY controller. The G-bit Ethernet controller operates at link rates of 10 Mb per second, 100 Mb per second, and 1000 Mb per second.

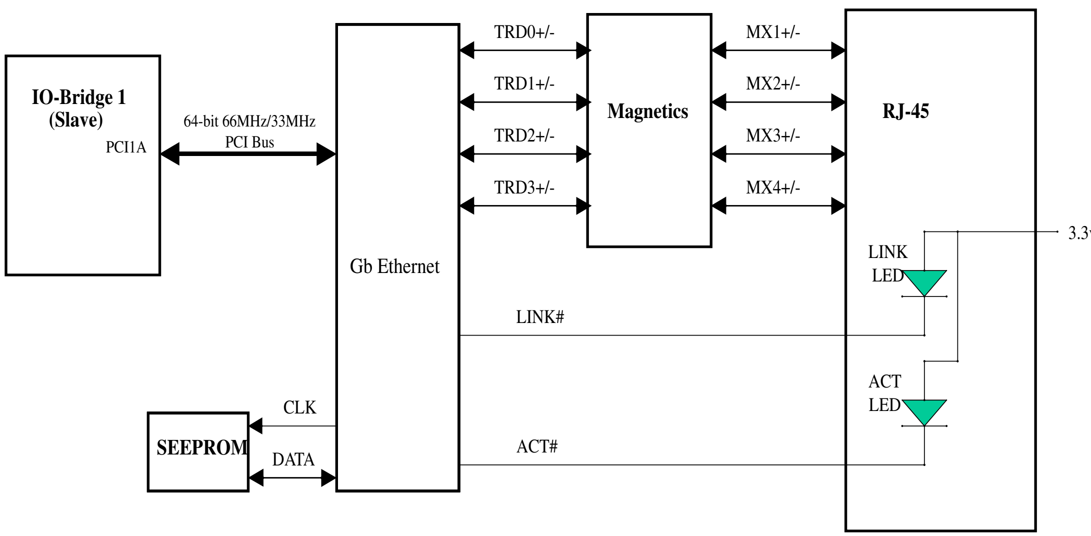


**FIGURE C-12** Gigabit Ethernet Block Diagram

### *G-bit Ethernet Features*

- Integrated 10BASE-T/100BASE-TX/1000BASE-T transceivers
- Full duplex support in G-Bit mode
- 10/100/1000 tri-speed MAC
- 64 bit/66 MHz 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, in-line packet classification
- TCP, IP, UDP checksum
- TCP segmentation
- CPU task off load
- Adaptive interrupts
- Priority queuing-802.lp Layer 2 priority encoding support for four priority queues
- Virtual LANs-802.lq VLAN tagging support for up to 64 VLANs
- Jumbo frames (9 KB)
- 802.3 flow control
- Link aggregation-802.3ad, GEC/FEC, Smart Load Balancing (supports heterogeneous teams)
- 300-pin HBGA package
- 3.3V I/Os

### *G-bit Diagnostic LEDs*

The Sun Blade 2500 TPE connector supports two LEDs, one indicating that a link is established and another indicating link traffic. The two LEDs are:

- **LINK (Green):** LED is *ON* when link detected for either 10/100/1000.
- **ACT (Amber):** LED *TOGGLES* for each transmit or receive activity.

## C.7.0.2 SCSI Subsystem

The Sun Blade 2500 SCSI subsystem supports two UltraSCSI IV 320 drives. The drives are interfaced to the backplane through two SCA-2 SCSI connectors. See FIGURE C-14.

### *SCSI Controller*

The Sun Blade 2500 motherboard uses a dual-channel UltraSCSI IV 320 controller. One of the channels is for internal drives. The second channel is for external drives. See FIGURE C-13.

The UltraSCSI IV 320 controller uses a 40 MHz clock driven by a discrete oscillator.

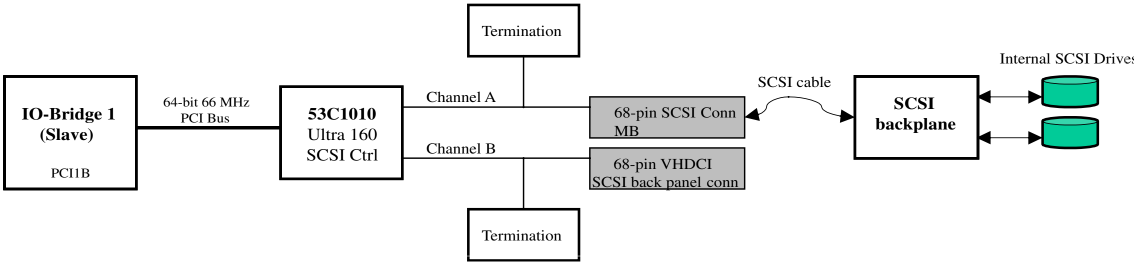


**FIGURE C-13** SCSI Subsystem Block Diagram

### *SCSI Connector*

The internal SCSI connector is a 68-pin shrouded SCSI connector.

### *SCSI Backplane*

Even though the backplane can electrically support hot-plug SCSI drives, the Sun Blade 2500 workstation does not support this feature. To support Energy Star, each drive can have the power removed by writing to a GPIO bit. See "PCA GPIO Registers" on page C-47.

FIGURE C-14 describes the electrical operation of the backplane.

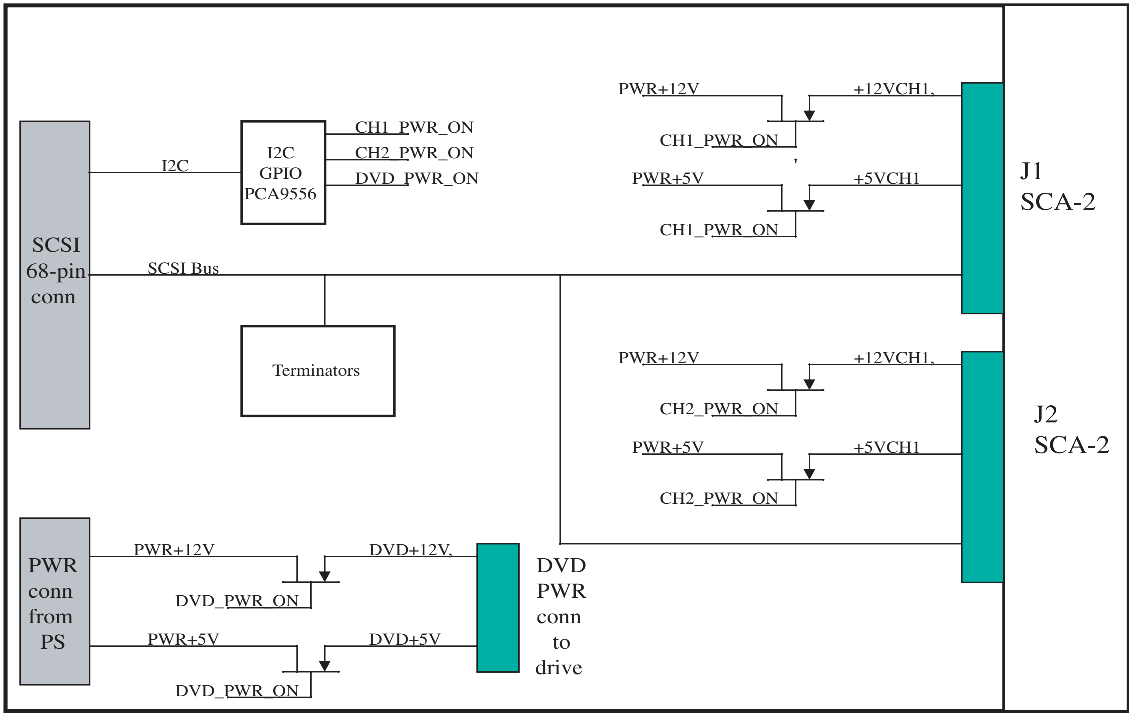


**FIGURE C-14** SCSI Backplane Block Diagram

## *SCSI Cable*

TABLE C-12 is a description of the physical characteristics of the SCSI cable used in the Sun Blade 2500 workstation.

**TABLE C-12** Physical Characteristics of the SCSI Cable

| Characteristic | Description |
|---|---|
| Conductors | 30 AWG Solid Tinned Copper |
| Insulation | 0.007 TPE |
| Color Code | First pair blue and white, followed by orange and white and report |
| Laminate | Polyester |
| Temperature Rating | 80º C |

**TABLE C-13** Electrical Characteristics of the SCSI Cable

| Characteristic | Value |
|---|---|
| Impedance | 93 Ohms* |
| | 131 Ohms† |
| Capacitance | 15.3 pF/ft. @ 1 MHz[1] |
| | 11.4 pF/ft. @ 1 MHz[2] |
| Propagation Delay | 14.5 ns/ft. |
| Voltage Rating | 150V |
| Current Rating | 0.75A |
| DC Resistance | 105 Ohms/1000 ft. @ 20º C |
| Approvals | CAS AWM |

* Above values measured single-ended, with one conductor of each pair common to one bus (SCSI mode).

† Above values measured differentially.

### *SCSI Drives*

The SCSI drives have a spin-down mode that is controlled by FET switches. The FET switches are located on the SCSI backplane and are controlled through GPIO pins from the I2C device on the SCSI backplane.

---

**Note –** The Sun Blade 2500 system does not support hot-plugging.

---

## C.7.0.3 Southbridge

The Sun Blade 2500 motherboard uses the Southbridge ASIC. This ASIC is a highly integrated system I/O chipset in a 328-pin BGA package that provides an interface between PCI and the:

- USB
- IDE
- Serial port
- Parallel port
- Audio module
- XBus
- System Management Bus

The Sun Blade 2500 system uses 13 general-purpose I/Os on the Southbridge.

### C.7.0.4 Serial Ports (2)

The system supports two DB-9 serial ports which are 16450/16550 compatible Universal Asynchronous Receiver Transmitter (UARTs) with 16-byte FIFOs. The serial ports have a programmable baud rate generator.

### C.7.0.5 Parallel Port

The parallel port supports ECP/EPP/PS/2/SPP and IEEE 1284 compliance.

### C.7.0.6 Smart Card Reader

The M1535D+ provides a System Management Bus (SMBus) host controller. The controller provides a communication channel for $I^2C$ devices using the SMBus protocol. In the Sun Blade 2500 system, 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-14 lists the functions of the smart card reader LED.

**TABLE C-14** 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.7.0.7 USB Interface

The USB interface on the Southbridge supports six USB 1.1 ports. The Sun Blade 2500 motherboard has four ports (USB0 and USB1) for the USB keyboard and mouse.

### *PCI IDE Controller*

There are two channels of IDE within the IDE controller to support a maximum of four devices. Each channel can operate independently at DMA mode-4 speed. The target devices are optical drives. The Sun Blade 2500 system supports both channels on the motherboard, however, the secondary channel is cabled to the optical drive and the primary channel is connected to the CD-RW drive.

The PCI IDE controller:

- Supports PCI bus mastering at a transfer rate of 132 MB per second.
- Contains two separate IDE channels that support Ultra 100 high performance ATA bus for 100 MB transfer rate and concurrent operation.
- Has dedicated ATA bus pins and buffers for each channel.

## C.7.0.8 Audio Module

The audio module plugs into the audio module connector. The audio module features (FIGURE C-15):

- Audio CODEC
- Four audio ports: Line-in, Line-out, Headphone, and Microphone
- Speaker output
- DB-9 serial port
- FRU-ID ROM

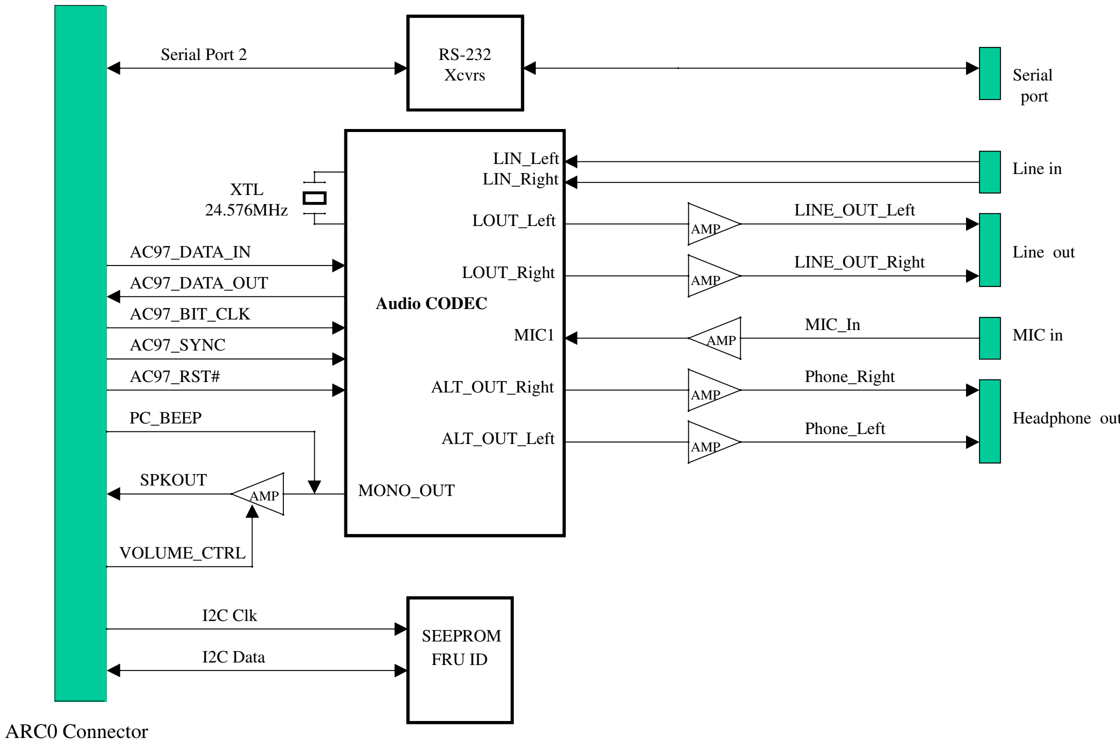


**FIGURE C-15** Audio Module Block Diagram

### *AC97-Compliant Audio Interface*

The AC link controller provides a cost-effective audio solution with any AC97-compliant Audio CODEC. The CODEC interface is fully compliant to AC97 version 2.1.

An internal speaker is connected to the motherboard through the audio module connector and used by software to make "beep" sounds as well as to provide audio sound output.

## C.7.0.9 System Management Bus Interface

The System Management Bus (SMBus) host controller provides the communication channel with other serial devices through SMBus protocol. In the Sun Blade 2500 system, this SMbus is connected to the smart card reader only.

### C.7.0.10 Static Memory

The Sun Blade 2500 system provides 32 KB of static memory that is used by POST software.

## C.8 General Purpose Input and Output Registers

### C.8.0.1 I/O bridge GPIO Registers

The I/O bridge has four General Purpose Input Output (GPIO) pins. These pins are used as two pseudo-I2C buses in the system. Software mimics I2C protocol through "bit-banging" the GPIO registers. Southbridge GPIO Registers

#### *PCA GPIO Registers*

The PCA is an I2C GPIO device physically located on the SCSI backplane and is part of the I2C bus. It controls the power FETs for the SCSI drives and the DVD drive.

**TABLE C-15** PCA9556 @0x30 GPIO Data Register

| Bits | Fields | Description | Reset Value | Type |
|---|---|---|---|---|
| 0 | GPIO0 | Not used | | |
| 1 | GPIO1 | 0= HD Slot 0 power is OFF<br>1= HD Slot 0 power is ON | 1 | R/W |
| 3:2 | GPIO3:2 | Not used | 1 | R/W |
| 4 | GPIO4 | 0= DVD power is OFF<br>1= DVD power is ON | 1 | R/W |
| 6:5 | GPIO6:5 | Not used | | |
| 7 | GPIO7 | 0= HD Slot 1 power is OFF<br>1= HD Slot 1 power is ON | 1 | R/W |

# C.9 System Thermal Management

## C.9.0.1 Fan Speed Control

The Sun Blade 2500 motherboard uses two ASICs to monitor CPU and ambient temperature and to control and monitor system fans. FIGURE C-16 shows how the ASICs are used in the system.

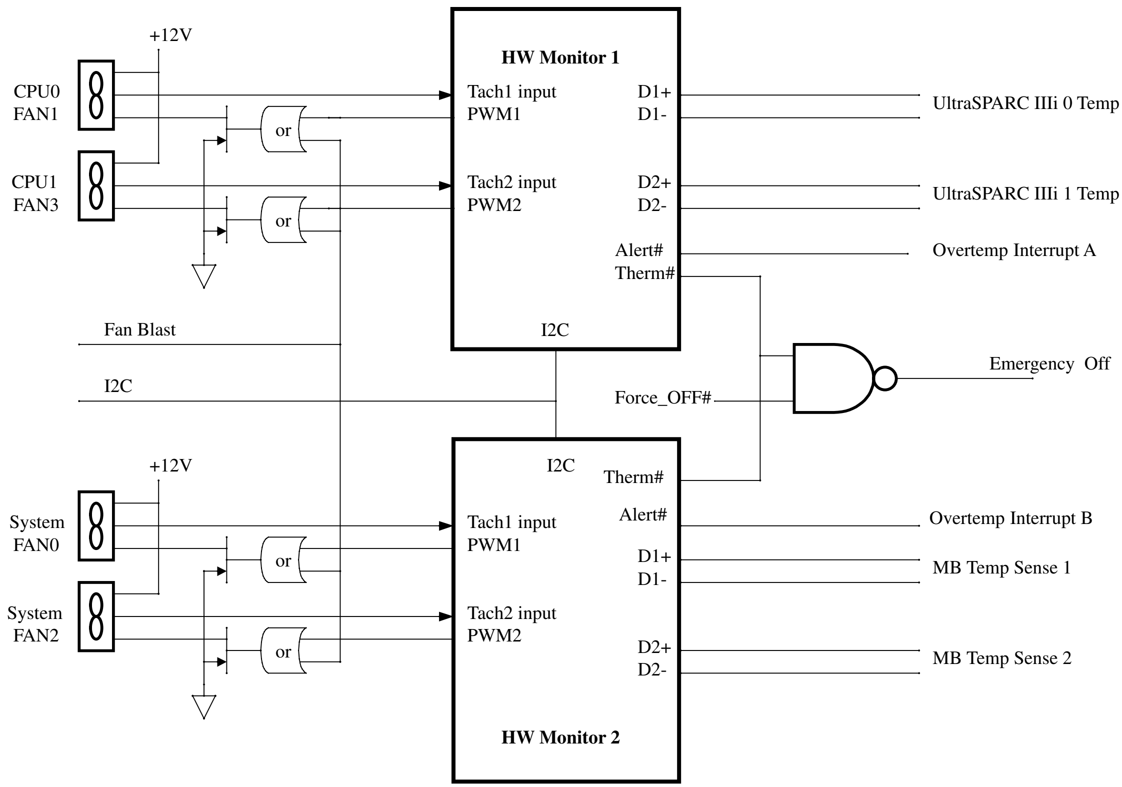


**FIGURE C-16** Fan Control and Temperature Sensing Block Diagram

The Sun Blade 2500 system monitors six temperatures:

- UltraSPARC IIIi 0 (internal in CPU)
- UltraSPARC IIIi 1 (internal in CPU)
- Motherboard (MB) temp sense 1
- Motherboard (MB) temp sense 2
- Ambient (monitored internally in the ASIC HW Monitor 1)

- Ambient (monitored internally in the ASIC HW Monitor 2)

All six temperature readings can be read through PICL software.

The Sun Blade 2500 workstation supports four system fans (two fans for `CPU0` and `CPU1` and two fans for the system). The speed of the four fans is controlled by the PWM outputs of the two ASICs. All four fans are controlled individually. The ASIC controls fan speed according to temperature without intervention from the host processor.

### *Fan Blast*

During OBP boot and before the ADM drivers are loaded, the fans are turned on to their maximum speed by using the fan blast function.

After the ADMs are initialized and the automatic fan speed control bit is set, fan speed control is handed over to the hardware monitors and the Fan Blast bit is cleared to 0.

### *Fan Speed Monitoring*

The Sun Blade 2500 system can monitor the speed of the four system fans through the Tach inputs. These inputs are driven by the Fan Tach outputs of the fan.

### *Thermal Shutdown*

If the temperature exceeds the temperature high limit, the ADM generates an over-temperature interrupt (INT/ALERT) to cause the software to turn off the system. If the temperature exceeds the temperature THERM limit, the ADM generates an emergency off (THERM output) to turn off the power supply without software intervention.

# C.10 System Power Management

## C.10.1 Power Management Registers for SCSI and Optical Drives

The power FETs for the SCSI drives and the optical drive are controlled through the GPIO registers on the I2C GPIO device (PCA) on the SCSI backplane as described in TABLE C-16.

**TABLE C-16** PCA@0x30 GPIO Data Register

| Bits | Fields | Description | Reset Value | Type |
|---|---|---|---|---|
| 0 | GPIO0 | Not used | | |
| 1 | GPIO1 | 0= HD Slot 0 power is OFF<br>1= HD Slot 0 power is ON | 1 | R/W |
| 3:2 | GPIO3:2 | Not used | 1 | R/W |
| 4 | GPIO4 | 0= DVD power is OFF<br>1= DVD power is ON | 1 | R/W |
| 6:5 | GPIO6:5 | Not used | | |
| 7 | GPIO7 | 0= HD Slot 1 power is OFF<br>1= HD Slot 1 power is ON | 1 | R/W |

APPENDIX **D**

# Power Management

This chapter discusses power management. Topics include:



## D.1 Power Management Overview

To help conserve energy, the Sun Blade 2500 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 2500 system 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<br>Drives are configured: 15 min, 30 min, 1 hr, 2 hr, or Always On<br>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 2500 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 the when the Sun Blade 2500 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 2500 system 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 2500 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 autoshutdown 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.

**ADM driver** Hardware monitor drivers that control ADM1031 chips (used for temperature sensing and fan control).

**ASIC** Application-specific integrated circuit.

**ASP** Authorized service provider.

## 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.

## C

**CAS** Column address select. Determines address locations in memory.

**CDE** Common Desktop Environment.

**CD-ROM** Compact disc read-only memory. A CD-ROM drive reads data recorded on the CD-ROM optical disc.

**C-RW** Rewriteable 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 $I^2C$ 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 in-line 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.

**dpi** Dots per inch.

**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.

**EIDE** Enhanced integrated drive electronics. An interface for mass storage devices. The controller is integrated with the disk or CD-ROM drive.

**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

**FCC** Federal Communications Commission.

**FET** Field effect transistor.

**flash PROM** Flash programmable read-only memory.

**FPU** Floating-point unit. A device (board or integrated circuit) that performs floating-point calculations.

# G

**G-bit** (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.

**GBps** Gigabytes per second.

**Gbps** Gigabits 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

**$I^2C$** 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. See also EIDE.

**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 lover 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.

**IOMMU** I/O memory mapping unit.

**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.

**JTAG** Joint Test Action Group which developed the IEEE standard 1149.1.

# 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** Megabytes per second.

**Mbps** Megabits per second.

**MCU** Memory controller unit.

**MHz** Megahertz.

**MII** Media independent interface.

**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

**ns** Nanosecond. $10^{-9}$ seconds.

**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.

**PCMCIA** Personal Computer Memory Card International Association.

**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. Initialized at system power-on or when the system is rebooted.

**PROM** Programmable read-only memory. After the PROM has been programmed, it cannot be reprogrammed. See flash PROM

## R

**RAS** Row address select.

**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 $I^2C$ 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** 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.

**STP** Shielded twisted-pair.

**SunVTS** A diagnostic application designed to test hardware.

**super-scalar** 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.

**TPE** Twisted-pair Ethernet.

**TOD** Time of day. A timekeeping integrated circuit.

**TQFP** Thin quad flat package.

**TTL** Transistor-transistor logic.

## U

**UARTS** 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).

**Vrms** Volts root mean square.

## X

**XOR** See interleaving.

# Index

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## J



## K



## L



## M

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## W



## X