



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

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# Contents

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**Preface xxxi**

**1. Start Here 1-1**

- 1.1 Diagnostic Tools Available 1-1
- 1.2 Additional Support Resources 1-2
- 1.3 About Troubleshooting Flowcharts 1-4
- 1.4 Start Here Flowchart 1-5

**2. Product Description 2-1**

- 2.1 Product Overview 2-1
- 2.2 Configured Features 2-2
- 2.3 External System Description 2-3
- 2.4 Replaceable Hardware Components 2-7
- 2.5 Supported Sun Monitors 2-10

**3. Basic Troubleshooting 3-1**

- 3.1 Power-On Sequence 3-1
  - 3.1.1 Power-On Sequence List 3-1
  - 3.1.2 Power-On Flowchart 3-2
- 3.2 Display and Audio Responses 3-5
  - 3.2.1 Displayed Screens 3-5

- 3.2.2 Audio Responses 3-8
- 3.3 Displayed Messages 3-10
  - 3.3.1 OpenBoot PROM Messages 3-11
  - 3.3.2 Solaris Error Messages 3-13
  - 3.3.3 Other Messages 3-16
- 3.4 Troubleshooting Commands 3-17
  - 3.4.1 iostat Command 3-17
  - 3.4.2 prtdiag Command 3-19
  - 3.4.3 prtconf Command 3-23
  - 3.4.4 netstat Command 3-26
  - 3.4.5 ping Command 3-28
  - 3.4.6 ps Command 3-30
  - 3.4.7 prstat Command 3-32

#### **4. Troubleshooting Flowcharts 4-1**

- 4.1 Power Problem 4-2
- 4.2 Hard Drive Problem 4-4
- 4.3 System Fan Problem 4-5
- 4.4 USB Problem 4-6
- 4.5 Audio Output Problem 4-8
- 4.6 Monitor Problem 4-10
- 4.7 Network Problem 4-13
- 4.8 Keyboard Problem 4-15
- 4.9 Login Problem 4-16
- 4.10 Graphical User Interface Problem 4-18
- 4.11 Data Access and Running Applications Problem 4-19
- 4.12 DVD-ROM Drive Problem 4-20
- 4.13 PCI Card Problem 4-23
- 4.14 IEEE 1394 Problem 4-25

- 4.15 Smart Card Reader Problem 4-27
- 4.16 Motherboard Problem 4-28
- 4.17 Memory Problem 4-31
- 4.18 NVRAM Problem 4-33
- 4.19 Battery Problem 4-34
  
- 5. Introduction to Advanced Troubleshooting 5-1**
  - 5.1 About NVRAM 5-1
    - 5.1.1 NVRAM Overview 5-1
  - 5.2 Obtaining the ok Prompt 5-2
  - 5.3 Diagnostic Tests Summary 5-3
  - 5.4 About Power-on Self-test 5-4
    - 5.4.1 POST Overview 5-4
    - 5.4.2 Configuring POST Output 5-5
  - 5.5 About OpenBoot PROM 5-5
    - 5.5.1 OpenBoot PROM Overview 5-5
    - 5.5.2 OpenBoot Diagnostics 5-5
  - 5.6 About SunVTS Software 5-6
    - 5.6.1 SunVTS Overview 5-6
    - 5.6.2 How to Use SunVTS 5-6
    - 5.6.3 SunVTS Requirements 5-6
    - 5.6.4 SunVTS References 5-7
  - 5.7 About Sun Install Check 5-7
    - 5.7.1 Sun Install Check Overview 5-7
    - 5.7.2 Downloading Sun Install Check 5-7
  - 5.8 About Sun Blade 1500 Software Enhancement Script 5-8
    - 5.8.1 Software Enhancement Script Overview 5-8
    - 5.8.2 Using the Sun Blade 1500 Software Enhancement Script 5-9
    - 5.8.3 Using the patchadd Command 5-11

## **6. NVRAM 6-1**

- 6.1 Changing NVRAM Configuration Parameter Values 6-1
  - 6.1.1 Displaying and Changing Parameter Values 6-2
- 6.2 Setting NVRAM Security Mode 6-6
  - 6.2.1 Configuring for Security Mode 6-7
- 6.3 eeprom Command 6-8
- 6.4 Key Commands 6-9
  - 6.4.1 Stop-A Command 6-9
  - 6.4.2 Stop-N Equivalent Command Procedure 6-10

## **7. Power-On Self-Test 7-1**

- 7.1 Levels of POST 7-1
  - 7.1.1 diag-level Variable Set to min Level 7-1
  - 7.1.2 diag-level Variable Set to max Level 7-2
  - 7.1.3 diag-level Variable Set to off Level 7-2
- 7.2 Setting Up POST 7-2
  - 7.2.1 Enabling POST From the ok Prompt 7-2
  - 7.2.2 Enabling POST From a Terminal Window 7-3
  - 7.2.3 Verifying the Baud Rate 7-3
  - 7.2.4 Viewing POST Output From an External Display Device 7-3
- 7.3 Running POST 7-5
- 7.4 POST Output 7-6
  - 7.4.1 Minimum Level Output Comparison 7-6
  - 7.4.2 Maximum Level Output Comparison 7-10
- 7.5 Analyzing POST Results 7-15
  - 7.5.1 Error Messages 7-15
  - 7.5.2 Warning Messages 7-16
  - 7.5.3 Info Messages 7-17

## **8. OpenBoot PROM 8-1**

- 8.1 OpenBoot PROM Utilities 8-1
  - 8.1.1 show-devs Utility 8-2
  - 8.1.2 watch-net Utility 8-2
  - 8.1.3 probe-ide Utility 8-3
  - 8.1.4 banner Utility 8-3
  - 8.1.5 watch-clock Utility 8-4
  - 8.1.6 date Utility 8-4
  - 8.1.7 .version Utility 8-4
- 8.2 OpenBoot Diagnostics 8-5
  - 8.2.1 Starting OpenBoot Diagnostics 8-5
  - 8.2.2 obdiag Menu 8-6
  - 8.2.3 Configuring OpenBoot Diagnostics 8-7
  - 8.2.4 Initiating a Test 8-7
  - 8.2.5 Test Output 8-7
  - 8.2.6 OpenBoot Diagnostics Tests 8-8

## **9. SunVTS 9-1**

- 9.1 Installing SunVTS 9-1
- 9.2 Exercising System Components Using SunVTS Software 9-2
  - 9.2.1 Connection Mode 9-2
  - 9.2.2 Connection Mode Component Testing 9-2
  - 9.2.3 Functional Mode 9-6
  - 9.2.4 Functional Mode Component Testing 9-7
- 9.3 Further SunVTS Testing 9-10

## **10. Preparing to Replace Components 10-1**

- 10.1 Safety Information 10-1
  - 10.1.1 Safety Precautions 10-2

- 10.1.2 Safety Symbols 10-2
- 10.1.3 Electrostatic Discharge Safety 10-2
- 10.2 Required Tools 10-3
- 10.3 Powering Off the Workstation 10-4
  - 10.3.1 Identifying the Power Button 10-4
  - 10.3.2 Powering Off Methods 10-5
  - 10.3.3 Shutting Down Gracefully 10-6
  - 10.3.4 Performing a Forced Shutdown 10-9
- 10.4 Removing the Access Panel 10-12
- 10.5 Removing the Bezel 10-14
- 10.6 Positioning the Chassis 10-16
- 10.7 Finding Your Replacement Procedures 10-18
- 11. Replacing the Motherboard and Associated Components 11-1**
  - 11.1 Replacing the DIMMs 11-2
    - 11.1.1 Identifying the DIMMs 11-2
    - 11.1.2 Removing DIMMs 11-3
    - 11.1.3 Installing DIMMs 11-8
    - 11.1.4 OpenBoot PROM Memory Message 11-13
  - 11.2 Replacing the CPU Fan and Heatsink Assembly 11-14
    - 11.2.1 Identifying the CPU Fan and Heatsink Assembly 11-14
    - 11.2.2 Removing the CPU Fan and Heatsink Assembly 11-15
    - 11.2.3 Installing the CPU Fan and Heatsink Assembly 11-19
  - 11.3 Replacing the Battery 11-23
    - 11.3.1 Identifying the Battery 11-24
    - 11.3.2 Removing the Battery 11-24
    - 11.3.3 Installing the Battery 11-25
  - 11.4 Replacing the NVRAM 11-26
    - 11.4.1 Identifying the NVRAM 11-27



- 11.4.2 Removing the NVRAM 11-27
- 11.4.3 Installing the NVRAM 11-28
- 11.5 Replacing the PCI Cards 11-29
  - 11.5.1 Identifying the PCI Cards 11-30
  - 11.5.2 Removing a PCI Card 11-30
  - 11.5.3 General PCI Card Guidelines 11-34
  - 11.5.4 Special Considerations for Graphics Accelerators 11-36
  - 11.5.5 Installing a PCI Card 11-40
- 11.6 Replacing the Motherboard 11-46
  - 11.6.1 Identifying the Motherboard 11-46
  - 11.6.2 Removing the Motherboard 11-48
  - 11.6.3 Installing the Motherboard 11-52
- 12. Replacing Storage Devices 12-1**
  - 12.1 Replacing a Hard Drive 12-2
    - 12.1.1 Identifying the Hard Drive 12-2
    - 12.1.2 Removing a Hard Drive 12-3
    - 12.1.3 Installing the Hard Drive 12-6
  - 12.2 Replacing the DVD-ROM Drive 12-9
    - 12.2.1 Identifying the DVD-ROM Drive 12-10
    - 12.2.2 Removing the DVD-ROM Drive 12-10
    - 12.2.3 Installing the DVD-ROM Drive 12-13
  - 12.3 Replacing the Smart Card Reader 12-15
    - 12.3.1 Identifying the Smart Card Reader 12-15
    - 12.3.2 Removing the Smart Card Reader 12-16
    - 12.3.3 Installing the Smart Card Reader 12-20
- 13. Replacing Chassis Components 13-1**
  - 13.1 Replacing the Power Supply 13-2

- 13.1.1 Identifying the Power Supply 13-2
- 13.1.2 Removing the Power Supply 13-3
- 13.1.3 Installing the Power Supply 13-5
- 13.2 Replacing the Front Fan 13-8
  - 13.2.1 Identifying the Front Fan 13-8
  - 13.2.2 Removing the Front Fan 13-9
  - 13.2.3 Installing the Front Fan 13-11
- 13.3 Replacing the Rear Fan 13-15
  - 13.3.1 Identifying the Rear Fan 13-15
  - 13.3.2 Removing the Rear Fan 13-16
  - 13.3.3 Installing the Rear Fan 13-18
- 13.4 Replacing the DIMM Cooling Duct 13-22
  - 13.4.1 Identifying the DIMM Cooling Duct 13-22
  - 13.4.2 Removing the DIMM Cooling Duct 13-23
  - 13.4.3 Installing the DIMM Cooling Duct 13-27
- 13.5 Replacing the Audio USB Board 13-31
  - 13.5.1 Identifying the Audio USB Board 13-31
  - 13.5.2 Removing the Audio USB Board 13-32
  - 13.5.3 Installing the Audio USB Board 13-36
- 13.6 Replacing the Speaker 13-40
  - 13.6.1 Identifying the Speaker 13-40
  - 13.6.2 Removing the Speaker 13-41
  - 13.6.3 Installing the Speaker 13-43
- 13.7 Replacing the PCI Card Support 13-46
  - 13.7.1 Identifying the PCI Card Support 13-46
  - 13.7.2 Removing the PCI Card Support 13-46
  - 13.7.3 Installing the PCI Card Support 13-48
- 13.8 Replacing the Chassis Cross Brace 13-50

- 13.8.1 Identifying the Chassis Cross Brace 13-50
- 13.8.2 Removing the Chassis Cross Brace 13-51
- 13.8.3 Installing the Chassis Cross Brace 13-54
- 13.9 Replacing the Drive Rails 13-60
  - 13.9.1 Identifying the Drive Rails 13-60
  - 13.9.2 Removing the Drive Rails 13-60
  - 13.9.3 Installing the Drive Rails 13-62
- 14. Replacing Internal Cables 14-1**
  - 14.1 Replacing the Smart Card Reader Cable 14-3
    - 14.1.1 Identifying the Smart Card Reader Cable 14-4
    - 14.1.2 Removing the Smart Card Reader Cable 14-4
    - 14.1.3 Installing the Smart Card Reader Cable 14-5
  - 14.2 Replacing the DVD-ROM Drive Interface Cable 14-6
    - 14.2.1 Identifying the DVD-ROM Drive Interface Cable 14-7
    - 14.2.2 Removing the DVD-ROM Drive Interface Cable 14-7
    - 14.2.3 Installing the DVD-ROM Drive Interface Cable 14-8
  - 14.3 Replacing the Hard Drive Interface Cable 14-10
    - 14.3.1 Identifying the Hard Drive Interface Cable 14-10
    - 14.3.2 Removing the Hard Drive Interface Cable 14-11
    - 14.3.3 Installing the Hard Drive Interface Cable 14-12
  - 14.4 Replacing the IDE Power Cable 14-13
    - 14.4.1 Identifying the IDE Power Cable 14-13
    - 14.4.2 Removing the IDE Power Cable 14-14
    - 14.4.3 Installing the IDE Power Cable 14-16
  - 14.5 Replacing the Power Switch Assembly 14-17
    - 14.5.1 Identifying the Power Switch Assembly 14-18
    - 14.5.2 Removing the Power Switch Assembly 14-18
    - 14.5.3 Installing the Power Switch Assembly 14-20

- 14.6 Replacing the Audio USB Board Cables 14-23
  - 14.6.1 Identifying Audio USB Board Cables 14-23
  - 14.6.2 Removing the Audio USB Board Cables 14-24
  - 14.6.3 Installing the Audio USB Board Cables 14-27

## **15. Finishing Component Replacement 15-1**

- 15.1 Repositioning the Chassis 15-1
- 15.2 Installing the Bezel 15-2
- 15.3 Installing the Access Panel 15-5
- 15.4 Powering On the Workstation 15-8
  - 15.4.1 Reconnecting Power and External Peripherals 15-8
  - 15.4.2 Choosing the Boot Mode 15-10
- 15.5 Verifying an Installation 15-11

## **16. Customizing Your System 16-1**

- 16.1 Optional PCI Cards 16-1
- 16.2 Internal Component Upgrades 16-5
- 16.3 External Peripherals 16-6

### **A. Product Specifications A-1**

- A.1 Physical Specifications A-1
- A.2 Electrical Specifications A-2
- A.3 Acoustic Specifications A-2
- A.4 Environmental Requirements A-2
- A.5 Shock and Vibration Specifications A-3

### **B. Signal Descriptions B-1**

- B.1 External Connectors B-2
  - B.1.1 Audio Jacks B-2
  - B.1.2 IEEE 1394 Ports B-2

B.1.3	Parallel Port	B-3
B.1.4	Serial Ports	B-4
B.1.5	Twisted-Pair Ethernet Port	B-5
B.1.6	USB Ports	B-6
B.1.7	Video Ports	B-7
B.2	Internal Connectors	B-10
B.2.1	Fan Connectors	B-10
B.2.2	Front Audio Connector	B-10
B.2.3	Front USB Connector	B-11
B.2.4	IDE Interface Connectors	B-12
B.2.5	IDE Power Connector	B-14
B.2.6	Power Supply Connectors	B-14
B.2.7	Power Switch Connector	B-17
B.2.8	Smart Card Reader Connector	B-17
B.2.9	Speaker Connector	B-18
<b>C.</b>	<b>Functional Description</b>	<b>C-1</b>
C.1	Hardware Architecture	C-1
C.1.1	Component Introduction	C-1
C.1.2	System Block Diagram	C-2
C.1.3	Enclosure	C-3
C.2	Motherboard	C-4
C.2.1	Motherboard Block Diagram	C-4
C.2.2	Motherboard Layout Diagram	C-5
C.2.3	Motherboard Jumpers	C-8
C.3	CPU and Memory	C-9
C.3.1	CPU Description	C-9
C.3.2	Caches	C-9
C.3.3	Memory Controller	C-11

- C.3.4 Memory Block Diagram C-11
- C.3.5 DIMM Configurations C-13
- C.3.6 Memory Interleaving C-13
- C.4 Internal Interfaces C-15
  - C.4.1 JBus and JIO C-15
  - C.4.2 PCI Bus and ASICS C-17
  - C.4.3 Graphics Accelerators C-20
  - C.4.4 Other Buses C-27
- C.5 System Clocks and Interrupts C-28
  - C.5.1 Clock Generation C-28
  - C.5.2 Interrupt Map C-29
- C.6 External Interfaces C-31
  - C.6.1 ATA 100 C-31
  - C.6.2 Smart Card Reader C-32
  - C.6.3 USB C-32
  - C.6.4 Audio C-33
  - C.6.5 PCI Slots C-33
  - C.6.6 IEEE 1394 USB 2 Combination Card C-33
  - C.6.7 Ethernet C-34
  - C.6.8 Parallel C-34
  - C.6.9 Serial C-34
- C.7 System Thermal Management C-36
  - C.7.1 Cooling Fan Control C-36
- C.8 System Power Management C-37
  - C.8.1 Energy Star C-38
  - C.8.2 Power Budget C-38
  - C.8.3 Peripheral Power Supply C-39

## **D. Power Management D-1**

- D.1 Enabling Power Management D-2
  - D.1.1 Scenarios for the Example Configuration D-3
  - D.1.2 Activating the Workstation From Low-Power Mode D-4
- D.2 Disabling Power Management D-5
  - D.2.1 Disabling Hard Drive Power Management D-5
  - D.2.2 Disabling All System Power Management D-5

**Glossary Glossary-1**

**Index Index-1**





# Figures

---

- FIGURE 1-1 Start Here Flowchart 1–5
- FIGURE 2-1 Sun Blade 1500 Workstation, Monitor, Keyboard and Mouse 2–4
- FIGURE 2-2 Bezel Overview, Sun Blade 1500 Workstation 2–5
- FIGURE 2-3 Back Panel Overview, Sun Blade 1500 Workstation 2–6
- FIGURE 2-4 Exploded Diagram of Sun Blade 1500 Workstation Replaceable Components 2–8
- FIGURE 3-1 Power-On Flowchart 3–3
- FIGURE 3-2 Power-On Flowchart (*Continued*) 3–4
- FIGURE 3-3 Displayed Messages Flowchart 3–11
- FIGURE 4-1 Power Problem 4–2
- FIGURE 4-2 Power Problem (*Continued*) 4–3
- FIGURE 4-3 Hard Drive Problem 4–4
- FIGURE 4-4 System Fan Problem 4–5
- FIGURE 4-5 USB Problem 4–6
- FIGURE 4-6 USB Problem (*Continued*) 4–7
- FIGURE 4-7 Audio Output Problem 4–8
- FIGURE 4-8 Audio Output Problem (*Continued*) 4–9
- FIGURE 4-9 Monitor Problem 4–10
- FIGURE 4-10 Monitor Problem (*Continued*) 4–11
- FIGURE 4-11 Monitor Problem (*Continued*) 4–12
- FIGURE 4-12 Network Problem 4–13

FIGURE 4-13	Network Problem ( <i>Continued</i> )	4-14
FIGURE 4-14	Keyboard Problem	4-15
FIGURE 4-15	Login Problem	4-16
FIGURE 4-16	Login Problem ( <i>Continued</i> )	4-17
FIGURE 4-17	Graphical User Interface Problem	4-18
FIGURE 4-18	Data Access and Running Applications Problems	4-19
FIGURE 4-19	DVD-ROM Drive Problem	4-20
FIGURE 4-20	DVD-ROM Drive Problem ( <i>Continued</i> )	4-21
FIGURE 4-21	DVD-ROM Drive Problem ( <i>Continued</i> )	4-22
FIGURE 4-22	PCI Card Problem	4-23
FIGURE 4-23	PCI Card Problem ( <i>Continued</i> )	4-24
FIGURE 4-24	IEEE 1394 Problem	4-25
FIGURE 4-25	IEEE 1394 Problem ( <i>Continued</i> )	4-26
FIGURE 4-26	Smart Card Reader Problem	4-27
FIGURE 4-27	Motherboard Problem	4-28
FIGURE 4-28	Motherboard Problem ( <i>Continued</i> )	4-29
FIGURE 4-29	Motherboard Problem ( <i>Continued</i> )	4-30
FIGURE 4-30	Memory Problem	4-31
FIGURE 4-31	Memory Problem ( <i>Continued</i> )	4-32
FIGURE 4-32	NVRAM Problem	4-33
FIGURE 4-33	Battery Problem	4-34
FIGURE 7-1	Crossover Cable Wiring Diagram	7-5
FIGURE 10-1	Required Tools	10-3
FIGURE 10-2	Power Button and Sleep Key Location and Identification	10-5
FIGURE 10-3	Disconnecting the Keyboard, Mouse, Monitor, and Network Connections	10-8
FIGURE 10-4	Pressing the Power Button	10-10
FIGURE 10-5	Removing the Power Cord	10-11
FIGURE 10-6	Loosening the Screws	10-12
FIGURE 10-7	Removing the Access Panel	10-13
FIGURE 10-8	Attaching the Antistatic Wrist Strap	10-14

FIGURE 10-9	Bezel Location and Identification	10-15
FIGURE 10-10	Releasing the Bezel Mounting Tabs	10-15
FIGURE 10-11	Removing the Bezel	10-16
FIGURE 10-12	Positioning the Chassis	10-17
FIGURE 10-13	Replaceable Components	10-18
FIGURE 11-1	DIMM Location and Identification	11-3
FIGURE 11-2	Location of DIMMs Under Cooling Duct	11-4
FIGURE 11-3	Pressing the Catch on the Rear Fan Bracket	11-5
FIGURE 11-4	Sliding the Duct Up	11-5
FIGURE 11-5	Flipping the Duct Over	11-6
FIGURE 11-6	Removing the DIMM	11-7
FIGURE 11-7	Lifting the DIMM Out of the Slot	11-7
FIGURE 11-8	Aligning the DIMM	11-9
FIGURE 11-9	Securing the DIMM	11-10
FIGURE 11-10	Flipping DIMM Cooling Duct Back	11-10
FIGURE 11-11	Ejector Levers Closed Position	11-11
FIGURE 11-12	Sliding the Duct Down	11-12
FIGURE 11-13	Examples of Faulty DIMM Locations	11-14
FIGURE 11-14	CPU Fan and Heatsink Assembly Location and Identification	11-15
FIGURE 11-15	Disconnecting the CPU Fan and Heatsink Assembly Cable	11-16
FIGURE 11-16	Pressing Down on the Clip Latch	11-17
FIGURE 11-17	Releasing the CPU Fan and Heatsink Assembly Clips	11-17
FIGURE 11-18	Rotating CPU Fan and Heatsink Assembly	11-18
FIGURE 11-19	Lifting the CPU Fan and Heatsink Assembly Away	11-19
FIGURE 11-20	Setting the CPU Fan and Heatsink Assembly on the CPU	11-20
FIGURE 11-21	Aligning the Clips Over the Locking Ring	11-21
FIGURE 11-22	Hooking Clip Over End Tab	11-21
FIGURE 11-23	Securing the Clip to the Locking Ring	11-22
FIGURE 11-24	Connecting the CPU Fan and Heatsink Assembly Cable	11-22
FIGURE 11-25	Battery Location and Identification	11-24

FIGURE 11-26	Releasing the Battery	11-25
FIGURE 11-27	Installing the Battery	11-26
FIGURE 11-28	NVRAM Location and Identification	11-27
FIGURE 11-29	Removing the NVRAM	11-28
FIGURE 11-30	Installing the NVRAM	11-29
FIGURE 11-31	PCI Card Location and Identification	11-30
FIGURE 11-32	Swinging Out the PCI Card Support	11-31
FIGURE 11-33	Opening the PCI Card Retainer	11-32
FIGURE 11-34	Removing the PCI Card	11-33
FIGURE 11-35	Installing a PCI Card Filler Panel	11-34
FIGURE 11-36	Identifying the PCI Card Slots	11-35
FIGURE 11-37	Swinging Out the PCI Card Support	11-41
FIGURE 11-38	Opening the PCI Card Retainer	11-42
FIGURE 11-39	Installing the PCI Card	11-43
FIGURE 11-40	Fastening the PCI Card Retainer	11-44
FIGURE 11-41	Closing the PCI Card Support	11-45
FIGURE 11-42	Motherboard Location and Identification	11-46
FIGURE 11-43	Motherboard Connector Layout	11-47
FIGURE 11-44	Removing Cables From the Clips	11-50
FIGURE 11-45	Removing the Motherboard Fastening Screws	11-51
FIGURE 11-46	Releasing the Motherboard Retaining Clip	11-52
FIGURE 11-47	Latching the Motherboard Retaining Clip	11-53
FIGURE 11-48	Installing the Motherboard Fastening Screws	11-54
FIGURE 11-49	Motherboard Connectors	11-55
FIGURE 11-50	Securing Cables Into the Clips	11-56
FIGURE 12-1	Hard Drive Location and Identification	12-2
FIGURE 12-2	Disconnecting the Hard Drive Cables	12-4
FIGURE 12-3	Removing the Hard Drive	12-5
FIGURE 12-4	Storing the Drive Rails	12-6
FIGURE 12-5	Removing the Drive Rails From Storage	12-7

FIGURE 12-6	Installing the Drive Rails	12-8
FIGURE 12-7	Installing the Hard Drive Cables	12-8
FIGURE 12-8	DVD-ROM Drive Location and Identification	12-10
FIGURE 12-9	Disconnecting Cables From the DVD-ROM Drive	12-11
FIGURE 12-10	Removing the DVD-ROM Drive	12-12
FIGURE 12-11	Installing the Drive Rails	12-13
FIGURE 12-12	Connecting Cables to the DVD-ROM Drive	12-14
FIGURE 12-13	Smart Card Reader Location and Identification	12-16
FIGURE 12-14	Removing the Smart Card Reader Interface Cable From the Reader Cable Clip	12-17
FIGURE 12-15	Disconnecting the Smart Card Reader Interface Cable	12-18
FIGURE 12-16	Removing the Smart Card Reader	12-19
FIGURE 12-17	Removing Smart Card Reader Interface Cable	12-19
FIGURE 12-18	Installing Smart Card Reader Into Bracket	12-20
FIGURE 12-19	Feeding Smart Card Cable Through Chassis	12-21
FIGURE 12-20	Connecting the Smart Card Reader Interface Cable	12-22
FIGURE 12-21	Securing the Smart Card Reader Interface Cable into the Reader Cable Clip	12-23
FIGURE 13-1	Power Supply Location and Identification	13-2
FIGURE 13-2	Releasing Cable From Routing Clip	13-4
FIGURE 13-3	Power Supply Motherboard Connections	13-4
FIGURE 13-4	Removing Power Supply.	13-5
FIGURE 13-5	Installing the Power Supply	13-6
FIGURE 13-6	Securing Cables Into Routing Clips	13-7
FIGURE 13-7	Attaching Power Supply Connectors	13-7
FIGURE 13-8	Front Fan Location and Identification	13-9
FIGURE 13-9	Removing the Front Fan Cable From the Bezel Cable Clip	13-10
FIGURE 13-10	Removing the Front Fan Bracket	13-11
FIGURE 13-11	Installing the Front Fan Bracket	13-12
FIGURE 13-12	Securing the Front Fan Bracket	13-13
FIGURE 13-13	Securing the Front Fan Cable in the Bezel Cable Clip	13-14
FIGURE 13-14	Rear Fan Location and Identification	13-16

FIGURE 13-15	Rear Fan Motherboard Connection	13-17
FIGURE 13-16	Removing the Rear Fan	13-18
FIGURE 13-17	Installing the Rear Fan Bracket	13-19
FIGURE 13-18	Securing the Rear Fan Bracket	13-20
FIGURE 13-19	Connecting the Rear Fan Cable to FAN1 SYS	13-21
FIGURE 13-20	DIMM Cooling Duct Location and Identification.	13-23
FIGURE 13-21	DIMM Cooling Duct Attachment to Rear Fan	13-24
FIGURE 13-22	Pressing the Catch on the Rear Fan Bracket	13-24
FIGURE 13-23	Sliding the Duct to the Left	13-25
FIGURE 13-24	Swinging Out the Duct	13-25
FIGURE 13-25	Sliding Duct Back to the Right	13-26
FIGURE 13-26	Pulling the Duct Free	13-26
FIGURE 13-27	Aligning the Pivot Pins With the Gap	13-27
FIGURE 13-28	Moving the Duct to the Left	13-28
FIGURE 13-29	Swinging the Duct In	13-28
FIGURE 13-30	Ejector Levers Closed Position	13-29
FIGURE 13-31	Sliding the Duct to the Right	13-30
FIGURE 13-32	Duct Clicks Into Place	13-30
FIGURE 13-33	Audio USB board Location and Identification	13-32
FIGURE 13-34	Disconnecting the Cables From the Motherboard	13-33
FIGURE 13-35	Removing the Audio USB Cables From the I/O Cable Clip	13-34
FIGURE 13-36	Unfastening the Audio USB Assembly	13-35
FIGURE 13-37	Removing the Audio USB Board From the Bracket	13-36
FIGURE 13-38	Installing the Audio USB Board Into the Bracket	13-37
FIGURE 13-39	Securing the Audio USB Assembly	13-38
FIGURE 13-40	Reconnecting the Cables to the Motherboard	13-38
FIGURE 13-41	Securing the Audio USB Cables in the I/O Cable Clip	13-39
FIGURE 13-42	Speaker Location and Identification	13-40
FIGURE 13-43	Removing the Speaker Cable From the Bezel Cable Clip	13-42
FIGURE 13-44	Removing the Speaker	13-43

FIGURE 13-45	Installing the Speaker	13-44
FIGURE 13-46	Securing the Speaker Cable in the Bezel Cable Clip	13-45
FIGURE 13-47	PCI Card Support Location and Identification	13-46
FIGURE 13-48	Swinging Out the PCI Card Support	13-47
FIGURE 13-49	Removing the PCI Card Support	13-48
FIGURE 13-50	Installing the PCI Card Support	13-49
FIGURE 13-51	Closing the PCI Card Support	13-49
FIGURE 13-52	Chassis Cross Brace Location and Identification	13-51
FIGURE 13-53	Swinging out the PCI Card Support	13-52
FIGURE 13-54	Removing the Cross Brace Screw	13-53
FIGURE 13-55	Removing the Chassis Cross Brace	13-53
FIGURE 13-56	PCI Shield on Chassis Cross Brace	13-55
FIGURE 13-57	Swinging Chassis Cross Brace Into Position	13-56
FIGURE 13-58	Preventing PCI Shield From Striking Components	13-57
FIGURE 13-59	Preventing PCI Shield From Binding With Socket	13-58
FIGURE 13-60	PCI Shield Fit to PCI Card in Slot <small>PCI4</small>	13-59
FIGURE 13-61	Drive Rails Location and Identification	13-60
FIGURE 13-62	Removing the Drive Rails From the Hard Drive	13-61
FIGURE 13-63	Installing the Drive Rails to the Hard Drive	13-62
FIGURE 14-1	Sun Blade 1500 Workstation Motherboard Cable Connections	14-3
FIGURE 14-2	Smart Card Reader Cable Connection	14-4
FIGURE 14-3	Disconnecting the Cable From the Smart Card Reader	14-5
FIGURE 14-4	Connecting the Cable to the Smart Card Reader	14-6
FIGURE 14-5	DVD-ROM Drive Interface Cable Connection	14-7
FIGURE 14-6	Disconnecting the Interface Cable From the DVD-ROM Drive	14-8
FIGURE 14-7	Connecting the Interface Cable to the DVD-ROM Drive	14-9
FIGURE 14-8	Hard Drive Interface Cable Connection	14-10
FIGURE 14-9	Disconnecting the Interface Cable From the Hard Drive(s)	14-11
FIGURE 14-10	Connecting the Interface Cable to the Hard Drive(s)	14-12
FIGURE 14-11	IDE Power Cable Connections	14-14

FIGURE 14-12	Disconnecting the IDE Power Cable From the Hard Drive(s)	14–15
FIGURE 14-13	Disconnecting the IDE Power Cable From the DVD-ROM Drive	14–15
FIGURE 14-14	Connecting the IDE Power Cable to the DVD-ROM Drive	14–16
FIGURE 14-15	Connecting the IDE Power Cable to the Hard Drive(s)	14–17
FIGURE 14-16	Power Switch Assembly Location and Identification	14–18
FIGURE 14-17	Removing the Power Switch Assembly Cable From the Bezel Cable Clip and Metal Clamp	14–19
FIGURE 14-18	Removing the Power Switch Assembly	14–20
FIGURE 14-19	Routing the Power Switch Assembly Cable	14–21
FIGURE 14-20	Securing the Power Switch Assembly Cable to the Bezel Cable Clip and Metal Clamp	14–22
FIGURE 14-21	Audio USB Board Cable Connections	14–24
FIGURE 14-22	Removing Audio and USB Cables From the Motherboard	14–25
FIGURE 14-23	Removing the Audio USB Cables From the I/O Cable Clip	14–26
FIGURE 14-24	Disconnecting Cables From the Audio USB Board	14–27
FIGURE 14-25	Connecting Cables to the Audio USB Board	14–28
FIGURE 14-26	Connecting the Audio and USB Cables to the Motherboard	14–29
FIGURE 14-27	Securing the Audio USB Cables to the I/O Cable Clip	14–30
FIGURE 15-1	Positioning the Chassis Upright	15–2
FIGURE 15-2	Locating Bezel Short Tabs	15–3
FIGURE 15-3	Aligning the Bezel	15–4
FIGURE 15-4	Securing the Bezel	15–4
FIGURE 15-5	Aligning the Access Panel	15–6
FIGURE 15-6	Closing the Access Panel	15–7
FIGURE 15-7	Tightening the Access Panel Thumbscrews	15–7
FIGURE 15-8	Reconnecting the Keyboard, Mouse, Monitor, and Network Connections	15–9
FIGURE 15-9	Reconnecting the Power Cord	15–10
FIGURE 15-10	Powering Up the Workstation	15–11
FIGURE B-1	IEEE 1394A Port	B–2
FIGURE B-2	Parallel Port	B–3
FIGURE B-3	Serial Port	B–4



FIGURE B-4	Twisted-Pair Ethernet Port	B-5
FIGURE B-5	USB Port	B-6
FIGURE B-6	Sun XVR-600, Sun XVR-500, and Sun XVR-100 Graphics Accelerator Ports	B-7
FIGURE B-7	Fan Connector	B-10
FIGURE B-8	Front Audio Connector	B-11
FIGURE B-9	Front USB Connector	B-11
FIGURE B-10	IDE Interface Connector	B-12
FIGURE B-11	IDE Power Connector	B-14
FIGURE B-12	Power Supply Connectors	B-15
FIGURE B-13	Power Switch Connector	B-17
FIGURE B-14	Smart Card Reader Connector	B-17
FIGURE B-15	Speaker Connector	B-18
FIGURE C-1	Sun Blade 1500 System Block Diagram	C-3
FIGURE C-2	Sun Blade 1500 Motherboard Block Diagram	C-5
FIGURE C-3	Sun Blade 1500 Motherboard Layout Diagram	C-6
FIGURE C-4	Sun Blade 1500 Memory Block Diagram	C-12
FIGURE C-5	JIO Block Diagram	C-17
FIGURE C-6	BCM5703C Block Diagram	C-20
FIGURE C-7	Cooling Fan Control Block Diagram	C-37



# Tables

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TABLE 1-1	Summary of Diagnostic Tools	1–2
TABLE 1-2	Additional Support Resources	1–3
TABLE 1-3	Flowchart Elements	1–4
TABLE 2-1	Sun Blade 1500 Workstation Configured Features	2–2
TABLE 2-2	Bezel Overview, Sun Blade 1500 Workstation	2–5
TABLE 2-3	Back Panel Overview, Sun Blade 1500 Workstation	2–7
TABLE 2-4	Sun Blade 1500 Workstation Replaceable Components	2–8
TABLE 2-5	Monitors supported by the Sun Blade 1500 Workstation	2–10
TABLE 3-1	Screen Images and What They Mean	3–5
TABLE 3-2	System Sounds at Locations and What They Mean	3–8
TABLE 3-3	OpenBoot PROM Messages and Their Meaning	3–11
TABLE 3-4	Solaris Error Messages and Their Meanings	3–13
TABLE 3-5	Other Messages and Their Meaning	3–16
TABLE 3-6	Options for <code>iostat</code>	3–17
TABLE 3-7	Options for <code>prtdiag</code>	3–20
TABLE 3-8	Options for <code>prtconf</code>	3–24
TABLE 3-9	Options for <code>netstat</code>	3–26
TABLE 3-10	Options for <code>ping</code>	3–29
TABLE 3-11	Options for <code>ps</code>	3–30
TABLE 3-12	Options for <code>prstat</code>	3–32

TABLE 5-1	Methods for Obtaining the <code>ok</code> Prompt	5-2
TABLE 5-2	POST, OpenBoot Diagnostics, and SunVTS Tests Available for Components	5-3
TABLE 5-3	POST Output Levels	5-5
TABLE 5-4	Important Proxy Server Information Needed	5-9
TABLE 6-1	NVRAM Parameter Configuration Commands	6-2
TABLE 6-2	NVRAM Configuration Parameter Default Values	6-4
TABLE 6-3	<code>security-mode</code> Values and Their Enforcement Policy	6-6
TABLE 6-4	Stop-N Equivalent Configuration Parameters	6-11
TABLE 7-1	Serial Terminal Communication Parameters	7-4
TABLE 7-2	Power Cycling the Sun Blade 1500 Workstation	7-6
TABLE 7-3	Minimum Level Output Comparison	7-7
TABLE 7-4	Maximum Level Output Comparison	7-10
TABLE 8-1	OpenBoot Diagnostics Test Usage	8-9
TABLE 9-1	Steps to Test Components in Connection Mode	9-3
TABLE 9-2	Steps to Test Components in Functional Mode	9-7
TABLE 10-1	<code>init</code> Command Shutdown Options	10-7
TABLE 10-2	Workstation Chassis Directional Terms	10-17
TABLE 10-3	Component Replacement Procedures	10-19
TABLE 11-1	DIMM Pair Configurations	11-3
TABLE 11-2	OpenBoot PROM Memory Check Actions	11-13
TABLE 11-3	CPU Fan Specifications	11-15
TABLE 11-4	Battery Specifications	11-24
TABLE 11-5	PCI Card Slot Specifications	11-30
TABLE 11-6	PCI Card Probe Order	11-36
TABLE 11-7	Motherboard Connectors and Descriptions	11-47
TABLE 12-1	Hard Drive Specifications	12-3
TABLE 12-2	DVD-ROM Drive Specifications	12-10
TABLE 13-1	Power Supply Specifications	13-3
TABLE 13-2	Front Fan Specifications	13-9
TABLE 13-3	Rear Fan Specifications	13-16

TABLE 13-4	Speaker Specifications	13–41
TABLE 14-1	Power Switch Assembly Specifications	14–18
TABLE 16-1	Optional PCI Cards	16–2
TABLE 16-2	Sun Blade 1500 Internal Component Upgrades	16–5
TABLE 16-3	External Peripherals	16–6
TABLE A-1	Sun Blade 1500 Physical Specifications	A–1
TABLE A-2	Enclosure Interior Dimensions for Sun Blade 1500	A–1
TABLE A-3	Sun Blade 1500 Workstation Electrical Specifications	A–2
TABLE A-4	Sun Blade 1500 Workstation Acoustic Specifications	A–2
TABLE A-5	Sun Blade 1500 Workstation Environmental Requirements	A–2
TABLE A-6	Sun Blade 1500 Workstation Shock and Vibration Values	A–3
TABLE B-1	Audio Jack Pinouts	B–2
TABLE B-2	IEEE 1394A Port Pinouts	B–2
TABLE B-3	Parallel Port Pinouts	B–3
TABLE B-4	Serial Port Pinouts	B–4
TABLE B-5	Twisted-Pair Ethernet Port Pinouts	B–5
TABLE B-6	Twisted-Pair Ethernet LED Status	B–6
TABLE B-7	USB Port Pinouts	B–6
TABLE B-8	Graphics Accelerator Connectors	B–7
TABLE B-9	HD15 Video Output Port Pinouts	B–8
TABLE B-10	Stereoscopic Imager Interface Connector Pinouts	B–8
TABLE B-11	DVI-I Video Output Port Pinouts	B–9
TABLE B-12	Fan Connectors <i>FAN0 SYS</i> , <i>FAN1 SYS</i> , and <i>FAN2</i> Pinouts	B–10
TABLE B-13	Front Audio Connector <i>J13 AUDIO</i> Pinouts	B–11
TABLE B-14	Front USB Connector <i>J19 USB</i> Pinouts	B–11
TABLE B-15	IDE Interface Connectors <i>IDE PRI</i> and <i>IDE SEC</i> Pinouts	B–12
TABLE B-16	IDE Power Connector <i>IDE PWR</i> Pinouts	B–14
TABLE B-17	Power Supply Connector <i>PS0</i> Pinouts	B–15
TABLE B-18	Power Supply Connector <i>PS1</i> Pinouts	B–15
TABLE B-19	Power Supply Connector <i>PS2</i> Pinouts	B–16

TABLE B-20	Power Switch Connector J24 SW0 Pinouts	B-17
TABLE B-21	Smart Card Reader Connector SCR0 Pinouts	B-18
TABLE B-22	Speaker Connector SPK0 Pinouts	B-18
TABLE C-1	Sun Blade 1500 Motherboard Locations and Common Terminology	C-7
TABLE C-2	Correct Motherboard Jumper Settings	C-8
TABLE C-3	Sun Blade 1500 Workstation Supported DIMM Configurations	C-13
TABLE C-4	Interleaving Modes	C-14
TABLE C-5	Sun XVR-600 Graphics Accelerator Monitor Screen Resolutions	C-23
TABLE C-6	Sun XVR-500 Graphics Accelerator Monitor Screen Resolutions	C-25
TABLE C-7	Sun XVR-100 Graphics Accelerator Monitor Screen Resolutions	C-27
TABLE C-8	Clock Frequencies	C-28
TABLE C-9	Sun Blade 1500 Interrupt Map	C-29
TABLE C-10	Smart Card Reader LED Status	C-32
TABLE C-11	TPE LED Status	C-34
TABLE C-12	Sun Blade 1500 Component Power Consumption	C-38
TABLE C-13	Power Supplied at Various Interfaces	C-39
TABLE D-1	Dtpower Power Management Modes	D-1
TABLE D-2	First Scenario Timeline	D-3
TABLE D-3	Second Scenario Timeline	D-4

# Preface

---

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

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 Environment and the command-line interface.
- Has superuser privileges for the system being serviced.
- Understands typical hardware troubleshooting tasks.

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

---

## About the Multimedia Links in This Manual

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

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



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

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

---

## How This Book Is Organized

**Chapter 1** explains how to use the flowcharts in this manual.

**Chapter 2** provides a product description of the Sun Blade 1500 workstation.

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

**Chapter 4** provides the troubleshooting flowcharts for the Sun Blade 1500 system.

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

**Chapter 6** provides information about the NVRAM and alternatives to the Stop-A and Stop-N key commands.

**Chapter 7** describes using POST to diagnose problems with the Sun Blade 1500 workstation.

**Chapter 8** instructs how to use OpenBoot Diagnostics to troubleshoot the Sun Blade 1500 workstation.

**Chapter 9** summarizes using SunVTS software to exercise a Sun Blade 1500 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 1500 workstation chassis.

**Chapter 14** describes how to replace system cabling.



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

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

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

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

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

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

---

## Safety and Compliance Information

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

- 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 1500 system.

The Sun Blade 1500 workstation complies with regulatory requirements of safety and EMI as documented in the *Sun Blade 1500 Safety and Compliance Guide*, 816-7566. 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 environment available at:  
`docs.sun.com`
- *Sun Blade 1500 Getting Started Guide*, 816-7565
- *Sun Blade 1500 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 <code>.login</code> file. Use <code>ls -a</code> to list all files. % You have mail.
<b>AaBbCc123</b>	What you type, when contrasted with on-screen computer output	% <b>su</b> Password:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized. Replace command-line variables with real names or values.	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this. To delete a file, type <code>rm filename</code> .

\* Your browser settings might differ

---

# Shell Prompts

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

---

# Related Documentation

**TABLE P-1** Related Documentation

Application	Title	Part Number
Setting up poster	<i>Sun Blade 1500 Start Here</i>	816-7561
Handy reference information	<i>Sun Blade 1500 Troubleshooting Card</i>	816-7563
Preinstalled software	<i>Sun Blade 1500 Getting Started Guide</i>	816-7565
Last minute information	<i>Sun Blade 1500 Product Notes</i>	816-7569
Safety and compliance	<i>Sun Blade 1500 Safety and Compliance Guide</i>	816-7566
	<i>Important Safety Information for Sun Hardware Systems</i>	816-7190
Configuration	<i>Solaris 8 HW 2/04 Sun Hardware Platform Guide</i>	817-4347
	<i>Solaris 9 4/04 Sun Hardware Platform Guide</i>	817-4189
	<i>Solaris Handbook for Sun Peripherals</i>	816-4468
SunVTS documentation	<i>SunVTS 5.1 User's Guide</i>	816-5144
	<i>SunVTS Quick Reference Card</i>	816-5146
	<i>SunVTS 5.1 Test Reference Manual</i>	816-5145
	<i>SunVTS 5.1 Patch Set 5 Documentation Supplement</i>	817-4350

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

<b>Application</b>	<b>Title</b>	<b>Part Number</b>
Graphics accelerator documentation	<i>Sun XVR-100 Graphics Accelerator Installation Guide</i>	816-7560
	<i>Sun XVR-500 Graphics Accelerator Installation Guide</i>	816-3028
	<i>Sun XVR-600 Graphics Accelerator Installation and User's Guide</i>	817-2195
Co-processor board documentation	<i>SunPCi™ III 3.2 User's Guide</i>	817-3630
	<i>SunPCi III Quick Start Installation Guide</i>	817-4343
	<i>SunPCi III 3.2 Product Notes</i>	817-3631

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## Accessing Sun Documentation Online

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

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

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## Contacting Sun Technical Support

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

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

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## Sun Welcomes Your Comments

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

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

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

*Sun Blade 1500 Service, Diagnostics, and Troubleshooting Manual*, part number 816-7564-11.



# Start Here

---

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

This chapter contains the following topics:

- [“Diagnostic Tools Available” on page 1-1](#)
- [“Additional Support Resources” on page 1-2](#)
- [“About Troubleshooting Flowcharts” on page 1-4](#)
- [“Start Here Flowchart” on page 1-5](#)

---

## 1.1 Diagnostic Tools Available

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

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

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

TABLE 1-1 provides a summary of these diagnostics tools.

TABLE 1-1 Summary of Diagnostic Tools

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 DVD-ROM 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.
NVRAM	Firmware	Contains properties and flags to configure system and diagnostic tests.	The <code>setenv</code> command typed at the <code>ok</code> prompt or the <code>EEPROM</code> command in a terminal window can configure the OpenBoot PROM for POST diagnostics and automatic execution of scripts.
POST diagnostics	Firmware	Tests workstation core components such as CPU and memory.	Upon power up, checks low-level interaction between CPU, caches, memory, JBus, and PCI bridge. Output displayed through serial port.
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.
SunVTS	Software	Exercises and stresses workstation components.	Invoked from the Solaris operating environment. Command-line or GUI user interface. SunVTS must be installed on the system under test.
Solaris Operating Environment	Software	Commands display system information.	Commands <code>iostat</code> , <code>prtdiag</code> , <code>prtconf</code> , <code>netstat</code> , <code>ping</code> , <code>ps</code> , and <code>prstat</code> are run with superuser privileges.

## 1.2 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 1-2 lists resources for troubleshooting assistance.

TABLE 1-2 Additional Support Resources

Sun Blade 1500 Workstation Support Resources	URL or Telephone Number
PDF files for all the current Sun Blade 1500 documents. Key documents include: <i>Sun Blade 1500 Service, Diagnostic, and Troubleshooting Manual</i> , 816-7564 <i>Sun Blade 1500 Getting Started Guide</i> , 816-7565 <i>Sun Blade 1500 Troubleshooting Card</i> , 816-7563 <i>Sun Blade 1500 Product Notes</i> , 816-7569 <i>Sun Blade 1500 Safety and Compliance Guide</i> , 816-7566	<a href="http://www.sun.com/documentation">http://www.sun.com/documentation</a> Select the links: Hardware Product Categories → Desktops & Workstations → Sun Blade Workstations. Select the Sun Blade 1500 link.
Find Solaris and other software documents here. This is also an alternative website for some Sun Blade 1500 workstation documents. This website has full search capabilities.	<a href="http://docs.sun.com">http://docs.sun.com</a>
Warranty and Contract Support contacts. Links to other service tools.	<a href="http://www.sun.com/service/online">http://www.sun.com/service/online</a>
Discussion and Troubleshooting Forums.	<a href="http://supportforum.sun.com/">http://supportforum.sun.com/</a>
Support, Diagnostic Tools, Alerts, for all Sun products.	<a href="http://www.sun.com/bigadmin/">http://www.sun.com/bigadmin/</a>
SunSolve <sup>SM</sup> : Contains links to software patches. Lists some system specifications, troubleshooting and maintenance information, and other tools.	<a href="http://www.sunsolve.sun.com/handbook_pub/">http://www.sunsolve.sun.com/handbook_pub/</a>
Lists warranties for every Sun product.	<a href="http://www.sun.com/service/support/warranty">http://www.sun.com/service/support/warranty</a>
Sun Service Support phone number.	1-800-872-4786 (1-800-USA-4Sun) Select Option 1
This website lists international telephone numbers for Sun Service Support.	<a href="http://www.sun.com/service/contacting/solution.html">http://www.sun.com/service/contacting/solution.html</a>

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

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

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## 1.3 About Troubleshooting Flowcharts

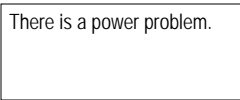
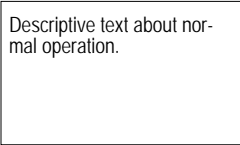
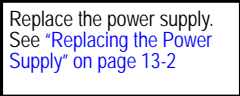
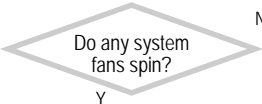

The *Sun Blade 1500 Service, Diagnostics, and Troubleshooting Manual* contains flowcharts that you can use to:

- 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 1-3](#):

**TABLE 1-3** Flowchart Elements

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

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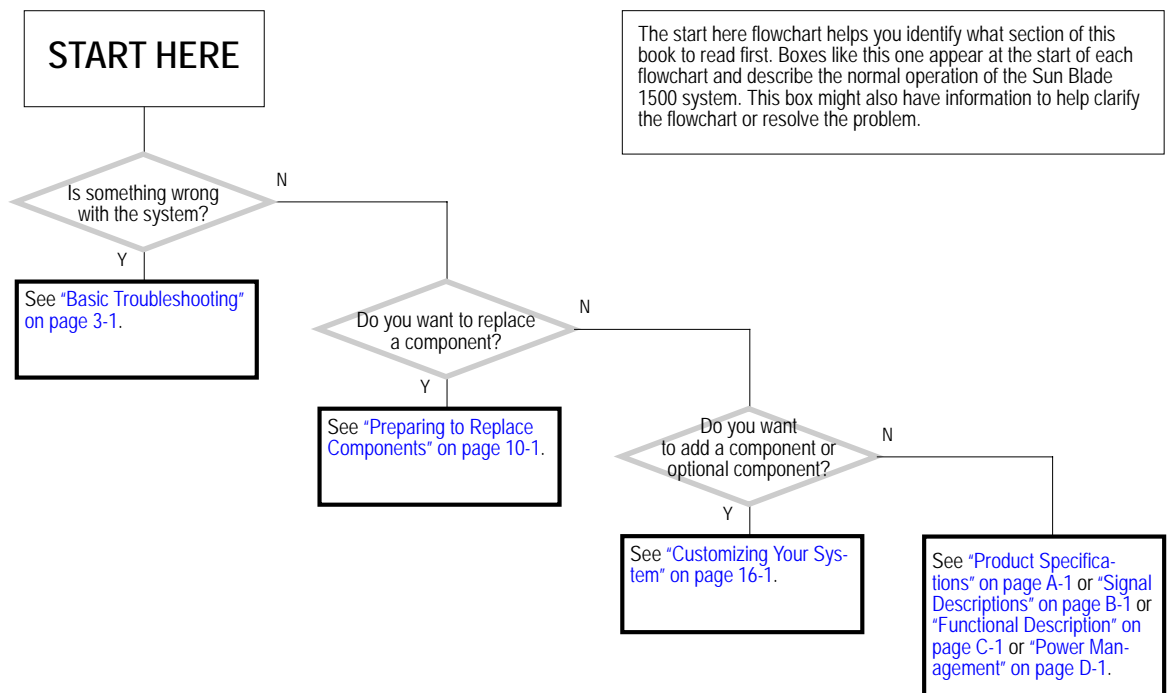
**Note** – Some flowcharts also point to additional diagnostic information in other Sun documents.

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## 1.4 Start Here Flowchart

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

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



**FIGURE 1-1** Start Here Flowchart



# Product Description

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Topics covered in this chapter are:

- “Product Overview” on page 2-1
- “Configured Features” on page 2-2
- “External System Description” on page 2-3
- “Replaceable Hardware Components” on page 2-7
- “Supported Sun Monitors” on page 2-10

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## 2.1 Product Overview

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

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

- UltraSPARC IIIi 1.06 GHz 64-bit processor
- 512 MB of DDR1 memory
- Sun XVR-100 graphics accelerator
- 80 GB ATA 100 hard drive
- 16x DVD-ROM drive

## 2.2 Configured Features

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

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

Feature	Description
Processor	1.06 GHz UltraSPARC IIIi CPU with 1 MB integrated Level2 cache, heatsink, and fan
Operating environment	Preinstalled Solaris 8 HW 2/04 and Solaris 9 4/04 operating environment supporting 32 and 64-bit applications
Enclosure	Deskside system enclosure with front-panel access to optical media drive and smart card reader
Memory options	From a minimum of 512 MB to a maximum of 4 GB of ECC error-correcting DDR-1 SDRAM memory, using matched pairs of 256 MB, 512 MB, and 1 GB DIMMs Maximum of 2 DIMM pairs per system (4 DIMMS total)
Power supply	360 W or 420 W autoranging
Internal storage	One or two 80 GB ATA 100 3.5-inch hard drives (7,200 rpm) Note: Internal drive mirroring is not supported.
Optical media	DVD-ROM drive
Audio	CD-quality audio
Controlled system access	Smart card reader
Graphics accelerator	PCI-based graphics accelerators <ul style="list-style-type: none"><li>•Sun XVR-100 - up to 3</li><li>•Sun XVR-500 - up to 2</li><li>•Sun XVR-600 - up to 2</li></ul>
Keyboard	Sun Type-6 USB AT 101 layout
Mouse	Sun 3-button Crossbow USB mouse

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

Feature	Description
Expansion slots on the motherboard	Peripheral component interconnect (PCI) slots: 1 64-bit at 66 MHz connector (slot 4) 2 64-bit at 33 MHz connectors (slots 2 and 3) 2 32-bit at 33 MHz connectors (slots 0 and 1)
Back panel connectors for external options	2 universal serial bus (USB) 1.1 connectors 2 serial connectors (DB-9) 1 parallel connector (DB-25) 1 twisted-pair Ethernet (TPE) 10/100/1000BASE-T connector (RJ-45) 1 audio line-in connector 1 audio line-out connector 1394/USB card: 2 IEEE 1394A connectors and 3 universal serial bus (USB) 2.0 connectors
Front panel connectors for external options	2 USB 1.1 connectors 1 headphone connector 1 microphone connector

---

**Note** – If so equipped, do not remove the plastic rivet from the headphone jack of the DVD-ROM or CD-RW drive. Instead, use the headphone jack at the bottom of the front panel.

---

The Sun Blade 1500 workstation also supports the following options:

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

---

## 2.3 External System Description

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

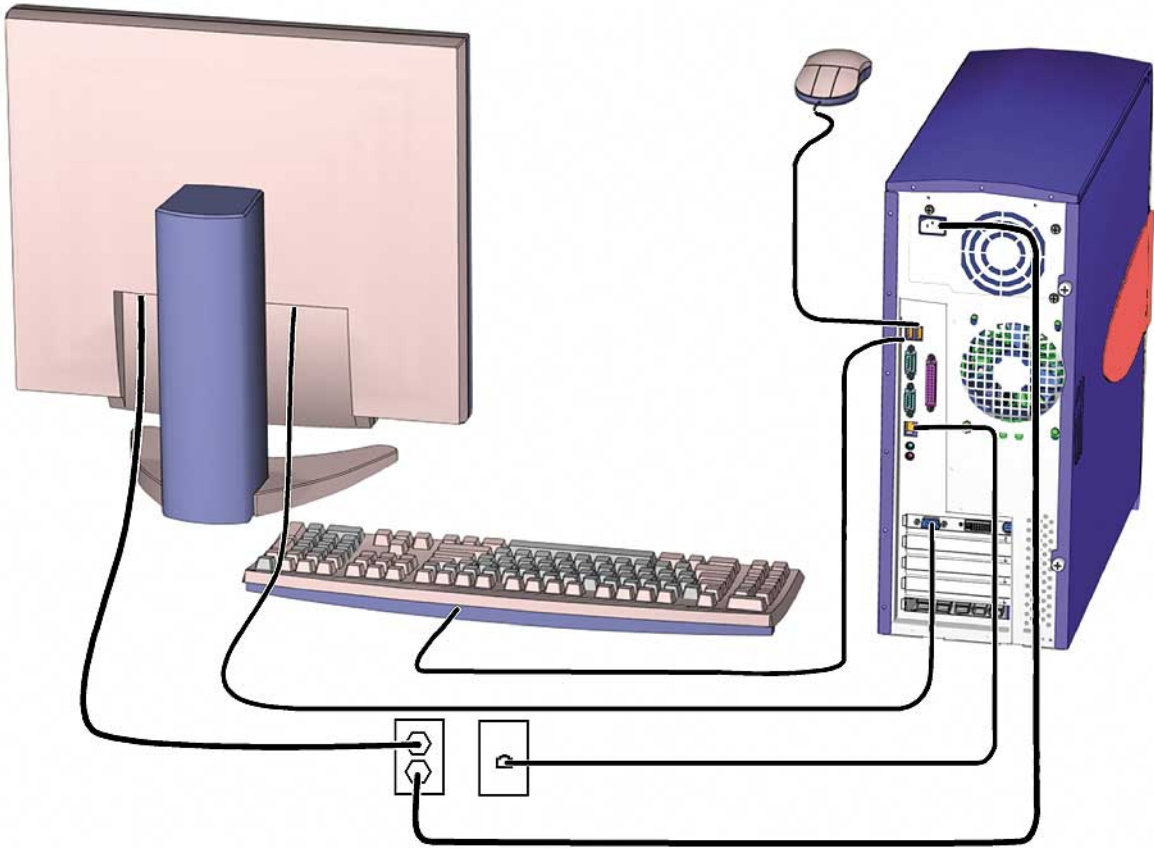


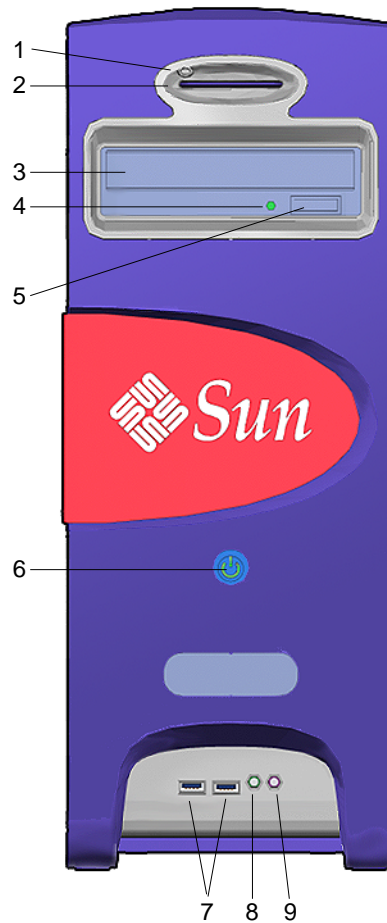
FIGURE 2-1 Sun Blade 1500 Workstation, Monitor, Keyboard and Mouse

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**Note** – Make sure that the keyboard and mouse are only connected to USB 1.1 compliant connectors on the bezel or back panel.

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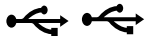




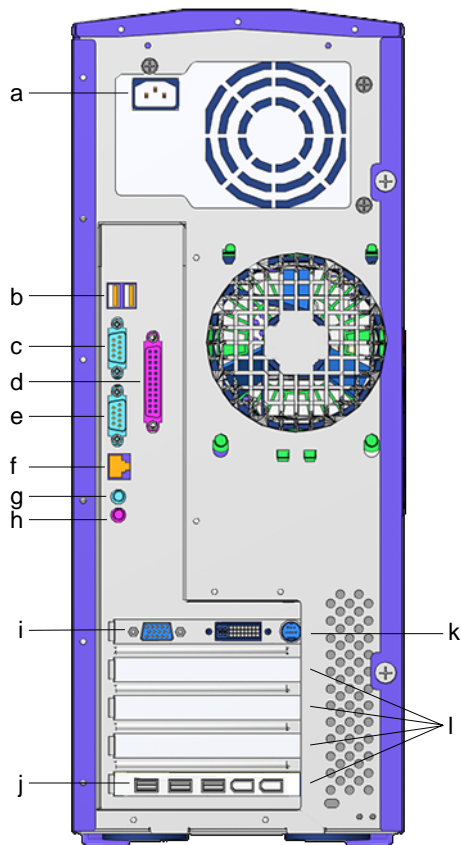
**FIGURE 2-2** Bezel Overview, Sun Blade 1500 Workstation

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

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









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

Callout in <a href="#">FIGURE 2-2</a>	Part Description	Bezel Symbol
6	Power button with LED	
7	USB v1.1 connector (2)	
8	Audio connector, headphone	
9	Audio connector, microphone	



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

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

Callout in FIGURE 2-3	Part Description	Back Panel Symbol
a	Power connector	none
b	USB v1.1 connector (2)	
c	Serial1 connector (DB-9)	 1
d	Parallel connector (DB-25)	//
e	Serial2 connector (DB-9)	 2
f	Twisted-pair Ethernet (TPE)	
g	Audio connector, line-out	
h	Audio connector, line-in	
i	Graphics accelerator	
j	IEEE 1394/USB v2.x combination card with 3 IEEE 1394a connectors and 2 USB v2.0 ports	
k	PCI card connector (66 MHz): PCI connector 4	<b>PCI 4</b> <b>66</b>
l	PCI card connectors (33 MHz): PCI connector 0, PCI connector 1, PCI connector 2, and PCI connector 3	<b>PCI 3</b> <b>PCI 2</b> <b>PCI 1</b> <b>PCI 0</b>

## 2.4 Replaceable Hardware Components

FIGURE 2-4 shows the replaceable components of the Sun Blade 1500 workstation.



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

Number	Component	Description
4	Power supply	Power Supply, 360 W or 420 W, 100 - 240 VAC
5	Front fan	Front fan, Sun Blade 1500 chassis, 12VDC
6	Rear fan	Rear fan, Sun Blade 1500 chassis, 12VDC
7	Smart card reader	Smart card reader, bare board
8	CD-RW drive	CD-RW, 40X write
9	Audio USB board	USB connector board, mounting bracket
10	CPU fan and heatsink assembly	Heatsink, integrated fan, 12VDC
11	Graphics accelerator	Sun XVR-600 PCI graphics card Sun XVR-500 PCI graphics card Sun XVR-100 PCI graphics card
12	Combination card	IEEE 1394/USB 2.0 I/O PCI card
13	Speaker assembly	Speaker, 8 ohms
14	Power switch and cable kit	Cable kit, Sun Blade 1500 chassis
15	Motherboard	Sun Blade 1500 motherboard
16	Lithium battery	Type CR2032

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

**Note** – The components listed in [TABLE 2-4](#) are subject to change without notice. Consult your authorized Sun sales representative or service provider to confirm a part number prior to ordering a replacement component, or search:

<http://www.sun.com/ibb/spares>

## 2.5 Supported Sun Monitors

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

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

Monitor	Maximum resolution	Number of monitors supported by Sun XVR-100	Number of monitors supported by Sun XVR-500	Number of monitors supported by Sun XVR-600
17-inch color	1152 x 900 @ 66 Hz	Up to 2	1	1
19-inch LCD color	1280 x 1024 @ 60/76 Hz	Up to 2	1	1
22-inch CRT color	1600 x 1200 @ 75 Hz	Up to 2	1	1
24.1-inch LCD flat screen color	1920 x 1200 @ 60 Hz	Up to 2	1	1

Dual monitor support requires special cabling and software configuration. For more information about the Sun XVR-100, Sun XVR-500, and Sun XVR-600 graphics accelerators, refer to the *Sun XVR-100 Graphics Accelerator Installation Guide*, 816-7560, the *Sun XVR-500 Graphics Accelerator Installation Guide*, 816-3028, or the *Sun XVR-600 Graphics Accelerator Installation and User's Guide*, 817-2195.

# Basic Troubleshooting

---

This chapter provides basic troubleshooting assistance. Topics include:

- [“Power-On Sequence” on page 3-1](#)
- [“Power-On Flowchart” on page 3-3](#)
- [“Display and Audio Responses” on page 3-5](#)
- [“Displayed Messages” on page 3-10](#)
- [“Troubleshooting Commands” on page 3-17](#)

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## 3.1 Power-On Sequence

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

### 3.1.1 Power-On Sequence List

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

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 boot strap program.
9. Boot strap 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.

## 3.1.2 Power-On Flowchart

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

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

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

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



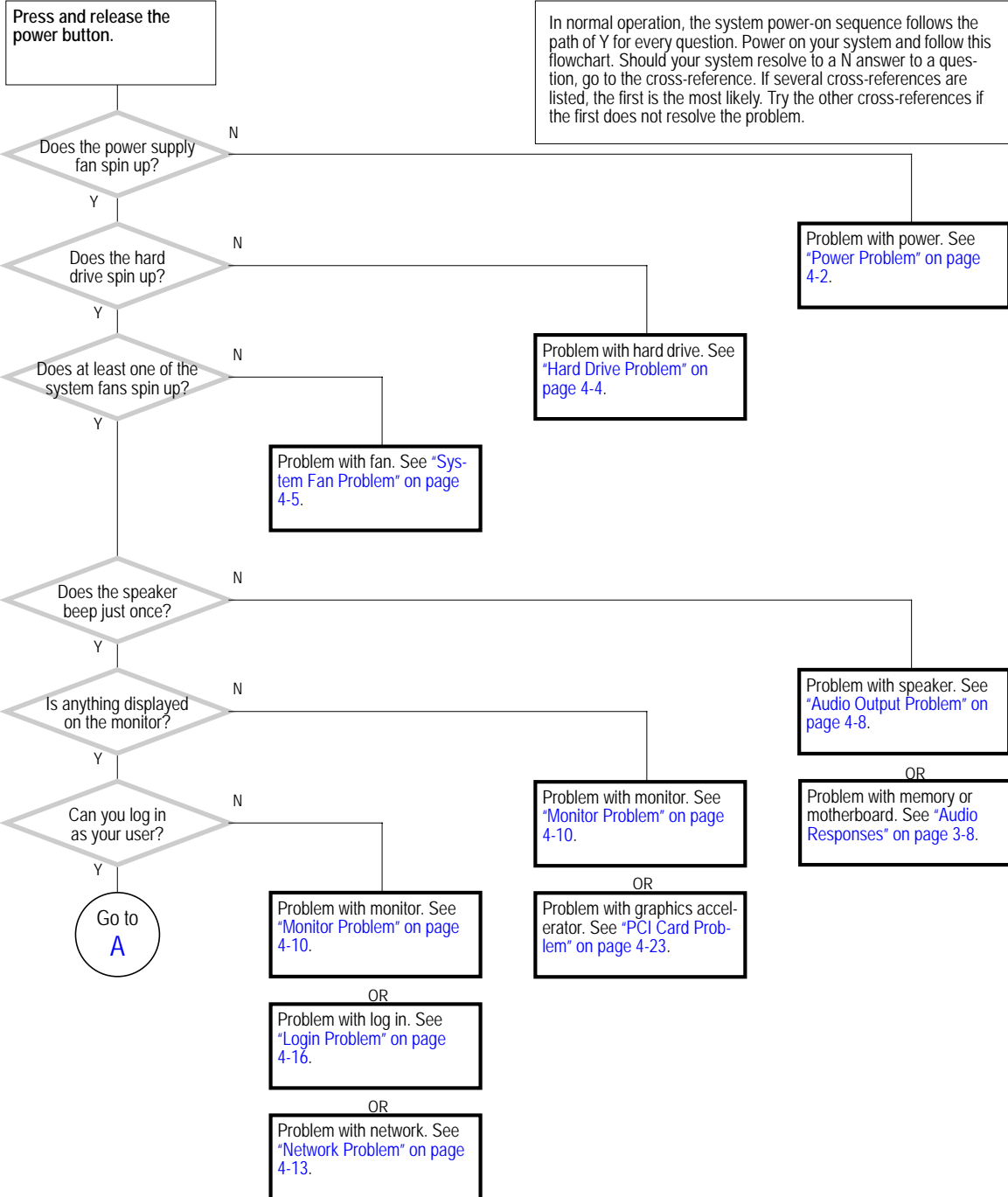


FIGURE 3-1 Power-On Flowchart

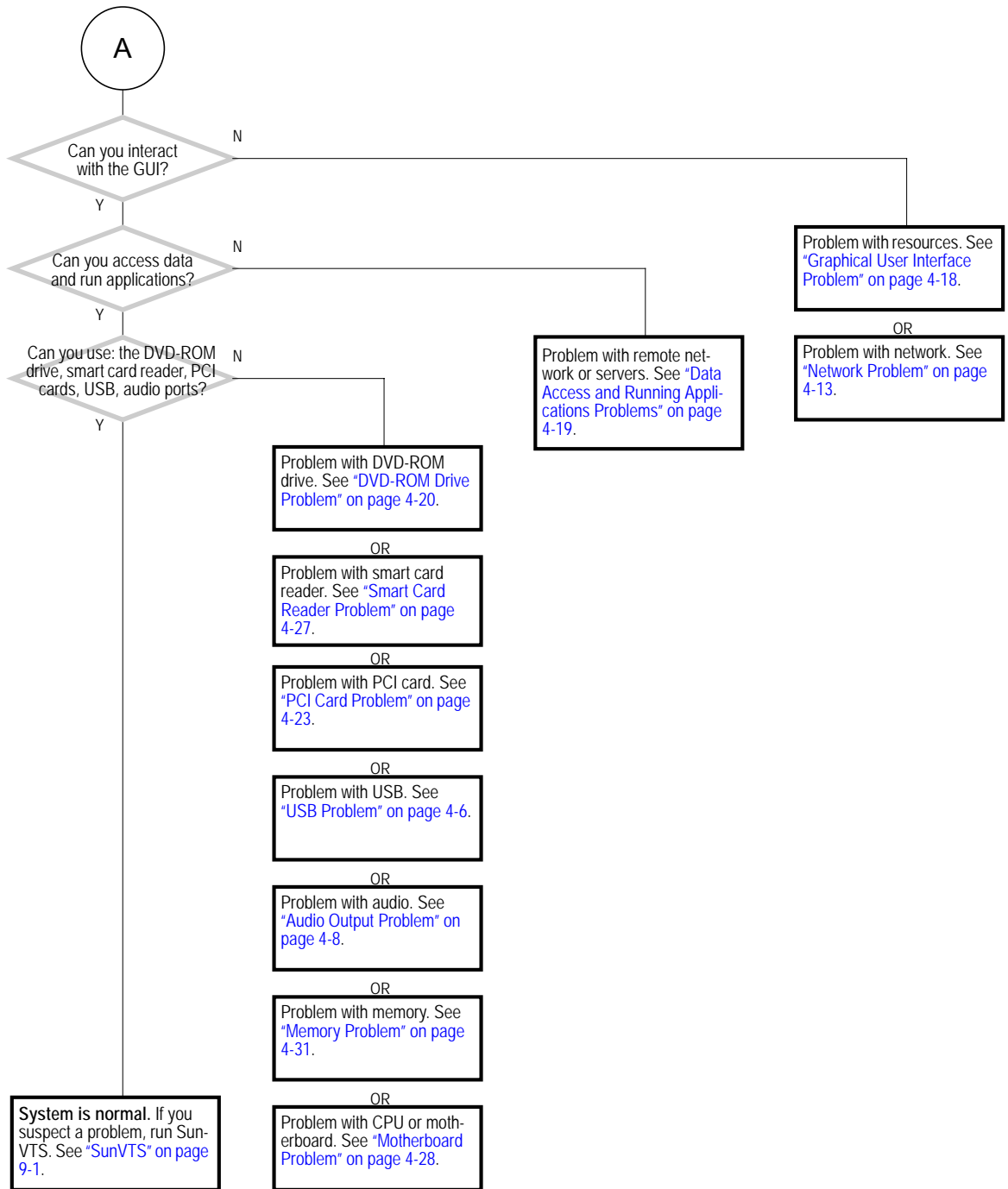


FIGURE 3-2 Power-On Flowchart (Continued)

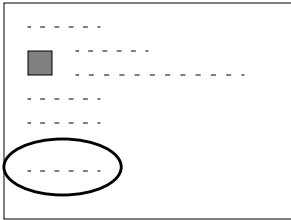
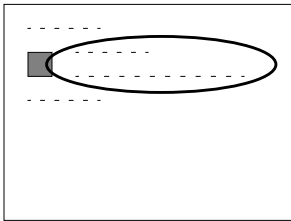
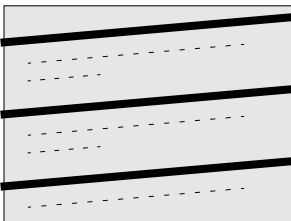
## 3.2 Display and Audio Responses

Component failures can often be diagnosed by looking at the monitor or listening to the system.

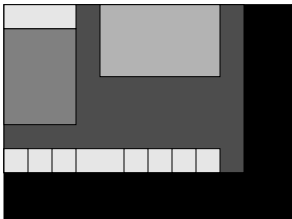
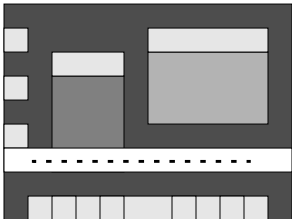
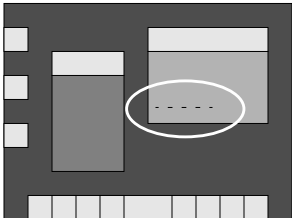

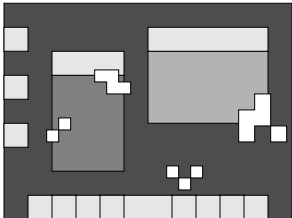
### 3.2.1 Displayed Screens

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

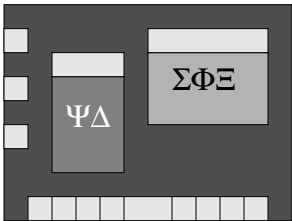
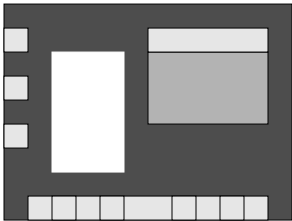

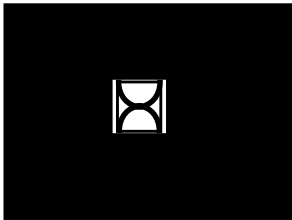
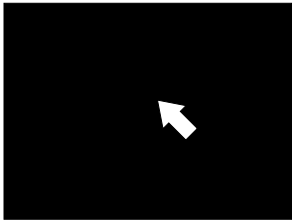
TABLE 3-1 Screen Images and What They Mean

Screen Images	Description	Meaning	Comment
	White screen with banner and text. Error message displayed.	Error from OpenBoot PROM.	See <a href="#">“OpenBoot PROM Messages”</a> on page 3-11.
	White screen with banner and text. Information displayed in banner is incorrect.	Corruption of OpenBoot PROM.	See <a href="#">“OpenBoot PROM Messages”</a> on page 3-11.
	Display has flickering horizontal lines.	Monitor sync problem.	Verify monitor can sync to set frequency. See <a href="#">“Graphics Accelerators”</a> on page C-20. Also see monitor documentation.  See <a href="#">“Monitor Problem”</a> on page 4-10.  See <a href="#">“PCI Card Problem”</a> on page 4-23.

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

Screen Images	Description	Meaning	Comment
	GUI is too small, too large, or not centered.	Monitor settings or sync problem.	<p>Adjust monitor according to monitor manual.</p> <hr/> <p>Verify monitor can sync to set frequency. See <a href="#">“Graphics Accelerators”</a> on page C-20.</p> <hr/> <p>See <a href="#">“Monitor Problem”</a> on page 4-10.</p>
	White bar with black text across GUI.	Error occurred in Solaris kernel.	See <a href="#">“Other Messages”</a> on page 3-16.
	Error message in terminal window.	Error occurred in process started from that terminal.	<p>See <a href="#">“Solaris Error Messages”</a> on page 3-13.</p> <hr/> <p>See <a href="#">“Other Messages”</a> on page 3-16.</p> <hr/> <p>See <a href="#">“Graphical User Interface Problem”</a> on page 4-18.</p>
	GUI colors flash or are wrong.	Color registers exhausted.	<p>Allocate more colors to GUI. See <a href="#">“Avoiding Colormap Flash”</a> on page 11-38.</p> <hr/> <p>Monitor problem. See <a href="#">“Monitor Problem”</a> on page 4-10.</p>
	GUI has artifacts.	Graphics accelerator problem.	See <a href="#">“PCI Card Problem”</a> on page 4-23.

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

Screen Images	Description	Meaning	Comment
	GUI is in wrong language.	Locale problem.	<ol style="list-style-type: none"> <li>1. Log out.</li> <li>2. At the login GUI Options pulldown, select Language.</li> <li>3. Select your language.</li> <li>4. Log in as usual.</li> </ol>
	Window in GUI is completely white.	Window process is hung.	See <a href="#">“Graphical User Interface Problem” on page 4-18.</a>
	Display is all one color.	<p>Monitor problem.</p> <hr/> <p>Graphics accelerator problem.</p> <hr/> <p>NVRAM problem.</p>	<p>See <a href="#">“Monitor Problem” on page 4-10.</a></p> <hr/> <p>See <a href="#">“PCI Card Problem” on page 4-23.</a></p> <hr/> <p>See <a href="#">“NVRAM Problem” on page 4-33.</a></p>
	Display is black with hourglass.	<p>Network problem.</p> <hr/> <p>dtlogin problem.</p>	<p>See <a href="#">“Network Problem” on page 4-13.</a></p> <hr/> <p>See <a href="#">“Login Problem” on page 4-16.</a></p>
	Display is black with mouse pointer.	<p>Network problem.</p> <hr/> <p>dtlogin problem.</p>	<p>See <a href="#">“Network Problem” on page 4-13.</a></p> <hr/> <p>See <a href="#">“Login Problem” on page 4-16.</a></p>

## 3.2.2 Audio Responses

[TABLE 3-2](#) 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 3-2** System Sounds at Locations and What They Mean

Location	Sound	Meaning	Comment
System	Silence	Power delivery problem.	See <a href="#">“Power Problem”</a> on page 4-2.
Monitor	Ticking	Monitor is searching for video mode or trying to sync.	Verify monitor can sync to set frequency. See <a href="#">“Graphics Accelerators”</a> on page C-20. Also see monitor documentation.
			See <a href="#">“Monitor Problem”</a> on page 4-10.
	Very high-pitched whine	Monitor cannot sync.	See <a href="#">“PCI Card Problem”</a> on page 4-23. Change graphics accelerator resolution. See graphics accelerator documentation.
Monitor or power supply	Low-pitched buzz	Power supply degraded.	Replace the power supply. See <a href="#">“Replacing the Power Supply”</a> on page 13-2.
		Monitor power supply degraded.	Replace the monitor.

**TABLE 3-2** System Sounds at Locations and What They Mean (*Continued*)

Location	Sound	Meaning	Comment
Front of system chassis	Upon power on, three beeps and the system powers off	Invalid configuration. Memory or CPU does not match requirements.	See <a href="#">“Memory Problem” on page 4-31</a> or <a href="#">“Motherboard Problem” on page 4-28</a> .
	Upon power on, four beeps and the system powers off	FRUID checksum error.	Replace motherboard. See <a href="#">“Replacing the Motherboard” on page 11-46</a> .
	Upon power on, five beeps and the system powers off	Internal reset failed.	See <a href="#">“Motherboard Problem” on page 4-28</a> .
	Continuous beeping	Keyboard key is stuck or connection is bad.	See <a href="#">“Keyboard Problem” on page 4-15</a> .
	Quiet scratching	Hard disk heads are moving.	Hard drive is normal.
	High-pitched humming	Hard disk bearings are failing.	Replace the hard drive. See <a href="#">“Replacing a Hard Drive” on page 12-2</a> .
Front or back of system chassis	Low shrill sound	Front fan bearing is failing.	Replace front fan. See <a href="#">“Replacing the Front Fan” on page 13-8</a> .
		Rear fan bearing is failing.	Replace rear fan. See <a href="#">“Replacing the Rear Fan” on page 13-15</a> .
		Power supply fan bearing is failing.	Replace the power supply. See <a href="#">“Replacing the Power Supply” on page 13-2</a> .
	Quiet grumbling sound	Temperature is such that fans are barely turning.	Fans are normal.
	Silence from fans	Front fan is not spinning. Rear fan is not spinning.	See <a href="#">“System Fan Problem” on page 4-5</a> .
		Power supply fan is not spinning.	See <a href="#">“Power Problem” on page 4-2</a> .

**TABLE 3-2** System Sounds at Locations and What They Mean (*Continued*)

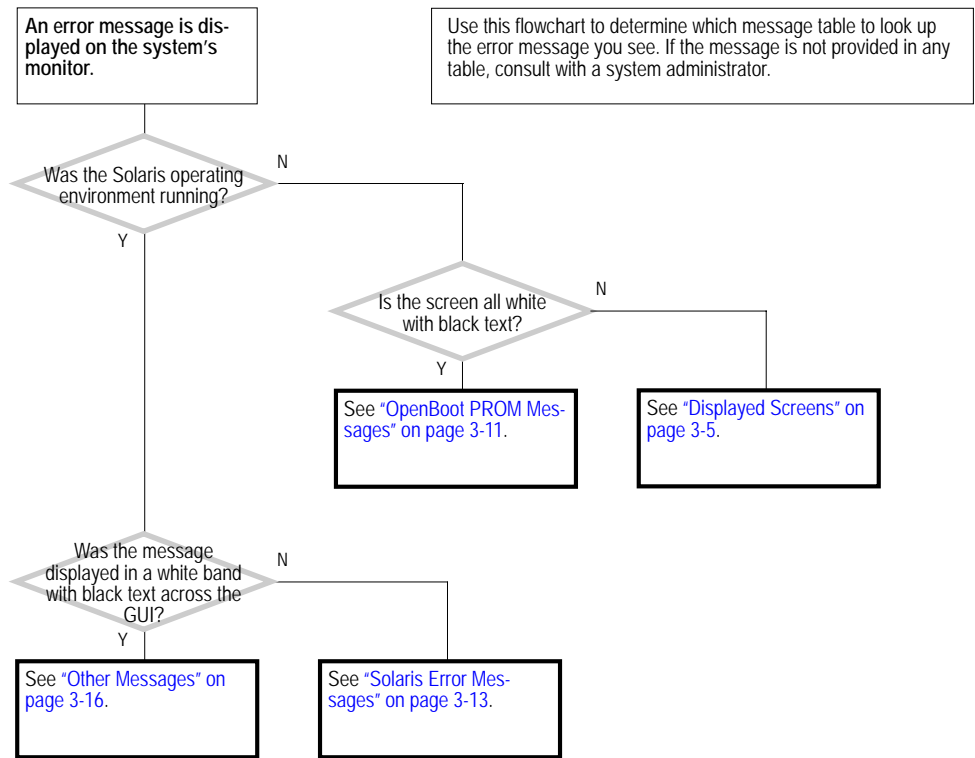
Location	Sound	Meaning	Comment
DVD-ROM	Repetitive quiet clunking	Disc is unbalanced.	Reposition disc.
	Rapid shifting	Laser pickup head is moving.	DVD-ROM drive normal
	Rushing air that is constant or intermittently changes	Disc is spinning properly.	DVD-ROM drive normal
	Rushing air that is rhythmically changing	Laser pickup head cannot locate tracks on disc.	Try a different disc. If the problem continues, see <a href="#">“DVD-ROM Drive Problem”</a> on page 4-20.
	Very high-pitched squeaking	Laser pickup head is out of alignment.	Try a different disc. If the problem continues, replace DVD-ROM drive. See <a href="#">“Replacing the DVD-ROM Drive”</a> on page 12-9.

---

## 3.3 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 3-3** Displayed Messages Flowchart

### 3.3.1 OpenBoot PROM Messages

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

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

Message	Meaning	What to Do
The date is displayed as 01/01/2000 00:00:00 GMT	The battery has drained.	Replace the battery. See <a href="#">"Replacing the Battery" on page 11-23.</a>

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

Message	Meaning	What to Do
Can't open boot device	The device specified for boot is unavailable.	<ul style="list-style-type: none"> <li>For hard drive, check internal connections. Drive might be corrupted. See <a href="#">“Hard Drive Problem” on page 4-4.</a></li> <li>For DVD-ROM drive, check that disc is bootable. Check internal connections. See <a href="#">“DVD-ROM Drive Problem” on page 4-20.</a></li> <li>For network, check network connections. Check boot server. See <a href="#">“Network Problem” on page 4-13.</a></li> </ul>
Can't run OBDIAG from the device tree node or with the active instance	Attempt to run OpenBoot Diagnostics from a selected device node.	Type: ok <b>unselect-dev</b>
NOTICE - CPUx Banky DIMMs are from different vendors.	A pair of DIMMs are each from different manufacturers.	Install DIMMs in identical pairs. See <a href="#">“Replacing the DIMMs” on page 11-2.</a>
NOTICE - CPUx Banky DIMMs have different architectures and will not be used.	A pair of DIMMs are each of different architectures. The DIMMs are not used.	Install DIMMs in identical pairs. See <a href="#">“Replacing the DIMMs” on page 11-2.</a>
Searching for self-test methods . . . Rejecting alloc-mem!	OpenBoot Diagnostics failed to start. Some devices might be tied to other processes	Type: ok <b>unselect-dev</b>
The process “cs00.sh” has been exited with retcode#256	The battery has drained.	Replace the battery. See <a href="#">“Replacing the Battery” on page 11-23.</a>
Timeout waiting for ARP/RARP packet	Network connection problem.	Check network connection. See <a href="#">“Network Problem” on page 4-13.</a>
/usr/bin/ps/getexecname () has failed	The battery has drained.	Replace the battery. See <a href="#">“Replacing the Battery” on page 11-23.</a>
WARNING: Timed out waiting for NIS to come up	The name service cannot be found.	Check network connection. See <a href="#">“Network Problem” on page 4-13.</a> Check system name service configuration information.

## 3.3.2 Solaris Error Messages

TABLE 3-4 lists some common error messages or *portions* of error messages displayed while the Solaris operating environment 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 3-4 Solaris Error Messages and Their Meanings

Message	Meaning	What to do
Arguments too long	Too many arguments follow a C shell command.	Run the command in the Bourne shell.
automountd[int]: server <i>hostname</i> responding	An NFS server cannot be mounted.	Check the NFS server's status and network connection.
Bad address	The value of an address is invalid.	Determine and use the correct address.
Bad file number	A program error where the application does not have permission to interact with the file.	Program bug, or change permissions of the file.
BAD TRAP	Faulty hardware or mismatch of hardware and its configuration. Can sometimes indicate a bad or earlier version CPU. Usually precedes a panic.	Check configuration. Check hardware functionality.
Broken pipe	Occurs when a pipe ( ) directs without data.	Check the structure of the command.
Bus error	I/O was attempted on a nonexistent device. Might be caused by invalid file descriptors, bad memory allocation, or corrupt boot blocks.	Check for device and its connection.
Command not found	The C shell could not find the command you typed.	Check the command path. Type the command explicitly.
Connection closed (by foreign host)	Timeout has occurred or network connection failed from remote host using either <code>rlogin</code> or <code>telnet</code> .	Try again. Check network connection.
Connection refused	Remote host actively refused connection or network security policy was violated.	Try issuing <code>xhost +</code> on the local host.
Connection reset by peer	Connection timed out.	Try again.
Device busy	Device is already mounted or there was an attempt to unmount a device while a file was in use. Typically seen when ejecting an optical media disc.	Close all files and quit all applications from that mount point. If it is an optical media disc, stop the volume manager.

**TABLE 3-4** Solaris Error Messages and Their Meanings (*Continued*)

Message	Meaning	What to do
Error Host Unknown	Name services have not been set up correctly or an alias is missing from NS maps.	Reconfigure name services or update NS maps.
Exec format error	Software is not compatible with platform. File is not an executable, though identified as such.	Check that the Binary Compatibility Package is installed. Check that the file is truly executable.
File descriptor in bad state	Permissions on file prevent reading	Check and reset file permissions.
File exists	An attempt to overwrite a file occurred.	Rename or remove the existing file.
File name too long	A file name was greater than 256 characters, or a path name was over 1024 characters.	If more characters are required, edit the <code>/usr/include/limits.h</code> file.
giving up	An action has been retried until it has timed out. Can occur when syncing SCSI hard drive file systems.	Check cabling to suspect hardware. Check hardware driver.
Illegal Instruction	Application for a different platform was run, there is too little swap space available, or a data file was run as an executable.	Verify the compatibility of the software. Check swap space. Set correct permissions for the file.
Illegal seek	Misuse of the pipe ( <code> </code> ).	Direct the output to a file, then use the file as input.
INIT: Cannot create <code>/var/adm/utmpx</code>	The root file system has been mounted as read only, or has become corrupted.	Run <code>fsck</code> on the root file system. If unsuccessful, replace the root file system.
Invalid argument	An invalid parameter was specified that the system cannot interpret.	Check that the actions you are taking make logical sense. For example, don't mount a nonexistent file system.
Invalid null command	Typographical error when using the pipe ( <code> </code> ). For example, a double pipe or no command following a pipe.	Check the format of the command.
I/O error	Hardware error has occurred on storage device.	Check device media. If a hard drive, run <code>fsck</code> .
process killed	Lack of swap space 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.

**TABLE 3-4** Solaris Error Messages and Their Meanings (Continued)

Message	Meaning	What to do
No carrier	Network connection faulty.	Check network connection. See “Network Problem” on page 4-13.
Network is down	Network connection faulty.	Check network connection. See “Network Problem” on page 4-13.
Network is unreachable	There is no route to network, or gateways are refusing packets.	Check network security.
NFS read failed for server	File-sharing permissions changed while the file was open.	Close the file and reset the permissions.
NFS server not responding still trying	NFS server is down or slow to respond. NFS server network connection might be down.	Check resource load and network connection of NFS server.
No child process	Application is trying to communicate with subprocess that does not exist.	Restart the parent process.
No default media available	No removable media exists or volume manager is confused.	Insert media or update the volume manager with the <code>volcheck</code> command.
No such device	Device does not exist.	Check hardware connections of suspect device.
No utmpx entry	File system is full.	In single-user mode, zero-out the <code>/var/adm/utmp</code> and <code>/var/adm/utmpx</code> files. Bring system up and clean out large files starting in the <code>/var</code> directory.
Not on system console	Security is set so that superuser logins occur only at the console.	Comment out the <code>CONSOLE</code> line in the <code>/etc/default/login</code> file. This action compromises security.
Package not installed	A software package is missing.	Install the package.
RPC: program not registered	Corruption of the <code>rpc.bynumber</code> NIS map.	Check the <code>rpc.bynumber</code> NIS map.
Segmentation fault	A programming error.	The command file <code>core</code> returns the application that caused the fault.

**TABLE 3-4** Solaris Error Messages and Their Meanings (*Continued*)

Message	Meaning	What to do
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.

### 3.3.3 Other Messages

[TABLE 3-5](#) 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 3-5** Other Messages and Their Meaning

Message	Meaning	What to do
Panic in kernel	The Solaris kernel can no longer continue to run. Usually precedes a core dump.	Message might identify hardware that is at fault. Check memory. See <a href="#">“Memory Problem” on page 4-31</a> .
xntpd[356]: too many recvbufs allocated (30)	Problem with network time protocol daemon.	Check network. See <a href="#">“Network Problem” on page 4-13</a> . Check time server. Contact system administrator.
metainit:hostname: there are no existing databases	The Solstice Disk Suite software is installed, but not configured.	Not a problem. Message can be ignored.
WARNING: timeout: reset target chno = 0 targ = 0 WARNING: timeout: reset bus chno = 0 targ = 0	Hard drive is not responding to resets. For this example, it is HDD0.	Check hard drive and connections. See <a href="#">“Hard Drive Problem” on page 4-4</a> .
Bad magic number in disk label Can't open disk label package	Partitions are corrupted on hard drive.	Repartition and format hard drive. Refer to Solaris documentation.
starting rpc services: rpcbin keyserv	Network problem if system does not boot and message persists.	Check network. See <a href="#">“Network Problem” on page 4-13</a> . Check time server.
The X-server can not be started on display :0 ...	The GUI cannot be started for certain software components are not configured properly	Attach a mouse to the back panel USB connectors. Check mouse and connection.

**TABLE 3-5** Other Messages and Their Meaning (Continued)

Message	Meaning	What to do
WARNING: fcsd: _init: Transport Layer driver 'fp' load failed	Might appear in /var/adm/messages.	Not a problem. Message can be ignored.
Hardware Reboot: X86 failed to respond	Might appear in /var/adm/messages.	Not a problem. Message can be ignored.

## 3.4 Troubleshooting Commands

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

- “[iostat Command](#)” on page 3-17
- “[prtdiag Command](#)” on page 3-19
- “[prtconf Command](#)” on page 3-23
- “[netstat Command](#)” on page 3-26
- “[ping Command](#)” on page 3-28
- “[ps Command](#)” on page 3-30
- “[prstat Command](#)” on page 3-32

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

### 3.4.1 `iostat` Command

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

#### 3.4.1.1 Options

[TABLE 3-6](#) describes options for the `iostat` command and how those options can help troubleshoot the Sun Blade 1500 system.

**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.

**TABLE 3-6** Options for `iostat` (Continued)

Option	Description	How It Can Help
-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 disk, reports extended disk statistics. The output is in tabular form.	Similar to the -e option, but provides rate information. This will help identify poor performance of internal devices and other I/O devices across the network.

### 3.4.1.2 Examples

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

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

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



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

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

```
# iostat -En
c0t0d0      Soft Errors: 0 Hard Errors: 0 Transport Errors: 0
Model: ST380021A      Revision: 3.75      Serial No: 3HV17BQQ
Size: 80.02GB <80023879680 bytes>
Media Error: 0 Device Not Ready: 0 No Device: 0 Recoverable: 0
Illegal Request: 0
c0t2d0      Soft Errors: 0 Hard Errors: 2 Transport Errors: 0
Vendor: SAMSUNG      Product: DVD-ROM SD-816B      Revision: bm02
Serial No: MMM
Size: 18446744073.71GB <-1 bytes>
Media Error: 0 Device Not Ready: 2 No Device: 0 Recoverable: 0
Illegal Request: 0 Predictive Failure Analysis: 0
```

## 3.4.2 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.

### 3.4.2.1 Options

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

**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 ASIC and PROM revisions.

### 3.4.2.2 Examples

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

```
# /usr/platform/sun4u/sbin/prtdiag
System Configuration: Sun Microsystems sun4u Sun Blade 1500
System clock frequency: 177 MHZ
Memory size: 512MB
===== CPUs =====
====
CPU Freq      E$      CPU      CPU      Temperature
      Size      Impl.    Mask     Die      Ambient
----  -
0    1062 MHz  1MB      US-IIIi  2.1     61 C     30 C
===== IO Devices =====
====
      Bus  Freq
Brd  Type  MHz  Slot      Name                          Model
----  -
0    pci   66      2  network-pci14e4,1647.14e4.16+
0    pci   33      3  SUNW,m64B (display)          SUNW,370-4625
0    pci   33      7  isa/serial-sul6550 (serial)
0    pci   33      7  isa/serial-sul6550 (serial)
0    pci   33      7  isa/dma-isadma (dma)
0    pci   33      8  sound-pci10b9,5451.10b9.5451+
0    pci   33     10  usb-pci10b9,5237.3 (usb)
0    pci   33     11  usb-pci10b9,5237.3 (usb)
0    pci   33     13  ide-pci10b9,5229.c4 (ide)
===== Memory Configuration =====
====
Segment Table:
-----
Base Address      Size      Interleave Factor  Contains
-----
0x0                512MB          1                GroupID 0
Memory Module Groups:
-----
ControllerID  GroupID  Size      Labels
-----
0              0        512MB     DIMM1,DIMM2
===== usb Devices =====
=
Name          Port#
-----
mouse         1
keyboard      2
```

```

# /usr/platform/sun4u/sbin/prtdiag -v
System Configuration: Sun Microsystems   sun4u Sun Blade 1500
System clock frequency: 177 MHZ
Memory size: 512MB
. . .
===== Environmental Status =====
====
Fan Speeds:
-----
Fan Device           Speed
-----
cpu-fan              2410rpm
intake-fan           1939rpm
outtake-fan          1939rpm

===== HW Revisions =====
====
ASIC Revisions:
-----
pci: Rev 3
pci: Rev 3

System PROM revisions:
-----
OBP 4.x.build_25 2003/02/04 18:45 Sun Blade 1500
OBDIAG 4.x.0 2003/02/04 18:46

```

### 3.4.3 prtconf Command

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

The `prtconf` command identifies hardware that is recognized by the Solaris operating environment. 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.

### 3.4.3.1 Options

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

TABLE 3-8 Options for `prtconf`

Option	Description	How It Can Help
No option	Displays the device tree of devices recognized by the operating environment.	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 environment 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.

### 3.4.3.2 Examples

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

```
# prtconf
System Configuration: Sun Microsystems sun4u
Memory size: 512 Megabytes
System Peripherals (Software Nodes):

SUNW,Sun-Blade-1500
  packages (driver not attached)
    SUNW,builtin-drivers (driver not attached)
    deblocker (driver not attached)
    disk-label (driver not attached)
    terminal-emulator (driver not attached)
    dropins (driver not attached)
    kbd-translator (driver not attached)
    obp-tftp (driver not attached)
    SUNW,i2c-ram-device (driver not attached)
    SUNW,fru-device (driver not attached)
    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: 512 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)
. . .

```

## 3.4.4 netstat Command

The `netstat` command displays the network status.

### 3.4.4.1 Options

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

**TABLE 3-9** Options for `netstat`

Option	Description	How It Can Help
<code>-i</code>	Displays the interface state, including packets in/out, error in/out, collisions, and queue.	Provides a quick overview of the system's network health.
<code>-i interval</code>	Providing a trailing number with the <code>-i</code> option repeats the <code>netstat</code> command every <code>interval</code> seconds.	Helps identify intermittent or long duration network events. By piping <code>netstat</code> output to a file, activity overnight is later viewed at once.



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

Option	Description	How It Can Help
-p	Displays the media table.	Provides MAC address for hosts on the subnet.
-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.

### 3.4.4.2 Examples

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

```
# netstat -i 1
      input   bge0      output
packets errs  packets errs  colls  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

## 3.4.5 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*.

## 3.4.5.1 Options

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

TABLE 3-10 Options for `ping`

Option	Description	How It Can Help
<i>hostname</i>	The probe packet is sent to <i>hostname</i> and returned.	Verifies that a host is active on the network.
<code>-g hostname</code>	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.
<code>-i interface</code>	Designates which interface to send and receive the probe packet through.	Enables a simple check of secondary network interfaces.
<code>-n</code>	Replaces host names with IP addresses.	Used when an address is more beneficial than a host name.
<code>-s</code>	Ping continuously in one second intervals. Ctrl-C aborts. Upon abort, statistic are displayed.	Helps identify intermittent or long-duration network events. By piping <code>ping</code> output to file, activity overnight is later viewed at once.
<code>-svR</code>	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.

## 3.4.5.2 Examples

The following show sample 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
```

## 3.4.6 ps Command

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

### 3.4.6.1 Options

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

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

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

### 3.4.6.2 Examples

The following show sample 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.

---

## 3.4.7 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.

### 3.4.7.1 Options

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

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

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

### 3.4.7.2 Examples

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

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

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

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





## Troubleshooting Flowcharts

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

- “Power Problem” on page 4-2
- “Hard Drive Problem” on page 4-4
- “System Fan Problem” on page 4-5
- “USB Problem” on page 4-6
- “Audio Output Problem” on page 4-8
- “Monitor Problem” on page 4-10
- “Network Problem” on page 4-13
- “Keyboard Problem” on page 4-15
- “Login Problem” on page 4-16
- “Graphical User Interface Problem” on page 4-18
- “Data Access and Running Applications Problems” on page 4-19
- “DVD-ROM Drive Problem” on page 4-20
- “PCI Card Problem” on page 4-23
- “IEEE 1394 Problem” on page 4-25
- “Smart Card Reader Problem” on page 4-27
- “Motherboard Problem” on page 4-28
- “Memory Problem” on page 4-31
- “NVRAM Problem” on page 4-33
- “Battery Problem” on page 4-34

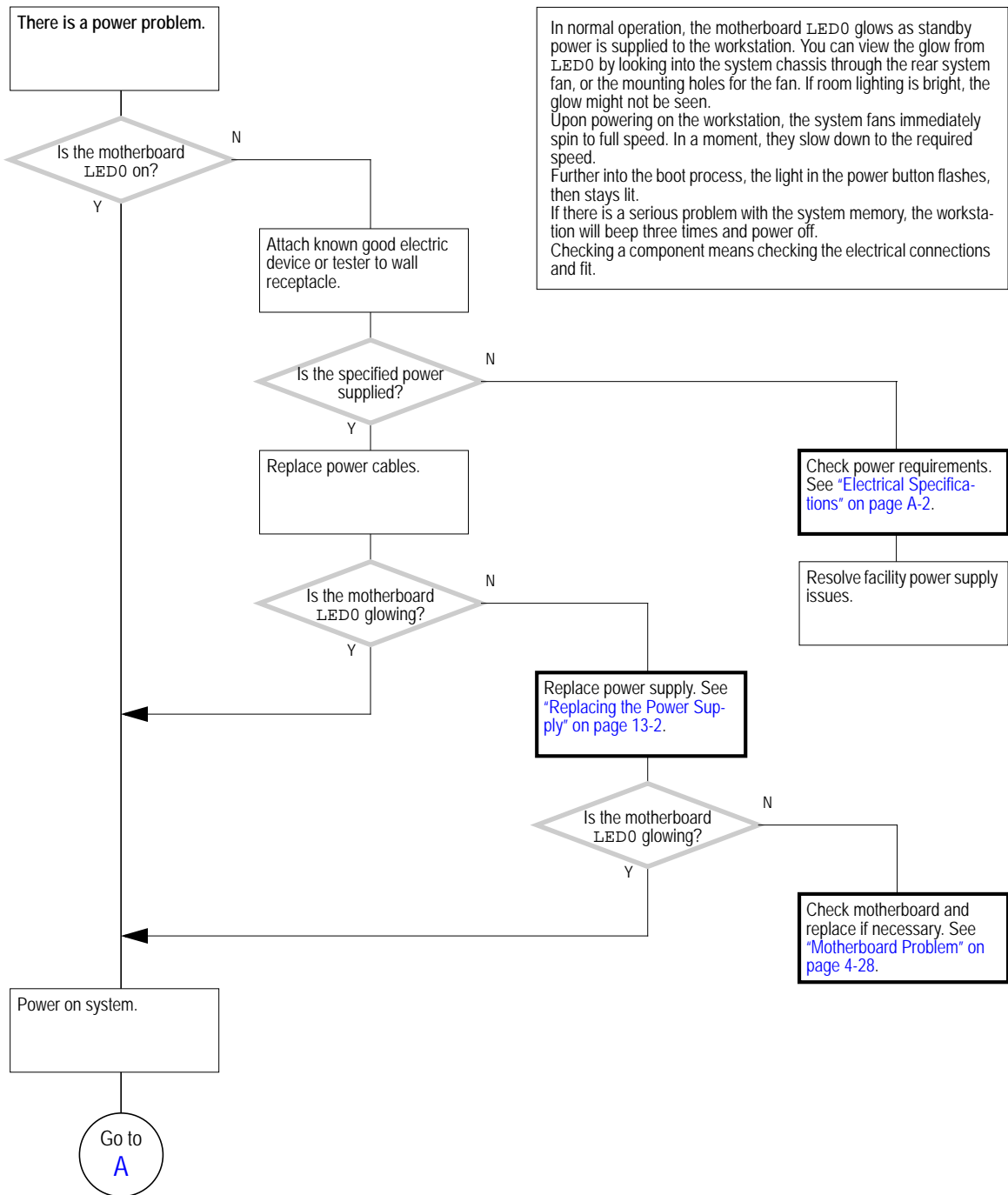


FIGURE 4-1 Power Problem

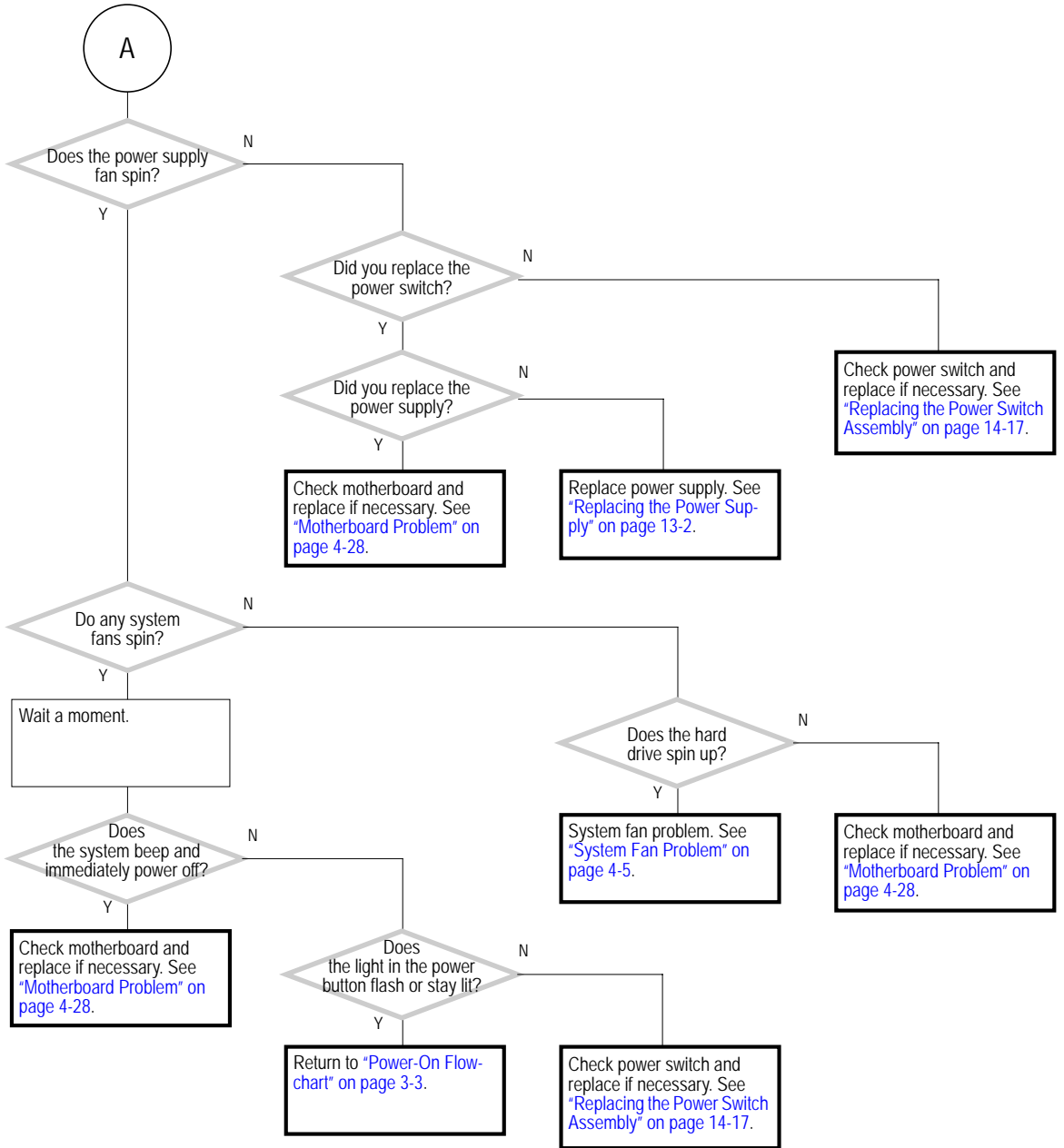


FIGURE 4-2 Power Problem (Continued)

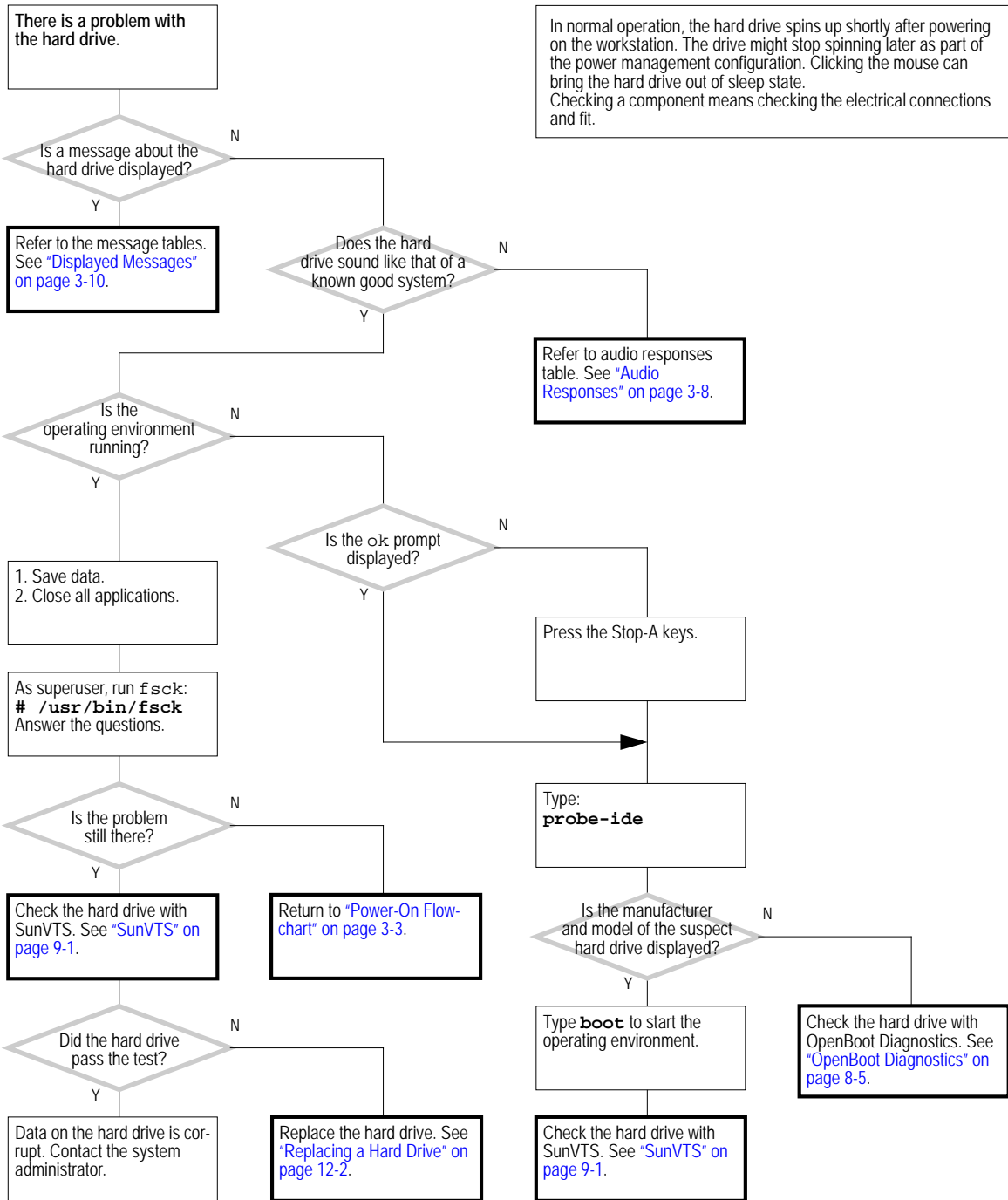


FIGURE 4-3 Hard Drive Problem

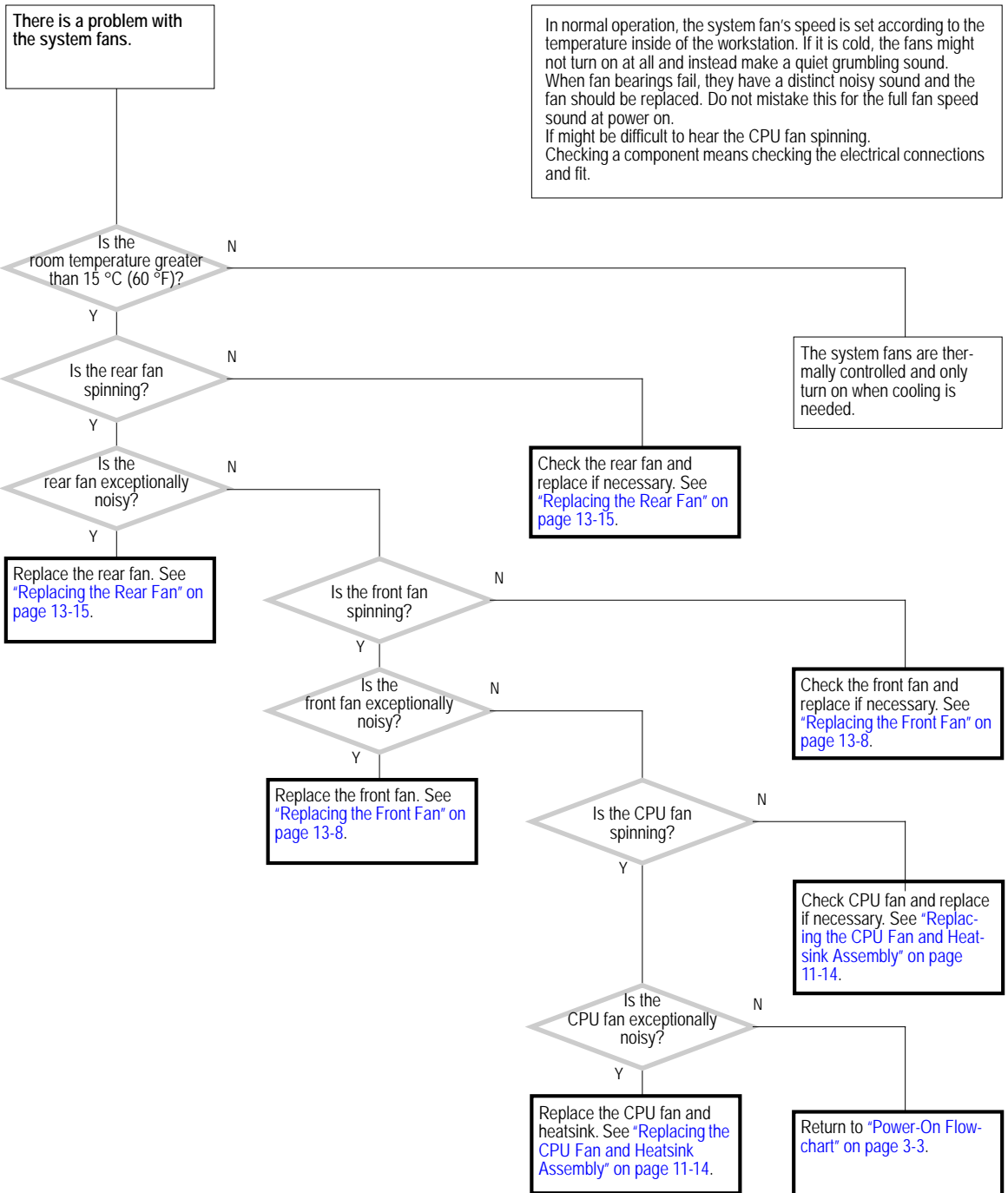


FIGURE 4-4 System Fan Problem

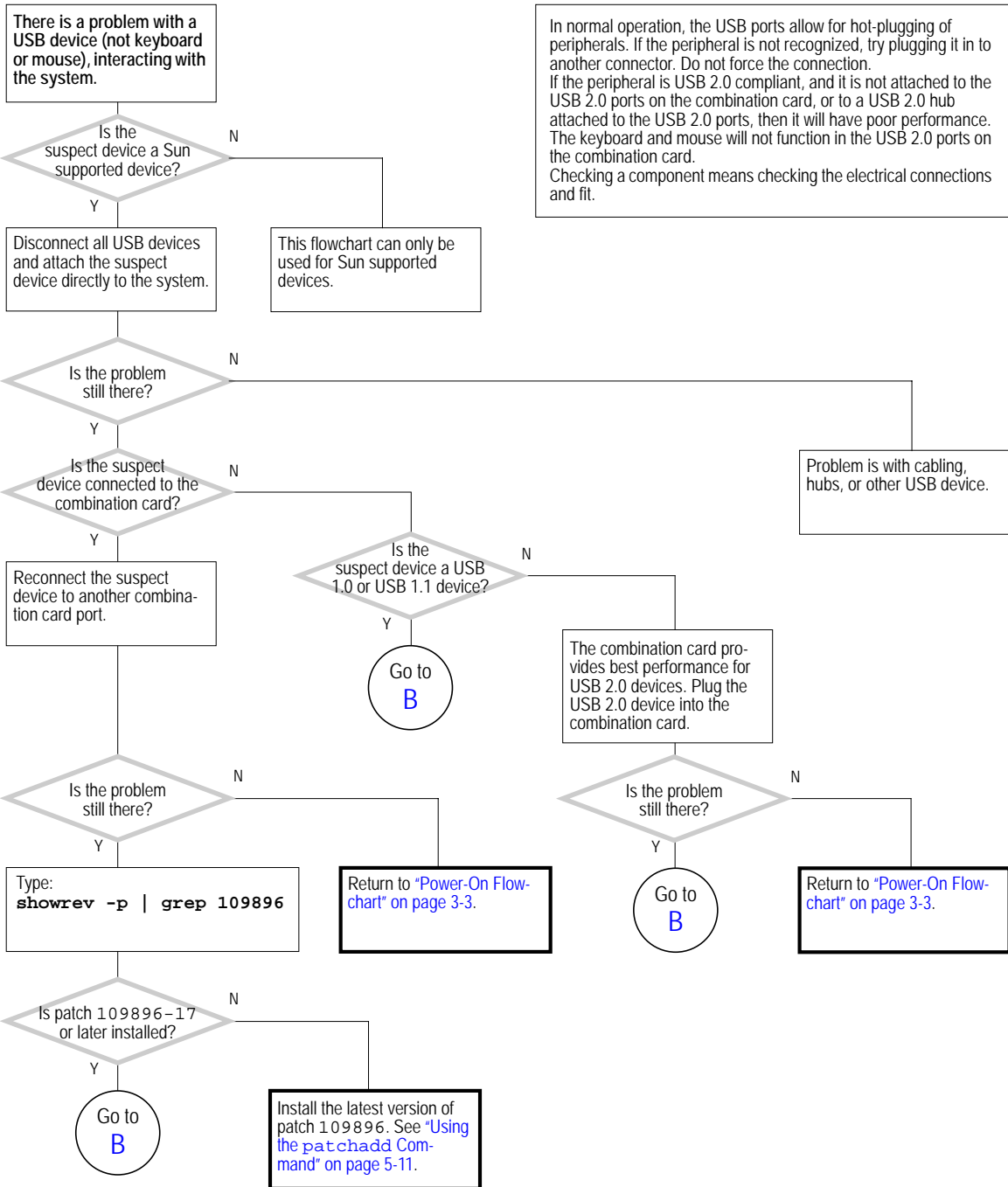


FIGURE 4-5 USB Problem

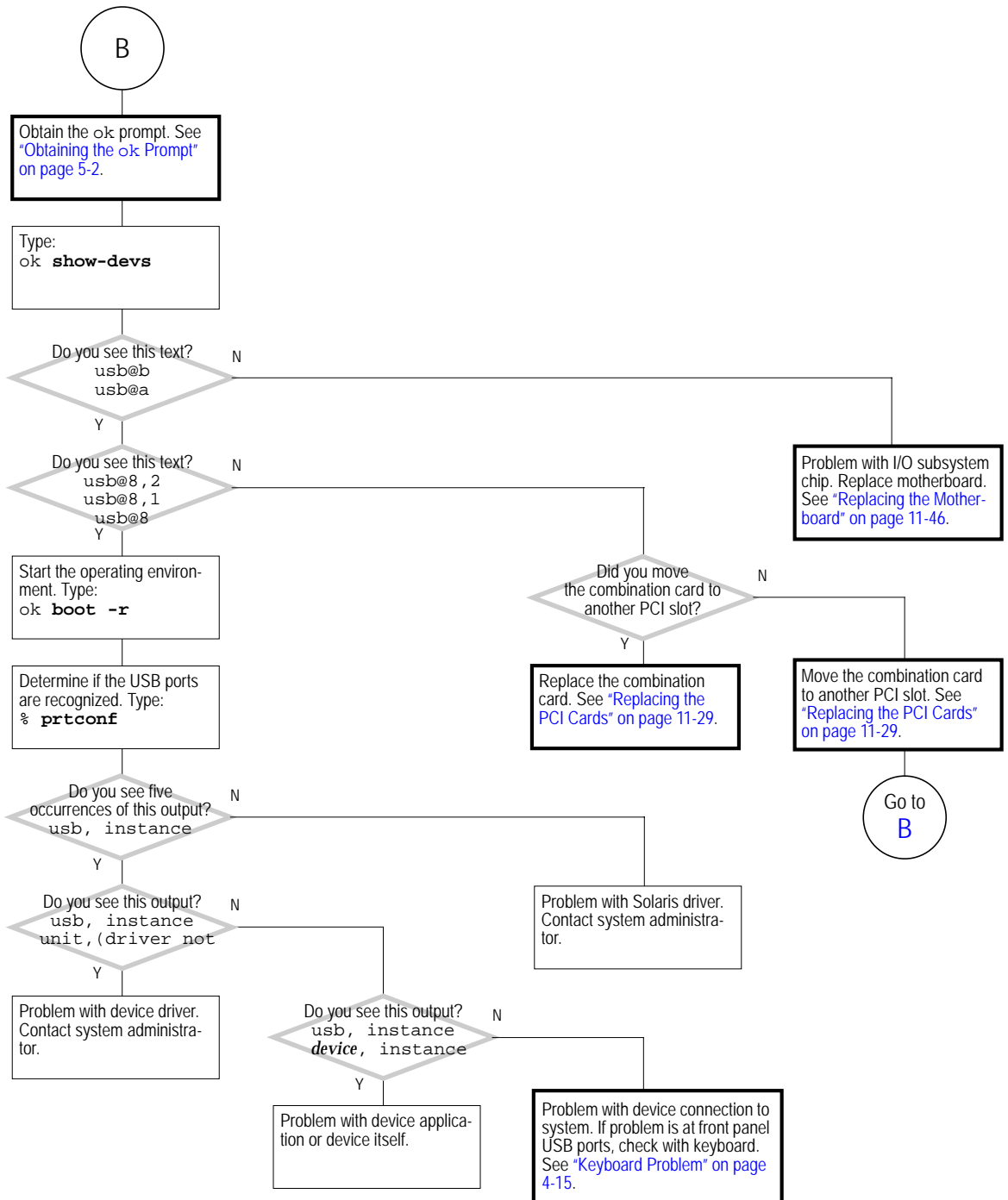


FIGURE 4-6 USB Problem (Continued)

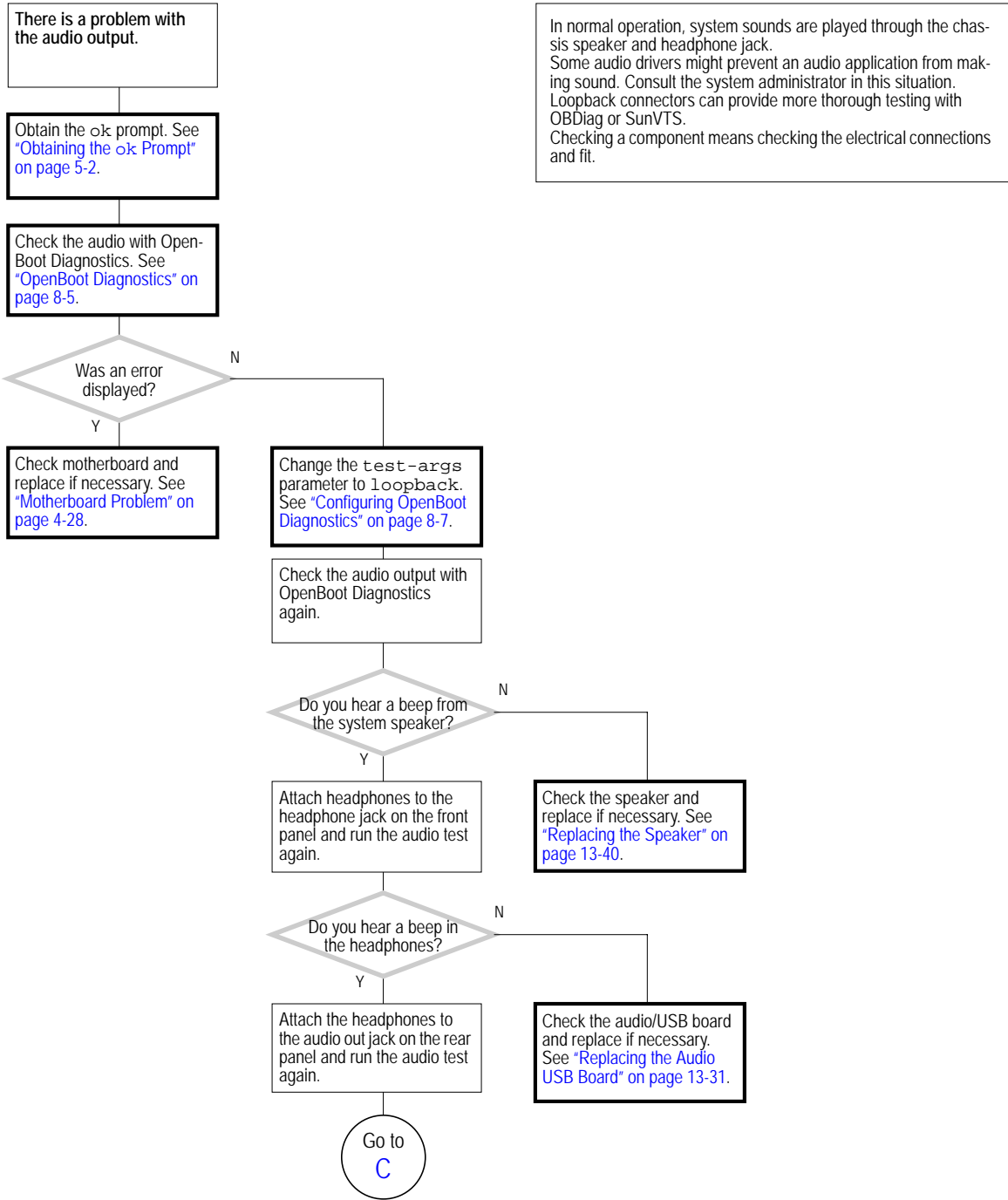
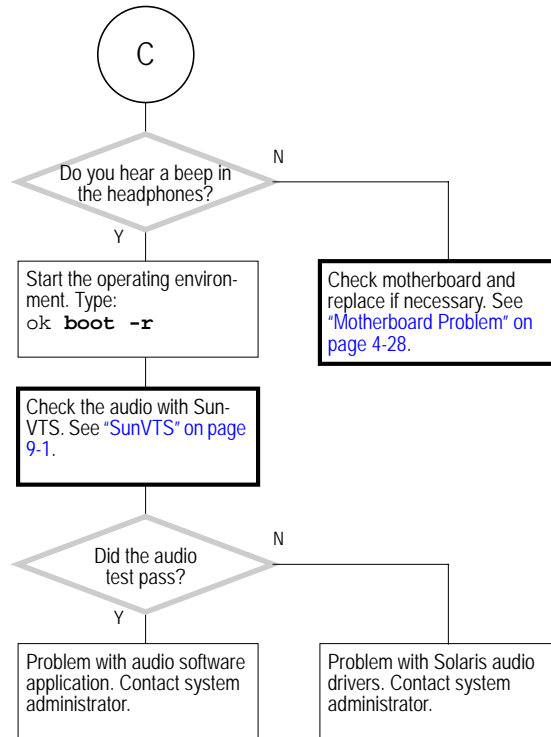
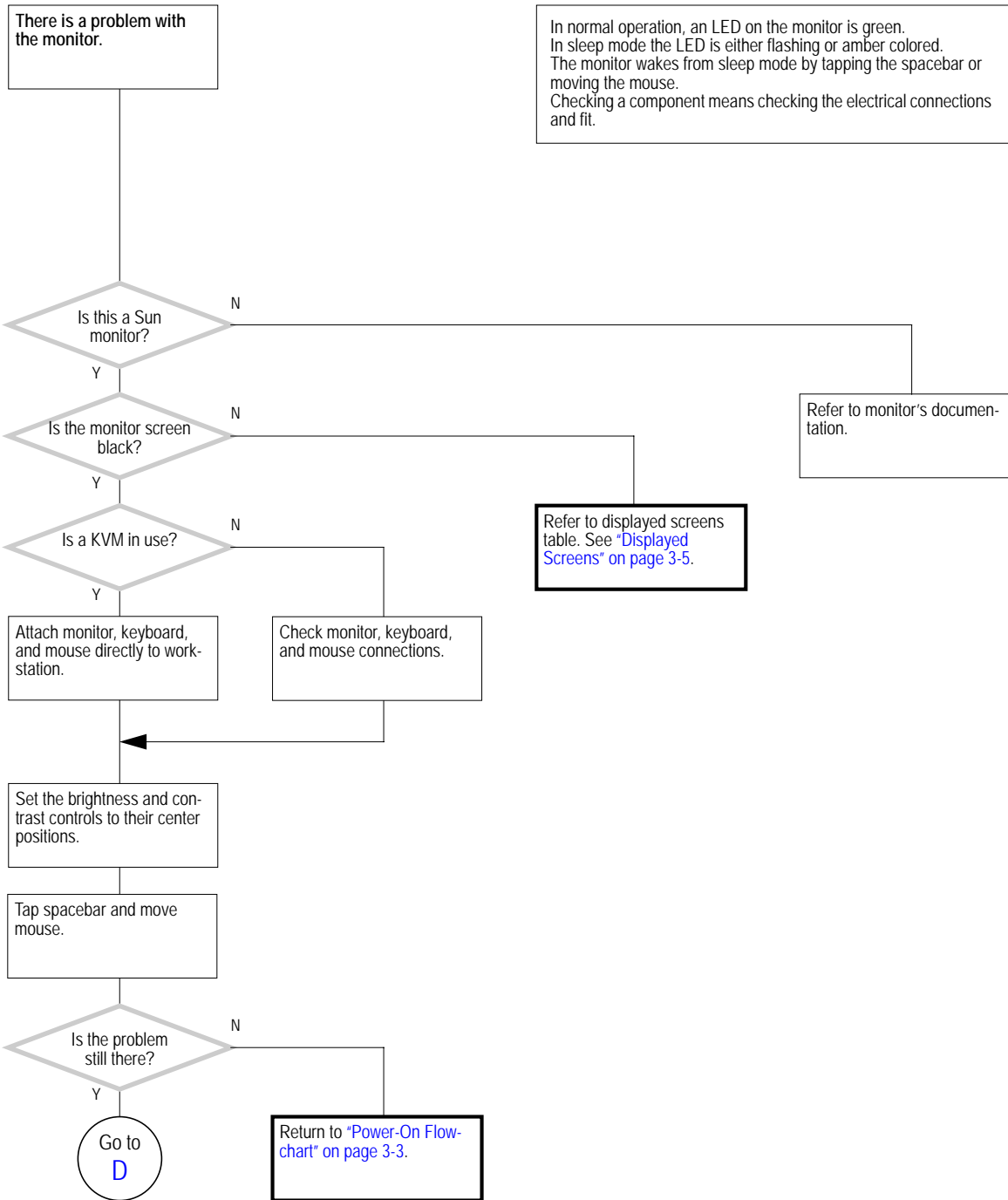


FIGURE 4-7 Audio Output Problem





**FIGURE 4-8** Audio Output Problem (*Continued*)



In normal operation, an LED on the monitor is green. In sleep mode the LED is either flashing or amber colored. The monitor wakes from sleep mode by tapping the spacebar or moving the mouse. Checking a component means checking the electrical connections and fit.

FIGURE 4-9 Monitor Problem

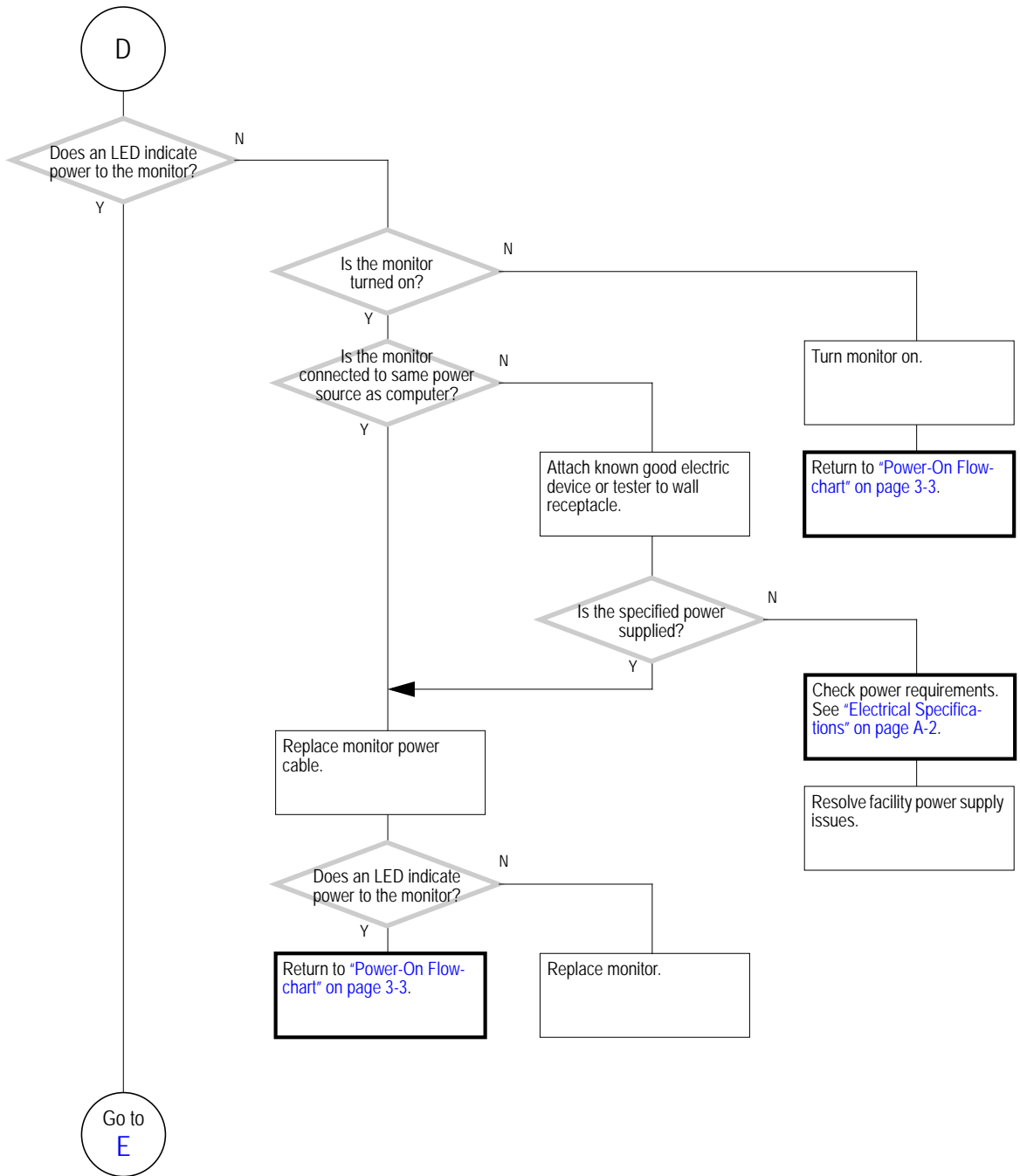
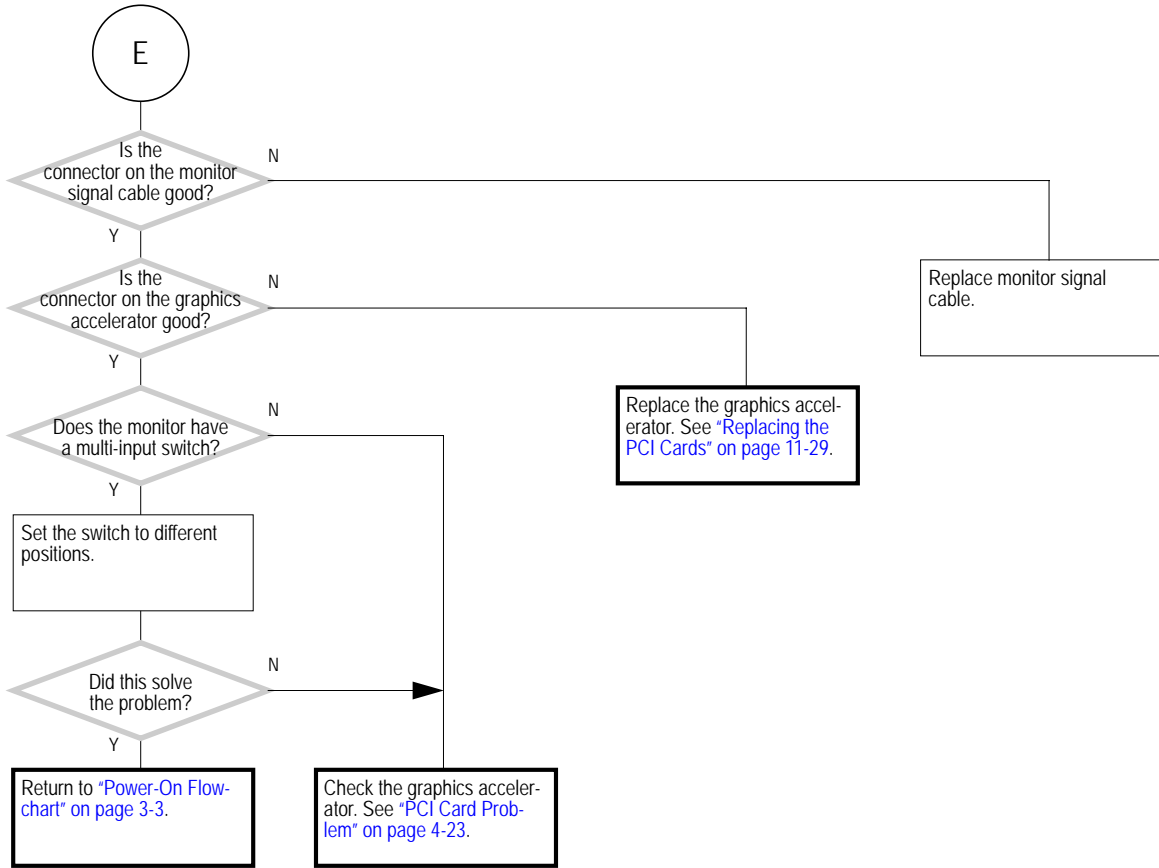


FIGURE 4-10 Monitor Problem (Continued)



**FIGURE 4-11** Monitor Problem (Continued)

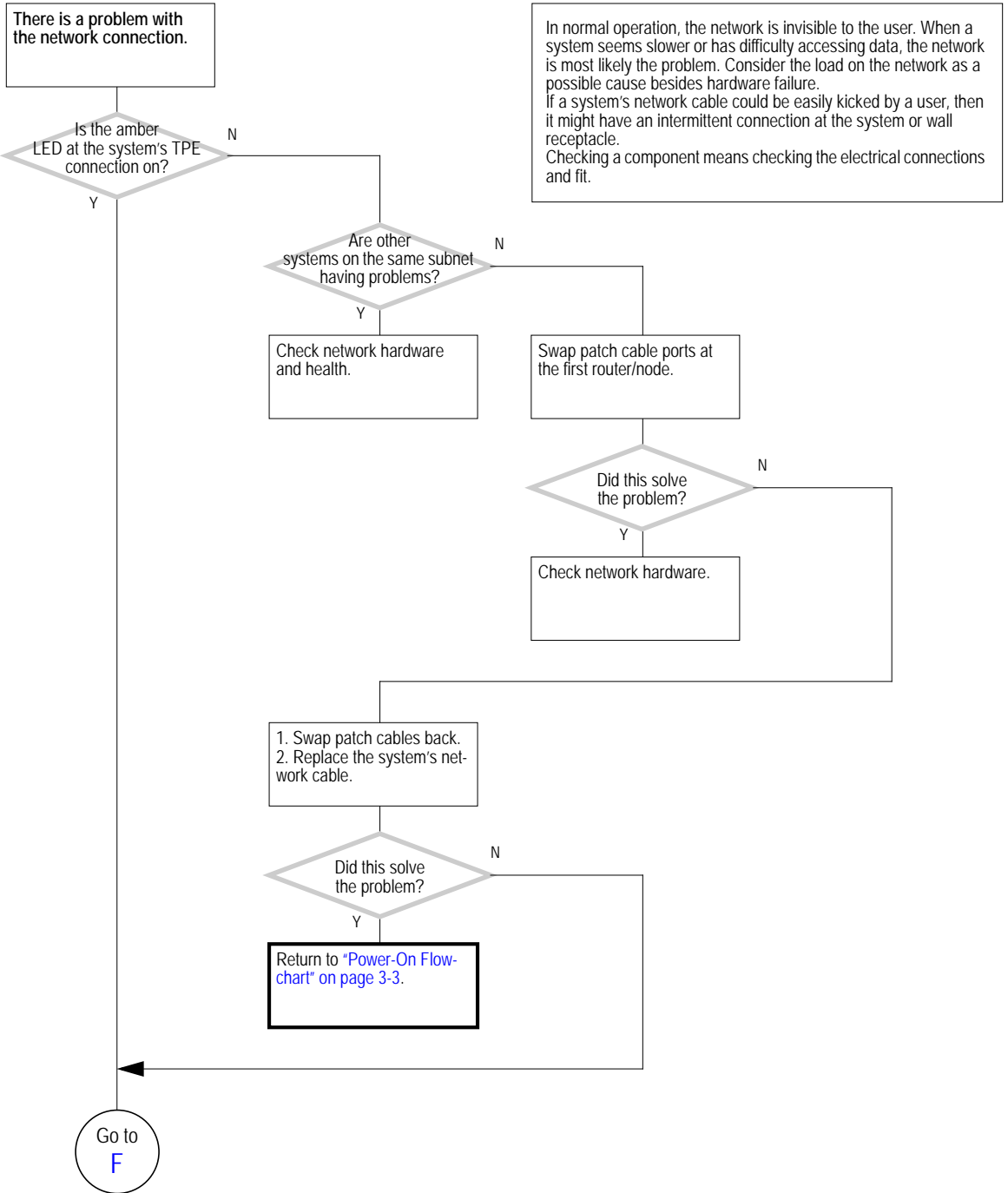


FIGURE 4-12 Network Problem

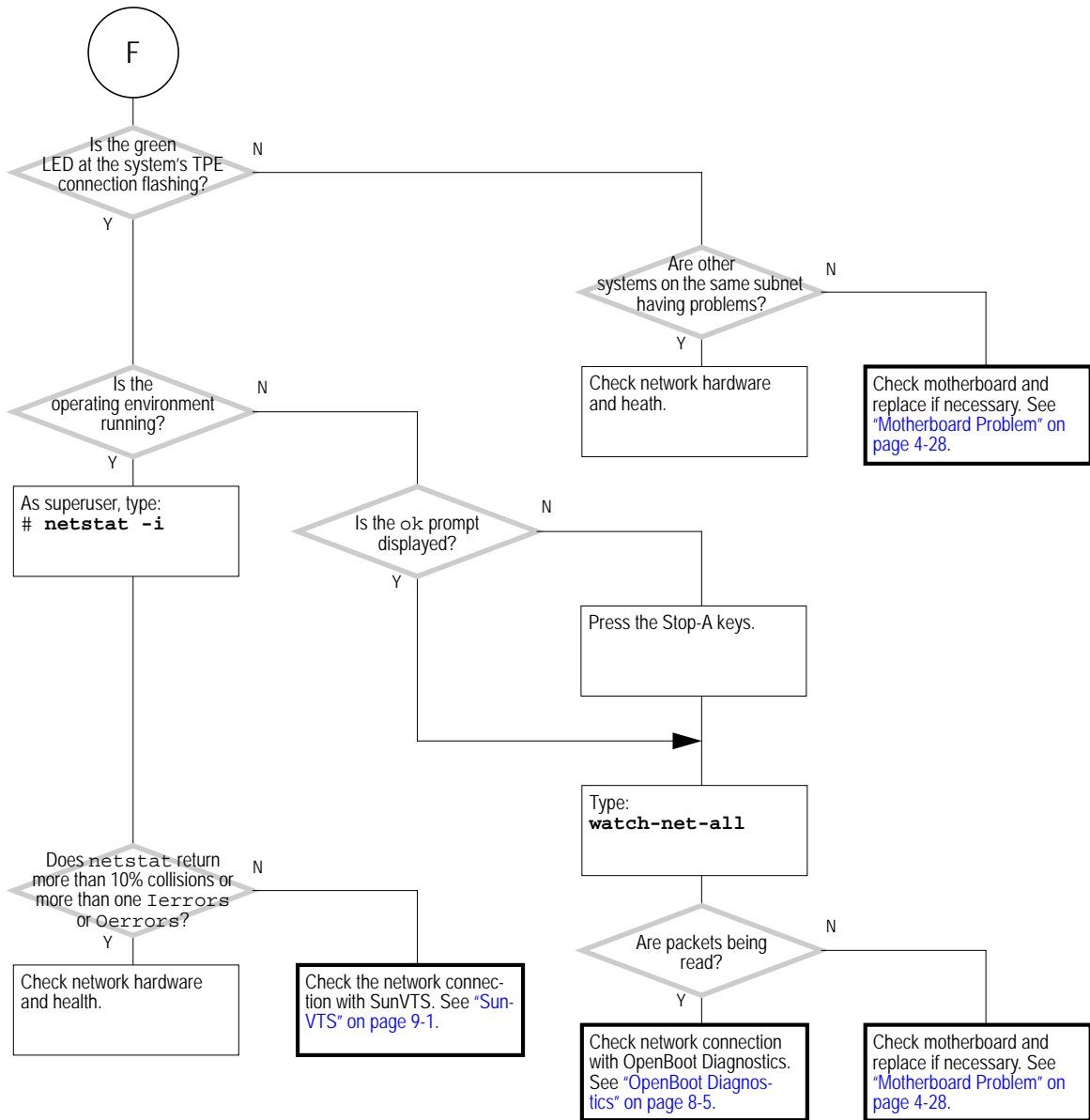


FIGURE 4-13 Network Problem (Continued)

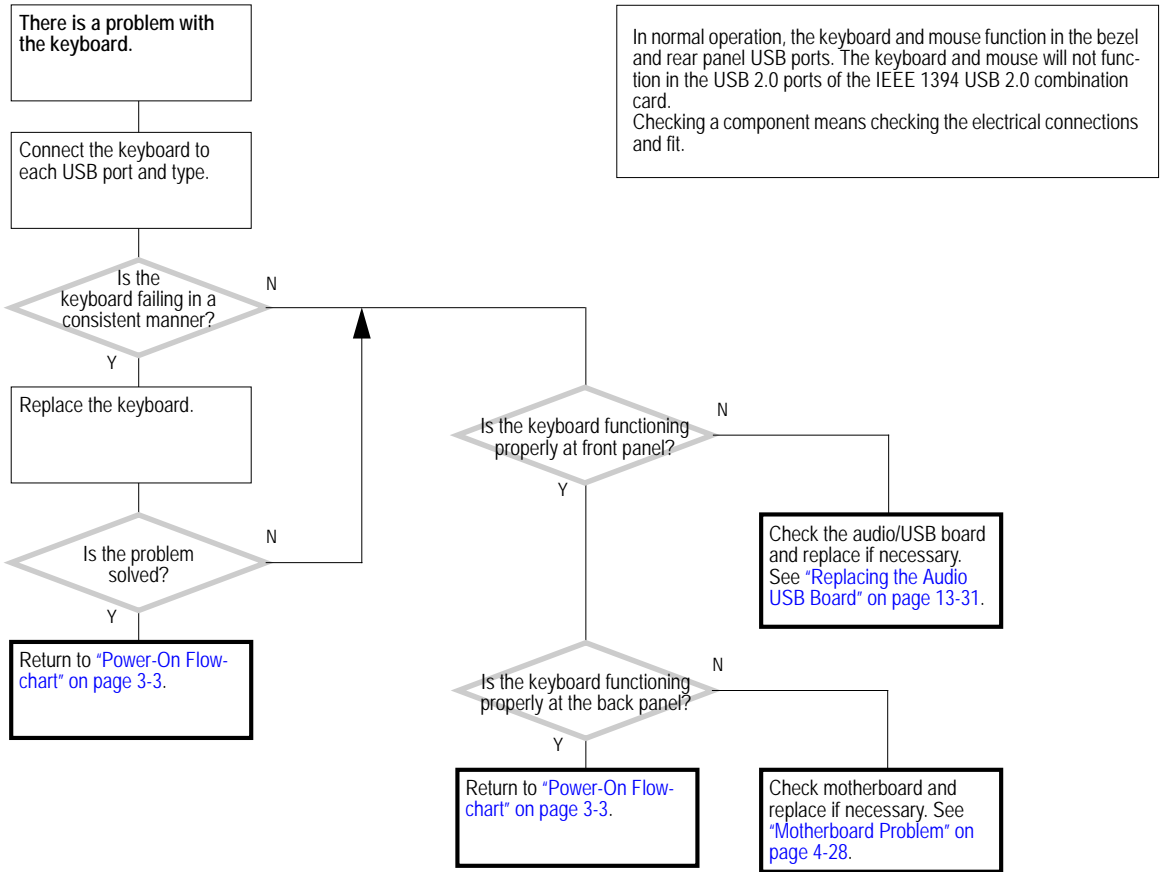


FIGURE 4-14 Keyboard Problem

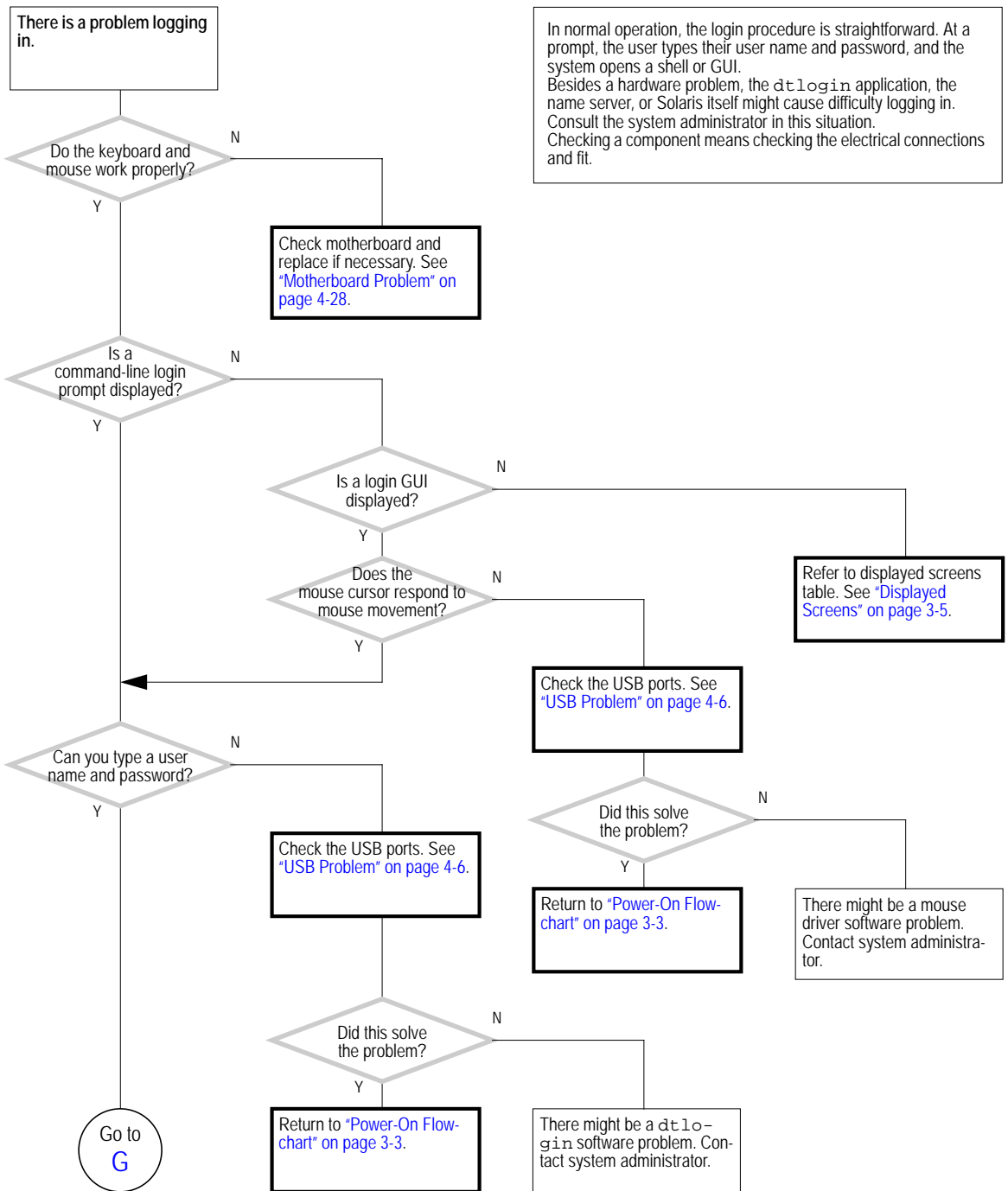
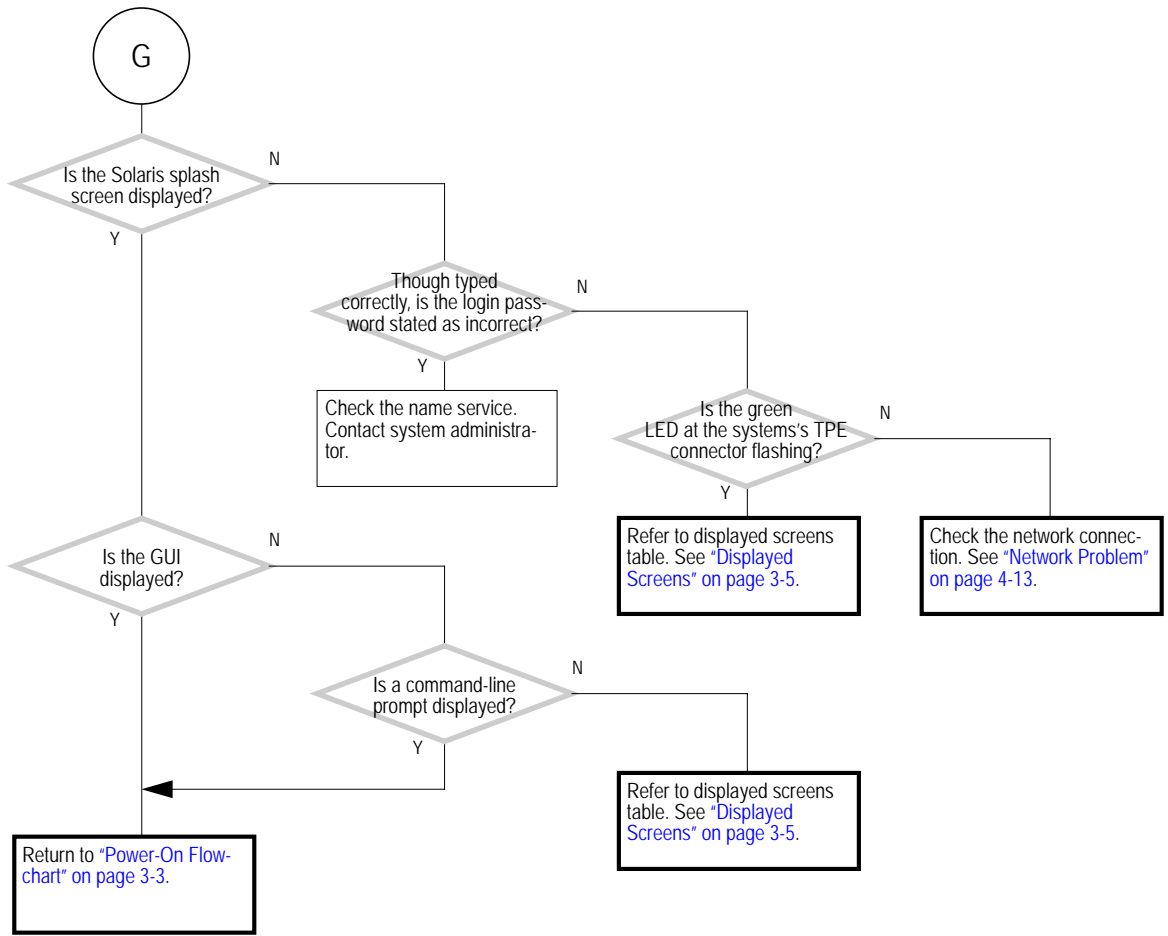


FIGURE 4-15 Login Problem





**FIGURE 4-16** Login Problem (Continued)

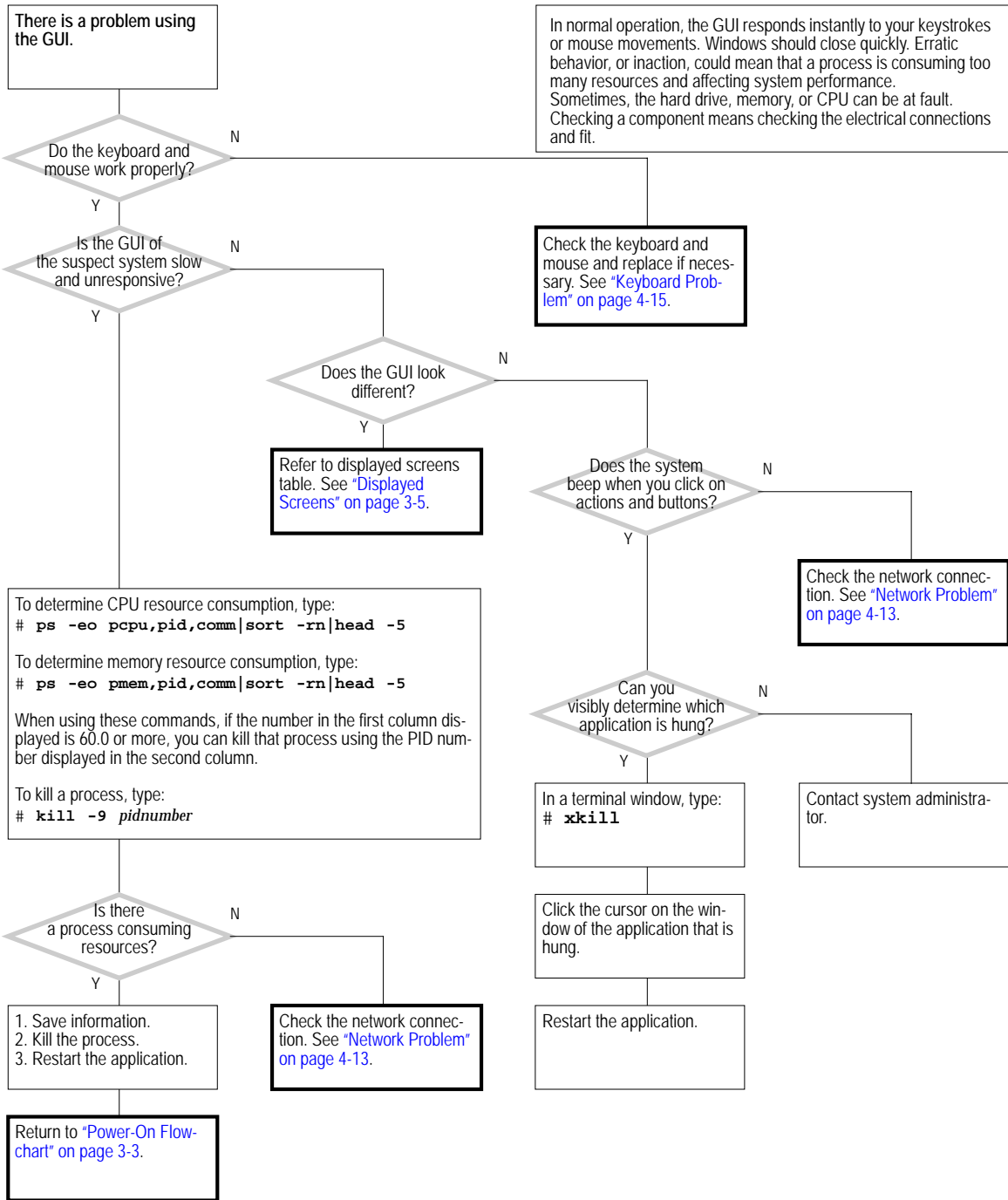


FIGURE 4-17 Graphical User Interface Problem

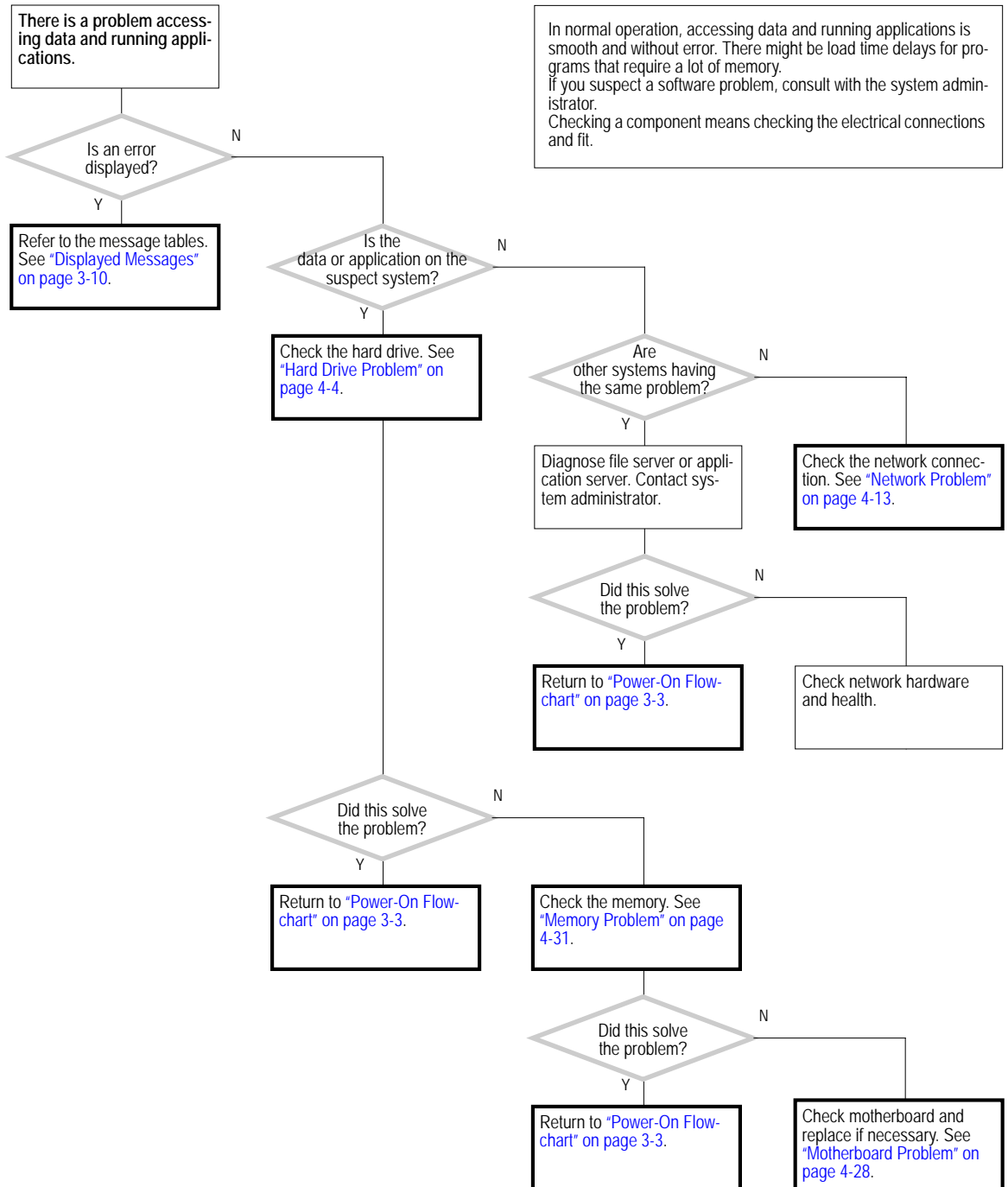


FIGURE 4-18 Data Access and Running Applications Problems

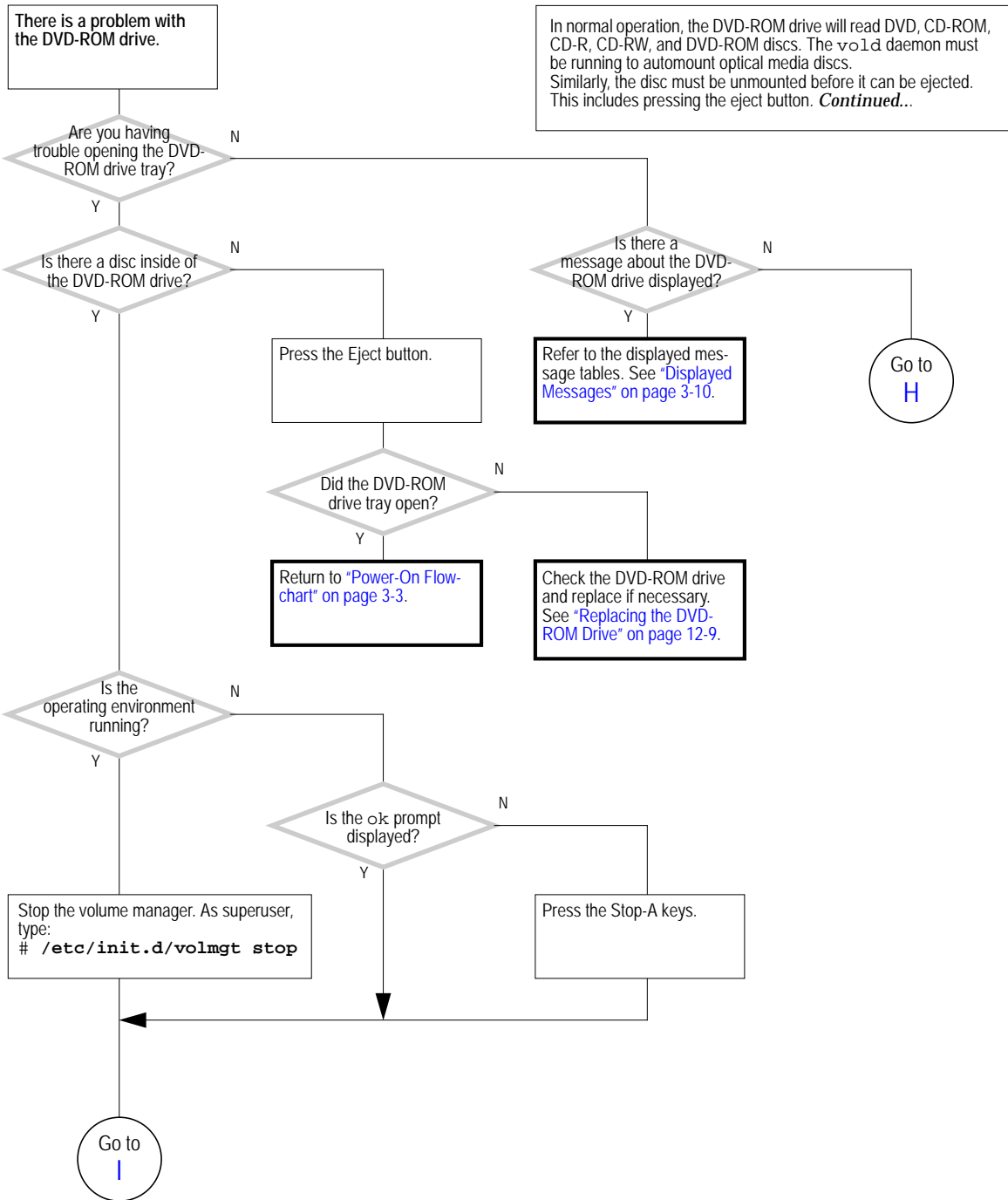


FIGURE 4-19 DVD-ROM Drive Problem

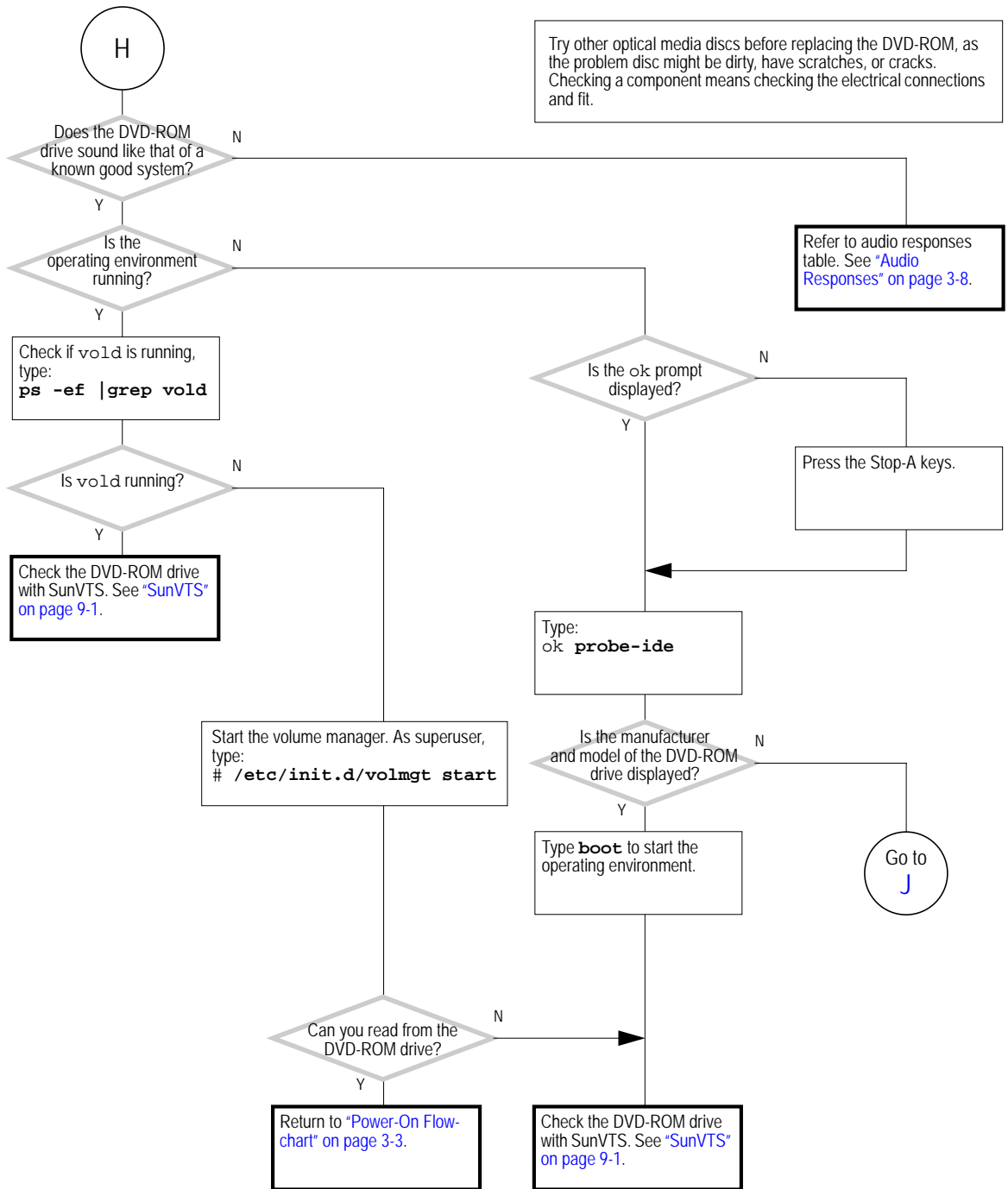


FIGURE 4-20 DVD-ROM Drive Problem (Continued)

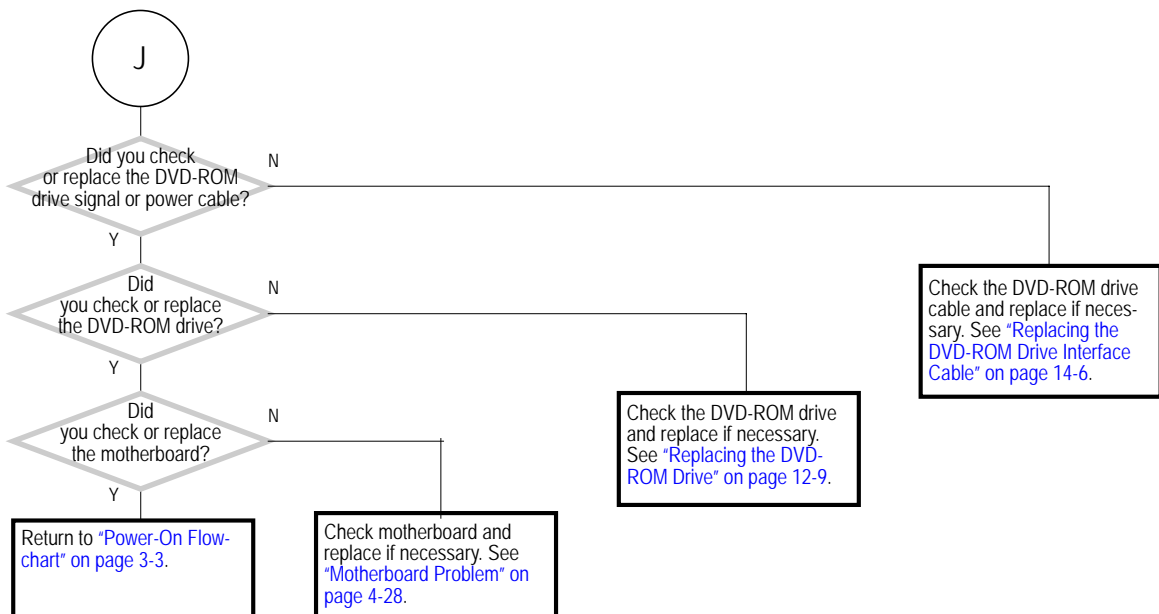
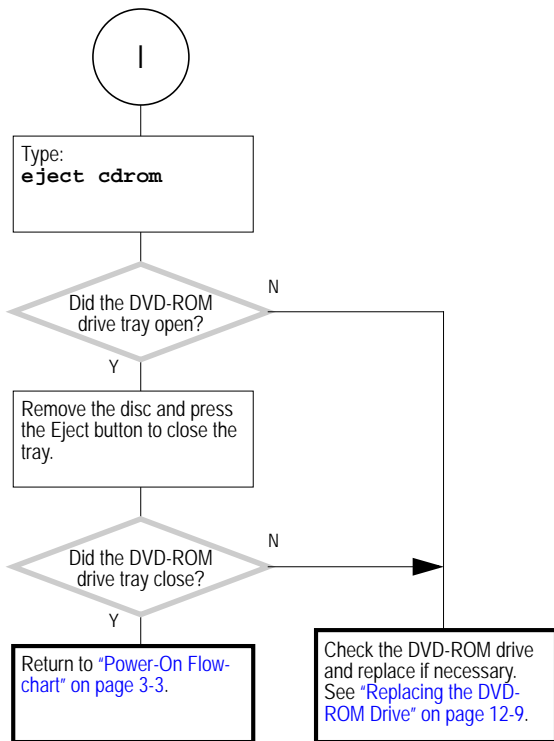
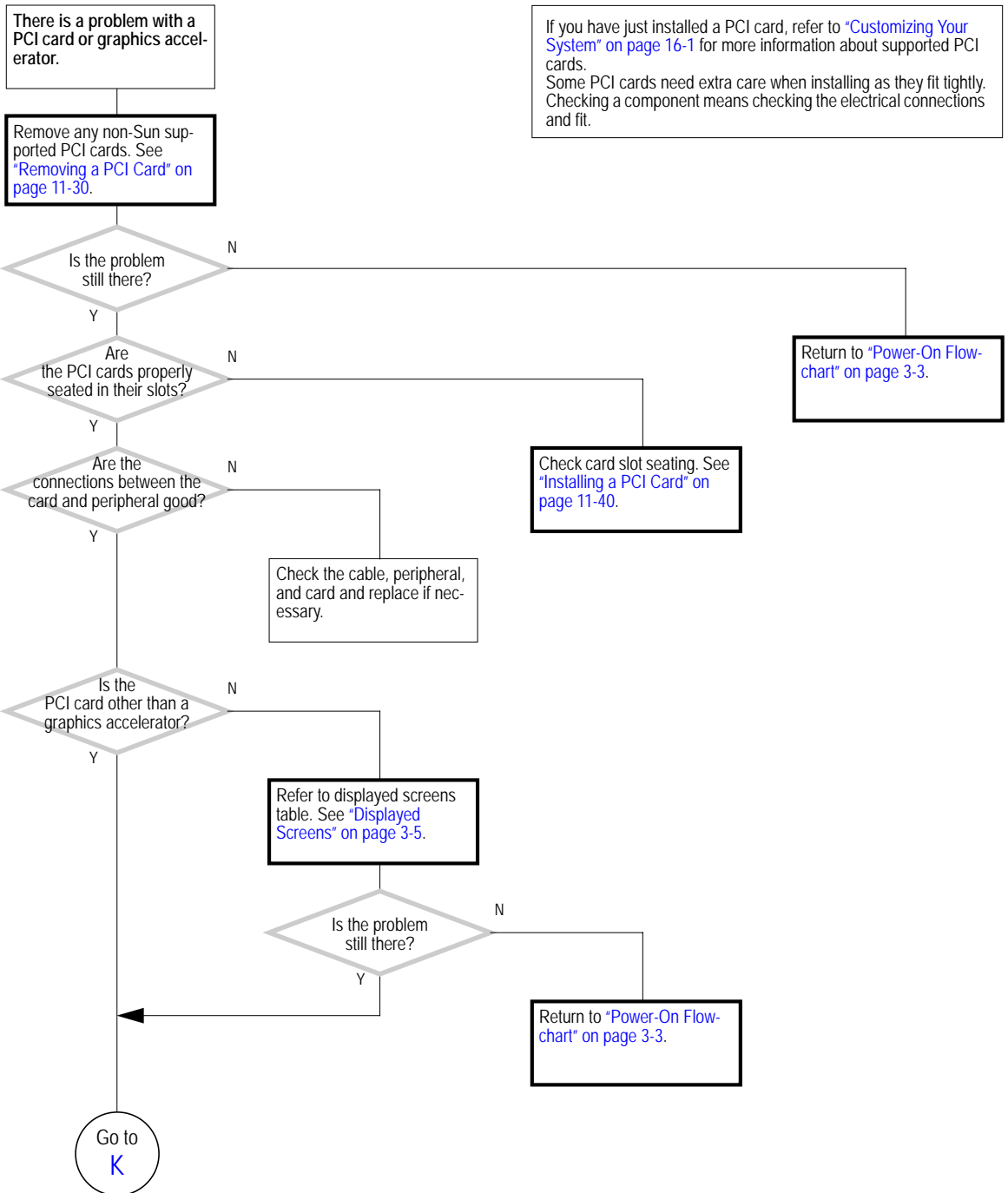
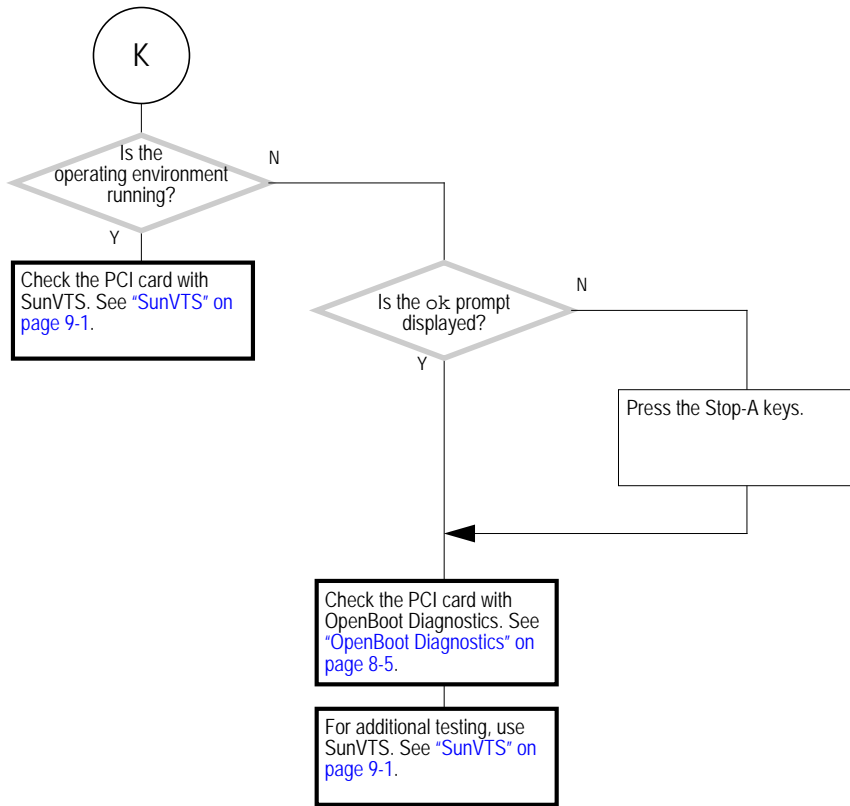


FIGURE 4-21 DVD-ROM Drive Problem (Continued)



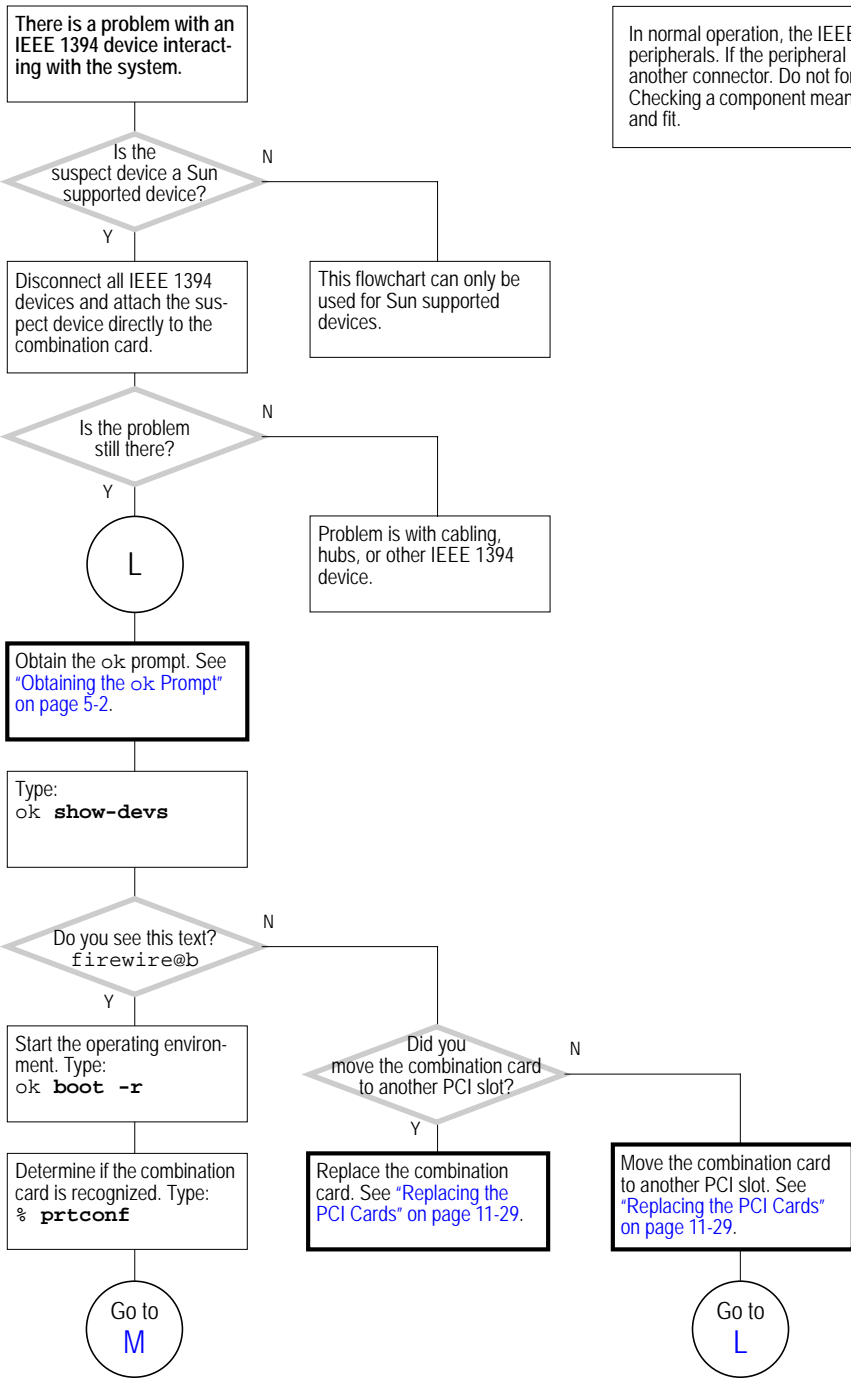
If you have just installed a PCI card, refer to "Customizing Your System" on page 16-1 for more information about supported PCI cards. Some PCI cards need extra care when installing as they fit tightly. Checking a component means checking the electrical connections and fit.

FIGURE 4-22 PCI Card Problem



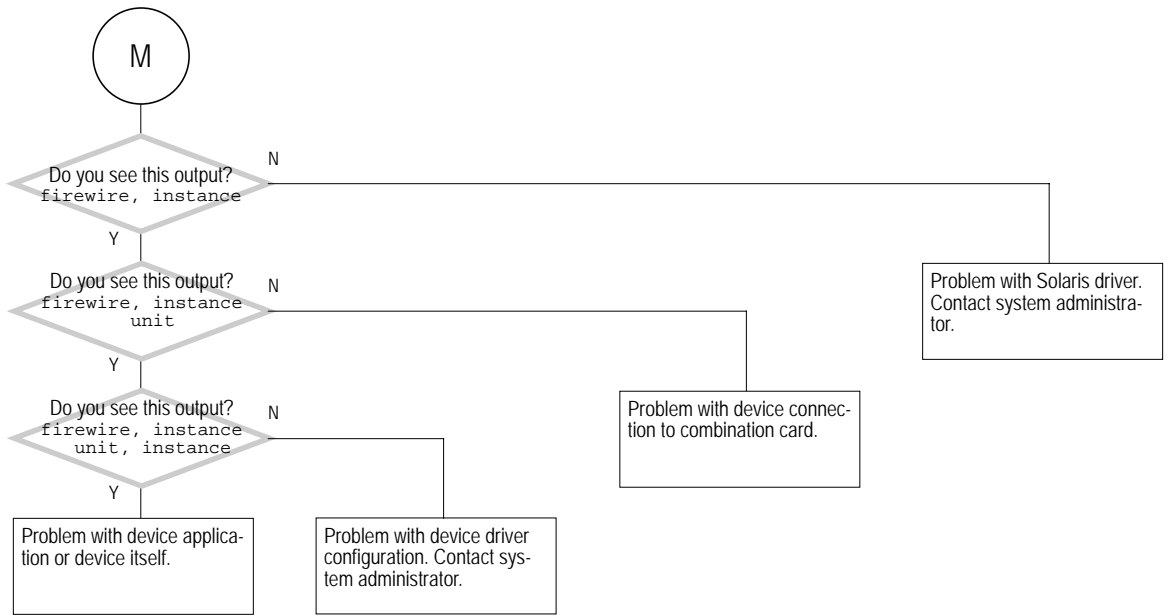
**FIGURE 4-23** PCI Card Problem (*Continued*)





In normal operation, the IEEE 1394 ports allow for hot-plugging of peripherals. If the peripheral is not recognized, try plugging it in to another connector. Do not force the connection. Checking a component means checking the electrical connections and fit.

FIGURE 4-24 IEEE 1394 Problem



**FIGURE 4-25 IEEE 1394 Problem (Continued)**

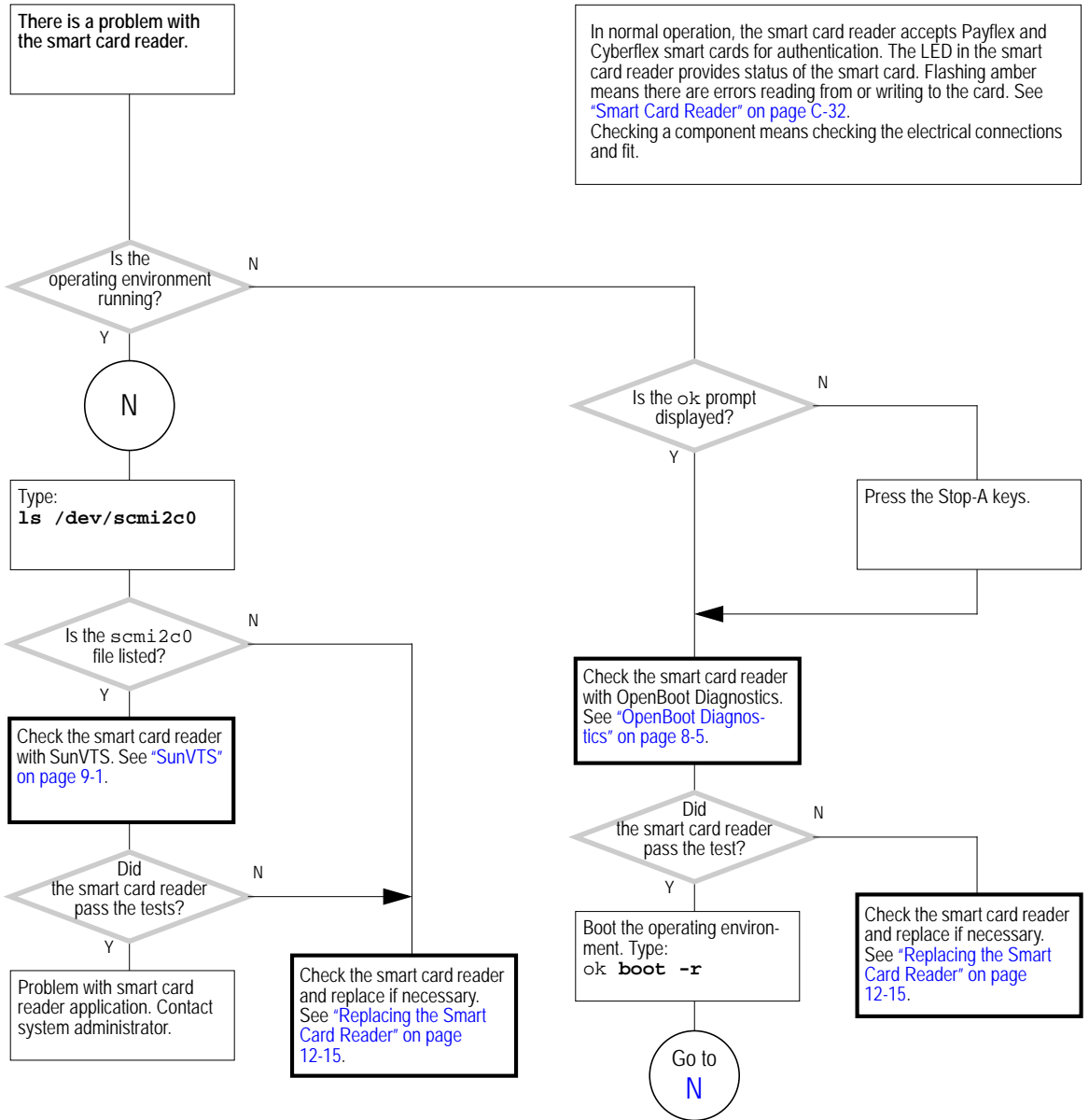


FIGURE 4-26 Smart Card Reader Problem

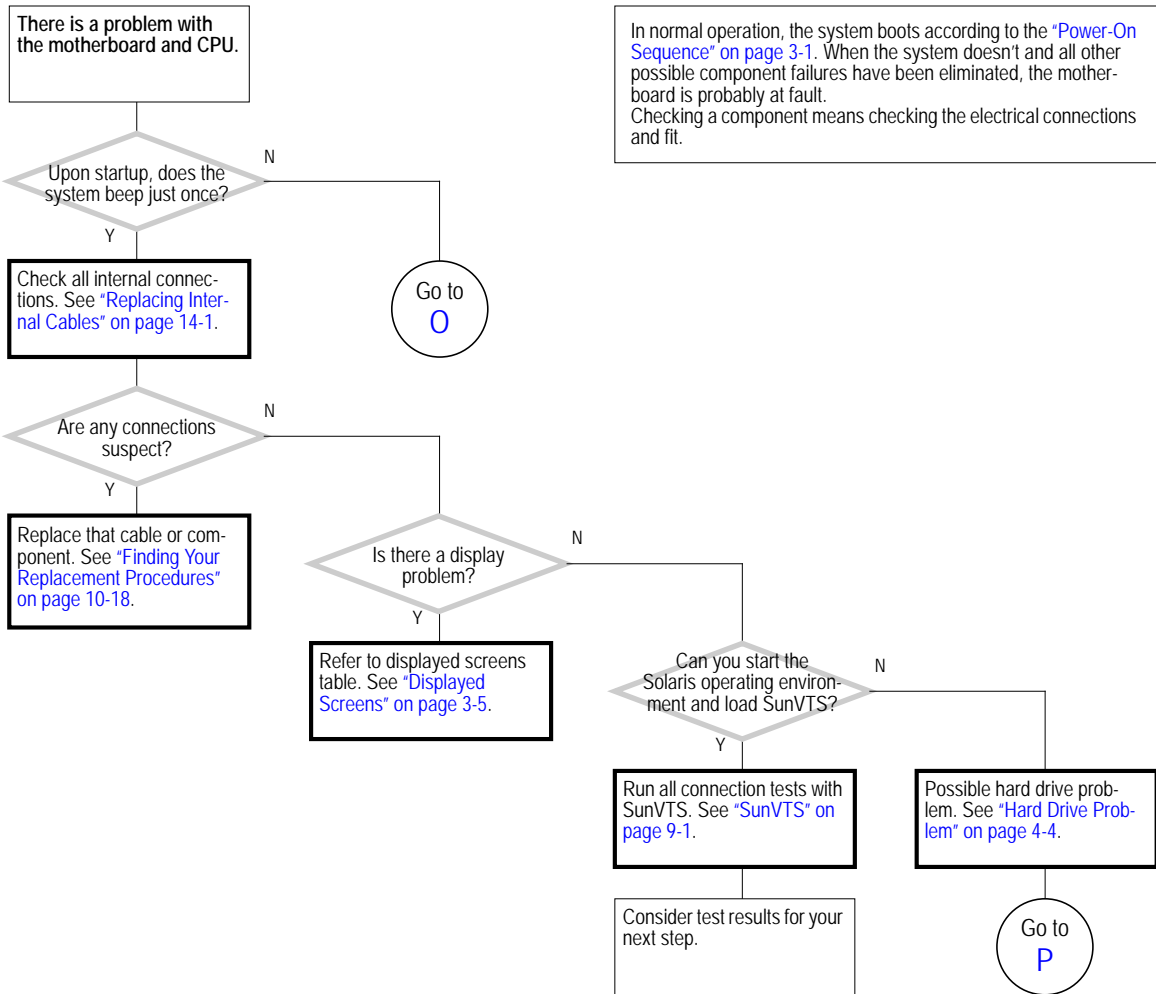
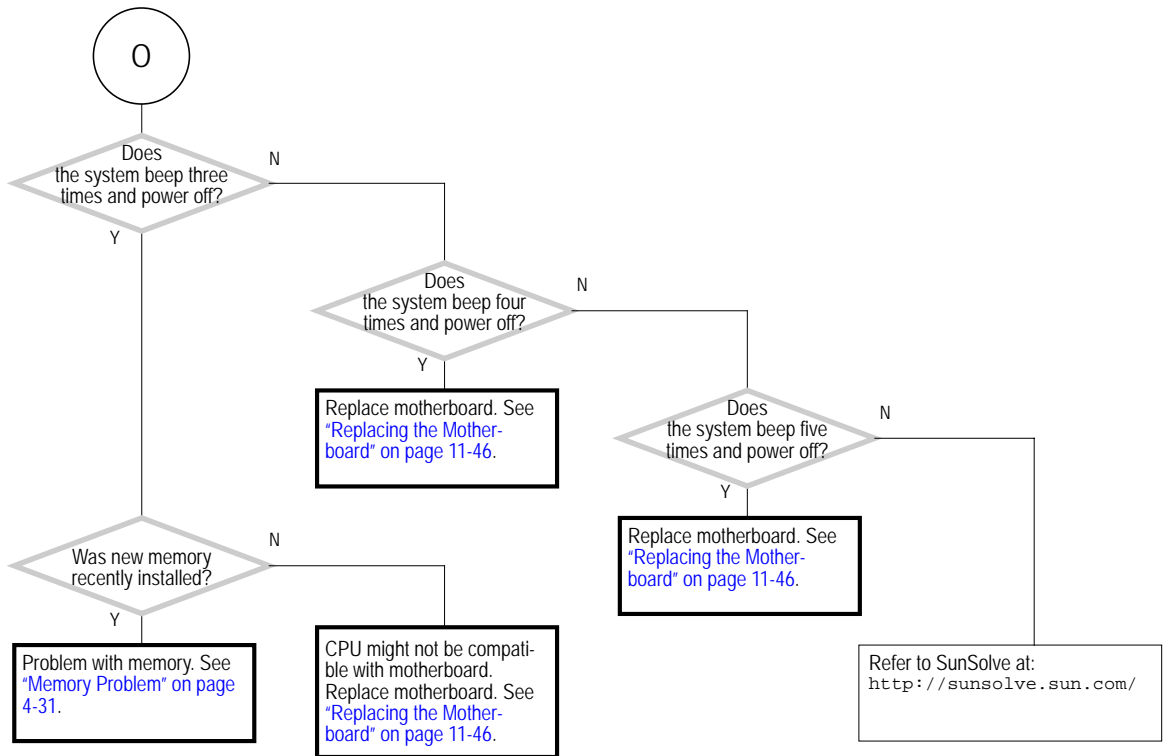
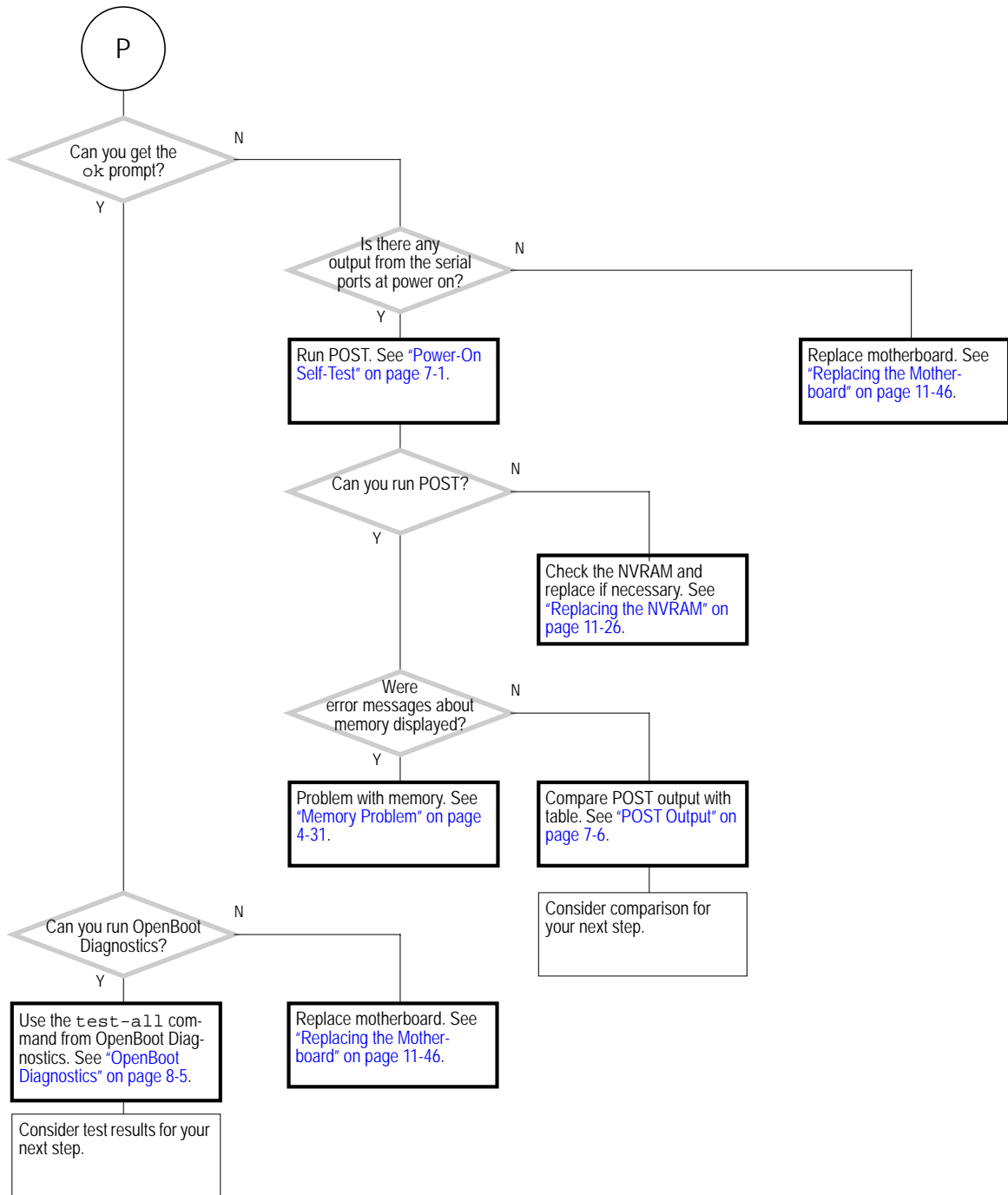


FIGURE 4-27 Motherboard Problem



**FIGURE 4-28** Motherboard Problem (Continued)



**FIGURE 4-29** Motherboard Problem (Continued)

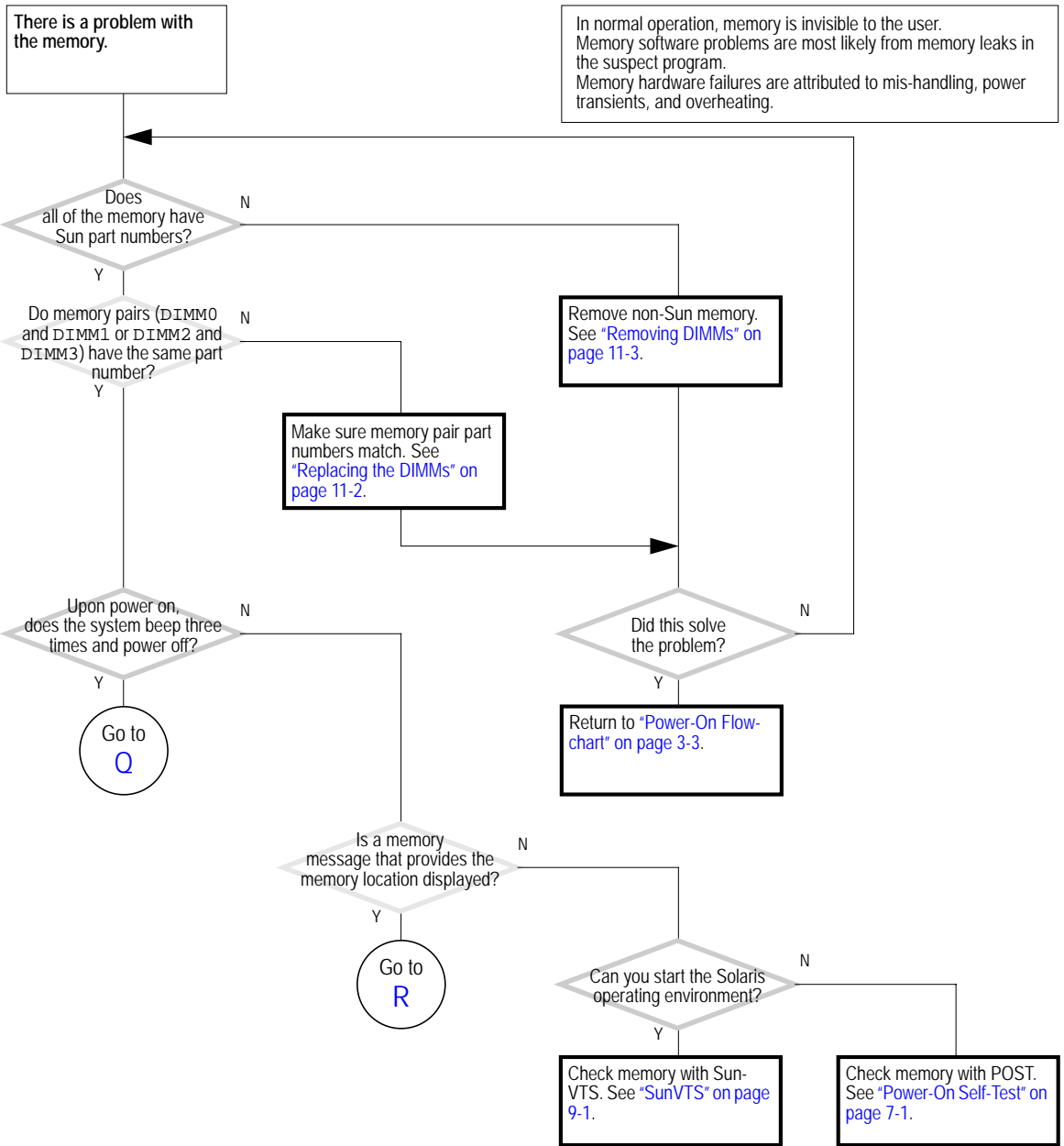


FIGURE 4-30 Memory Problem

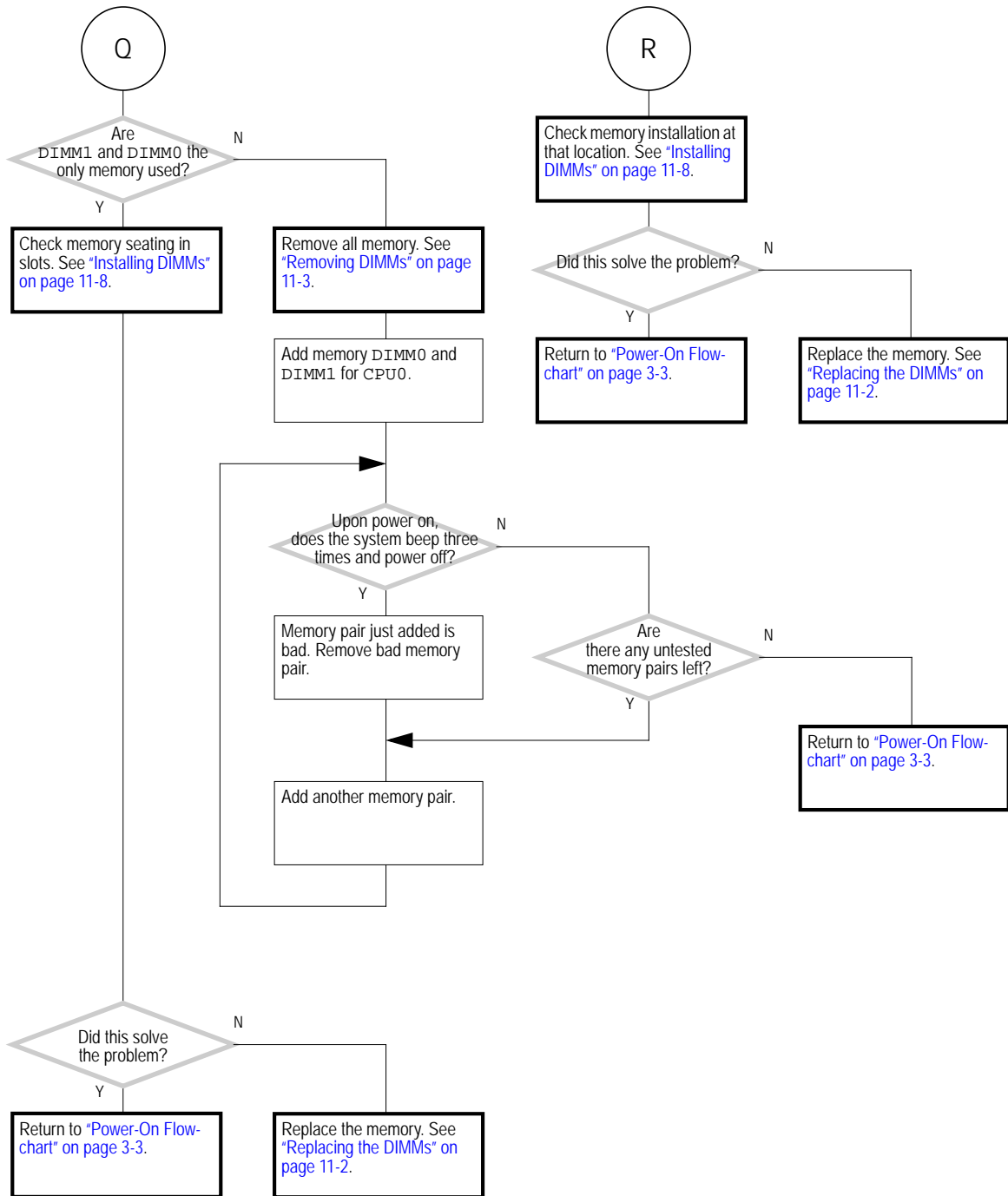


FIGURE 4-31 Memory Problem (Continued)



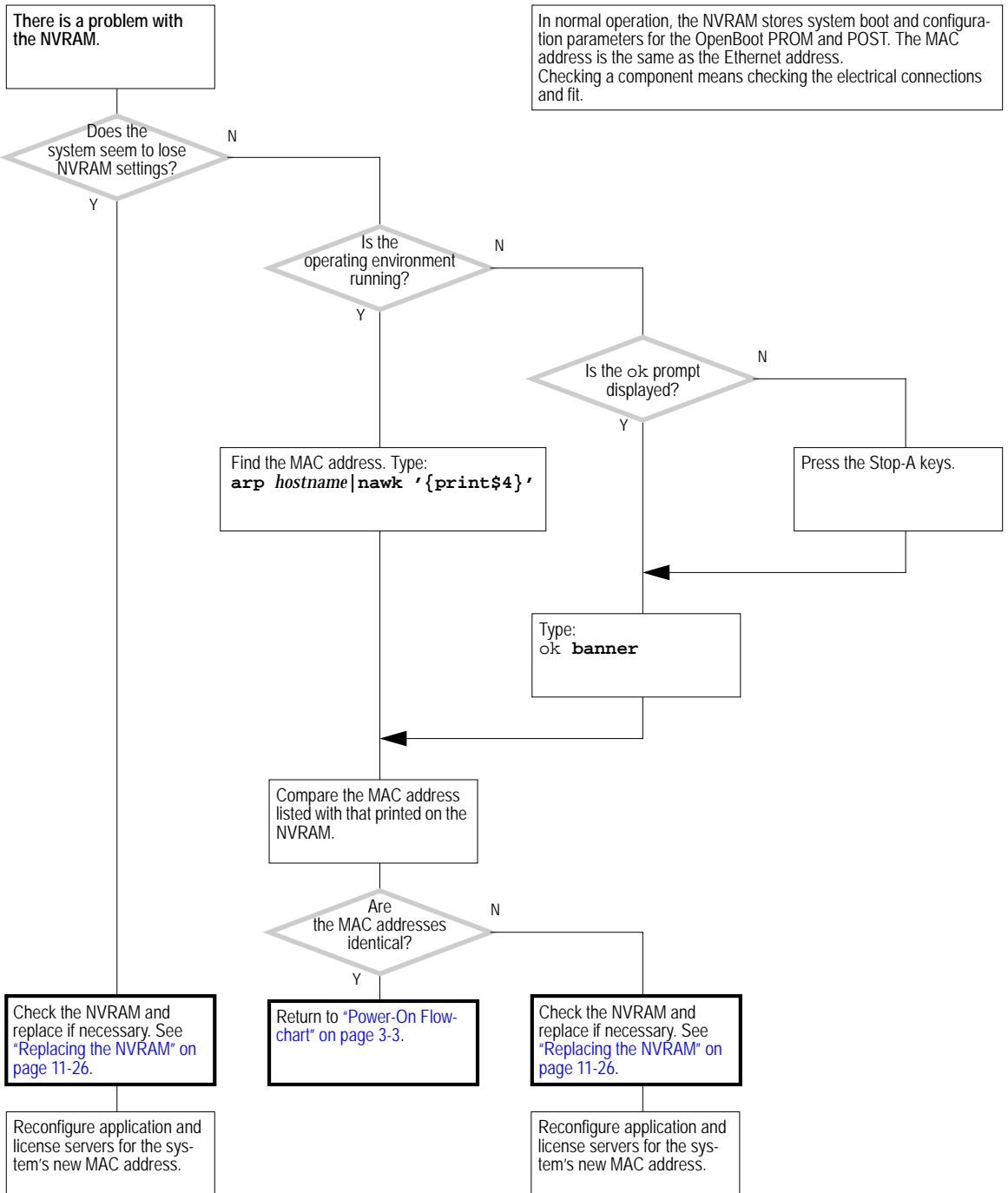
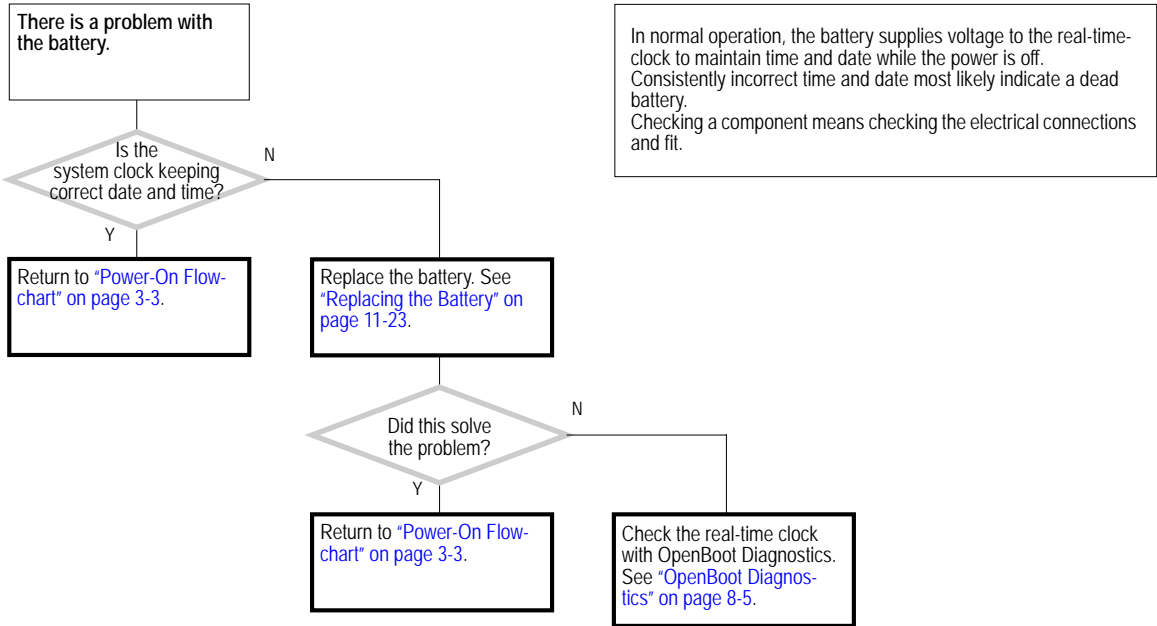


FIGURE 4-32 NVRAM Problem



**FIGURE 4-33** Battery Problem

# Introduction to Advanced Troubleshooting

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This chapter discusses advanced troubleshooting using the following software tools:

- “About NVRAM” on page 5-1
- “Obtaining the ok Prompt” on page 5-2
- “Diagnostic Tests Summary” on page 5-3
- “About Power-on Self-test” on page 5-4
- “About OpenBoot PROM” on page 5-5
- “About SunVTS Software” on page 5-6
- “About Sun Install Check” on page 5-7
- “About Sun Blade 1500 Software Enhancement Script” on page 5-8

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## 5.1 About NVRAM

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

### 5.1.1 NVRAM Overview

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

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

## 5.2 Obtaining the `ok` Prompt

When the Sun Blade 1500 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 environment is functioning normally. You have superuser access.	<ol style="list-style-type: none"><li>1. Save all data and close all active applications.</li><li>2. Become superuser of the system.</li><li>3. Type: # <code>init 0</code></li></ol>
2	Operating environment is functioning normally. You do not have superuser access.	<ol style="list-style-type: none"><li>1. Save all data and close all active applications.</li><li>2. Momentarily press and release the front panel power button.</li><li>3. Select Shutdown from the Power Off window. (If a GUI is displayed)</li><li>4. In a few moments, the system will power off.</li><li>5. Momentarily press and release the front panel power button to power the system back on.</li><li>6. When the power LED flashes, press the power button twice quickly.</li></ol>
3	System is off.	<ol style="list-style-type: none"><li>1. Momentarily press and release the front panel power button to power the system back on.</li><li>2. When the power LED flashes, press the power button twice quickly.</li></ol>
4	Operating environment is not functioning normally. You can log in as superuser remotely.	Type: # <code>init 0</code>
5	System has just been powered on.	When the power LED flashes, press the power button twice quickly.
6	No other alternatives are available.	Press the Stop and A keys simultaneously. WARNING! See caution preceding this table.

## 5.3 Diagnostic Tests Summary

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

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

Component	POST	OpenBoot Diagnostics	SunVTS
CPU module	Performs cache, MMU, CPU and FPU tests	No testing	cpu-unit0(cputest) cpu-unit0(l2cachetest) cpu-unit0(l1dcachetest) cpu-unit0(iutest) cpu-unit0(fputest) cpupm(cpupmtest)
Memory	Max diag level performs tests including block memory and quick memory tests	No testing	mem(pmentest) kmem(vmentest)
I/O Bridge chip	Performs several tests including register tests	No testing	No testing
Assorted motherboard components	No testing	i2c@0,320 pmu@6 rtc@0,70	adm1031(env3test)
Flash PROM	Verification of POST portion checksum	flashprom@2,0	Seeprom0(seepromtest)
Graphics accelerator	No testing	SUNW,XVR-600@3 SUNW,XVR-500@3 SUNW,XVR-100@3	jfb0(jfbtest) ifb0(ifbtest) xvrtest(pfbtest)
PCI cards	No testing	Tests available if card has IEEE 1275 self-test	
Hard drive	No testing	ide@d	c0t0d0(disktest)
DVD-ROM drive	No testing	ide@d	c0t2d0(dvdtest)
Smart card reader	No testing	card-reader@0,40	scmi2c0(sc2test)
Network*	No testing	network@2	bge0(nettest) bge0(net1btest)

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

Component	POST	OpenBoot Diagnostics	SunVTS
USB	No testing	usb@a and usb@b	clt0d0(disktest) For USB removable media device.
Keyboard and mouse	No testing	keyboard@x (x varies as to which USB port the keyboard is attached.)	kbd(usbkbtest)
Parallel port*	No testing	parallel@0,378	ecpp0(eccptest)
Serial ports*	Used for POST output	serial@0,2e8 and serial@0,3f8	su0(sutest)
Audio ports*	No testing	sound@8	sound0(audiotest)

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

## 5.4 About Power-on Self-test

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

### 5.4.1 POST Overview

As soon as the system powers on, OpenBoot PROM performs the POST if configured to do so. This test checks the CPU, I/O Bridge chip, and memory modules.

Because POST happens before the display drivers are loaded, you can't see POST output on the screen of the system running POST. POST directs its output 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

For POST to output information to the serial port, it must be enabled and the level of output configured. POST has three levels of output: minimum, maximum, and off. [TABLE 5-3](#) differentiates these output levels.

TABLE 5-3 POST Output Levels

POST Output Level	Output
Minimum	Testing of CPU, cache, some memory, and I/O bridge chip.
Maximum	Same tests as minimum, with additional extensive memory testing.
Off	When set to this level, POST is disabled.

---

## 5.5 About OpenBoot PROM

### 5.5.1 OpenBoot PROM Overview

OpenBoot PROM is the core software installed on the Sun Blade 1500 system motherboard. This software enables the CPU, memory, I/O bridge, I/O subsystem, and other motherboard components to perform minimal communication to initially boot the Sun Blade 1500 system to a state where it can further load an operating system from either an installed hard disk, a DVD-ROM or CD-ROM, 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, OpenBoot PROM plays a major role in starting the Sun Blade 1500 system. If an error occurs during that process, a message is likely to be displayed. The error might happen during POST or during the time after POST has finished and OpenBoot PROM loads the Solaris operating environment. Refer to “[Power-On Self-Test](#)” on page 7-1 for information about POST.

### 5.5.2 OpenBoot Diagnostics

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

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

---

## 5.6 About 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

The Sun Validation Test Suite (SunVTS) software 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.

### 5.6.2 How to Use SunVTS

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 distributed with each SPARC™ or Solaris release on the Sun Computer Systems Supplement CD.

### 5.6.3 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 environment 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.



## 5.6.4 SunVTS References

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 HW 2/04 and Solaris 9 4/04 operating environments.

---

## 5.7 About Sun Install Check

### 5.7.1 Sun Install Check Overview

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

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

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

### 5.7.2 Downloading Sun Install Check

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

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

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

---

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

---

5. **Read and accept the licensing agreement.**
6. **Click the Sun Install Check Application, English link and save the `sunic.zip` file to a download directory.**
7. **Go to the download directory and unzip the `sunic.zip` file.**

```
# unzip sunic.zip
```

A `sunic` sub-directory is created, containing a `README` file.

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

---

## 5.8 About Sun Blade 1500 Software Enhancement Script

### 5.8.1 Software Enhancement Script Overview

The Sun Blade 1500 workstation software is continuously improved throughout the life cycle of the product. To guarantee that your system's software has the latest improvements, install the latest suggested patches for your system.

There are two ways to install patches:

- [“Using the Sun Blade 1500 Software Enhancement Script” on page 5-9](#) — Optimizes a Sun Blade 1500 workstation with the Solaris 8 HW 5/03 or Solaris 8 7/03 operating environment automatically.
- [“Using the `patchadd` Command” on page 5-11](#)—Helpful when optimizing many Sun Blade 1500 workstations.

A list of the latest suggested patches is available in the *Sun Blade 1500 Product Notes*, 816-7569, available at:

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

## 5.8.2 Using the Sun Blade 1500 Software Enhancement Script

The software enhancement script uses the PatchPro program to simplify and automate the patch installation process for workstations having the Solaris 8 HW 5/03 or Solaris 8 7/03 operating environment.

Approximately 112 MB of temporary disk space is needed to download and install the software enhancement script. After installation, the script provides a method for simplified future patch updates and occupies 55 MB of disk space.

---

**Note** – More information about the PatchPro software is available at:  
<http://patchpro.sun.com>

---

To run the script, you need to know if a proxy server is used, and if so, its hostname or IP address and port. If the proxy server requires authentication, you also need the user ID and password. See [TABLE 5-4](#).

**TABLE 5-4** Important Proxy Server Information Needed

Proxy Server Hostname or IP Address	Proxy Server Port Number	Proxy Server User ID	Proxy Server Password
-------------------------------------	--------------------------	----------------------	-----------------------

The following procedure describes how to download and run the Sun Blade 1500 Software Enhancement Script.

**1. Open a web browser and go to the following Sun web site:**

[http://sunsolve.sun.com/handbook\\_pub/Systems/SunBlade1500/SunBlade1500.html](http://sunsolve.sun.com/handbook_pub/Systems/SunBlade1500/SunBlade1500.html)

**2. Below the Quick Facts table, click the Sun Blade 1500 Software Enhancement Script link.**

**3. Download the Sun\_Blade\_1500\_2500\_update.zip file to a temporary directory, such as /tmp.**

**4. As superuser, unzip the Sun\_Blade\_1500\_2500\_update.zip file:**

```
# unzip Sun_Blade_1500_2500_update.zip
```

A subdirectory, Sun\_Blade\_1500\_2500, is created and files are copied to this directory.

**5. Change to the Sun\_Blade\_1500\_2500 directory and start the Sun Blade 1500 Software Enhancement Script:**

```
# cd Sun_Blade_1500_2500
# ./sb1500ses
```

**6. The script begins and asks if you want to continue. Answer *y*.**

---

**Note** – If you have run the software enhancement script previously, or have already installed the PatchPro software, the script might skip [Step 7](#) through [Step 9](#).

---

**7. The script states that it will install software and asks you to continue. Answer *y*.**

**8. The script asks if you have a direct internet connection or a proxy server.**

- If you connect directly to the internet, answer 1. Go to [Step 9](#).
- If you have a proxy server, answer 2. Provide the hostname or IP address of the proxy server and the appropriate port.
- If the proxy server does not require authentication, answer n. Go to [Step 9](#).
- If the proxy server requires authentication, answer *y*. Provide the proxy server user ID and password.

**9. The script displays your responses and ask for verification; answer appropriately.**

If PatchPro is not already installed, the script installs the program, installing support and configuration packages, then displaying the configuration.

The script accesses Sun databases to identify the suggested patches for your system. About three minutes later, the script displays the patches to be installed.

For example:

```
/var/spool/pkg/patchpro/xxxxxx-x.jar has been validated.
/var/spool/pkg/patchpro/yyyyyy-y.jar has been validated.
/var/spool/pkg/patchpro/zzzzzz-z.jar has been validated.
```

---

**Note** – The variables *xxxxxx-x*, *yyyyyy-y*, and *zzzzzz-z* represent patch ID numbers.

---

The script installs the patches and indicates that they have been applied.

For example:

```
xxxxxx-x has been applied  
yyyyyy-y has been applied  
zzzzzz-z has been applied
```

The script ends:

```
Download and installation of patches completed.
```

**10. If requested by a patch, reboot the system after installing all of the patches.**

For example:

```
# reboot -- -r
```

**11. After completing the software enhancement script, you can verify the system configuration by running the Sun Install Check tool.**

See [“About Sun Install Check”](#) on page 5-7.

## 5.8.3 Using the patchadd Command

**1. Go to the Sun website:**

<http://sunsolve.sun.com>

**2. Click the Patchfinder link.**

**3. Enter a patch ID into the field and click Find Patch.**

You can find patch IDs in the *Sun Blade 1500 Product Notes*, 816-7569, available at:

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

**4. Download the patch to a temporary location.**

**5. Repeat [Step 3](#) and [Step 4](#) for each patch required.**

**6. Become superuser of the system that is to receive the patch(es).**

**7. Transfer and unzip each patch.**

For example:

```
# unzip xxxxxx-x
```

---

**Note** – The variable `xxxxxx-x` represents a patch ID number.

---

**8. Install each patch.**

For example:

```
# patchadd xxxxxx-x
```

**9. Repeat [Step 7](#) and [Step 8](#) for each patch required.**

**10. If requested by a patch, reboot the system after installing all of the patches.**

For example:

```
# reboot -- -r
```

**11. You can verify the system configuration by running the Sun Install Check tool.**

See [“About Sun Install Check”](#) on page 5-7.

# NVRAM

---

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

This chapter contains information about the following topics:

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

---

## 6.1 Changing NVRAM Configuration Parameter Values

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

## 6.1.1 Displaying and Changing Parameter Values

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

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

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



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

```
ok printenv
```

Variable Name	Value	Default Value
test-args		
diag-passes	1	1
local-mac-address?	true	true
fcode-debug?	false	false
silent-mode?	false	false
scsi-initiator-id	7	7
oem-logo		No default
oem-logo?	false	false
oem-banner		No default
oem-banner?	false	false
ansi-terminal?	true	true
screen-#columns	80	80
screen-#rows	34	34
ttyb-rts-dtr-off	false	false
ttyb-ignore-cd	true	true
ttya-rts-dtr-off	false	false
ttya-ignore-cd	true	true
ttyb-mode	9600,8,n,1,-	9600,8,n,1,-
ttya-mode	9600,8,n,1,-	9600,8,n,1,-
output-device	screen	screen
input-device	keyboard	keyboard
auto-boot-on-error?	false	false
load-base	16384	16384
auto-boot?	false	true
boot-command	boot	boot
diag-file		
diag-device	net	net
boot-file		
boot-device	disk net	disk net
use-nvramrc?	false	false
nvramrc		
security-mode	none	No default
security-password		No default
security-#badlogins	0	No default
diag-script	none	none
diag-level	max	max
diag-switch?	false	false
error-reset-recovery	boot	boot

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

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

This example enables POST.

---

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

---

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
<code>test-args</code>		The arguments which configure OpenBoot Diagnostics.
<code>diag-passes</code>	1	The number of passes that diagnostics are to make before continuing to boot.
<code>local-mac-address?</code>	true	A value of <code>true</code> means to use the MAC address within the motherboard.
<code>fcode-debug?</code>	false	A value of <code>false</code> disables debugging of Fcode.
<code>silent-mode?</code>	false	Reserved
<code>scsi-initiator-id</code>	7	The identifying number of any SCSI host bus adapter.
<code>oem-logo</code>	no default	The bitmap of a custom OEM logo.
<code>oem-logo?</code>	false	A value of <code>false</code> disables use of a custom logo.
<code>oem-banner</code>	no default	The text of a custom OEM banner.
<code>oem-banner?</code>	false	A value of <code>false</code> disables use of a custom banner.
<code>ansi-terminal?</code>	true	A value of <code>true</code> enables the terminal emulator to interpret ANSI escape sequences.
<code>screen-#columns</code>	80	The number of character columns displayed on the console.
<code>screen-#rows</code>	34	The number of character rows displayed on the console.

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

Parameter	Default Value	Description
ttyb-rts-dtr-off	false	A value of <code>false</code> disables hardware handshaking for ttyb (serial2 <code>[OIO] 2</code> ).
ttyb-ignore-cd	true	A value of <code>true</code> ignores carrier detect for ttyb (serial 2 <code>[OIO] 2</code> ).
ttya-rts-dtr-off	false	A value of <code>false</code> disables hardware handshaking for ttya (serial1 <code>[OIO] 1</code> ).
ttya-ignore-cd	true	A value of <code>true</code> ignores carrier detect for ttya (serial 1 <code>[OIO] 1</code> ).
ttyb-mode	9600,8,n,1,-	The communication parameters for ttyb (serial2 <code>[OIO] 2</code> ). 9600 baud, 8 data bits, no parity, 1 stop bit, no handshaking
ttya-mode	9600,8,n,1,-	The communication parameters for ttya (serial1 <code>[OIO] 1</code> ). 9600 baud, 8 data bits, no parity, 1 stop bit, no handshaking
output-device	screen	The device alias of the console output display. <code>screen</code> 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 <code>false</code> disables autoboot upon error.
load-base	16384	The decimal address of the start of the client program.
auto-boot?	true	A value of <code>true</code> enables the system to boot the Solaris operating environment 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.
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 <code>false</code> disables use of the information in the <code>nvramrc</code> space.

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

Parameter	Default Value	Description
<code>nvrामrc</code>		A storage space for special conditions and variables used for booting the system.
<code>security-mode</code>	No default	Firmware security level
<code>security-password</code>	No default	Firmware security password
<code>security-#badlogins</code>	No default	The number of failed security password attempts
<code>diag-script</code>	none	The name of the diagnostics script.
<code>diag-level</code>	max	A value of <code>max</code> enables verbose and enhanced diagnostics for POST.
<code>diag-switch?</code>	false	A value of <code>false</code> disables diagnostics under the OpenBoot PROM.
<code>error-reset-recovery</code>	boot	The command to be executed upon recovery from an error.

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



---

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

---

## 6.2.1 Configuring for Security Mode

### 12. Obtain the `ok` prompt.

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

### 13. 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.

### 14. Set the security mode to `full` or `command`. Type:

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

### 15. 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 environment 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
test-args: data not available.
diag-passes=1
local-mac-address?=true
.
.
.
diag-level=max
diag-switch?=false
error-reset-recovery=boot
```

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

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

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

---

## 6.4 Key Commands

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

- [“Stop-A Command” on page 6-9](#)
- [“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 back panel USB ports. Connecting the keyboard or mouse to the IEEE 1394/USB 2 combination card is not recommended

---

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

---

### 6.4.1 Stop-A Command

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



---

**Caution** – Performing the Stop-A command while the Solaris operating environment is running causes a system halt. As such, 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 environment has crashed.

---

## 6.4.2 Stop-N Equivalent Command Procedure

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

### 6.4.2.1 Resetting the NVRAM Temporarily

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

---

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

---

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

```
Sun Blade 1500 UltraSPARC-IIIi, Keyboard Present
OpenBoot 4.x, 512 MB memory installed, Serial #12134241.
Ethernet address 8:0:20:b9:27:61, Host ID: 80b92761.

Safe NVRAM mode, the following nvram configuration variables have
been overridden:
'diag-switch?' is true
'use-nvramrc?' is false
'input-device', 'output-device' are defaulted
'ttya-mode', 'ttyb-mode' are defaulted

These changes are temporary and the original values will be
restored
after the next hardware or software reset.

ok
```



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

[TABLE 6-4](#) lists the configuration parameters that are reset to default values, and describes those values.

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

Parameter	Stop-N Equivalent Value	Description
diag-switch?	true	Workstation runs in diagnostic mode
use-nvramrc?	false	Do not use the contents of nvramrc
input-device	keyboard	Console input device
output-device	screen	Console output device
ttya-mode	9600,8,n,1,-	Serial1 (⎓⎓⎓⎓ 1) port default settings. See <a href="#">“Setting Up POST” on page 7-2</a> .
ttyb-mode	9600,8,n,1,-	Serial2 (⎓⎓⎓⎓ 2) port default settings. See <a href="#">“Setting Up POST” on page 7-2</a> .

### 6.4.2.2 Resetting the NVRAM Permanently

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



# Power-On Self-Test

---

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

- “Levels of POST” on page 7-1
- “Setting Up POST” on page 7-2
- “Running POST” on page 7-5
- “POST Output” on page 7-6
- “Analyzing POST Results” on page 7-15

---

## 7.1 Levels of POST

For POST to output information to the serial port, it must be enabled and the level of output configured. POST has three levels of output:

- “diag-level Variable Set to min Level” on page 7-1
- “diag-level Variable Set to max Level” on page 7-2
- “diag-level Variable Set to off Level” on page 7-2

### 7.1.1 diag-level Variable Set to min Level

When `diag-level` is set to `min`, POST performs the following tests:

- Initialize critical CPU resources
- CPU tests
- CPU I<sup>2</sup>C tests
- CPU memory
- CPU pin checks
- Internal cache tests
- CPU memory scrub
- I/O Bridge chip tests

## 7.1.2 `diag-level` Variable Set to `max` Level

When `diag-level` is set to `max`, POST performs the same tests as when set to `min` with this additional test:

- Full memory test

## 7.1.3 `diag-level` Variable Set to `off` Level

When `diag-level` is set to `off`, POST is disabled.

---

# 7.2 Setting Up POST

There are two methods to enable POST on the system to be tested:

- From the `ok` prompt
- From a terminal window

These procedures configure POST to output to `/dev/tty1`. After enabling POST, you should verify the baud rate and other serial port parameters.

## 7.2.1 Enabling POST From the `ok` Prompt

1. **Obtain the `ok` prompt on the system to run POST.**

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

2. **Enable POST. Type:**

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

3. **Set the POST level. Type:**

```
ok setenv diag-level level
```

Where *level* is `min` or `max`. Setting the level to `off` disables POST.

## 7.2.2 Enabling POST From a Terminal Window

You can also enable POST from a terminal window.

1. **As superuser, open a terminal window and enable POST for that system. Type:**

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

2. **Set the POST level. Type:**

```
# eeprom diag-level=level
```

Where *level* is `min` or `max`. Setting the level to `off` disables POST.

## 7.2.3 Verifying 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,-
```

## 7.2.4 Viewing POST Output From an External Display Device

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

### 7.2.4.1 Serial Terminal

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



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 7-1](#).

**TABLE 7-1** Serial Terminal Communication Parameters

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

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

## 7.2.4.2 Second System

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

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

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

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

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

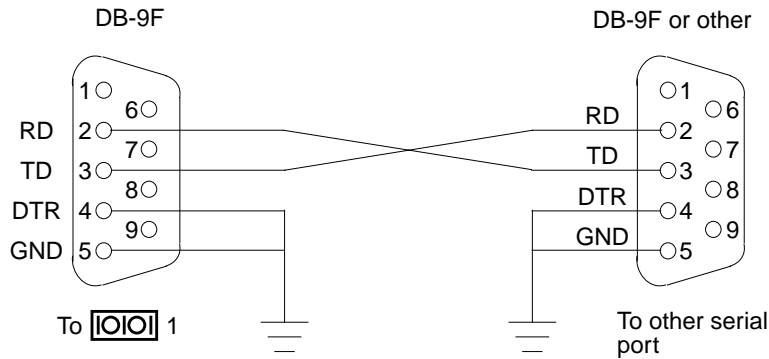


FIGURE 7-1 Crossover Cable Wiring Diagram

### 7.2.4.3 Making 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 `[IOIO] 1`.

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

```
hardware:\
        :dv=/dev/term/a:br#9600:e1=^C^S^Q^U^D:ie=%$:oe=^D:
```

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

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

---

## 7.3 Running POST

1. Attach the crossover cable to the system being tested and then to the serial terminal or second system.

2. If you are using a second system, start the TIP connection. Type:

```
# tip hardware
```

3. Power cycle the system under test. Use [TABLE 7-2](#) as a guide:

TABLE 7-2 Power Cycling the Sun Blade 1500 Workstation

System State	Action
ok prompt is displayed.	<ol style="list-style-type: none"><li>1. Type <code>power-off</code></li><li>2. Momentarily press and release the power button.</li></ol>
Operating environment is running and you have superuser privileges.	Open a terminal window and type: <code># init 6</code>
Operating environment is running.	<ol style="list-style-type: none"><li>1. Momentarily press and release the power button.</li><li>2. Should a GUI window open, select Shutdown.</li><li>3. After the system has powered off, momentarily press and release the power button again.</li></ol>

When the system powers up, information is displayed on the serial terminal or in the terminal window of the second system.

**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.

## 7.4 POST Output

The contents of the POST output depends on the setting of the `diag-level` variable.

### 7.4.1 Minimum Level Output Comparison

[TABLE 7-3](#) lists a minimum level output of a known functional Sun Blade 1500 system. The system was configured with two 256 MB DIMMS. The POST output was 81 seconds in duration. 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 7-3** Minimum Level Output Comparison

Output Displayed	What Is Happening
@(#)OBP 4.9.5 2003/09/15 14:00 Sun Blade 1500 Clearing TLBs Power-On Reset Executing Power On SelfTest	OpenBoot PROM resets the system and starts POST.
>@(#) Sun Blade[TM] 1500 POST 4.9.4 2003/09/16 10:02	POST build version and date is displayed.
/export/common-source/firmware_re/post/post-build-4.9.4/Fiesta/taco/integrated (firmware_re)	POST build path is displayed.
0>Hard Powerup RST thru SW 0>CPUs present in system: 0 0>OBP->POST Call with %o0=00000000.01002000. 0>Diag level set to MIN. 0>MFG script mode set to NONE 0>I/O port set to TTYA.	CPU0 is acknowledged and POST configuration is read from register.
0>Start selftest... 0>Init SB 0>Init CPU 0>DMMU 0>DMMU TLB DATA RAM Access 0>DMMU TLB TAGS Access 0>IMMU Registers Access 0>IMMU TLB DATA RAM Access 0>IMMU TLB TAGS Access 0>Init mmu regs	I/O bridge, CPU, data memory management unit (DMMU) and instruction memory management unit (IMMU) are initialized.
0>Setup Ecache 0>Ecache control = 00000000.00f04400 0> Size = 00000000.00100000... 0>Scrub and Setup Ecache	Ecache is setup and scrubbed (data values set to defaults).
0>Setup and Enable DMMU 0>Setup DMMU Miss Handler	DMMU is set up.
0>Test and Init Temp Mailbox	Mailbox register is checked and initialized.
0>CPU Tick and Tick Compare Registers Test	Operation of TICK registers is verified.
0>CPU Stick and Stick Compare Registers Test	Operation of STICK registers is verified.
0>Set Timing	Motherboard timing is to be configured.
0> UltraSPARC[TM] IIIi, Version 2.3	CPU version is identified.
0>Setup Int Handlers	Interrupt handlers are setup.

**TABLE 7-3** Minimum Level Output Comparison (Continued)

<b>Output Displayed</b>	<b>What Is Happening</b>
0>Initialize I2C Controller	I <sup>2</sup> C controller is initialized.
0>MB: Part-Dash-Rev#: 3753187-01- Serial#: 000276	Motherboard part number and serial number is read from FRUID.
0>Set CPU/System Speed 0>CPU Config Jumper = 00000001	Jumpers for CPU and JBus frequency are read.
0>Probe Dimms	Presence of DIMMs is checked.
0>Init Mem Controller Regs	Memory controller registers are initialized.
0>Set JBUS config reg	JBus frequency register is set.
0>IO-Bridge unit 1 init test	I/O Bridge chip is initialized.
0>Do PLL reset	Phase locked loop (PLL) is reset.
0>Setting timing to 6:1 8:1, system frequency 177 MHz, CPU frequency 1062 MHz	Reconfigured frequencies are displayed.
0>Soft Power-on RST thru SW	Soft reset.
0>CPUs present in system: 0 0>Resume selftest... 0>Init SB 0>Init CPU 0>Init mmu regs 0>Setup Ecache 0>Ecache control = 00000000.00f04400 0> Size = 00000000.00100000... 0>Setup and Enable DMMU 0>Setup DMMU Miss Handler	Initializations and set ups are repeated.
0>Timing is 6:1 8:1, sys 177 MHz, CPU 1062 MHz, mem 132 MHz.	New timing ratios and frequencies are displayed.
0> UltraSPARC(TM) IIIi, Version 2.3 0>Initialize I2C Controller 0>Init Mem Controller Sequence 0>IO-Bridge unit 1 init test	Repeated initialization continues.
0>Select Bank Config 0>Probe and Setup Memory 0>INFO: 512MB Bank 0, Dimm Type X8 0>INFO: No memory detected in Bank 1 0>INFO: No memory detected in Bank 2 0>INFO: No memory detected in Bank 3	Memory is probed.
0>Data Bitwalk on Master	CPU data pins are tested.
0> Test Bank 0.	Where found, memory is tested.
0>Address Bitwalk on Master 0>INFO: Addr walk mem test on CPU 0 Bank 0: 00000000.00000000 to 00000000.20000000.	CPU address pins are tested.

**TABLE 7-3** Minimum Level Output Comparison (Continued)

<b>Output Displayed</b>	<b>What Is Happening</b>
0>Set Mailbox	Mailbox register is set.
0>Final mcl is 10000007.3e481c40.	Memory control register1 is set.
0>Setup Final DMMU Entries	Memory is allocated for POST.
0>Post Image Region Scrub	Allocated memory is set to defaults.
0>Run POST from Memory	POST is transferred to new memory and executed.
0>Verifying checksum on copied image. 0>The Memory's CHECKSUM value is dif9. 0>The Memory's Content Size value is 5598. 0>Success... Checksum on Memory Validated.	Copied data is verified.
0>FPU Registers and Data Path 0>FPU Move Registers	Floating point unit (FPU) is checked.
0>FSR Read/Write	FPU status register is checked.
0>FPU Block Register Test	Additional FPU testing is performed.
0>Print Mem Config	Memory configuration is to be displayed.
0>Caches : Icache is ON, Dcache is ON, Wcache is ON, Pcache is ON.	Cache status is displayed.
0>Memory interleave set to 0 0> Bank 0 512MB : 00000000.00000000 -> 00000000.20000000. 0>Scrub Memory 0>Quick Block Mem Test 0>Quick Test 4194304 bytes at 00000000.00600000	4 megabyte portion of memory is scrubbed and tested.
0>Flush Caches	Caches are set to zero.
0>IO-Bridge SouthBridge Remap Devs	I/O bridge and I/O subsystem probe for devices.
0>JBUS quick check 0> to IO-bridge_1	JBus communication with I/O Bridge is checked.
0>IO-Bridge unit 1 sram test	32K scratch pad SRAM is checked.
0>IO-Bridge unit 1 reg test	I/O bridge registers are checked.
0>IO-Bridge unit 1 mem test	I/O bridge memory is checked.
0>IO-Bridge unit 1 PCI id test	I/O bridge PCI buses are checked.
0>IO-Bridge unit 1 interrupt test	I/O bridge interrupts are checked.
0>INFO: 0> POST Passed all devices. 0> 0>POST: Return to OBP.	POST has passed successfully and returns control to the OpenBoot PROM.

---

**Note** – The 0> that precedes the output text 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.

---

## 7.4.2 Maximum Level Output Comparison

TABLE 7-4 lists a maximum level output of a known functional Sun Blade 1500 system. The workstation was configured with four 1 GB DIMMs. The POST duration was 460 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 7-4** Maximum Level Output Comparison

Output Displayed	What Is Happening
@(#)OBP 4.9.5 2003/09/15 14:00 Sun Blade 1500 Clearing TLBs Power-On Reset Executing Power On SelfTest	OpenBoot PROM resets the system and starts POST.
>@(#) Sun Blade[™] 1500 POST 4.9.4 2003/09/16 10:02	POST build version and date is displayed.
/export/common-source/firmware_re/post/post-build-4.9.4/Fiesta/taco/integrated (firmware_re)	POST build path is displayed.
0>Hard Powerup RST thru SW 0>CPUs present in system: 0 0>OBP->POST Call with %o0=00000000.01004000. 0>Diag level set to MAX. 0>MFG script mode set to NONE 0>I/O port set to TTYA.	CPU0 is acknowledged and POST configuration is read from register.
0>Start selftest... 0>Init SB 0>L2 Cache Tags Test 0>Init CPU 0>DMMU 0>DMMU TLB DATA RAM Access 0>DMMU TLB TAGS Access 0>IMMU Registers Access 0>IMMU TLB DATA RAM Access 0>IMMU TLB TAGS Access 0>Init mmu regs	I/O bridge, cache, CPU, data memory management unit (DMMU) and instruction memory management unit (IMMU) are initialized.
0>Setup Ecache 0>Ecache control = 00000000.00f04400 0> Size = 00000000.00100000... 0>Scrub and Setup Ecache	Ecache is setup and scrubbed (data values set to zero).

**TABLE 7-4** Maximum Level Output Comparison (*Continued*)

<b>Output Displayed</b>	<b>What Is Happening</b>
0>Setup and Enable DMMU 0>Setup DMMU Miss Handler	DMMU is setup.
0>Test and Init Temp Mailbox	Mailbox register is checked and initialized.
0>CPU Tick and Tick Compare Registers Test	Operation of TICK registers is verified.
0>CPU Stick and Stick Compare Registers Test	Operation of STICK registers is verified.
0>Set Timing	Motherboard timing is to be configured.
0> UltraSPARC[TM] IIIi, Version 2.3	CPU version is identified.
0>Setup Int Handlers	Interrupt handlers are setup.
0>Initialize I2C Controller	I <sup>2</sup> C controller is initialized.
0>MB: Part-Dash-Rev#: 3753128-01-06 Serial#: 000276	Motherboard part number and serial number is read from FRUID.
0>CPU0 DIMM 0: 0>Part#: M3 12L2828DT0-CA2 Serial#: 2104f200 Date Code: 0224 Rev#: 3044 0>CPU0 DIMM 1: 0>Part#: M3 12L2828DT0-CA2 Serial#: 286b8300 Date Code: 0215 Rev#: 3044 0>CPU0 DIMM 2: 0>Part#: M3 12L2828DT0-CA2 Serial#: 2161f100 Date Code: 0224 Rev#: 3044 0>CPU0 DIMM 3: 0>Part#: M3 12L2828DT0-CA2 Serial#: 21aaf100 Date Code: 0224 Rev#: 3044	DIMM part numbers, serial numbers, date codes, and revisions are read from FRUIDs.
0>Set CPU/System Speed 0>CPU Config Jumper = 00000001	Jumpers for CPU and JBus frequency are read.
0>Probe Dimms	Presence of DIMMs is checked.
0>Init Mem Controller Regs	Memory controller registers are initialized.
0>Set JBUS config reg	JBus frequency register is set.
0>IO-Bridge unit 1 init test	I/O Bridge chip is initialized.
0>Do PLL reset	Phase locked loop (PLL) is reset.
0>Setting timing to 6:1 8:1, system frequency 177 MHz, CPU frequency 1062 MHz	Reconfigured frequencies are displayed.
0>Soft Power-on RST thru SW	Soft reset.

**TABLE 7-4** Maximum Level Output Comparison (*Continued*)

<b>Output Displayed</b>	<b>What Is Happening</b>
<pre> 0&gt;CPUs present in system: 0 0&gt;Resume selftest... 0&gt;Init SB 0&gt;Init CPU 0&gt;Init mmu regs 0&gt;Setup Ecache 0&gt;Ecache control = 00000000.00f04400 0&gt;      Size = 00000000.00100000... 0&gt;Setup and Enable DMMU 0&gt;Setup DMMU Miss Handler </pre>	Initializations and setups are repeated.
<pre> 0&gt;Timing is 6:1 8:1, sys 177 MHz, CPU 1062 MHz, mem 132 MHz. </pre>	New timing ratios and frequencies are displayed.
<pre> 0&gt;      UltraSPARC(TM) IIIi, Version 2.3 0&gt;Initialize I2C Controller 0&gt;Init Mem Controller Sequence 0&gt;IO-Bridge unit 1 init test </pre>	Repeated initialization continues.
<pre> 0&gt;Select Bank Config 0&gt;Probe and Setup Memory 0&gt;INFO: 1024MB Bank 0, Dimm Type X4 0&gt;INFO: 1024MB Bank 1, Dimm Type X4 0&gt;INFO: 1024MB Bank 2, Dimm Type X4 0&gt;INFO: 1024MB Bank 3, Dimm Type X4 </pre>	Memory is probed.
<pre> 0&gt;Data Bitwalk on Master </pre>	CPU data pins are tested.
<pre> 0&gt;      Test Bank 0. 0&gt;      Test Bank 1. 0&gt;      Test Bank 2. 0&gt;      Test Bank 3. </pre>	Where found, memory is tested.
<pre> 0&gt;Address Bitwalk on Master 0&gt;INFO: Addr walk mem test on CPU 0 Bank 0: 00000000.00000000 to 00000000.40000000. 0&gt;INFO: Addr walk mem test on CPU 0 Bank 1: 00000001.00000000 to 00000001.40000000. 0&gt;INFO: Addr walk mem test on CPU 0 Bank 2: 00000002.00000000 to 00000002.40000000. 0&gt;INFO: Addr walk mem test on CPU 0 Bank 3: 00000003.00000000 to 00000003.40000000. </pre>	CPU address pins are tested.
<pre> 0&gt;Set Mailbox </pre>	Mailbox register is set.
<pre> 0&gt;Final mc1 is f0000027.3e781c40. </pre>	Memory control register1 is set.
<pre> 0&gt;Setup Final DMMU Entries </pre>	Memory is allocated for POST.
<pre> 0&gt;Post Image Region Scrub </pre>	Allocated memory is set to defaults.
<pre> 0&gt;Run POST from Memory </pre>	POST is transferred to new memory and executed.

**TABLE 7-4** Maximum Level Output Comparison (*Continued*)

Output Displayed	What Is Happening
<pre>0&gt;Verifying checksum on copied image. 0&gt;The Memory's CHECKSUM value is d1f9. 0&gt;The Memory's Content Size value is 5598. 0&gt;Success... Checksum on Memory Validated.</pre>	Copied data is verified.
<pre>0&gt;8k DMMU TLB 0 Data 0&gt;8k DMMU TLB 1 Data 0&gt;8k DMMU TLB 0 Tags 0&gt;8k DMMU TLB 1 Tags 0&gt;8k IMMU TLB Data 0&gt;8k IMMU TLB Tags</pre>	Translation look-aside buffers (TLB) are tested for data and instruction buffers.
<pre>0&gt;Instruction Cache Tag RAM 0&gt;I-Cache Valid/Predict TAGS Test 0&gt;Instruction Cache RAM 0&gt;Instruction Cache Snoop Tag Field 0&gt;I-Cache Branch Predict Array Test</pre>	Instruction cache is tested.
<pre>0&gt;Flush D/W caches 0&gt;Data Cache RAM 0&gt;Data Micro Tags 0&gt;D-Cache SnoopTags Test 0&gt;Data Cache Tags 0&gt;WCache RAM 0&gt;WCache Tags 0&gt;W-Cache Valid bit Test 0&gt;W-Cache Bank valid bit Test 0&gt;W-Cache SnoopTAGS Test</pre>	Data and write caches are tested.
<pre>0&gt;Prefetch Cache RAM 0&gt;Prefetch Cache Tags 0&gt;P-Cache SnoopTags Test 0&gt;P-Cache Status Data Test</pre>	Prefetch cache is tested.
<pre>0&gt;FPU Registers and Data Path 0&gt;FPU Move Registers</pre>	Floating point unit (FPU) is checked.
<pre>0&gt;FSR Read/Write</pre>	FPU status register is checked.
<pre>0&gt;FPU Block Register Test 0&gt;FPU Branch Instructions 0&gt;FPU Functional Test</pre>	Additional FPU tests are performed.
<pre>0&gt;Print Mem Config</pre>	Memory configuration is to be displayed.
<pre>0&gt;Caches : Icache is ON, Dcache is ON, Wcache is ON, Pcache is ON.</pre>	Cache status is displayed.
<pre>0&gt;Memory interleave set to 0 0&gt;   Bank 0 1024MB : 00000000.00000000 -&gt; 00000000.40000000. 0&gt;   Bank 1 1024MB : 00000001.00000000 -&gt; 00000001.40000000. 0&gt;   Bank 2 1024MB : 00000002.00000000 -&gt; 00000002.40000000. 0&gt;   Bank 3 1024MB : 00000003.00000000 -&gt; 00000003.40000000. 0&gt;Scrub Memory</pre>	4 megabyte portion of memory is scrubbed and tested.
<pre>0&gt;Flush Caches</pre>	Caches are set to zero.

**TABLE 7-4** Maximum Level Output Comparison (*Continued*)

<b>Output Displayed</b>	<b>What Is Happening</b>
0>IO-Bridge SouthBridge Remap Devs	I/O Bridge and I/O subsystem probe for devices.
0>JBUS quick check 0> to IO-bridge_1	JBus communication with I/O Bridge is checked.
0>IO-Bridge unit 1 sram test	32K scratch pad SRAM is checked.
0>IO-Bridge unit 1 reg test	I/O Bridge registers are checked.
0>IO-Bridge unit 1 mem test	I/O Bridge memory is checked.
0>IO-Bridge unit 1 PCI id test	I/O Bridge PCI buses are checked.
0>IO-Bridge unit 1 interrupt test	I/O Bridge interrupts are checked.
0>Block Memory	All of memory is checked.
0>Test 1067450368 bytes on bank 0.... 0>0% Done... 0>2% Done... . . . 0>98% Done... 0>99% Done...	Memory is checked in bank0.
0>Test 1073741824 bytes on bank 1.... 0>0% Done... 0>2% Done... . . . 0>97% Done... 0>99% Done...	Memory is checked in bank1.
0>Test 1073741824 bytes on bank 2.... 0>0% Done... 0>2% Done... . . . 0>97% Done... 0>99% Done...	Memory is checked in bank2.
0>Test 1073741824 bytes on bank 3.... 0>0% Done... 0>2% Done... . . . 0>97% Done... 0>99% Done...	Memory is checked in bank3.
0>INFO: 0> POST Passed all devices. 0> 0>POST: Return to OBP.	POST has passed successfully and returns control to the OpenBoot PROM.

**Note** – The 0> that precedes the output text 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.



---

## 7.5 Analyzing POST Results

POST has three categories of messages:

- “Error Messages” on page 7-15
- “Warning Messages” on page 7-16
- “Info Messages” on page 7-17

### 7.5.1 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.

---

## 7.5.2 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.

## 7.5.3 Info Messages

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

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

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



# OpenBoot PROM

---

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

- “OpenBoot PROM Utilities” on page 8-1
- “OpenBoot Diagnostics” on page 8-5

---

## 8.1 OpenBoot PROM Utilities

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

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

## 8.1.1 show-devs Utility

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

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

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

## 8.1.2 watch-net Utility

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

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

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

## 8.1.3 probe-ide Utility

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

```
ok probe-ide
  Device 0 ( Primary Master )
           ATA Model: ST380021A

  Device 1 ( Primary Slave )
           Not Present

  Device 2 ( Secondary Master )
           Removable ATAPI Model: LITEON DVD-ROM LTD163

  Device 3 ( Secondary Slave )
           Not Present
```

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

## 8.1.4 banner Utility

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

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

For example:

```
ok banner
Sun Blade 1500
Copyright 1998-2003 Sun Microsystems, Inc. All rights reserved.
OpenBoot 4.9.5, 1024 MB memory installed, Serial #51221875.
Ethernet address 0:3:ba:d:95:73, Host ID: 830d9573.
```

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

## 8.1.5 watch-clock Utility

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

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

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

## 8.1.6 date Utility

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

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

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

## 8.1.7 .version Utility

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

- OpenBoot PROM
- OpenBoot Diagnostics
- POST

For example:

```
ok .version
Release 4.9.5 created 2003/09/15 14:00
OBP 4.9.5 2003/09/15 14:00 Sun Blade 1500
OBDIAG 4.9.5 2003/09/15 14:00
POST 4.9.4 2003/09/16 10:02
```



---

## 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 will 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 [“Viewing POST Output From an External Display Device” on page 7-3](#). 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” 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-500@3      | 2 card-reader@0,40 | 3 flashprom@2,0
4 i2c@0,320          | 5 ide@d           | 6 network@2
7 parallel@0,378     | 8 pmu@6           | 9 rtc@0,70
10 serial@0,2e8      | 11 serial@0,3f8   | 12 sound@8
13 usb@a             | 14 usb@b

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

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

obdiag>
```

The diagnostics displayed are dynamic in that if a device node is not recognized, it is not listed in the menu. For example: if the Sun XVR-500 graphics accelerator were removed from the system, its test would not be available, and all remaining tests would shift location and drop a digit. For example:

```
o b d i a g

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

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

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

## 8.2.3 Configuring OpenBoot Diagnostics

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

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

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

2. Set the diagnostic level to maximum. Type:

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

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

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

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

---

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

---

## 8.2.4 Initiating a Test

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

```
obdiag> test 5
```

This initiates the diagnostics of the IDE interface.

## 8.2.5 Test Output

When OpenBoot Diagnostics runs a test, output is displayed.

The following is a successful pmu@6 test.

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

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

```
ERROR   : There is no POST in this FLASHPROM or POST header is unrecognized
DEVICE  : /pci@1e,600000/isa@7/flashprom@2,0
SUBTEST : selftest:crc-subtest
MACHINE : Sun Blade 1500
SERIAL# : 51221819
DATE    : 10/03/2002 00:21:40 GMT
CONTROLS: diag-level=max test-args=loopback,debug

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

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

## 8.2.6 OpenBoot Diagnostics Tests

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

- “SUNW,XVR-500@3 Test” on page 8-11
- “card-reader@0,40 Test” on page 8-11
- “flashprom@2,0 Test” on page 8-12
- “i2c@0,320 Test” on page 8-12
- “ide@d Test” on page 8-13
- “network@2 Test” on page 8-13
- “parallel@0,378 Test” on page 8-16
- “pmu@6 Test” on page 8-16
- “rtc@0,70 Test” on page 8-17
- “serial@0,2e8 Test” on page 8-17
- “serial@0,3f8 Test” on page 8-17
- “sound@8 Test” on page 8-18

- “usb@a Test” on page 8-19
- “usb@b Test” on page 8-20

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

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

OpenBoot Diagnostics Test	Purpose	What Error Results Might Mean and What to Do
SUNW, XVR-600@3 SUNW, XVR-500@3 SUNW, XVR-100@3	Tests the display and memory of the respective graphics accelerator.	Graphics accelerator not properly seated into PCI slot or graphics memory is bad. Reseat the graphics accelerator in the PCI slot or replace it. See “PCI Card Problem” on page 4-23 or “Replacing the PCI Cards” on page 11-29.
card-reader@0, 40	Checks for the presence of the smart card reader.	Problem with the smart card reader, smart card reader cable, or I <sup>2</sup> C chip on motherboard. See “Smart Card Reader Problem” on page 4-27 or “Motherboard Problem” on page 4-28.
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 4-28.
i2c@0, 320	Checks for the presence of the I <sup>2</sup> C devices and memory PROMs.	Problem on the I <sup>2</sup> C bus or controller, motherboard SEEPROM, DIMM SEEPROM or motherboard clock generator. Check the DIMM memory or the motherboard. See “Memory Problem” on page 4-31 or “Motherboard Problem” on page 4-28.
ide@d	Checks the IDE controller and provides the identity of devices attached to the IDE bus.	Problem with hard drive, DVD-ROM drive, IDE cables, or I/O subsystem chip. See “Hard Drive Problem” on page 4-4 or “DVD-ROM Drive Problem” on page 4-20 or “Motherboard Problem” on page 4-28.
network@2	Tests the network controller chip.	Problem with network or Gigabit Ethernet controller on motherboard. See “Network Problem” on page 4-13 or “Motherboard Problem” on page 4-28.
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 4-28.
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 4-28.
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 4-34 or “Motherboard Problem” on page 4-28.

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

<b>OpenBoot Diagnostics Test</b>	<b>Purpose</b>	<b>What Error Results Might Mean and What to Do</b>
serial@0,2e8 serial@0,3f8	Tests the secondary or primary serial port at different baud rates.	Problem with the item connected to the serial port or I/O subsystem chip. If not the item, check the motherboard. See <a href="#">“Motherboard Problem” on page 4-28</a> .
sound@8	Tests the audio controller and the CODEC chip.	Problem with item attached to the audio ports, the I/O subsystem chip, the CODEC chip, speaker, or speaker cable. If not item, check the audio and motherboard. See <a href="#">“Audio Output Problem” on page 4-8</a> or <a href="#">“Motherboard Problem” on page 4-28</a> .
usb@a	Tests the first USB controller.	Problem with the item attached to the front USB ports. Audio/USB board not making good connection to the motherboard or I/O subsystem chip. If not item, check cable, audio/USB board, and motherboard. See <a href="#">“USB Problem” on page 4-6</a> or <a href="#">“Motherboard Problem” on page 4-28</a> .
usb@b	Tests the second USB controller.	Problem with item attached to the rear USB ports or I/O subsystem chip. If not item, check motherboard. See <a href="#">“Motherboard Problem” on page 4-28</a> .

### 8.2.6.1 SUNW, XVR-500@3 Test

The following is an example of a successful SUNW, XVR-500@3 test:

```
obdiag> test 1
Hit the spacebar to interrupt testing
Testing /pci@1f,700000/SUNW,XVR-500@3

Starting XV-500 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-500@3 ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:20
```

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

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

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

### 8.2.6.3 flashprom@2,0 Test

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

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

### 8.2.6.4 i2c@0,320 Test

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

```
obdiag> test 4
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/isa@7/i2c@0,320
Testing /pci@1e,600000/isa@7/i2c@0,320/motherboard-fru-prom@0,a8
Testing /pci@1e,600000/isa@7/i2c@0,320/dimm-spd@0,a0
Testing /pci@1e,600000/isa@7/i2c@0,320/dimm-spd@0,a2
Testing /pci@1e,600000/isa@7/i2c@0,320/clock-generator@0,d2
Selftest at /pci@1e,600000/isa@7/i2c@0,320 ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:0
```



### 8.2.6.5 ide@d Test

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

```
obdiag> test 5
Hit the spacebar to interrupt testing
Testing /pci@1e,600000/ide@d
>> Primary interface selected.
Subtest pci-config-reg-tests
Subtest pci-config-reg-tests:vendor-id-test
Subtest pci-config-reg-tests:device-id-test
Subtest pci-config-reg-tests:status-reg-test
Subtest pci-config-reg-tests:rom-expansion-test
>> Primary interface selected.
Subtest pri-cmd-blk-reg-test4
>> Testing IDE Command register
>> Make sure IDE device is attached
Subtest reset&check-diag
>> Checking device reset capability
Subtest identify-ata
>> Checking that an ATA device is attached.
>> ATA disk responds to Identify Device Command
    ATA Model: ST380021A
>> 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-ataapi
>> Checking that an ATAPI device is attached.
>> ATAPI device responds to Identify Packet Device Command
    >> Removable ATAPI Model: LITEON DVD-ROM LTD163
Selftest at /pci@1e,600000/ide@d ..... passed
Pass:1 (of 1) Errors:0 (of 0) Tests Failed:0 Elapsed Time: 0:0:0:1
```

### 8.2.6.6 network@2 Test

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

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

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

```

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

```

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

### 8.2.6.7 parallel@0,378 Test

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

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

### 8.2.6.8 pmu@6 Test

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

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

### 8.2.6.9 rtc@0,70 Test

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

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

### 8.2.6.10 serial@0,2e8 Test

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

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

### 8.2.6.11 serial@0,3f8 Test

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

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

## 8.2.6.12 sound@8 Test

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

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

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

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

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

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

## 8.2.6.13 usb@a Test

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

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

## 8.2.6.14 usb@b Test

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

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



# SunVTS

---

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

- “Installing SunVTS” on page 1
- “Exercising System Components Using SunVTS Software” on page 2
- “Further SunVTS Testing” on page 10

---

## 9.1 Installing SunVTS

The SunVTS software is available on the CD-ROM disc included with your Sun Blade 1500 system. The SunVTS software is Solaris software release specific. Use only version 5.1PS2, which is for the Sun Blade 1500 workstation.

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

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

The website can also provide you with installation instructions.

---

## 9.2 Exercising System Components Using SunVTS Software

### 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-ROM drive test (`c0t2d0(dvdtest)`) displays an error, check the cable connections on the DVD-ROM drive and where those cables connect to the motherboard.

---

**Note** – You cannot test the graphics accelerator in connection mode.

---

### 9.2.2 Connection Mode Component Testing

To test a specific component in connection mode, follow this procedure. If you want to test more than one component, test one component at a time, and restart the procedure from [Step 4](#) for the second and subsequent components.

---

**Note** – If you are going to test the DVD-ROM drive or a CD-RW drive, insert a known good DVD-ROM or CD-RW 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 Steps to Test Components in Connection Mode

Component	Steps to Take	Successful Test Results
Hard drive	6. Click the plus sign adjacent to IDE - Devices(uata0).	Connection test starting....
	7. Select c0t0d0(disktest) for HDD0 or c0t1d0(disktest) for HDD1.	Connection test complete  IDE-Devices(uata0) c0t0d0
	8. Click Reset. 9. Click Start.	Status: Connected Capacity=10241.84 MB, Mounted=(), Free=1693.59 MB.
DVD-ROM	6. Click the plus sign adjacent to IDE - Devices(uata0).	Connection test starting....
	7. Select c0t2d0(dvdtest).	IDE-Devices(uata0) c0t2d0
	8. Click Reset. 9. Click Start.	Status: Connected Media Type = DVDROM, Block Size = 2048, Capacity(blocks) = 4119136  Connection test complete
DIMM memory	6. Click the plus sign adjacent to Memory.	Connection test starting....
	7. Select mem(pmemtest)	Memory mem
	8. Click Reset. 9. Click Start.	Status: "Connected 1024 MB physical memory has been found  Connection test complete
Flash PROM	6. Click the plus sign adjacent to Memory.	Connection test starting....
	7. Select Seeprom0(seepromtest)	Connection test complete  seeprom0
	8. Click Reset. 9. Click Start.	Status: Connected:  Name - motherboard-fru-prom Size - 0x002000 FullPath - /devices/pci@1e.600000/isa@7/i2c@0.320/motherboard-fru-prom@0.a8
DIMM0 PROM	6. Click the plus sign adjacent to Memory.	Connection test starting....
	7. Select Seeprom1(seepromtest)	seeprom1 Status: Connected:
	8. Click Reset. 9. Click Start.	Name - dimm-spd Size - 0x000100 FullPath - /devices/pci@1e.600000/isa@7/i2c@0.320/dimm-spd@0.a0  Connection test complete

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

Component	Steps to Take	Successful Test Results
DIMM1 PROM	<ol style="list-style-type: none"> <li>6. Click the plus sign adjacent to Memory.</li> <li>7. Select Seeeprom2(seeepromtest)</li> <li>8. Click Reset.</li> <li>9. Click Start.</li> </ol>	<pre> Connection test starting...  seeeprom2 Status: Connected:  Name - dimm-spd Size - 0x000100 FullPath - /devices/pci@1e.600000/isa@7/ i2c@0.320/dimm-spd@0.a2  Connection test complete </pre>
DIMM2 PROM	<ol style="list-style-type: none"> <li>6. Click the plus sign adjacent to Memory.</li> <li>7. Select Seeeprom3(seeepromtest)</li> <li>8. Click Reset.</li> <li>9. Click Start.</li> </ol>	<pre> Connection test starting...  seeeprom3 Status: Connected:  Name - dimm-spd Size - 0x000100 FullPath - /devices/pci@1e.600000/isa@7/ i2c@0.320/dimm-spd@0.a4  Connection test complete </pre>
DIMM3 PROM	<ol style="list-style-type: none"> <li>6. Click the plus sign adjacent to Memory.</li> <li>7. Select Seeeprom4(seeepromtest)</li> <li>8. Click Reset.</li> <li>9. Click Start.</li> </ol>	<pre> Connection test starting...  seeeprom4 Status: Connected:  Name - dimm-spd Size - 0x000100 FullPath - /devices/pci@1e.600000/isa@7/ i2c@0.320/dimm-spd@0.a6  Connection test complete </pre>
Graphics accelerator	Connection mode testing is not possible for graphics accelerators.	
Smart card reader	<ol style="list-style-type: none"> <li>6. Click the plus sign adjacent to Other Devices.</li> <li>7. Select scmi2c0(sc2test)</li> <li>8. Click Reset.</li> <li>9. Click Start.</li> </ol>	<pre> Connection test starting...  scmi2c0 Status: "Connected Device /dev/scmi2c0: Regs read Test passed  scmi2c0 Status: "Connected Device /dev/scmi2c0: Walking 1s Test passed  Connection test complete </pre>

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

Component	Steps to Take	Successful Test Results
Network	<ol style="list-style-type: none"> <li>6. Select Network.</li> <li>7. Click Reset.</li> <li>8. Click Start.</li> </ol>	<pre> Connection test starting...  Network   bge0     Status: Connected:  Connection test complete </pre>
Serial ports	<ol style="list-style-type: none"> <li>6. Select Comm. Ports.</li> <li>7. Click Reset.</li> <li>8. Click Start.</li> </ol>	<pre> Comm.Ports   su0     Status: Idle:     /dev/term/a:       Idle, current baud = 9600, maximum baud = 115200,     /dev/term/b:  Connection test complete </pre>
Parallel port	<ol style="list-style-type: none"> <li>6. Click the plus sign adjacent to Other Devices.</li> <li>7. Select ecpp0(ecpptest).</li> <li>8. Click Reset.</li> <li>9. Click Start.</li> </ol>	<pre> Connection test starting...  OtherDevices   ecpp0     Status: Idle:     /dev/ecpp0:       IEEE 1284 parallel port,       Port mode = ECPP_CENTRONICS (non-IEEE 1284 compliant device mode - Centronics only)  Connection test complete </pre>
Speaker	<ol style="list-style-type: none"> <li>6. Click the plus sign adjacent to Other Devices.</li> <li>7. Select sound0(audiotest).</li> <li>8. Click Reset.</li> <li>9. Click Start.</li> </ol>	<pre> Connection test starting...  audio: Playing 2 second(s) 1 KHz tone through the speaker port...done.   sound0     Status: Idle:     /dev/sound/0:       AC97 Codec, 16-bit Stereo, 48 KHz sample rate  Connection test complete </pre>
System sensors	<ol style="list-style-type: none"> <li>6. Click the plus sign adjacent to Other Devices.</li> <li>7. Select adm1031(env3test).</li> <li>8. Click Reset.</li> <li>9. Click Start.</li> </ol>	<pre> Connection test starting...  OtherDevices   adm1031     Status: Found    cpu-fan (fan. 4100000416)   sys-in (fan. 410000041c)   sys-out (fan. 4100000422)   cpu (temperature-sensor. 41000003f5)   sys-amb (temperature-sensor. 4100000400)   pci-amb (temperature-sensor. 410000040b)  Connection test complete </pre>

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

Component	Steps to Take	Successful Test Results
CPU	<ol style="list-style-type: none"> <li>6. Select Processor(s)</li> <li>7. Click Reset.</li> <li>8. Click Start.</li> </ol>	<pre> Connection test starting...  10/20/02 14:38:28 matlock SunVTS5.lps2build2: VTSID 2001 l2cachetcpu-unit0(P0).INFO cpu-unit0: "Connected : CPU Level 1 1 cache : size 1048576 Kbytes line 64 bytes associativity 4"  10/20/02 14:38:28 matlock SunVTS5.lps2build2: VTSID 2001 l1dcachetest(P0).INFO cpu-unit0: "Connected : CPU Level 1 cache : size 65536 Kbytes line 32 bytes associativity 4"  10/20/02 14:38:28 matlock SunVTS5.lps2build2: VTSID 2002 iutest(P0).INFO cpu-unit0: "sparcv9 based processor running @ 1062MHz Online"  Processor(s)   cpu-unit0     Status: "Connected     A sparcv9 processor operating at 1062 MHz.  Connection test complete </pre>
USB	<ol style="list-style-type: none"> <li>6. Select USB</li> <li>7. Click Reset.</li> <li>8. Click Start.</li> </ol>	<pre> Connection test starting...  Connection test complete </pre>

## 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 [“About SunVTS Software” on page 6](#).

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

```

10/25/02 01:41:44 sky-516 SunVTS5.lps2build1: VTSID 6021 m64test.
ERROR fbs/m641: RAMDAC test screen CRC signature error.
Monitor type = 34, Cursor Position = 2, Expected Signature = 0xf6af68, Actual
Signature = 0x5b0c24
Probable_Cause(s): <Device failure> Recommended_Actions(s): <Call your
authorized SUN service provider> (run_on_error message 2)

```

This error is displayed when the graphics accelerator is tested in functional mode. Because the graphics accelerator is being used for the GUI, the error is created and can be ignored.

## 9.2.4 Functional Mode Component Testing

To test a specific component in functional mode, follow this procedure. If you want to test more than one component, test one component at a time, and restart the procedure from [Step 6](#) for the second and subsequent components.

---

**Note** – If you are going to test the DVD-ROM drive or a CD-RW drive, insert a known good 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**.
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	Time for 1 Pass
Hard drive	8. Click the plus sign adjacent to IDE - Devices. 9. Select <code>c0t0d0(disktest)</code> for HDD0 or <code>c0t1d0(disktest)</code> for HDD1. 10. Click Reset. 11. Click Start.	250 seconds
DVD-ROM	8. From <b>Select Devices</b> , check <b>Intervention</b> . 8. Click the plus sign adjacent to IDE - Devices. 9. Select <code>c0t2d0(dvdtest)</code> . 10. Click Reset. 11. Click Start.	48 seconds

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

<b>Component</b>	<b>Steps to Take</b>	<b>Time for 1 Pass</b>
DIMM memory test1	8. Click the plus sign adjacent to Memory. 9. Select <code>kmem(vmentest)</code> . 10. Click Reset. 11. Click Start.	12 seconds
DIMM memory test2	8. Click the plus sign adjacent to Memory. 9. Select <code>mem(pmentest)</code> . 10. Click Reset. 11. Click Start.	10 seconds
Flash PROM	8. Click the plus sign adjacent to Memory. 9. Select <code>Seeprom0(seepromtest)</code> . 10. Click Reset. 11. Click Start.	9 seconds
DIMM0 PROM	8. Click the plus sign adjacent to Memory. 9. Select <code>Seeprom1(seepromtest)</code> . 10. Click Reset. 11. Click Start.	4 seconds
DIMM1 PROM	8. Click the plus sign adjacent to Memory. 9. Select <code>Seeprom2(seepromtest)</code> . 10. Click Reset. 11. Click Start.	4 seconds
DIMM2 PROM	8. Click the plus sign adjacent to Memory. 9. Select <code>Seeprom3(seepromtest)</code> . 10. Click Reset. 11. Click Start.	4 seconds
DIMM3 PROM	8. Click the plus sign adjacent to Memory. 9. Select <code>Seeprom4(seepromtest)</code> . 10. Click Reset. 11. Click Start.	4 seconds
Graphics accelerators	8. Select Graphics. 9. Click Reset. 10. Click Start.  Note: Because the GUI is using the graphics accelerator while SunVTS is testing it, errors are reported. These errors are ignored.	20 - 60 seconds



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

Component	Steps to Take	Time for 1 Pass
Smart card reader	8. From Select Devices, check Intervention. 9. Click the plus sign adjacent to Other Devices. 10. Select <code>scmi2c0(sc2test)</code> 11. Right click, select Test Parameter Options. 12. Click all enable buttons. 13. From Within Instance, select Apply. 14. Insert a known good smart card. 15. Click Reset. 16. Click Start.	6 seconds  Note: The smart card reader LED flashes while testing.
Network	8. Select Network. 9. Click Reset. 10. Click Start.	34 seconds
Serial ports	8. From Select Devices, check Intervention. 9. Click the plus sign adjacent to Comm.Ports. 10. Select <code>su0(sutest)</code> . 11. Right click, select Test Parameter Options. 12. For Test_Type, select <code>a_b</code> . 13. For Loopback_Type, select <code>Internal_a_to_a_b_to_b</code> . 14. From Within Instance, select Apply. 15. Click Reset. 16. Click Start.	7 seconds
Parallel port	8. Click the plus sign adjacent to Other Devices. 9. Select <code>ecpp0</code> . 10. Click Reset. 11. Click Start.	10 seconds
Speaker	8. Click the plus sign adjacent to Other Devices. 9. Select <code>sound0</code> . 10. Click Reset. 11. Click Start.	37 seconds
System sensors	8. Click the plus sign adjacent to Other Devices. 9. Select <code>adm1031</code> . 10. Click Reset. 11. Click Start.	6 seconds
CPU	8. Select Processor 9. Click Reset. 10. Click Start.	1000+ seconds  Note: This test is stopped by clicking Stop.

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

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

---

## 9.3 Further SunVTS Testing

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

# Preparing to Replace Components

---

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

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



---

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

---

This chapter contains the following topics:

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

---

## 10.1 Safety Information

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

## 10.1.1 Safety Precautions

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

- Follow all Sun standard cautions, warnings, and instructions marked on the equipment and described in *Important Safety Information for Sun Hardware Systems*, 816-7190.
- Follow the cautions, warnings, and instructions in the *Sun Blade 1500 Safety and Compliance Guide*, 816-7566. The document is available from:  
<http://www.sun.com/documentation>.
- Make sure that the voltage and frequency of your power source match the voltage and frequency inscribed on the equipment's electrical rating label.
- Never push objects of any kind through openings in the equipment. Dangerous voltages might be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock, or damage to your equipment.

## 10.1.2 Safety Symbols

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



---

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

---



---

**Caution** – Hot surface. Avoid contact. Surfaces are hot and might cause personal injury if touched.

---



---

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

---

## 10.1.3 Electrostatic Discharge Safety

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



---

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

---



---

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

---

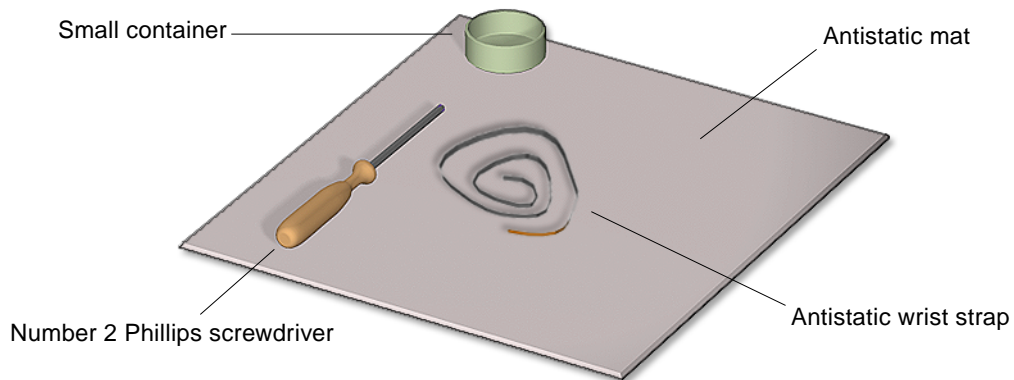
---

## 10.2 Required Tools

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

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

See [FIGURE 10-1](#).



**FIGURE 10-1** Required Tools

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

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

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

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

---

## 10.3 Powering Off the Workstation

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



---

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

---

This section describes the following:

- [“Identifying the Power Button” on page 4](#)
- [“Powering Off Methods” on page 5](#)
- [“Shutting Down Gracefully” on page 6](#)
- [“Performing a Forced Shutdown” on page 9](#)



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

### 10.3.1 Identifying the Power Button

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

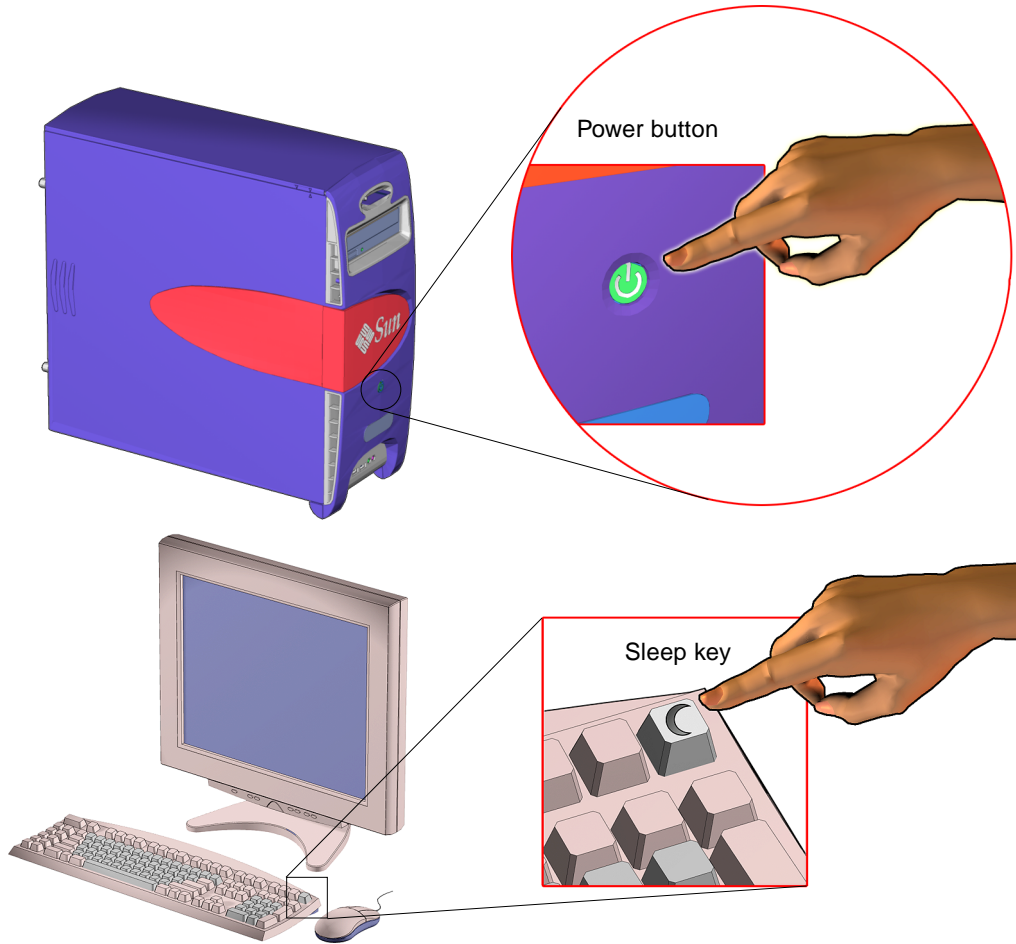


FIGURE 10-2 Power Button and Sleep Key Location and Identification

## 10.3.2 Powering Off Methods

There are two methods for powering off the workstation.

- **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 will be closed abruptly without saving any changes.

### 10.3.2.1 Workstation Power Cycling

Either one of the following two methods will accomplish a workstation power cycle by shutting down and immediately restarting the workstation:

- **System reboot**

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

- **Shutdown and Power On**

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

### 10.3.3 Shutting Down Gracefully

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

To power off the workstation gracefully:

1. **Notify affected users.**

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

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

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

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

- Manual
- Command Line

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

**To power off manually:**

- a. **Press and release either the:**



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

See [FIGURE 10-2](#).

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

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

**b. Click Shutdown.**

In a moment, the system shuts down.

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

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

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

or

```
# init 5
```

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

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

**TABLE 10-1** `init` Command Shutdown Options

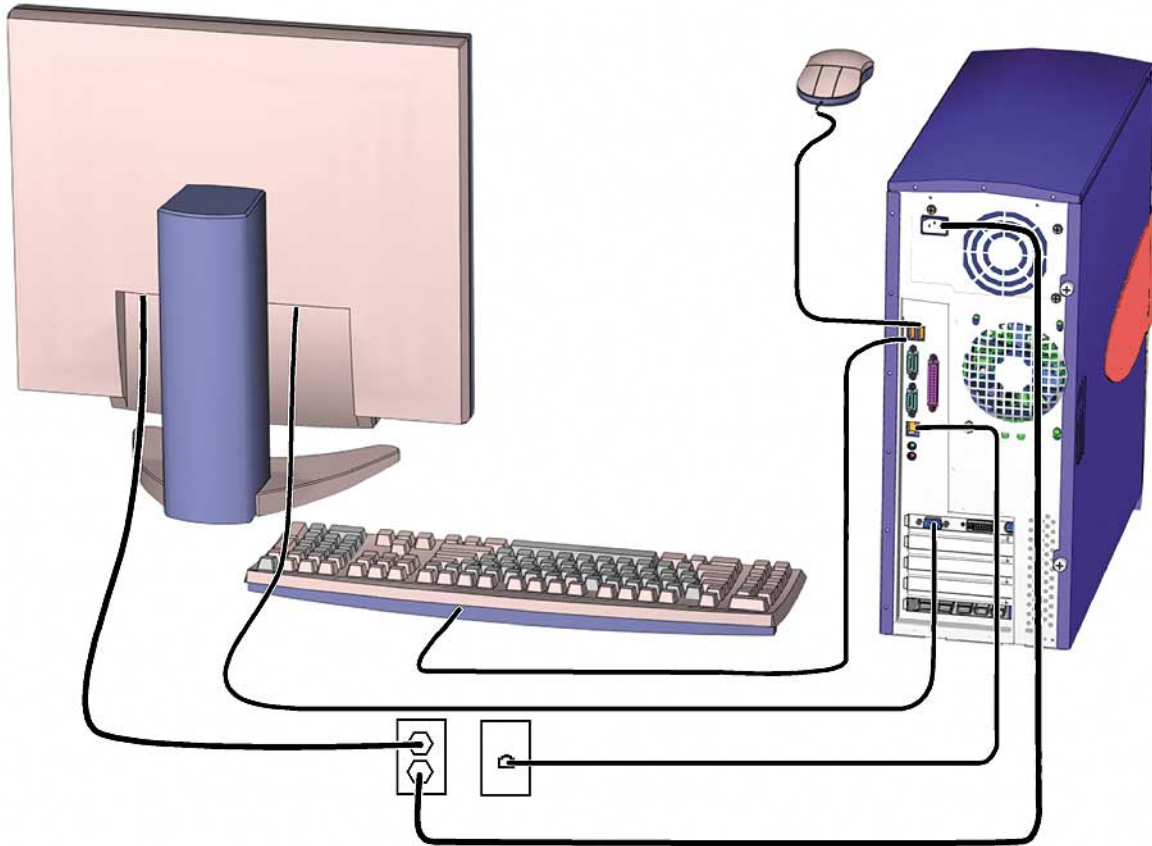
Opt	Purpose
0	Brings the system to the firmware level.
1	Reboots the system to system administrator mode. All files are accessible and no users are logged onto the system.
5	Shuts down the system so that it is safe to remove the power.
6	Stops the operating system and reboots to the state specified in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

**4. Verify that the power is off.**

Check that the system fans are not spinning.

5. Power off and disconnect the keyboard, mouse, monitor, and network connections.

See [FIGURE 10-3](#).



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

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



---

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

---

## 6. Remove all power to the workstation.

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

When the 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 12](#) where you will be directed to remove all power to the workstation.

## 10.3.4 Performing a Forced Shutdown

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



---

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

---

To force the workstation to power down:

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

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

Refer to the respective command man pages for syntax information.

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

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

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

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

- **Process Kill** - Use the `kill` command to shut down a single process. Use this command when an application or process is frozen and you have decided to force an it to quit and release the system. It might be necessary to execute this command from another workstation or another terminal window.

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

### 3. Manually synchronize the system.

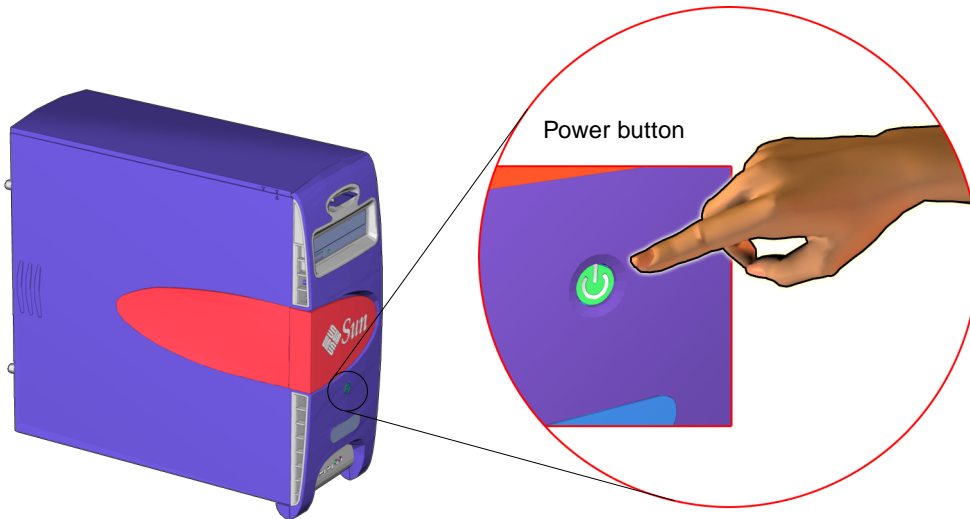
As superuser at a terminal window, type:

```
# sync
```

Use the `sync` command when powering off a workstation to maintain file system integrity. The command flushes all previously unwritten system buffers out to the disk. 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 powered is off.



---

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

---

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

Check that the system fans are not spinning.

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

See [FIGURE 10-3](#).

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



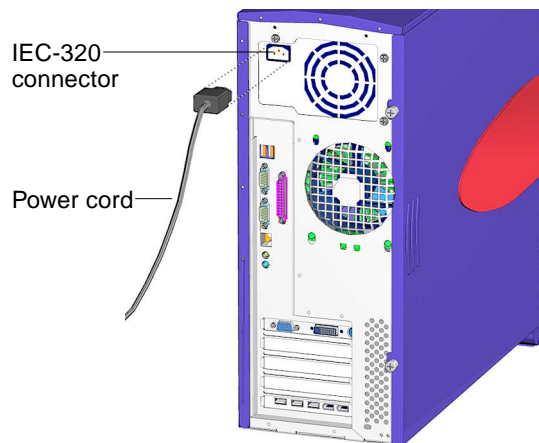
---

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

---

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

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



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

When the system is powered off, then it is safe to open the workstation to gain access to internal components. Proceed to [“Removing the Access Panel”](#) on page 12 where you will be directed to remove all power to the workstation.

---

## 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 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. Loosen the captive thumbscrews.

Turn the captive thumbscrews, located at the back of the system, counter-clockwise. See [FIGURE 10-6](#). If the thumbscrews are very tight, use a No. 2 Phillips screwdriver to loosen them.

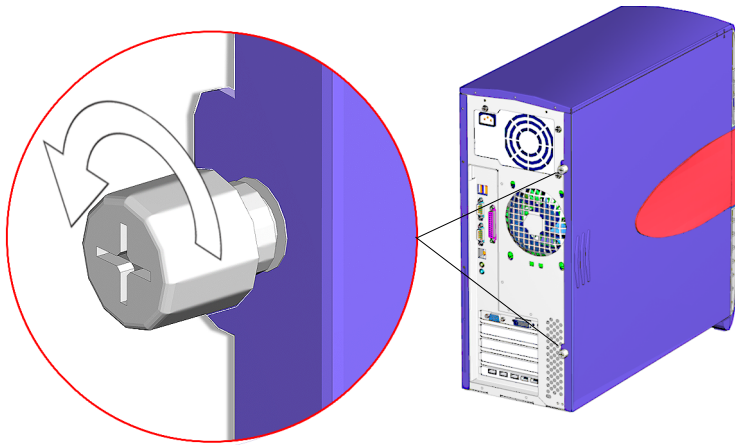
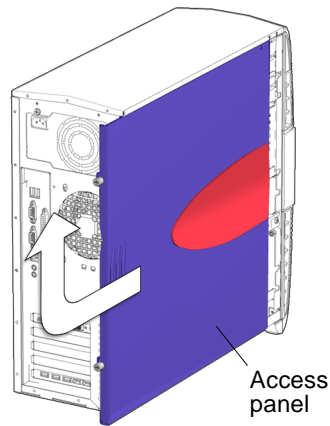


FIGURE 10-6 Loosening the Screws

### 4. Slide and lift the access panel from the chassis.

Slide the access panel toward the back of the system chassis about an inch (2.5 cm), then lift the access panel from the chassis and set it aside. See [FIGURE 10-7](#).



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

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

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

Some components inside the system are sensitive to ESD. To prevent damage to these components, attach an antistatic wrist strap to your wrist.



---

**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.

---

**a. Wrap the antistatic strap onto your wrist.**

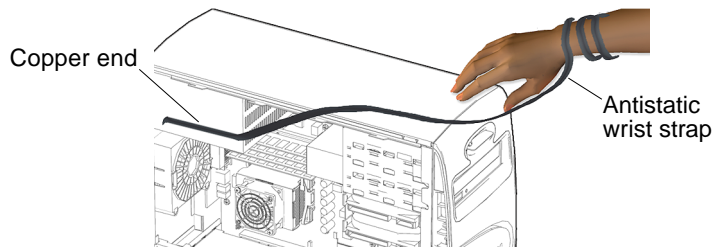
Unwrap the first two folds of the antistatic wrist strap and wrap the adhesive side firmly against your wrist. See [FIGURE 10-8](#). This is the end of the antistatic strap that does not have a copper strip.

**b. Open the contact portion of the antistatic strap.**

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

**c. Attach the antistatic strap to the chassis.**

Attach the copper end of the strap to a metal portion of the system chassis. See [FIGURE 10-8](#). Check its location to make sure it does not fall off and it is out of the way of your replacement procedure. A suggested location is the inside surface of the back panel, under the rear fan.



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

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

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

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

---

## 10.5 Removing the Bezel

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

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

Removing the bezel provides access to the chassis front panel.

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

See the following sections:

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

**2. Locate the bezel.**

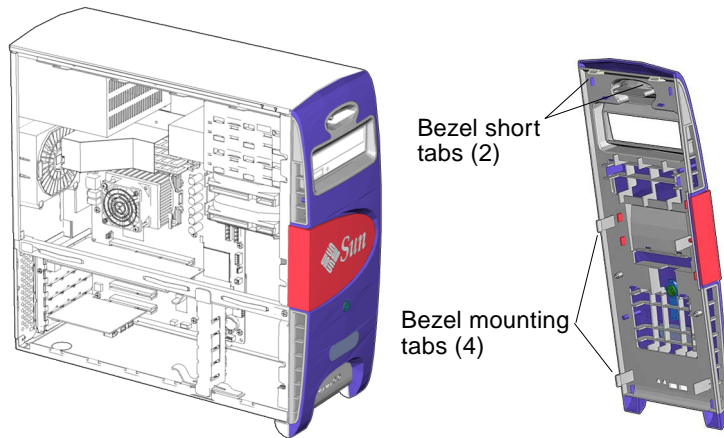
See [FIGURE 10-9](#).

---

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

---

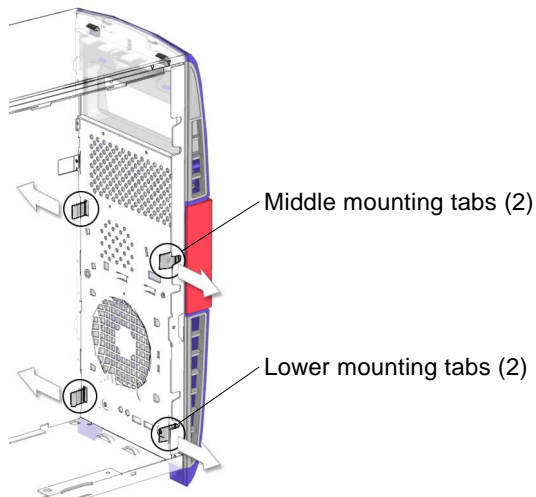




**FIGURE 10-9** Bezel Location and Identification

**3. Release the lower mounting tabs.**

Carefully move the lower pair of mounting tabs apart, and then push them forward slightly. See [FIGURE 10-10](#).



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

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

#### 4. Release the middle mounting tabs.

Carefully move the middle pair of mounting tabs apart, and then push them forward slightly. See [FIGURE 10-10](#). As you do this, you should see the bottom of the bezel move further away from the chassis.

#### 5. Release the bezel.

Grasp the bezel from the front near the bottom, and pull it down and away from the chassis. See [FIGURE 10-11](#). Set the bezel aside.

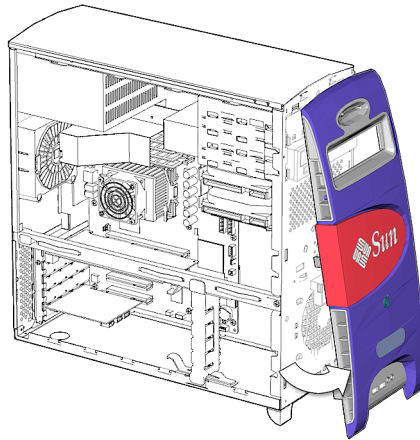


FIGURE 10-11 Removing the Bezel

---

## 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 not tip over the chassis.

#### 1. Prepare to position 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.

---

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

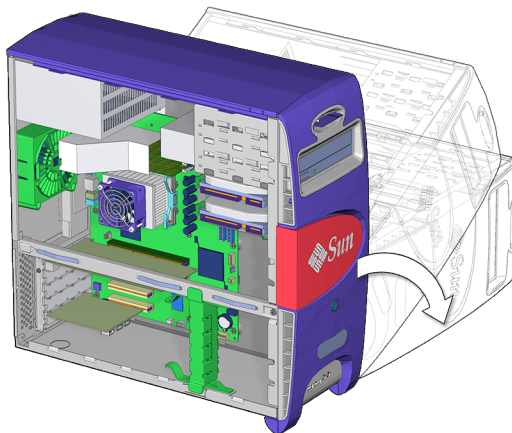
## 2. Set the chassis on its side.

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

---

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

---



**FIGURE 10-12** Positioning the Chassis

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

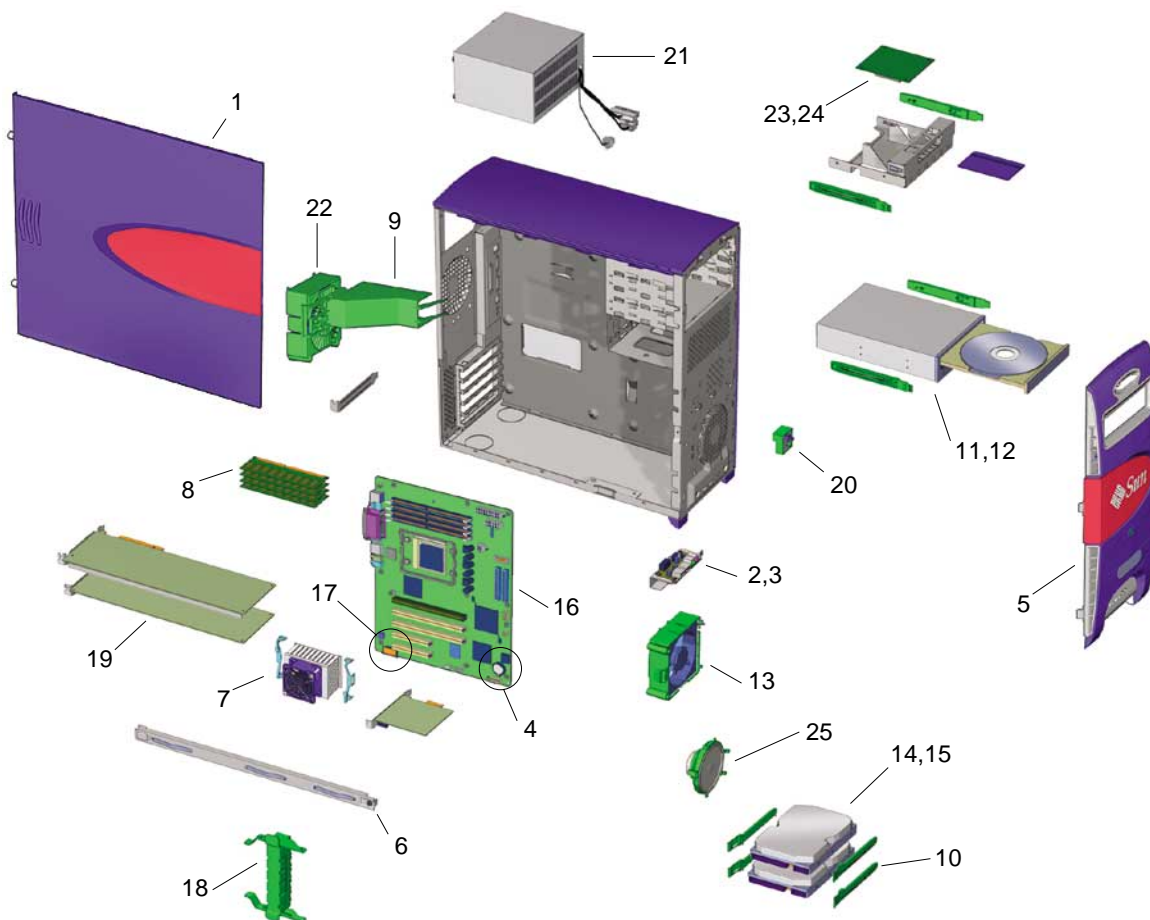
To help with replacement procedures, references to location are relative to the placement of the chassis. Directional terms are described in [TABLE 10-2](#).

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

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

## 10.7 Finding Your Replacement Procedures

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



**FIGURE 10-13** Replaceable Components

**TABLE 10-3** Component Replacement Procedures

Number	Component	Procedure
1	Access Panel	<a href="#">“Removing the Access Panel” on page 12</a> and <a href="#">“Installing the Access Panel” on page 5</a>
2	Audio/USB board	<a href="#">“Replacing the Audio USB Board” on page 31</a>
3	Audio/USB board cables	<a href="#">“Replacing the Audio USB Board Cables” on page 23</a>
4	Battery	<a href="#">“Replacing the Battery” on page 23</a>
5	Bezel	<a href="#">“Removing the Bezel” on page 14</a> and <a href="#">“Installing the Bezel” on page 2</a>
6	Chassis cross brace	<a href="#">“Replacing the Chassis Cross Brace” on page 50</a>
7	CPU fan and heatsink assembly	<a href="#">“Replacing the CPU Fan and Heatsink Assembly” on page 14</a>
8	DIMMs (Memory)	<a href="#">“Replacing the DIMMs” on page 2</a>
9	DIMM cooling duct	<a href="#">“Replacing the DIMM Cooling Duct” on page 22</a>
10	Drive rails	<a href="#">“Replacing the Drive Rails” on page 60</a>
11	DVD-ROM drive (removable media drive)	<a href="#">“Replacing the DVD-ROM Drive” on page 9</a>
12	DVD-ROM drive cables	<a href="#">“Replacing the DVD-ROM Drive Interface Cable” on page 6</a>
13	Front fan	<a href="#">“Replacing the Front Fan” on page 8</a>
14	Hard drive	<a href="#">“Replacing a Hard Drive” on page 2</a>
15	Hard drive cables	<a href="#">“Replacing the Hard Drive Interface Cable” on page 10</a>
16	Motherboard and CPU assembly	<a href="#">“Replacing the Motherboard” on page 46</a>
17	NVRAM	<a href="#">“Replacing the NVRAM” on page 26</a>
18	PCI card support	<a href="#">“Replacing the PCI Card Support” on page 46</a>
19	PCI cards	<a href="#">“Replacing the PCI Cards” on page 29</a>
20	Power switch assembly	<a href="#">“Replacing the Power Switch Assembly” on page 17</a>
21	Power supply	<a href="#">“Replacing the Power Supply” on page 2</a>
22	Rear fan	<a href="#">“Replacing the Rear Fan” on page 15</a>
23	Smart card reader	<a href="#">“Replacing the Smart Card Reader” on page 15</a>
24	Smart card reader cables	<a href="#">“Replacing the Smart Card Reader Cable” on page 3</a>
25	Speaker assembly	<a href="#">“Replacing the Speaker” on page 40</a>



# Replacing the Motherboard and Associated Components

---

This chapter describes the remove and install procedures for the Sun Blade 1500 workstation 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 11-46](#).

---

This chapter contains the following topics:

- [“Replacing the DIMMs” on page 11-2](#)
- [“Replacing the CPU Fan and Heatsink Assembly” on page 11-14](#)
- [“Replacing the Battery” on page 11-23](#)
- [“Replacing the NVRAM” on page 11-26](#)
- [“Replacing the PCI Cards” on page 11-29](#)
- [“Replacing the Motherboard” on page 11-46](#)



---

**Caution** – To prevent equipment damage, review the safety requirements, safety symbols, and safety precautions in [“Preparing to Replace Components” on page 10-1](#) before you perform any replacement procedure. Additional cautions, warnings, and instructions are provided in the *Sun Blade 1500 Safety and Compliance Guide*, 816-7566. The document is available from:

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

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

---



---

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

---

---

## 11.1 Replacing the DIMMs

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

- [“Identifying the DIMMs” on page 11-2](#)
- [“Removing DIMMs” on page 11-3](#)
- [“Installing DIMMs” on page 11-8](#)



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



---

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

---



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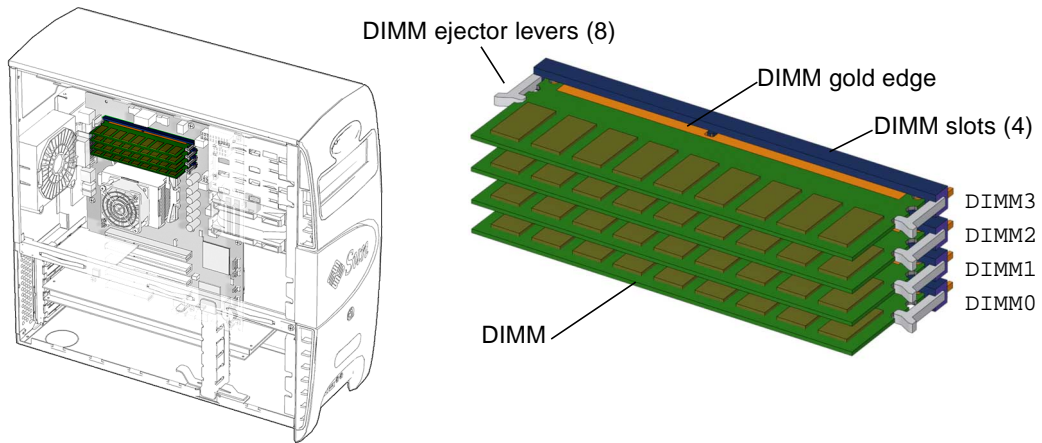
**Caution** – Handle the DIMMs along the outside edges. *Do not* handle the DIMM along the gold contact edge. Do not touch DIMM components or other metal parts. Always wear an antistatic wrist strap when handling DIMMs.

---

### 11.1.1 Identifying the DIMMs

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





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

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

**TABLE 11-1** DIMM Pair Configurations

DIMM Pair Total Memory	Installed DIMM Pairs	Configuration
512 MB memory	2 x 256 MB DIMMs	Standard
1 GB memory	2 x 512 MB DIMMs	Standard
2 GB memory	2 x 1 GB DIMMs	Optional

See the *Sun Blade 1500 Product Notes*, 816-7569, for more information about memory configurations and conditions.

If you are not removing an existing DIMM, proceed to [“Installing DIMMs”](#) on page 11-8.

## 11.1.2 Removing DIMMs

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

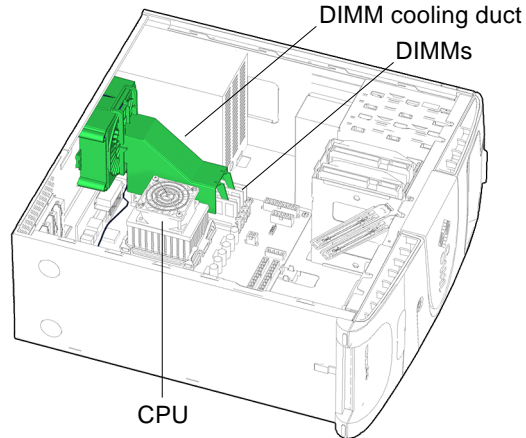
Refer to:

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

- “Positioning the Chassis” on page 10-16

**2. Locate the DIMM slots.**

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



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

---

**Note** – Your system’s DIMM cooling duct might not have two tines at the front end. The absence of these tines does not affect the functionality of the duct.

---

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

See [FIGURE 11-3](#).

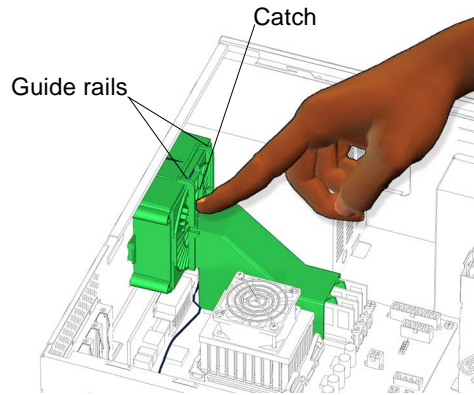


FIGURE 11-3 Pressing the Catch on the Rear Fan Bracket

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

See [FIGURE 11-4](#).

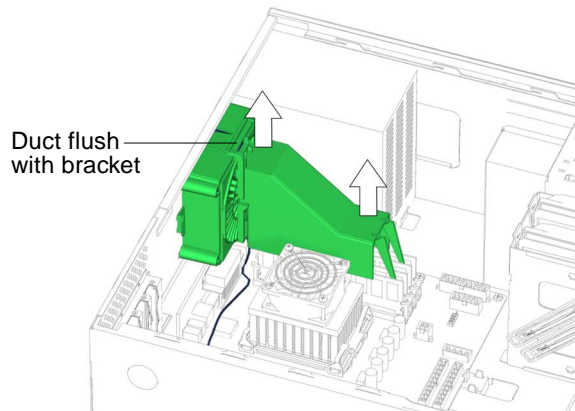
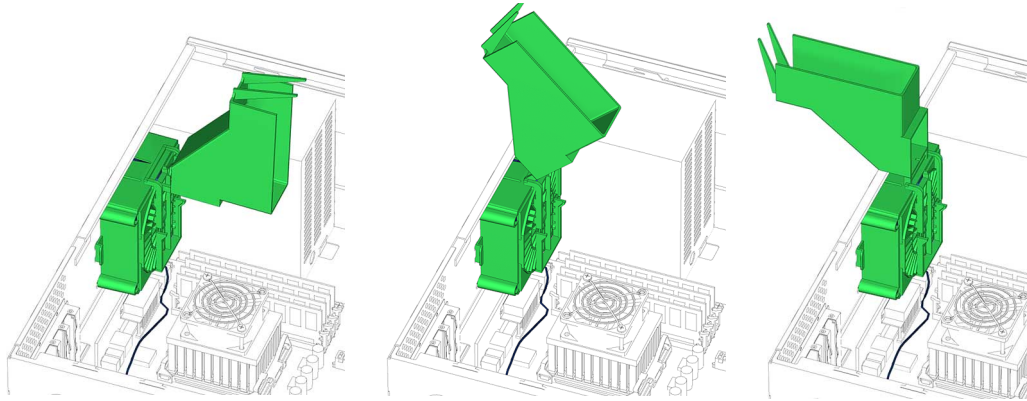


FIGURE 11-4 Sliding the Duct Up

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

See [FIGURE 11-5](#).



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

**6. Consider your next step.**

- If you lifted the DIMM cooling duct prior to installing DIMMs, return to [Step 4](#) of “[Installing DIMMs](#)” on page 11-8.
- If you lifted the DIMM cooling duct prior to removing the CPU fan and heatsink assembly, return to [Step 6](#) of “[Removing the CPU Fan and Heatsink Assembly](#)” on page 11-15.
- If you lifted the DIMM cooling duct prior to installing the CPU fan and heatsink assembly, return to [Step 7](#) of “[Installing the CPU Fan and Heatsink Assembly](#)” on page 11-19.
- Otherwise, continue to [Step 7](#).

**7. Release the desired DIMM.**

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

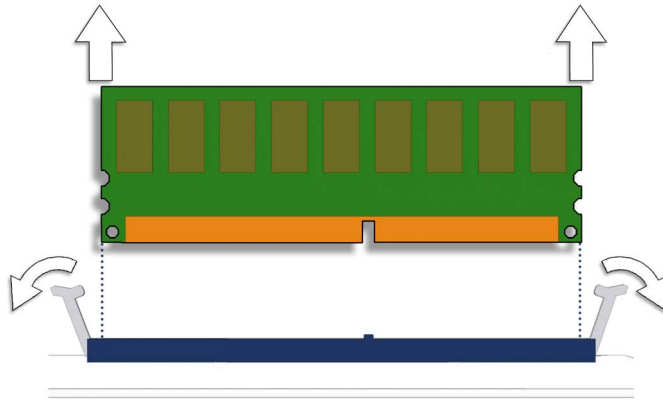


FIGURE 11-6 Removing the DIMM

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

See [FIGURE 11-7](#).

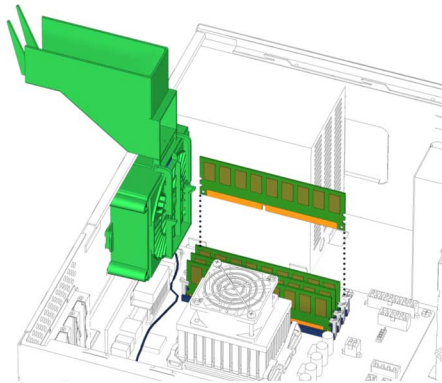


FIGURE 11-7 Lifting the DIMM Out of the Slot



---

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

---



---

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

---

9. Set the DIMM aside on an antistatic mat.
10. Repeat [Step 7](#) through [Step 9](#) until you have removed all relevant DIMMs.
11. Consider your next step.
  - If you removed a DIMM to replace it, proceed to [“Installing DIMMs”](#) on page 11-8.
  - If you removed DIMMs prior to removing the motherboard, return to [Step 6](#) in [“Removing the Motherboard”](#) on page 11-48.
  - If you removed a DIMM and will not replace it at this time, continue with [Step 8](#) of [“Installing DIMMs”](#) on page 11-8, to finish the procedure.

## 11.1.3 Installing DIMMs

---

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

---



---

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

---



---

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

---

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

Refer to:

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

### 2. Locate the DIMM slots.

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

---

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

---

Check placement of the DIMMs.

3. If you have not already done so, lift the DIMM cooling duct out of the way.  
See [Step 3](#) through [Step 5](#) of “[Removing DIMMs](#)” on page 11-3.
4. Remove the new DIMM from its antistatic container.

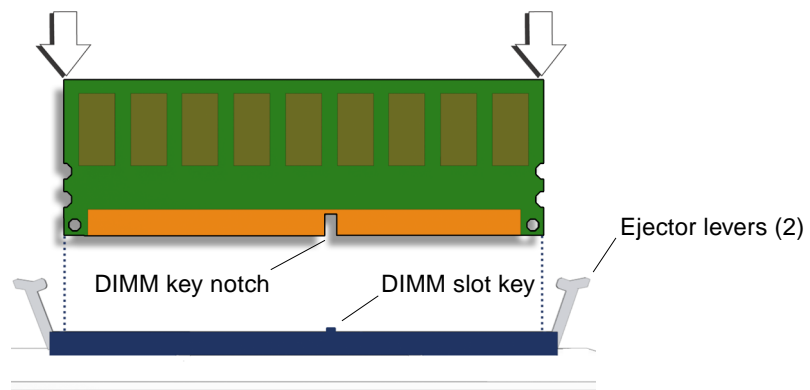


---

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

---

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



**FIGURE 11-8** Aligning the DIMM

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

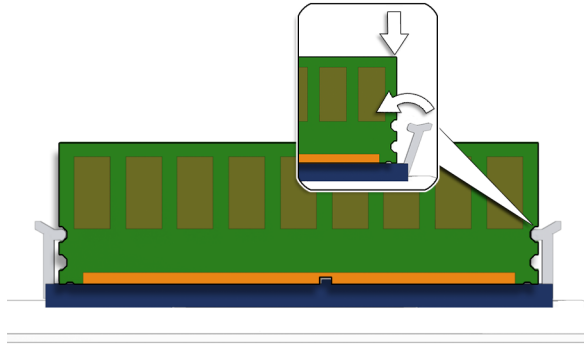


FIGURE 11-9 Securing the DIMM

---

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

---

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

7. Repeat **Step 4** through **Step 6** for all DIMMs.
8. Flip the DIMM cooling duct over toward the front of the chassis, so that the guide rails of the duct are flush with the guide rails of the rear fan bracket.  
See [FIGURE 11-10](#).

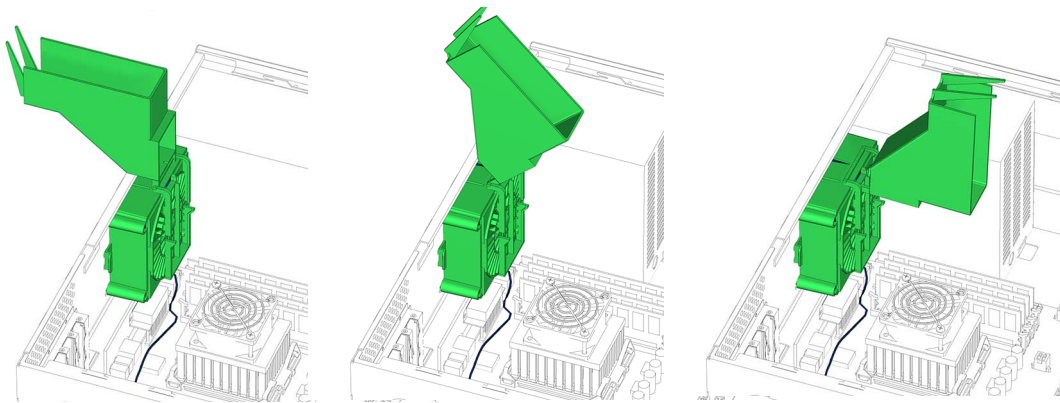
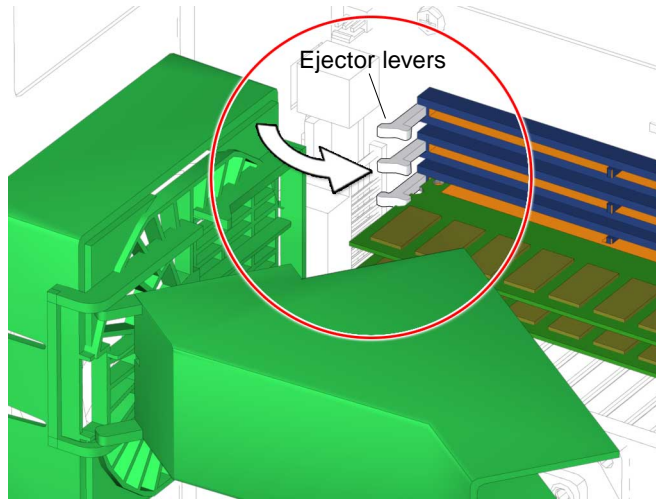


FIGURE 11-10 Flipping DIMM Cooling Duct Back



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

See [FIGURE 11-11](#).



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

---

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

---

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

See [FIGURE 11-12](#).

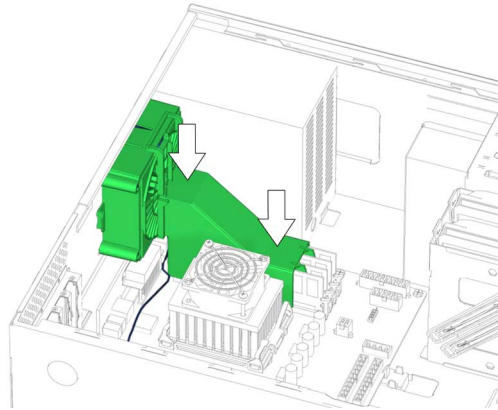


FIGURE 11-12 Sliding the Duct Down

11. Press the duct down until the catch clicks it into place.
12. If you returned the DIMM cooling duct to its original position after installing the CPU fan and heatsink assembly, return to [Step 11](#) of “[Installing the CPU Fan and Heatsink Assembly](#)” on page 11-19.
13. Inspect the DIMM and other component fasteners.
  - The DIMM ejectors are upright and tight.
  - If removed, verify the rear fan bracket feet are well seated in the chassis.
14. Inspect the DIMM and other component cabling.
  - The DIMM is fully seated in the slot.
  - If removed, verify the rear fan cable is firmly connected to the motherboard.
15. Consider your next step.
  - If you installed DIMMs after installing the motherboard, return to [Step 14](#) of “[Installing the Motherboard](#)” on page 11-52.
  - Reposition the chassis, install the access panel, power on the system, and verify the DIMM installation. Refer to:
    - “[Repositioning the Chassis](#)” on page 15-1
    - “[Installing the Access Panel](#)” on page 15-5
    - “[Powering On the Workstation](#)” on page 15-8
    - “[Verifying an Installation](#)” on page 15-11

If you installed unsupported DIMMs, consider the following section.

## 11.1.4 OpenBoot PROM Memory Message

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

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

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

---

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

---

---

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

---

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

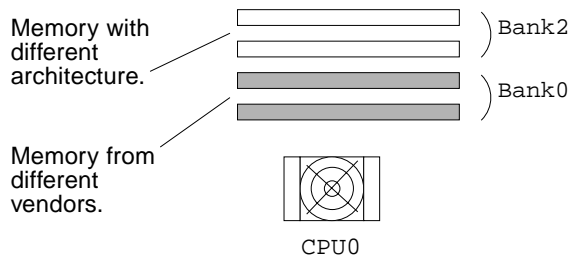
```
NOTICE - CPU0 Bank0 DIMMs are from different vendors.
```

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

```
NOTICE - CPU0 Bank2 DIMMs have different architectures and will not be used.
```

This message means that each of the two DIMMs in the upper slots has a different internal memory layout. The system does not use the DIMMs.

[FIGURE 11-13](#) identifies the location of the faulty DIMMs in the previous examples.



**FIGURE 11-13** Examples of Faulty DIMM Locations

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

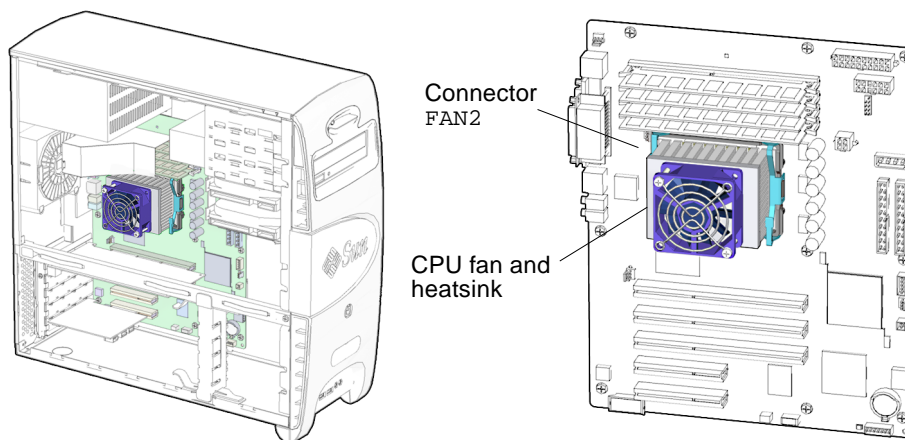
## 11.2 Replacing the CPU Fan and Heatsink Assembly

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

- [“Identifying the CPU Fan and Heatsink Assembly” on page 11-14](#)
- [“Removing the CPU Fan and Heatsink Assembly” on page 11-15](#)
- [“Installing the CPU Fan and Heatsink Assembly” on page 11-19](#)

### 11.2.1 Identifying the CPU Fan and Heatsink Assembly

The CPU fan and CPU heatsink are attached to each other. Replacing a fan requires replacing the heatsink as well. [FIGURE 11-14](#) shows the location and identifies the CPU fan and heatsink assembly.



**FIGURE 11-14** CPU Fan and Heatsink Assembly Location and Identification

The CPU fan and heatsink assembly is fastened to the CPU with two clips. These spring-loaded clips latch to the locking ring which surrounds the CPU and apply a downward force, pressing the CPU fan and heatsink assembly against the CPU.

When the clips are removed or installed one at a time, they have a tendency to rock the CPU fan and heatsink assembly. To prevent the CPU fan and heatsink assembly from rocking, either hold the assembly steady or remove and install both clips at the same time.

[TABLE 11-3](#) lists the CPU fan specifications.

**TABLE 11-3** CPU Fan Specifications

Specification	Value (Maximum)
Voltage	13.8 VDC
Current	0.24 AMPS
Speed	5400 RPM
Flow Rate	27.72 CFM (0.785 m <sup>3</sup> /min)

## 11.2.2 Removing the CPU Fan and Heatsink Assembly

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

Refer to:

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

- “Removing the Access Panel” on page 10-12
2. **Locate the CPU fan and heatsink assembly.**
  3. **(Optional) Remove the DIMM cooling duct and rear fan.**

If the DIMM cooling duct and rear fan are blocking access to the CPU fan and heatsink assembly clip, remove them. Refer to:

    - “Removing the DIMM Cooling Duct” on page 13-23.
    - “Removing the Rear Fan” on page 13-16.
  4. **Position the chassis.**

Refer to “Positioning the Chassis” on page 10-16.
  5. **If you have not already removed it, lift the DIMM cooling duct out of the way.**

Refer to Step 3 of “Removing DIMMs” on page 11-3.
  6. **Disconnect the CPU fan and heatsink assembly cable.**

Disconnect the cable from the motherboard connector, FAN2. See FIGURE 11-15.

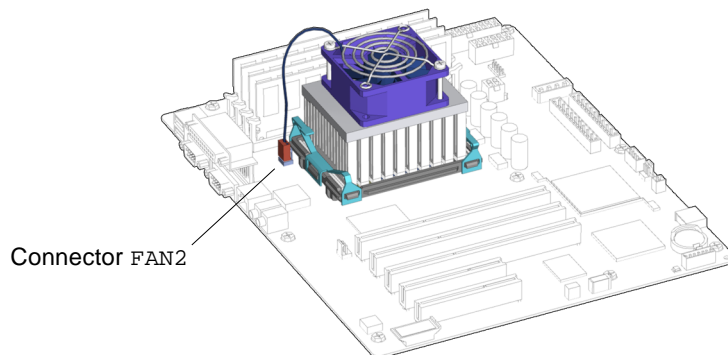
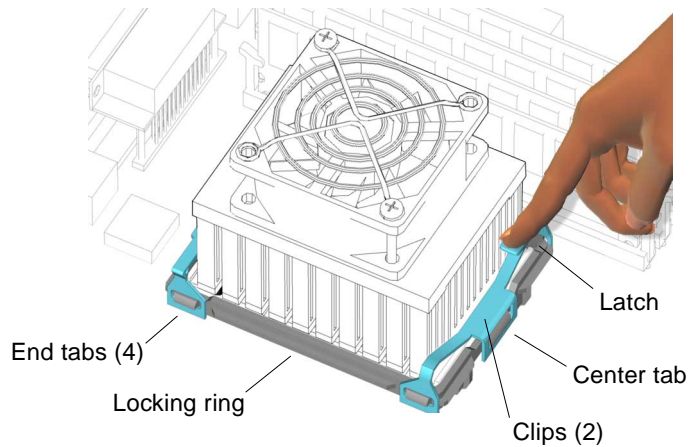


FIGURE 11-15 Disconnecting the CPU Fan and Heatsink Assembly Cable

7. **Release the CPU fan and heatsink assembly clips.**
  - a. **Press down on the latch of the clip, unhooking that end of the clip from the locking ring end tab.**

See FIGURE 11-16.



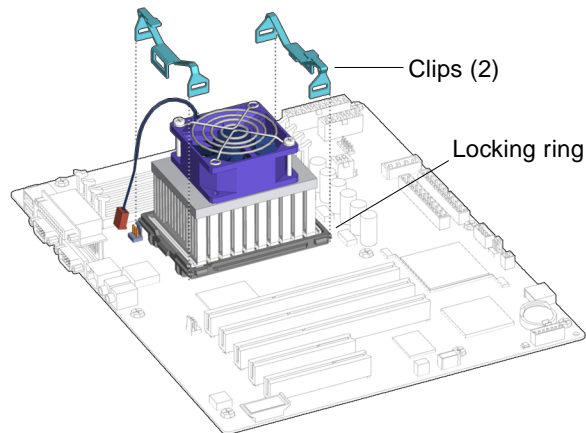
**FIGURE 11-16** Pressing Down on the Clip Latch

**b. Slide the clip to unhook the end opposite the latch.**

This relieves clip pressure. The CPU fan and heatsink assembly might lift up on one side. Hold the assembly down until the other clip is removed.

**c. Rotate the clip away from the CPU fan and heatsink assembly and lift it off the locking ring.**

Set the clip aside. If removing clips separately, repeat from [Step a](#) for the other clip. See [FIGURE 11-17](#).



**FIGURE 11-17** Releasing the CPU Fan and Heatsink Assembly Clips

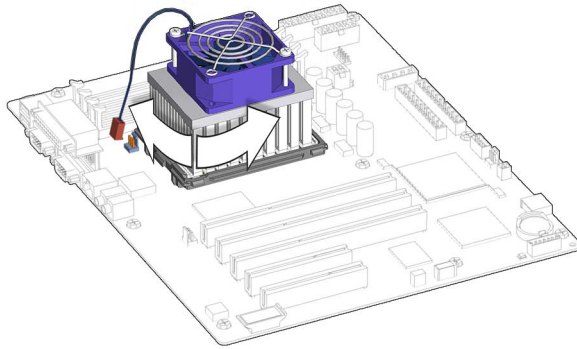
---

**Note** – Use care not to damage electronic components and other sensitive devices around the CPU fan and heatsink assembly.

---

**8. Remove the CPU fan and heatsink assembly from of the CPU.**

- a. If there is resistance, rotate the CPU fan and heatsink assembly clockwise/counterclockwise while gently pulling up. See [FIGURE 11-18](#).**



**FIGURE 11-18** Rotating CPU Fan and Heatsink Assembly

- b. Continue this rocking motion until the CPU fan and heatsink assembly releases from the CPU.**

---

**Note** – If the rocking motion is not possible, or if you cannot break the seal between the CPU fan and heatsink assembly and the CPU, replace the motherboard. See [“Replacing the Motherboard” on page 11-46](#)

---

- c. Lift the CPU fan and heatsink assembly off of the CPU. See [FIGURE 11-19](#).**



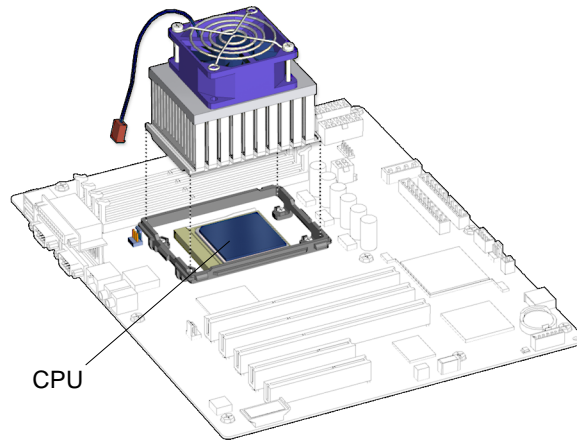


FIGURE 11-19 Lifting the CPU Fan and Heatsink Assembly Away

d. Set the CPU fan and heatsink assembly on its side.

9. Consider your next step.

- If you removed the CPU fan and heatsink assembly prior to removing the motherboard, return to [Step 6 of “Removing the Motherboard” on page 11-48](#).
- Otherwise, proceed to [“Replacing the CPU Fan and Heatsink Assembly” on page 11-14](#).



---

**Caution** – Do not power on the system without the CPU fan and heatsink assembly installed.

---

## 11.2.3 Installing the CPU Fan and Heatsink Assembly



---

**Caution** – The CPU will be damaged if the CPU fan and heatsink assembly is not installed upon powering on the workstation. In this situation, immediately power off the workstation.

---

1. Open and position the chassis.

Refer to:

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

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

The CPU fan and heatsink assembly centers within the locking ring which surrounds the CPU.

**3. (Optional) Lift the DIMM cooling duct out of the way.**

If the DIMM cooling duct is blocking access to install the CPU fan and heatsink assembly, refer to [Step 3](#) of “[Removing DIMMs](#)” on page 11-3.

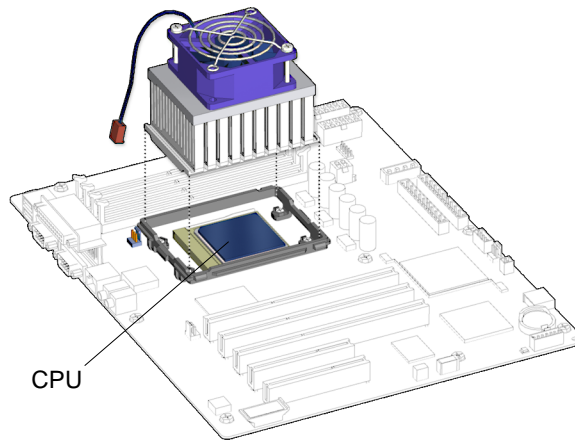
**4. Remove the CPU fan and heatsink assembly and clips from the packaging.**

**5. Clean the top surface of the CPU with an appropriate solvent or cleaner so that it is smooth.**

**6. Remove any covers or shields protecting the thermal pad of the replacement CPU fan and heatsink assembly.**

**7. Place the CPU fan and heatsink assembly over the CPU.**

Arrange the assembly so that the cable is toward the back of the chassis. See [FIGURE 11-19](#).



**FIGURE 11-20** Setting the CPU Fan and Heatsink Assembly on the CPU

**8. Attach the CPU fan and heatsink assembly clips onto the locking ring.**

**a. Align the clip over the CPU locking ring.**

See [FIGURE 11-21](#).

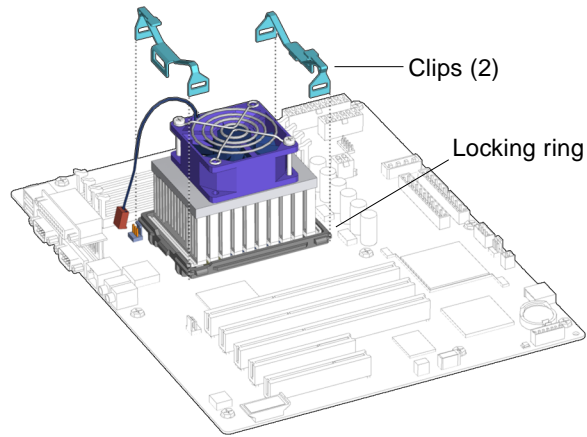


FIGURE 11-21 Aligning the Clips Over the Locking Ring

- b. Rotate the clip in toward the CPU fan and heatsink assembly to secure it over the center tab.**
- c. Press down on the latch-end of the clip and hook the end over the tab on the locking ring.**

See [FIGURE 11-22](#).

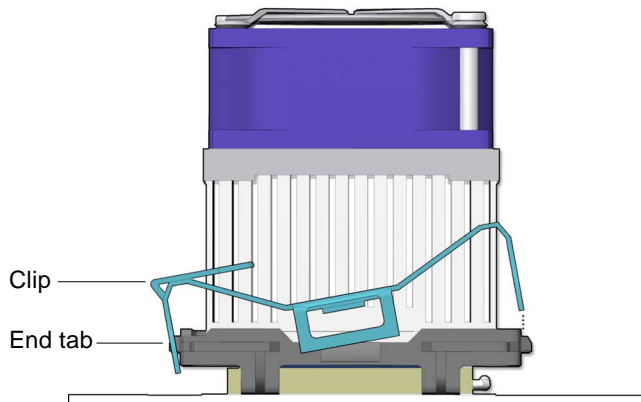
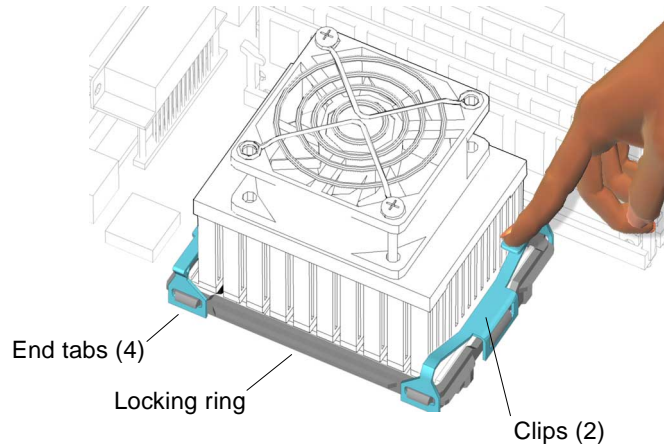


FIGURE 11-22 Hooking Clip Over End Tab

- d. Press down on the opposite end of the clip, hooking it over the end tab, and securing it to the locking ring.

See [FIGURE 11-23](#).

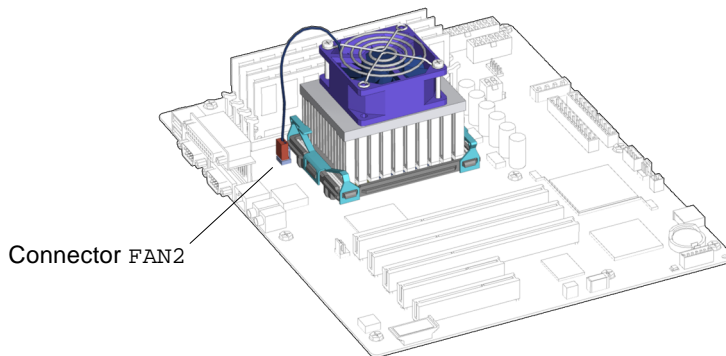


**FIGURE 11-23** Securing the Clip to the Locking Ring

The clip clicks into place. If installed separately, repeat from [Step a](#) for the other clip.

### 9. Connect the CPU fan and heatsink assembly cable.

The CPU fan assembly cable has a designated connector on the motherboard, FAN2. See [FIGURE 11-24](#). Press until it is snug.



**FIGURE 11-24** Connecting the CPU Fan and Heatsink Assembly Cable

- 10. If you lifted the DIMM cooling duct out of the way prior to installing the CPU fan and heatsink assembly, return the duct to its original position.**

Refer to [Step 8](#) through [Step 11](#) of “[Installing DIMMs](#)” on page 11-8.

- 11. Reposition the chassis.**

Refer to “[Repositioning the Chassis](#)” on page 15-1.

- 12. If you removed the rear fan and DIMM cooling duct prior to installing the CPU fan and heatsink assembly, install them.**

Refer to:

- “[Installing the Rear Fan](#)” on page 13-18
- “[Installing the DIMM Cooling Duct](#)” on page 13-27

- 13. Inspect the CPU fan and heatsink assembly and other component fasteners.**

- The CPU fan and heatsink assembly clip latches are down and both clips are locked in place.
- The rear fan bracket feet are well seated in the chassis.

- 14. Inspect the CPU fan and heatsink assembly and other component cabling.**

- The CPU fan and heatsink assembly cable is connected to the motherboard.
- The rear fan cable is firmly connected to the motherboard.

- 15. Consider your next step.**

- If you installed the CPU fan and heatsink assembly after installing the motherboard, return to [Step 13](#) of “[Installing the Motherboard](#)” on page 11-52.
- Install the access panel, power on the system, and verify the CPU fan and heatsink assembly installation. Refer to:
  - “[Installing the Access Panel](#)” on page 15-5
  - “[Powering On the Workstation](#)” on page 15-8
  - “[Verifying an Installation](#)” on page 15-11

---

## 11.3 Replacing the Battery

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

- “[Identifying the Battery](#)” on page 11-24
- “[Removing the Battery](#)” on page 11-24
- “[Installing the Battery](#)” on page 11-25

## 11.3.1 Identifying the Battery

FIGURE 11-25 shows the location of and identifies the battery.

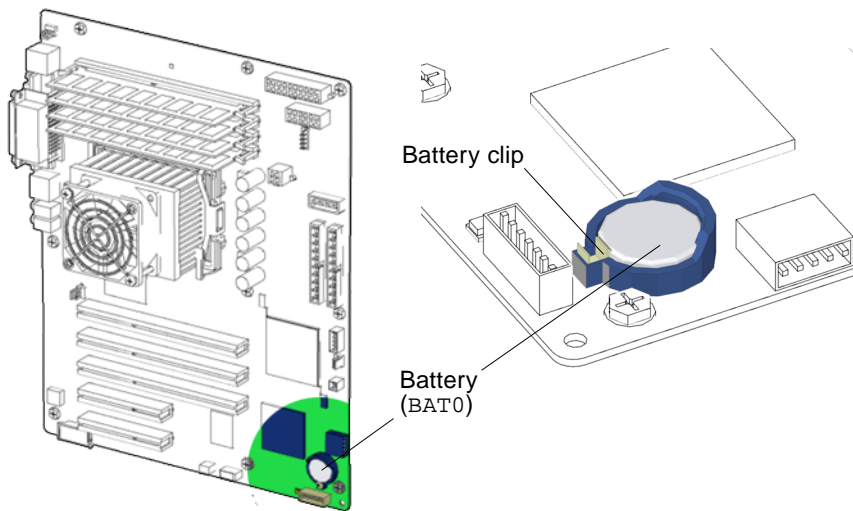


FIGURE 11-25 Battery Location and Identification

TABLE 11-1 lists the battery specifications.

TABLE 11-4 Battery Specifications

Specification	Value
Voltage	3 VDC
Type	CR 2032

## 11.3.2 Removing the Battery

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

Refer to:

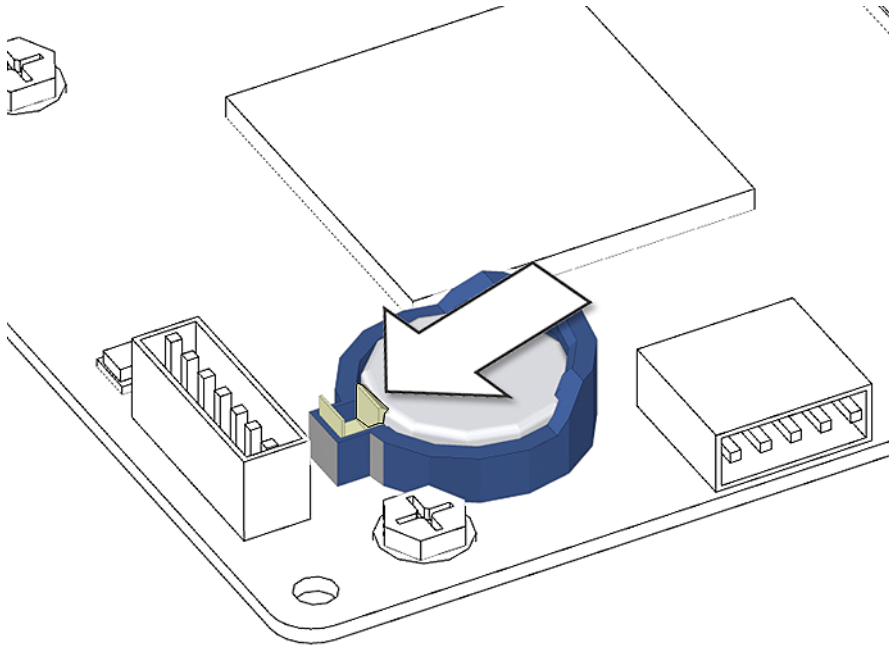
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Positioning the Chassis” on page 10-16](#)

**2. Locate the battery.**

See [FIGURE 11-25](#).

**3. Release the battery.**

Press the battery clip away from the battery until the battery shifts out of the battery socket. See [FIGURE 11-26](#).



**FIGURE 11-26** Releasing the Battery

The workstation does not function without the battery. To install the new battery proceed to [“Installing the Battery”](#) on page 11-25.

## 11.3.3 Installing the Battery

The battery installs directly into a socket on the motherboard. There are no additional fasteners or cables.

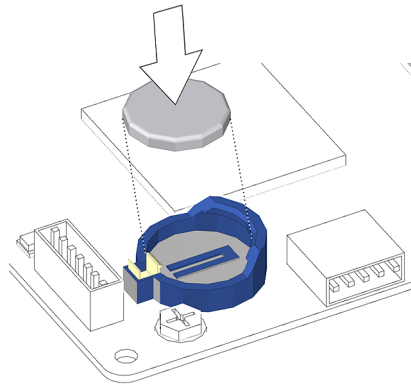
**1. Open and position the chassis.**

Refer to:

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

- [“Positioning the Chassis” on page 10-16](#)
- 2. **Identify the battery installation site, BAT0.**  
See [FIGURE 11-25](#).
- 3. **Install the battery.**

Position the battery over the battery socket with the plus (+) side up. Press the battery down into the socket until it clicks into place. See [FIGURE 11-27](#).



**FIGURE 11-27** Installing the Battery

- 4. **Inspect the battery fastening.**  
Make sure the battery is tight in its socket.
- 5. **Finishing up.**  
Reposition the chassis, install the access panel, power on the system, and verify the battery installation. Refer to:
  - [“Repositioning the Chassis” on page 15-1](#)
  - [“Installing the Access Panel” on page 15-5](#)
  - [“Powering On the Workstation” on page 15-8](#)
  - [“Verifying an Installation” on page 15-11](#)

---

## 11.4 Replacing the NVRAM

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



- “Identifying the NVRAM” on page 11-27
- “Removing the NVRAM” on page 11-27
- “Installing the NVRAM” on page 11-28

## 11.4.1 Identifying the NVRAM

FIGURE 11-28 shows the location of and identifies the NVRAM.

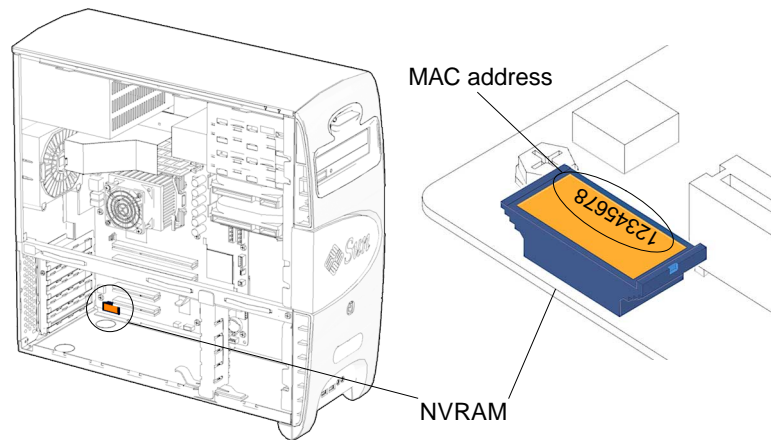


FIGURE 11-28 NVRAM Location and Identification

## 11.4.2 Removing the NVRAM

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

Refer to:

- “Powering Off the Workstation” on page 10-4
- “Removing the Access Panel” on page 10-12
- “Positioning the Chassis” on page 10-16

### 2. Locate the NVRAM.

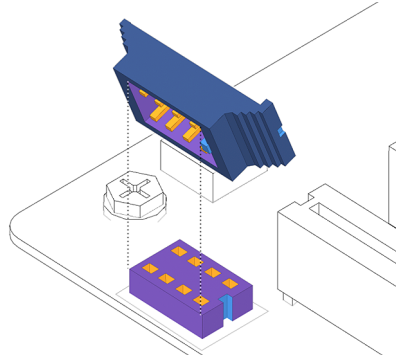
See FIGURE 11-28.

### 3. (Optional) Remove any PCI cards in PCI0 and PCI1.

If the PCI cards in slots PCI0 and/or PCI1 are blocking access to the NVRAM, remove them. Refer to “Removing a PCI Card” on page 11-30.

#### 4. Remove the NVRAM.

Pull the NVRAM straight up from the motherboard connector. See [FIGURE 11-29](#). Set the NVRAM aside on an antistatic mat.



**FIGURE 11-29** Removing the NVRAM

#### 5. Consider your next step.

- If you removed the NVRAM prior to removing the motherboard, return to [Step 8](#) of “[Removing the Motherboard](#)” on page 11-48.
- The workstation does not function without the NVRAM. To install a new NVRAM, proceed to “[Installing the NVRAM](#)” on page 11-28.

## 11.4.3 Installing the NVRAM

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

#### 1. Open and position the chassis.

Refer to:

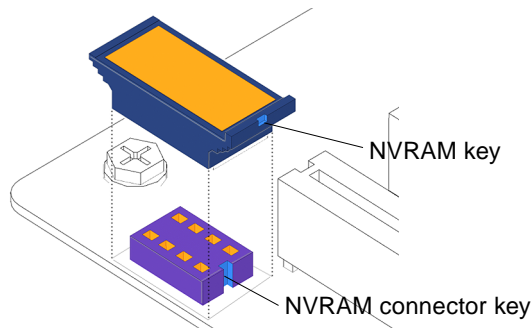
- “[Removing the Access Panel](#)” on page 10-12
- “[Positioning the Chassis](#)” on page 10-16

#### 2. Locate the NVRAM connector.

See [FIGURE 11-28](#).

#### 3. Install the NVRAM.

Align the NVRAM key to the NVRAM connector key on the motherboard. Press the NVRAM down until snug. See [FIGURE 11-30](#).



**FIGURE 11-30** Installing the NVRAM

**4. Inspect the NVRAM fastener.**

Make sure the NVRAM is tight in its connector.

**5. If you removed the PCI cards prior to replacing the NVRAM, install the PCI cards.**  
Refer to “[Installing a PCI Card](#)” on page 11-40.

**6. Consider your next step.**

- If you installed the NVRAM after installing a new motherboard, return to [Step 13](#) of “[Installing the Motherboard](#)” on page 11-52.
- Otherwise, reposition the chassis, install the access panel, power on the system, and verify the NVRAM installation. Refer to:
  - “[Repositioning the Chassis](#)” on page 15-1
  - “[Installing the Access Panel](#)” on page 15-5
  - “[Powering On the Workstation](#)” on page 15-8
  - “[Verifying an Installation](#)” on page 15-11

---

## 11.5 Replacing the PCI Cards

This section describes removal and installation of PCI cards in the workstation.

Topics include:

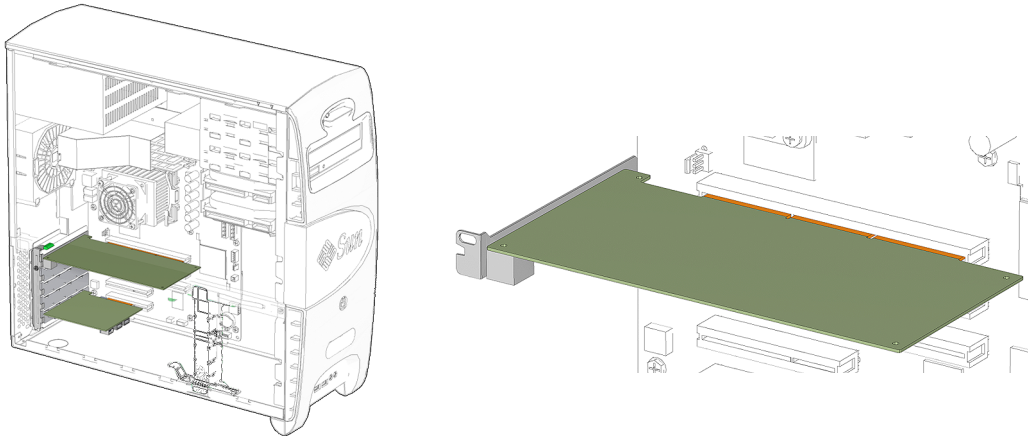
- “[Identifying the PCI Cards](#)” on page 11-30
- “[Removing a PCI Card](#)” on page 11-30
- “[Installing a PCI Card](#)” on page 11-40



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

## 11.5.1 Identifying the PCI Cards

PCI cards are supported in the five PCI slots that reside on the system motherboard. See [FIGURE 11-31](#).



**FIGURE 11-31** PCI Card Location and Identification

[TABLE 11-5](#) lists the PCI card slot specifications.

**TABLE 11-5** PCI Card Slot Specifications

PCI Card Slot	Supported Speed
PCI4	66 MHz
PCI0 through PCI3	33 MHz

---

**Note** – If you are installing or upgrading PCI cards, proceed to [“General PCI Card Guidelines”](#) on page 11-34.

---

## 11.5.2 Removing a PCI Card

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

Refer to:

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

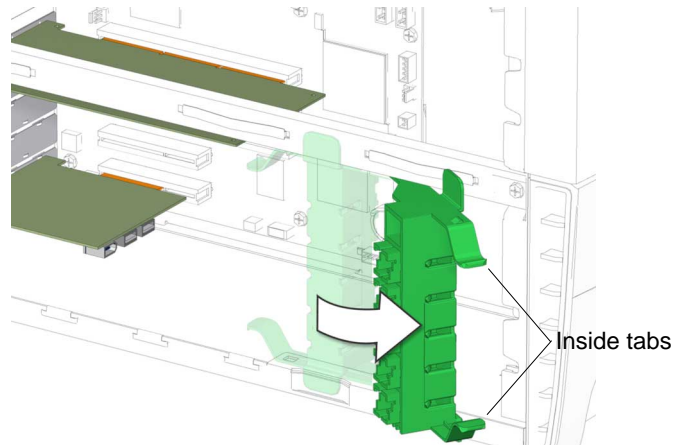
- [“Positioning the Chassis” on page 10-16](#)

**2. Locate the PCI card you wish to remove.**

If the PCI card is located in slot PCI4, remove the chassis cross brace according to the procedure in [“Removing the Chassis Cross Brace” on page 13-51](#).

**3. If necessary, swing out the PCI card support.**

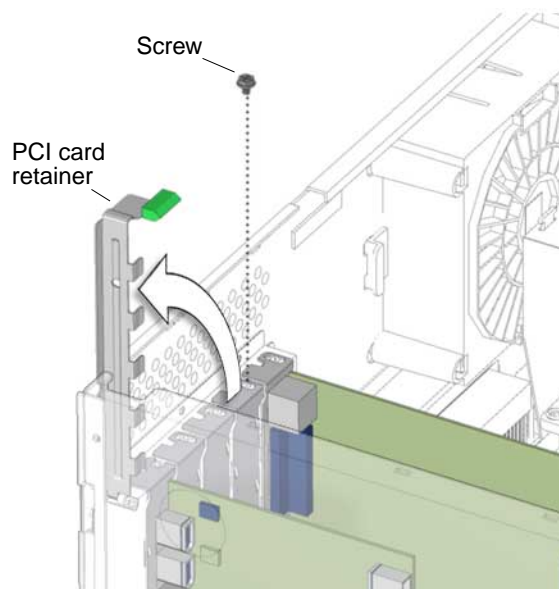
Squeeze the inside tabs together and swing the PCI card support out. See [FIGURE 11-32](#).



**FIGURE 11-32** Swinging Out the PCI Card Support

**4. Unfasten and open the PCI card retainer.**

Using a No. 2 Phillips screwdriver, remove the screw that secures the PCI card retainer to the chassis back panel. See [FIGURE 11-33](#). Set the screw aside in a container. Unlatch the PCI card retainer and lift it up.



**FIGURE 11-33** Opening the PCI Card Retainer

**5. Remove the PCI card.**

Gently rock the PCI card forward, then lift it straight out of the PCI card slot, and set it aside on an antistatic mat. See [FIGURE 11-34](#).

---

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

---

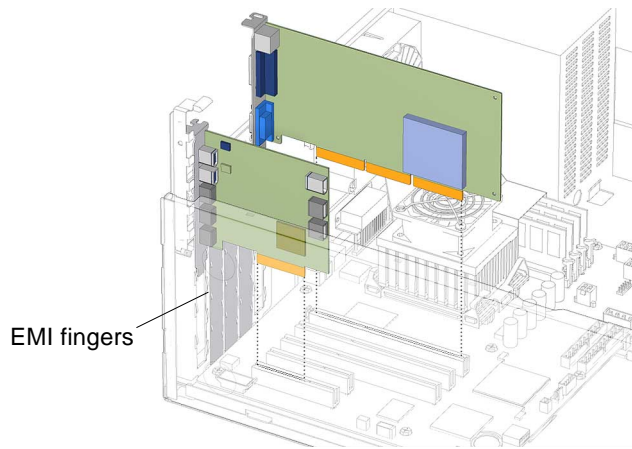


FIGURE 11-34 Removing the PCI Card

**6. Consider 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 11-40](#) to install the new PCI cards.
- If you removed PCI cards prior to removing the NVRAM, return to [Step 4 of “Removing the NVRAM” on page 11-27](#).
- If you removed PCI cards prior to removing the motherboard, return to [Step 7 of “Removing the Motherboard” on page 11-48](#).
- If you are not replacing the PCI card you removed, install a filler panel.

**a. Insert a filler panel into the chassis back panel slot.**

The back panel slot must be closed with a filler panel to meet system EMI and airflow requirements. See [FIGURE 11-35](#).

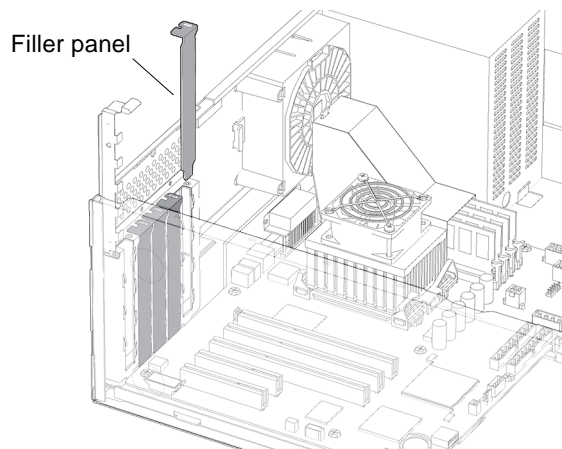


FIGURE 11-35 Installing a PCI Card Filler Panel

**b. Fasten the PCI card retainer.**

Use a No. 2 Phillips screwdriver to fasten the screw that secures the PCI card retainer. See [FIGURE 11-40](#).

**c. Re-position the chassis, install the access panel, and power on the system.**

Refer to:

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

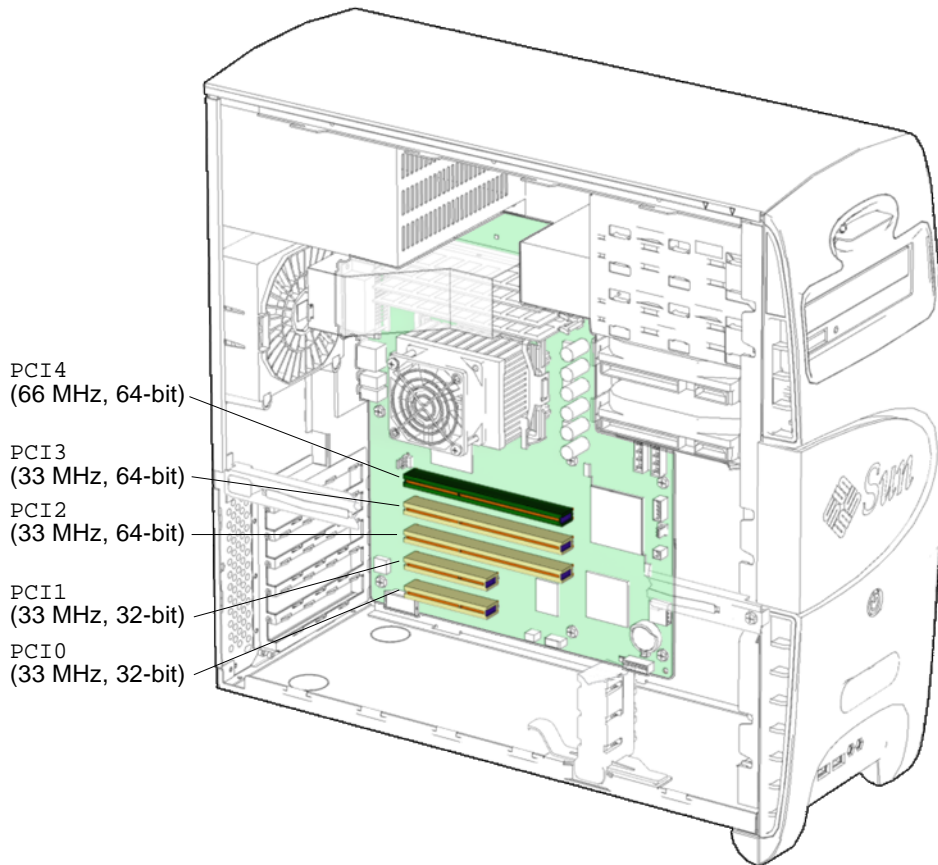
## 11.5.3 General PCI Card Guidelines

When adding PCI cards to the Sun Blade 1500, consider these general guidelines:

- The total power consumption of the installed PCI cards must not exceed 110 Watts.
- The Sun XVR-600, Sun XVR-500, and Sun XVR-100 graphics accelerators and the SunPCi III co-processor card are considered high-performance PCI cards. Installing more than three high-performance PCI cards affects system resources and is not supported. Also:
  - Installing more than two Sun XVR-500 or XVR-600 graphics accelerators is not supported.
  - Installing more than three Sun XVR-100 graphics accelerators is not supported.
  - Installing more than one SunPCi III co-processor card is not supported.



- High-performance PCI cards can be installed into any slot. However, for best results, install high performance PCI cards into slot PCI4, the 64-bit 66 MHz slot.
- Use [FIGURE 11-36](#) to help determine where to install your PCI cards.



**FIGURE 11-36** Identifying the PCI Card Slots

## 11.5.4 Special Considerations for Graphics Accelerators

### 11.5.4.1 Visual Inspection

If the firmware does not configure a console display, you can determine the default console display by inspecting the back panel of the workstation. If a graphics accelerator is installed into the top slot, then that card is the default console display. If there is no graphics accelerator installed into PCI4, consider the following probe order.

### 11.5.4.2 Probe Order

During the boot sequence, device nodes are probed. The PCI slots are probed in the order described in [TABLE 11-6](#):

**TABLE 11-6** PCI Card Probe Order

Order	Slot Identifier	Slot Position on Back Panel	Device Node
1	PCI4	top slot	/devices/pci@1f,700000 device 3
2	PCI0	bottom slot	/devices/pci@1e,600000 device 2
3	PCI1	second slot from the bottom	/devices/pci@1e,600000 device 3
4	PCI2	middle slot	/devices/pci@1e,600000 device 4
5	PCI3	second slot from the top	/devices/pci@1e,600000 device 5

Unless you reconfigure the default, the first graphics accelerator occurring in the probe order is designated the default console display and assigned the aliases `screen` and `/dev/fb`.

### 11.5.4.3 Identifying the Default Console Display

The `test screen` command issued at the `ok` prompt requests the default console display to execute a self-test, thereby identifying itself. The self-test checks memory and might display color bars on the monitor. If the `ok` prompt is accessed from an external display device like a serial terminal or TTP connection, then test information is output to that connection. For example:

```
ok test screen
Testing screen

Starting XV-500 Selftest
(This will take an estimated
 2-4 minutes for the full test)
. . .
```

This is the beginning of the self-test output for a Sun XVR-500 graphics accelerator. If the device does not have a self-test built in, the following message is displayed.

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

### 11.5.4.4 Changing the Console Display

You can configure the OpenBoot PROM to designate a different graphics accelerator as the console display. Use the `show-displays` utility, the `nvalias` command, and the `output-device` parameter to make this change. For the following example, a Sun XVR-500 graphics accelerator is installed in slot `PCI4` and a Sun XVR-100 graphics accelerator is installed in slot `PCI1`. Initially, the Sun XVR-500 graphics accelerator is the default console display. This example configures the Sun XVR-100 graphics accelerator to be the new console display.

**1. Obtain the `ok` prompt.**

See [“Obtaining the `ok` Prompt” 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-500@3
b) /pci@1e,600000/SUNW,XVR-100@3
q) NO SELECTION
```

3. Select the graphics accelerator to be the new console display by typing its respective letter. For example:

```
Enter Selection, q to quit: b
```

The utility ends and the device node path is loaded into a text buffer.

4. Make an alias for the device node path. For example:

```
ok nvalias newconsoledisplay (Ctrl + Y)
```

Type a space, hold down the Control key, and press the Y key.

5. Configure the `output-device` parameter for the new console display. For example:

```
ok setenv output-device newconsoledisplay
```

6. Reset the OpenBoot PROM:

```
ok reset-all
```

The system now uses the Sun XVR-100 graphics accelerator as the new console display.

---

**Note** – The default console display, the first graphics accelerator found in probe order, is still aliased to `screen`. If you wish to check the new console display, type: `test newconsoledisplay`.

---

### 11.5.4.5 Avoiding Colormap Flash

Your Sun Blade 1500 workstation might ship with a Sun XVR-100 graphics accelerator configured to 8-bit color depth.

If you experience colormap flashing (incorrect colors or color changes), your graphics accelerator might be incorrectly configured. Perform one of the following procedures to set 24-bit or 8+24-bit color depth.

## Setting 24-bit Color Depth

1. Using the `fbconfig` command, set the Sun XVR-100 to 24-bit color depth.

```
% fbconfig -dev pfb0 -depth 24
```

2. Log out, then log back in for the change to take effect.

---

**Note** – 24-bit color depth performance might be slower than 8-bit color depth performance.

---

## Setting 8+24-bit Color Depth

If both 8-bit and 24-bit graphics are to be run simultaneously (8+24-bit color depth), Sun XVR-100 graphics accelerator patch 114537-15 or later must first be installed.

---

**Note** – Do not invoke 8+24-bit color depth when two monitors are connected to one XVR-100 graphics accelerator.

---

1. As superuser, download and install patch 114537-15 or later:

---

**Note** – If you have already installed the patch either by using the Sun Blade 1500 Software Enhancement Script or the `patchadd` command, skip to [Step 2](#).

---

- a. Go to the Sun website:

<http://sunsolve.sun.com>.

- b. Click the Patchfinder link.

- c. Enter patch ID 114537 into the field and click Find Patch.

The latest version of the patch is displayed.

- d. Download the patch.

- e. Unzip the patch.

For example:

```
# unzip 114537-15.zip
```

**f. Install the patch.**

For example:

```
# patchadd 114537-15
```

**2. 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.

---

**3. Log out, then log back in for the change to take effect.**

---

**Note** – 8-bit color depth performance is slower in 8+24-bit color depth mode.

---

## 11.5.5 Installing a PCI Card

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

Refer to:

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

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

Certain PCI cards must be installed in specific PCI card slots in the motherboard. You might have to remove a second chassis filler panel for some PCI cards that use two PCI card slots. Locate the corresponding chassis filler panel slot and PCI card slot.

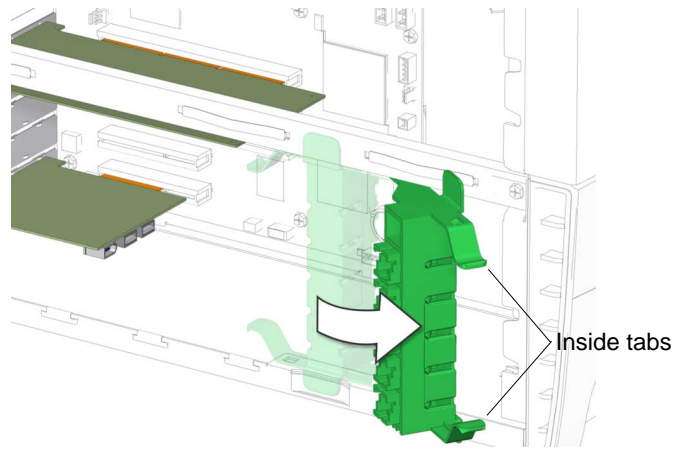
---

**Note** – If you are installing an additional PCI card, check the PCI card documentation to make sure you install the PCI card into an appropriate PCI card slot. See [“General PCI Card Guidelines” on page 11-34](#).

---

**3. Swing out the PCI card support.**

Squeeze the inside tabs together and swing the PCI card support out. See [FIGURE 11-37](#).



**FIGURE 11-37** Swinging Out the PCI Card Support

---

**Note** – If you are installing a PCI card into slot PCI4, remove the chassis cross brace according to the procedure in [“Removing the Chassis Cross Brace”](#) on page 13-51.

---

**4. Unfasten and open the PCI card retainer.**

Using a No. 2 Phillips screwdriver, remove the screw that secures the card bracket retainer to the chassis back panel. See [FIGURE 11-38](#). Set the screw aside in a container.

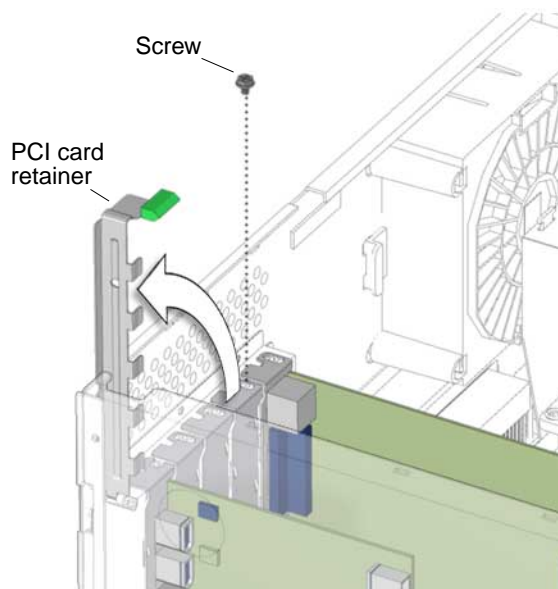


FIGURE 11-38 Opening the PCI Card Retainer

5. **Remove the chassis filler panel that corresponds to the PCI card slot you wish to use, as needed.**

Lift the filler panel up and out. See [FIGURE 11-35](#). Remove an adjacent second filler panel if needed.

6. **Remove the new PCI card from its antistatic container.**



---

**Caution** – Handle the PCI card along the outside edges. Do not handle the PCI card along the contact edge.

---

7. **Align the PCI card with the selected PCI card slot.**

Face the PCI card so that the PCI bracket aligns with the chassis back panel slot and the PCI card edge aligns with the motherboard PCI card slot.

8. **Insert the PCI card into the PCI card slot.**

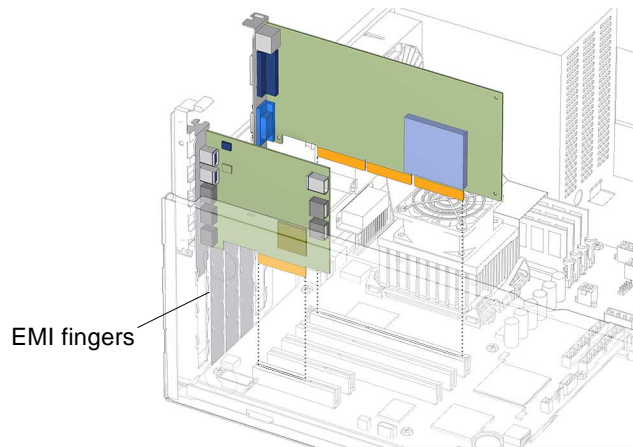
See [FIGURE 11-39](#).

---

**Note** – If you choose to keep the chassis in its upright position, use care that you do not tip over the chassis.

---





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

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

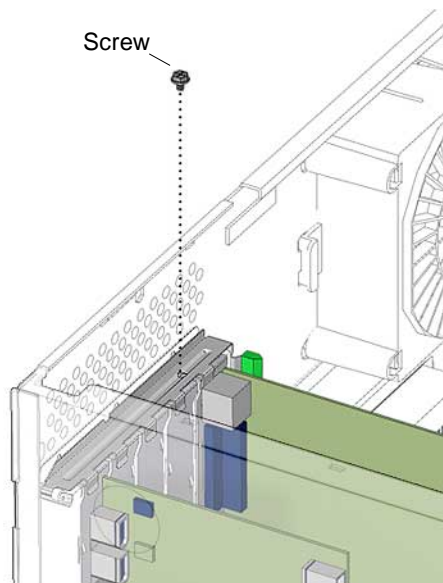
---

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

---

**9. Fasten the PCI card retainer.**

Use a No. 2 Phillips screwdriver to fasten the screw that secures the PCI card retainer. See [FIGURE 11-40](#).



**FIGURE 11-40** Fastening the PCI Card Retainer

---

**Note** – If you installed a PCI card into slot `PCI4`, install the chassis cross brace according to the procedure in [“Installing the Chassis Cross Brace”](#) on page 13-54.

---

**10. If you installed PCI cards after installing the motherboard, return to [Step 13](#) of [“Installing the Motherboard”](#) on page 11-52.**

**11. Close the PCI card support.**

Swing the PCI card support back down into the chassis. Align the center of the PCI card support fingers with each PCI card. Press the PCI card support toward the motherboard until it clicks in place, fully closed. See [FIGURE 11-41](#).

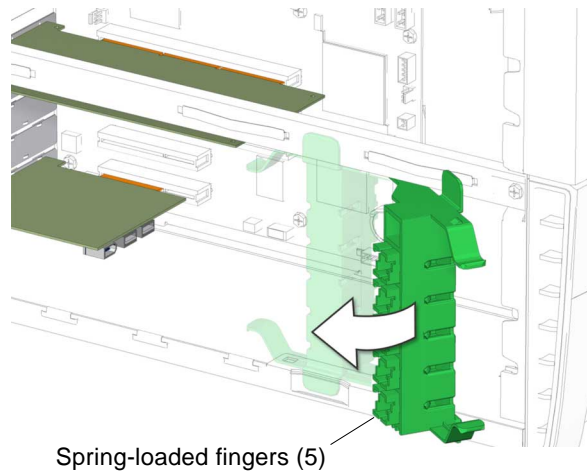


FIGURE 11-41 Closing the PCI Card Support

**12. Inspect the PCI card fasteners.**

- The PCI card panel slot screws are tight.
- The PCI cards are well seated in the motherboard.

**13. If you installed PCI cards after installing the NVRAM, return to [Step 6 in “Installing the NVRAM” on page 11-28](#).**

**14. Finishing up.**

Reposition the chassis, install the access panel, power on the system, and verify the PCI card installation. Refer to:

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

---

**Note** – Remember to either boot or reboot the system with the `-r` option, so that the Solaris operating environment can reconfigure itself for the new PCI card.

---



---

**Note** – If the Sun Blade 1500 workstation is configured with a SunPCi III coprocessor card, the following message *might* appear on the console during boot or in the `/var/adm/messages` file:

```
Hardware Reboot: X86 failed to respond
There is no action necessary and you may ignore this message.
```

---

---

## 11.6 Replacing the Motherboard

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

- “Identifying the Motherboard” on page 11-46
- “Removing the Motherboard” on page 11-48
- “Installing the Motherboard” on page 11-52



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



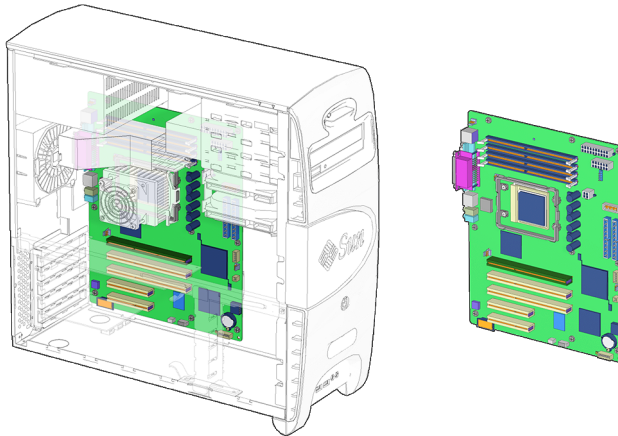
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**Caution** – This procedure is intended for Sun authorized service providers only.

---

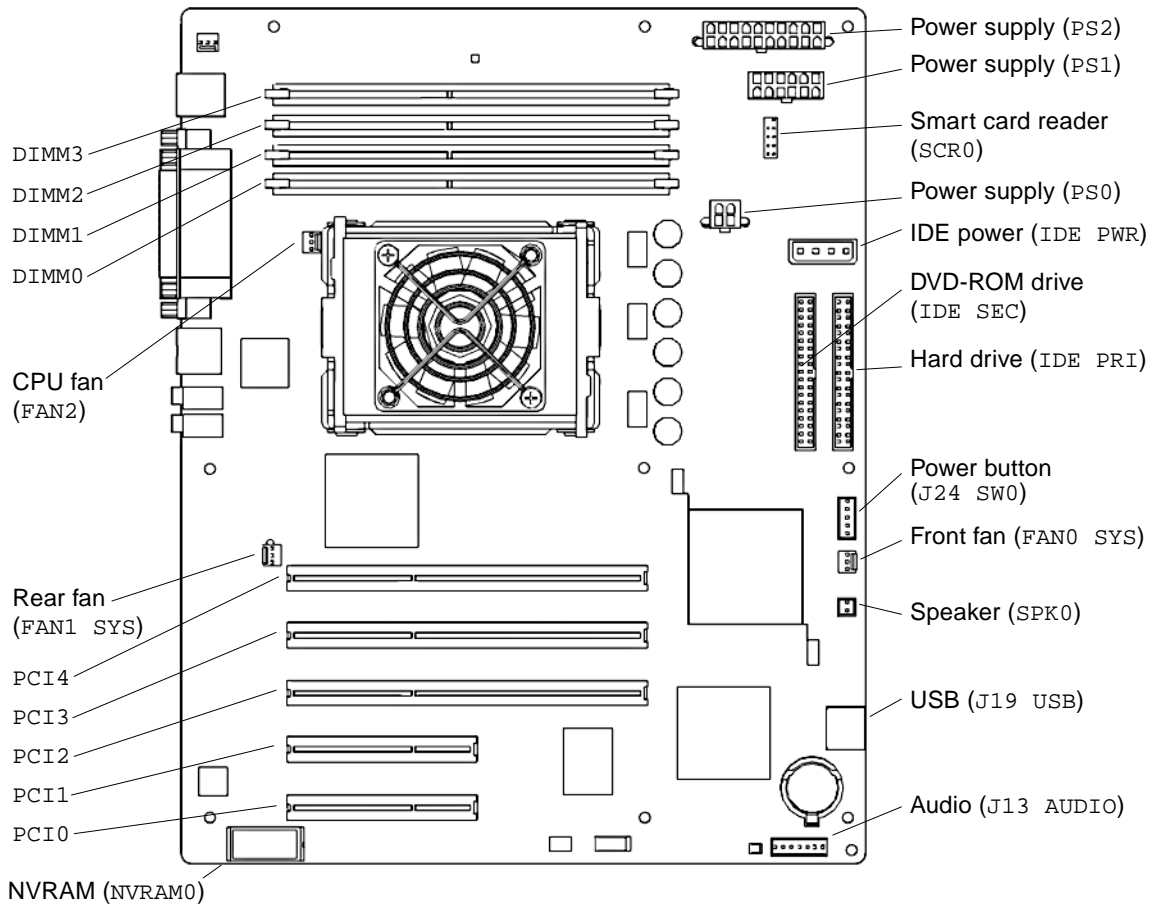
### 11.6.1 Identifying the Motherboard

The workstation motherboard and CPU are a single replaceable unit. See [FIGURE 11-42](#).



**FIGURE 11-42** Motherboard Location and Identification

[FIGURE 11-43](#) shows the connectors and slots on the Sun Blade 1500 motherboard.



**FIGURE 11-43** Motherboard Connector Layout

[TABLE 11-7](#) lists the motherboard connectors and their functions.

**TABLE 11-7** Motherboard Connectors and Descriptions

Location	Description
DIMM0 - DIMM3	DDR 132 pin memory slots
FAN0 SYS	Front fan connection
FAN1 SYS	Rear fan connection
FAN2	CPU fan connection
IDE PRI	Primary IDE connection

**TABLE 11-7** Motherboard Connectors and Descriptions *(Continued)*

Location	Description
IDE PWR	IDE power connection
IDE SEC	Secondary IDE connection
J13 AUDIO	Audio cable connection, front panel
J19 USB	Front panel USB cable connection
J24 SW0	Power switch assembly connection
NVRAM0	Nonvolatile random access memory
PCI0 - PCI4	PCI card slots
PS0	CPU power connection
PS1	Supplemental power connection
PS2	Primary power connection
SCR0	Smart card reader connection
SPK0	Speaker connection

## 11.6.2 Removing the Motherboard

As a guide, be prepared to remove the following items before removing the motherboard:

- Chassis cross brace
- PCI card support
- (Optional) DIMM cooling duct
- (Optional) Rear fan
- DIMMs
- CPU fan and heatsink assembly
- PCI cards
- (Optional) NVRAM
- Power cables
- Signal cables
- Interface cables
- Motherboard fastening screws

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

Refer to:

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

**2. Locate the motherboard.**

See [FIGURE 11-42](#).

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

---

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

---

Refer to “[Removing the Chassis Cross Brace](#)” on page 13-51. When you remove the chassis cross brace, the PCI card support will fall off.

**4. (Optional) Remove the DIMM cooling duct and rear fan.**

If the DIMM cooling duct and rear fan are blocking access to the motherboard, remove them. Refer to:

- “[Removing the DIMM Cooling Duct](#)” on page 13-23
- “[Removing the Rear Fan](#)” on page 13-16

**5. Position the chassis for component and motherboard removal.**

Refer to “[Positioning the Chassis](#)” on page 10-16

**6. Remove the DIMMs, CPU fan and heatsink assembly, and PCI cards.**

Refer to:

- “[Removing DIMMs](#)” on page 11-3
- “[Removing the CPU Fan and Heatsink Assembly](#)” on page 11-15
- “[Removing a PCI Card](#)” on page 11-30

Set these components onto an antistatic mat.

**7. (Optional) Remove the NVRAM.**

If you wish to use the same ethernet address and system ID for the new motherboard, remove the NVRAM. Refer to “[Removing the NVRAM](#)” on page 11-27. Set the NVRAM on an antistatic mat.

**8. Remove the cables from the cable clips.**

See [FIGURE 11-44](#).

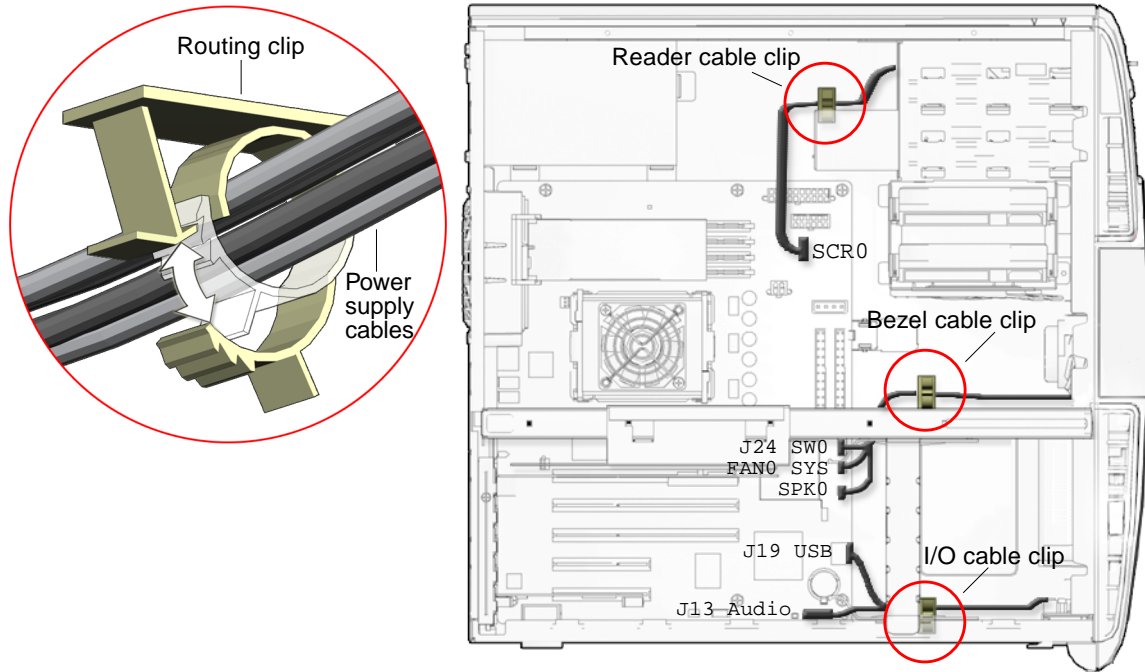


FIGURE 11-44 Removing Cables From the Clips

### 9. Disconnect the power and signal cables.

Disconnect the following power and signal cables from the corresponding motherboard connectors and set them out of the way of the motherboard. See [FIGURE 11-43](#).

- Power supply cables at connectors PS0, PS1, and PS2
- IDE power at connector IDE PWR
- Power button at connector J24 SW0
- Front fan at connector FAN0 SYS
- Rear fan at connector FAN1 SYS (if the rear fan was not removed)
- Front audio at connector J13 AUDIO
- Speaker at connector SPK0

### 10. Disconnect the interface cables.

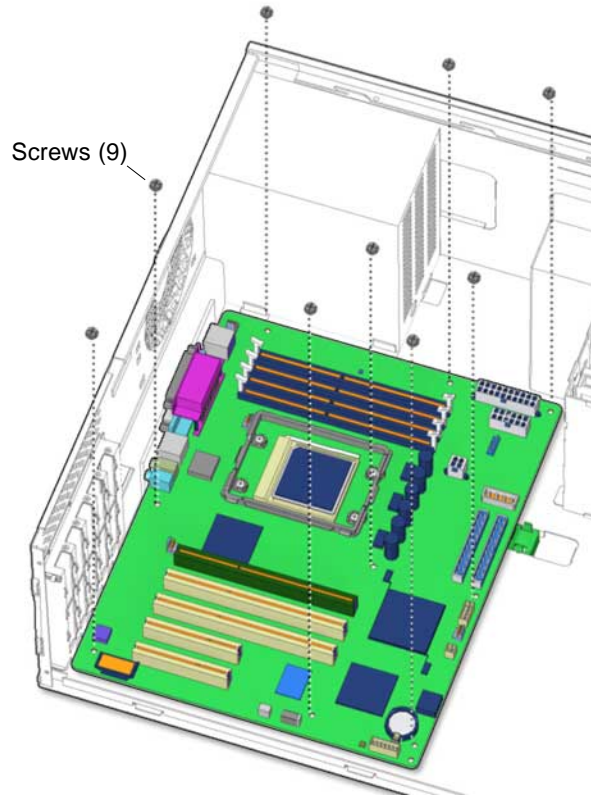
Disconnect the following interface cables from the corresponding motherboard connectors and set them out of the way of the motherboard. See [FIGURE 11-43](#).

- Smart card reader at connector SCR0
- Hard drive at connector IDE PRI
- DVD-ROM drive at connector IDE SEC
- Front USB at connector J19 USB



**11. Remove the motherboard fastening screws.**

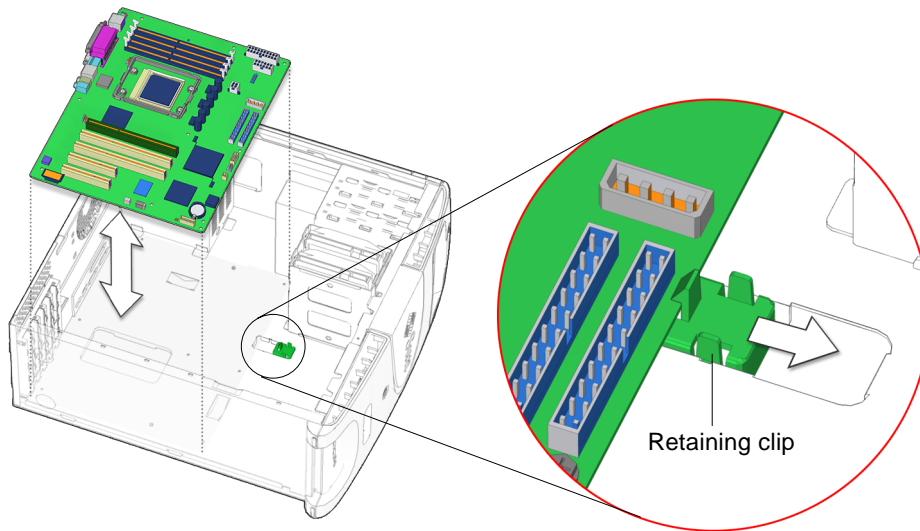
Use the Phillips screwdriver to remove the nine (9) screws which fasten the motherboard to the chassis. See [FIGURE 11-45](#). Set the screws aside in a container.



**FIGURE 11-45** Removing the Motherboard Fastening Screws

**12. Release the motherboard retaining clip.**

Squeeze the motherboard retaining clip and slide it forward. See [FIGURE 11-46](#).



**FIGURE 11-46** Releasing the Motherboard Retaining Clip

**13. Remove the motherboard from the chassis.**

Move the cables out of the way. Lift up on the edge of the motherboard nearest the front panel, pull the motherboard away from the back panel, and then up and out of the system. See [FIGURE 11-46](#). Set the motherboard down onto the antistatic mat.

Proceed to [“Installing the Motherboard”](#) on page 11-52 to install the new motherboard.

## 11.6.3 Installing the Motherboard

Install the following items after installing the motherboard:

- Motherboard fastening screws
- Interface cables
- Signal cables
- Power cables
- (Optional) NVRAM
- CPU fan and heatsink assembly
- DIMMs
- PCI cards
- (Optional) Rear fan
- (Optional) DIMM cooling duct
- Chassis cross brace
- PCI card support

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

Refer to:

- “Removing the Access Panel” on page 10-12
- “Positioning the Chassis” on page 10-16

**2. Locate where the motherboard is to be installed.**

See [FIGURE 11-42](#).

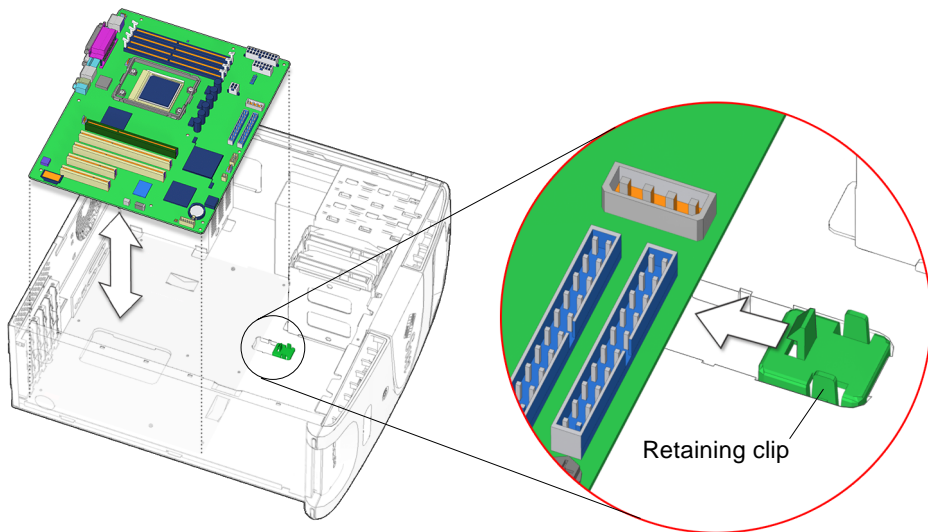
**3. Remove the new motherboard from its antistatic package and place it on an antistatic mat.**

**4. Remove the new CPU fan and heatsink assembly from its packaging and set it aside.**

**5. Move all cables out of the way.**

**6. Place the motherboard into the system chassis.**

Align the motherboard back panel connectors with the matching holes in the back panel. Place the motherboard into the chassis. Angle the motherboard down at the back so that the connectors enter the respective holes in the back panel, then tilt the front edge of the motherboard down so that it lays flat on the chassis. See [FIGURE 11-47](#).



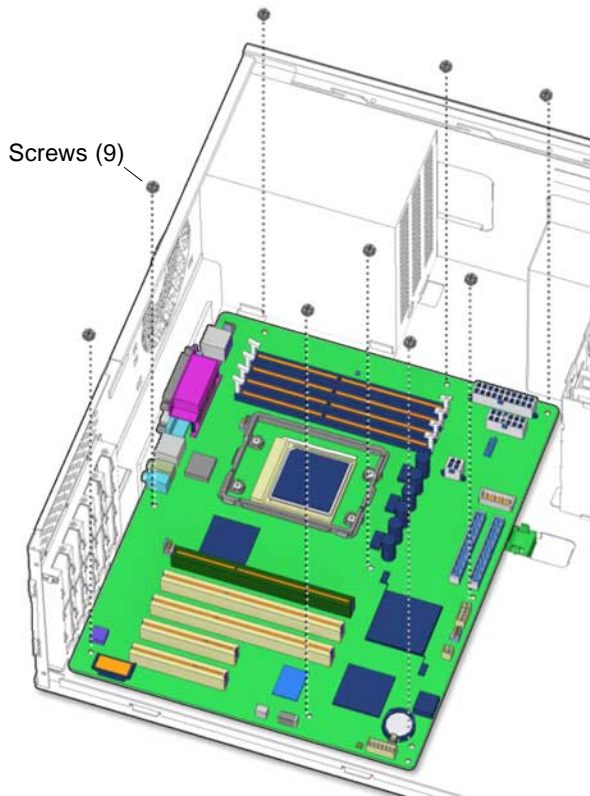
**FIGURE 11-47** Latching the Motherboard Retaining Clip

**7. Latch the motherboard into place.**

Squeeze both tabs of the motherboard retaining clip together and slide the clip toward the back of the system until it clicks in place and secures the front edge of the motherboard. See [FIGURE 11-47](#).

**8. Fasten the motherboard to the chassis.**

Press the motherboard toward the rear of the chassis to align the screwholes. Using a No. 2 Phillips screwdriver, fasten all nine (9) screws that secure the motherboard to the chassis. See [FIGURE 11-48](#).



**FIGURE 11-48** Installing the Motherboard Fastening Screws

**9. Connect the interface cables to the motherboard.**

Connect the interface cables to the corresponding motherboard connectors. See [FIGURE 11-49](#).

- Smart card reader at connector SCR0
- Hard drive at connector IDE PRI

- DVD-ROM drive at connector IDE SEC
- Front USB at connector J19 USB

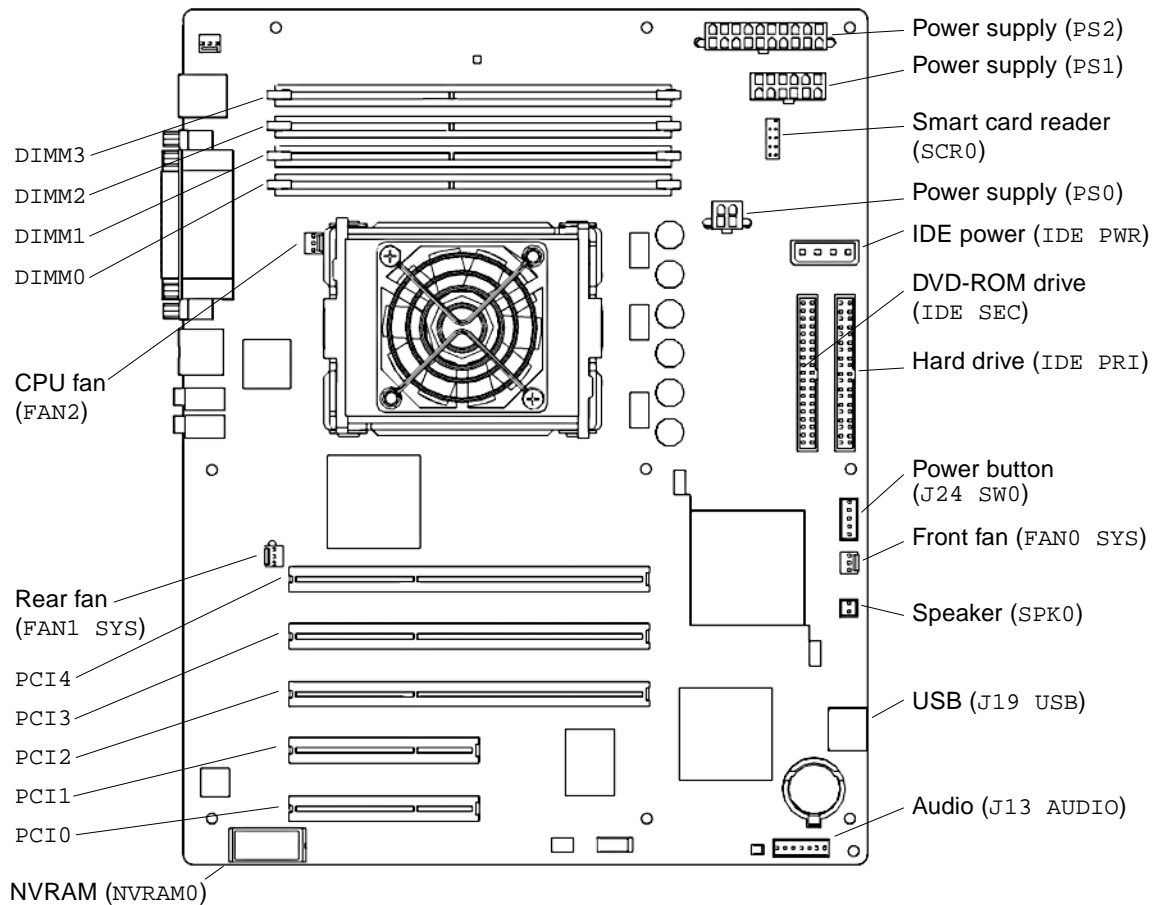


FIGURE 11-49 Motherboard Connectors

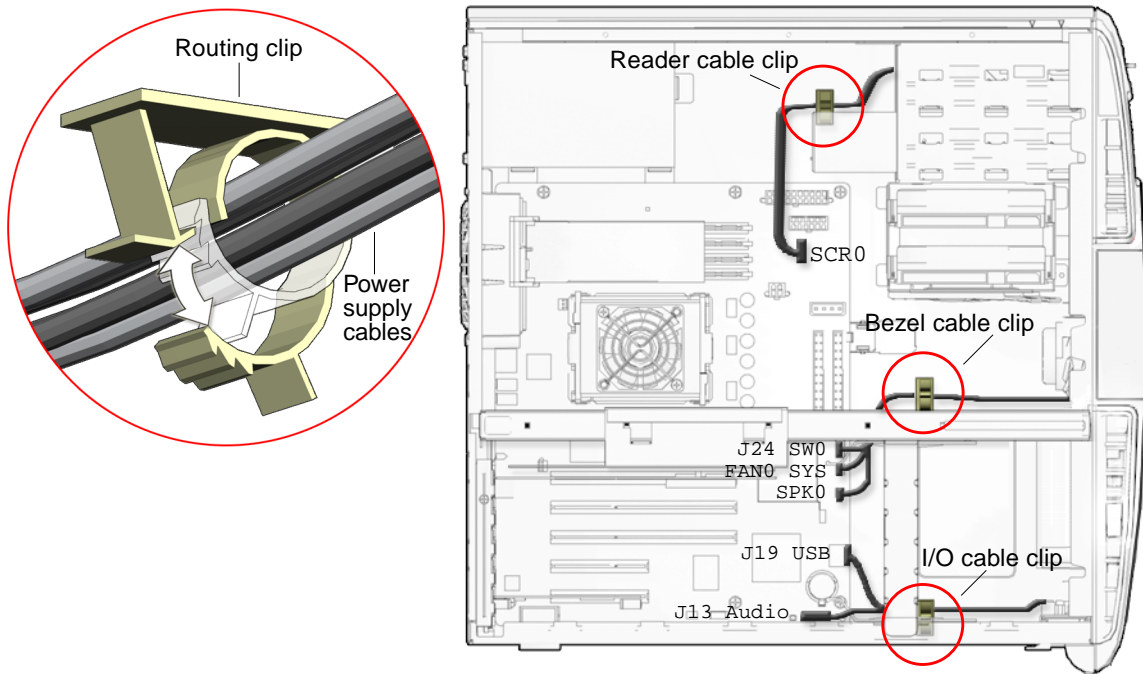
## 10. Connect the power and signal cables to the motherboard.

Connect the power and signal cables to the corresponding component connector:

- Power supply cables at connectors PS0, PS1, and PS2
- IDE power at connector IDE PWR
- Power button at connector J24 SW0
- Front fan at connector FAN0 SYS
- Rear fan at connector FAN1 SYS (if the rear fan was not removed)
- Front audio at connector J13 AUDIO
- Speaker at connector SPK0

**11. Secure the cables into the cable clips.**

See [FIGURE 11-50](#).



**FIGURE 11-50** Securing Cables Into the Clips

**12. If you removed the old NVRAM prior to removing the old motherboard, install the old NVRAM onto the new motherboard.**

Refer to [“Replacing the NVRAM”](#) on page 11-26.

**13. Install the PCI cards, the new CPU fan and heatsink assembly, and the DIMMs.**

Refer to:

- [“Installing a PCI Card”](#) on page 11-40
- [“Installing the CPU Fan and Heatsink Assembly”](#) on page 11-19
- [“Installing DIMMs”](#) on page 11-8

**14. Reposition the chassis.**

- Refer to [“Repositioning the Chassis”](#) on page 15-1.

**15. If you removed them previously, install the rear fan and DIMM cooling duct.**

Refer to:

- [“Installing the Rear Fan”](#) on page 13-18

- [“Installing the DIMM Cooling Duct” on page 13-27](#)

**16. Install the chassis cross brace and PCI card support.**

Refer to:

- [“Installing the Chassis Cross Brace” on page 13-54](#)
- [“Installing the PCI Card Support” on page 13-48](#)

**17. Inspect the motherboard and other component fasteners.**

- The DIMM ejectors are upright and tight.
- The rear fan bracket feet are well seated in the chassis.

**18. Inspect the motherboard cabling.**

- Smart card reader cable at connector SCRO
- Hard drive interface cable at connector IDE PRI
- DVD-ROM drive interface cable at connector IDE SEC
- Front USB cable at connector J19 USB
- Power supply cables at connectors PS0, PS1, and PS2
- IDE power cable at connector IDE PWR
- Power switch cable at connector J24 SW0
- Front fan cable at connector FAN0 SYS
- Rear fan cable at connector FAN1 SYS (if the rear fan was not removed)
- Front audio cable at connector J13 AUDIO
- Speaker cable at connector SPK0
- The cables are secure in the clips.

**19. Finishing up.**

Install the access panel, power on the system, and verify the motherboard installation. Refer to:

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





## Replacing Storage Devices

---

This chapter describes the remove and install procedures for the Sun Blade 1500 workstation storage devices.

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

This chapter contains the following topics:

- “Replacing a Hard Drive” on page 12-2
- “Replacing the DVD-ROM Drive” on page 12-9
- “Replacing the Smart Card Reader” on page 12-15



---

**Caution** – To prevent equipment damage, review the safety requirements, safety symbols, and safety precautions in “Preparing to Replace Components” on page 10-1 before you perform any replacement procedure. Additional cautions, warnings, and instructions are provided in the *Sun Blade 1500 Safety and Compliance Guide*, 816-7566. The document is available from:

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

---



---

**Caution** – The procedures in this chapter are performed with the workstation chassis in an upright position. Use care that you do not tip over the chassis.

---



---

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

---

## 12.1 Replacing a Hard Drive

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

- “Identifying the Hard Drive” on page 12-2
- “Removing a Hard Drive” on page 12-3
- “Installing the Hard Drive” on page 12-6



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

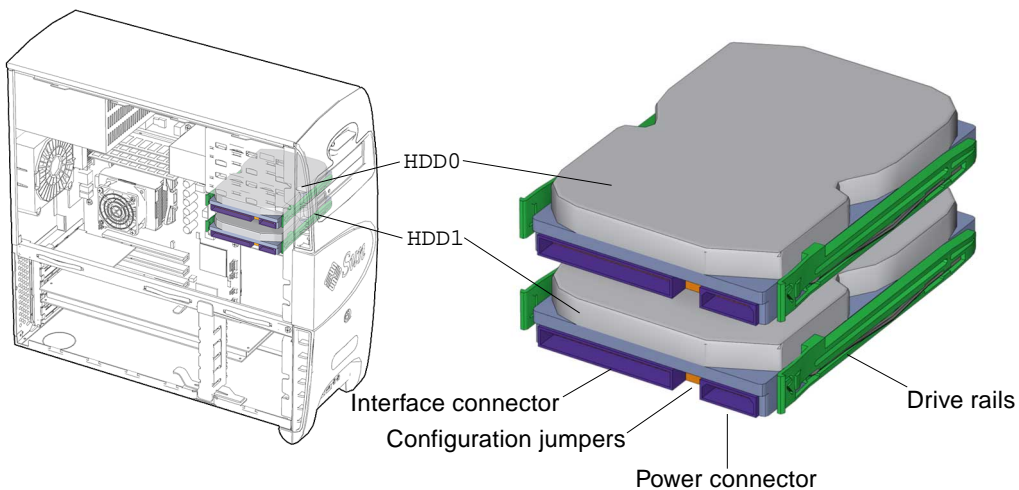
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**Note** – The hard drives of the Sun Blade 1500 workstation share the same IDE controller channel. Therefore, internal drive mirroring is not supported.

---

### 12.1.1 Identifying the Hard Drive

The workstation supports up to two hard drives. The hard drives are installed on drive rails that slide into the hard drive bay. The power and IDE connectors to the motherboard are directly accessible when the access panel is removed. The hard drives are labeled HDD0 and HDD1. HDD0, the hard drive closer to the top of the chassis, is the boot drive. See [FIGURE 12-1](#).



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

[TABLE 12-1](#) lists the hard drive specifications.

**TABLE 12-1** Hard Drive Specifications

Specification	Value
Capacity	80 GBytes
Speed	7200 RPM
Access Time	9.5 mseconds
Interface	ATA 100

## 12.1.2 Removing a Hard Drive

---

**Note** – The Sun Blade 1500 workstation can accommodate up to two hard drives. If you are not removing an existing drive, proceed to [“Installing the Hard Drive” on page 12-6](#).

---

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

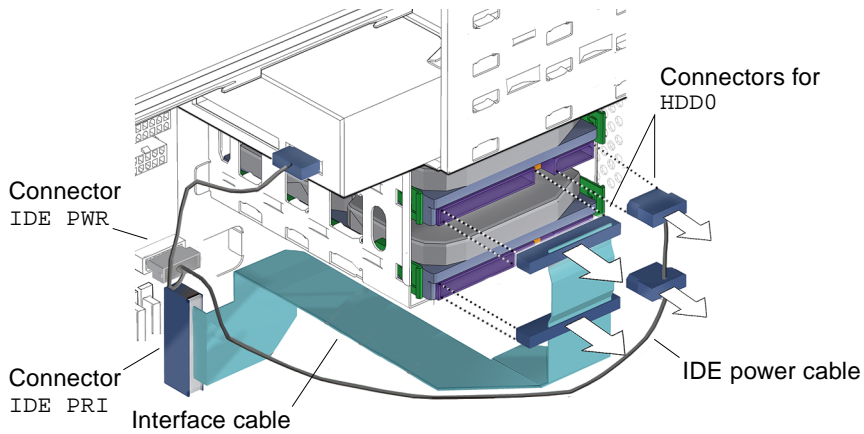
Refer to:

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

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

See [FIGURE 12-1](#).

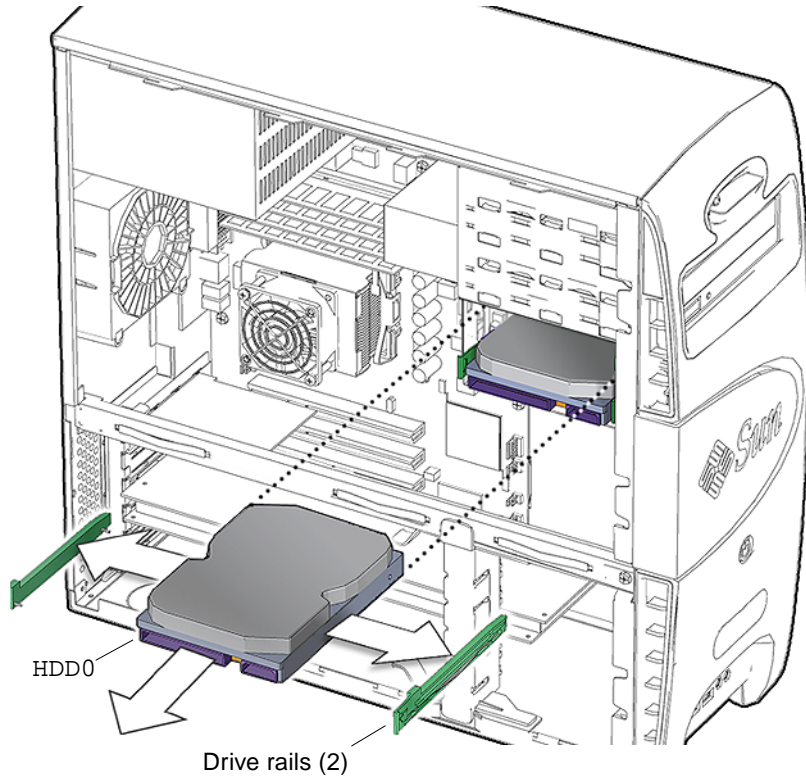
**3. Disconnect the power and interface cables from all installed hard drives. See [FIGURE 12-2](#).**



**FIGURE 12-2** Disconnecting the Hard Drive Cables

**4. Remove the hard drive from the hard drive bay.**

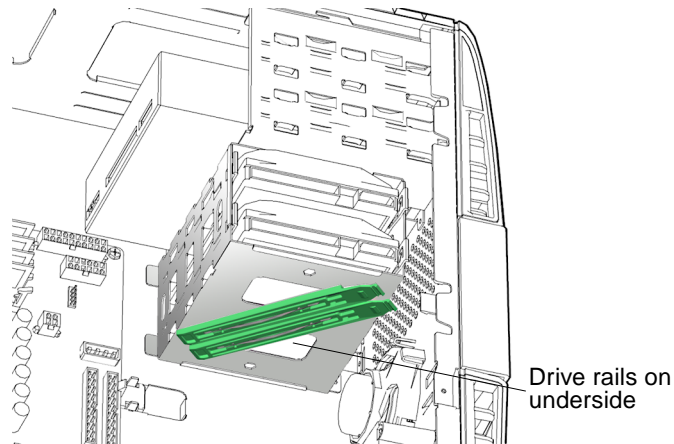
Squeeze the green tabs on both sides of the hard drive to be removed. Pull the hard drive out of the hard drive bracket. See [FIGURE 12-3](#). Set the hard drive aside on an antistatic mat.



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

**5. Remove the drive rails.**

Pull the green plastic drive rails off the sides of the hard drive. See [FIGURE 12-3](#). If you are not going to immediately replace the hard drive with a new one, store them on the underside of the hard drive bay. See [FIGURE 12-4](#).



**FIGURE 12-4** Storing the Drive Rails

- If you removed the hard drive to replace it, proceed to [“Installing the Hard Drive” on page 12-6](#) to install the new hard drive.
- If you removed the hard drive and will not replace it at this time, install the access panel and power on the system. Refer to:
  - [“Installing the Access Panel” on page 15-5](#)
  - [“Powering On the Workstation” on page 15-8](#)

## 12.1.3 Installing the Hard Drive



---

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

---

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

Refer to:

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

### 2. Locate the hard drive bay and hard drive slots.

See [FIGURE 12-1](#).

---

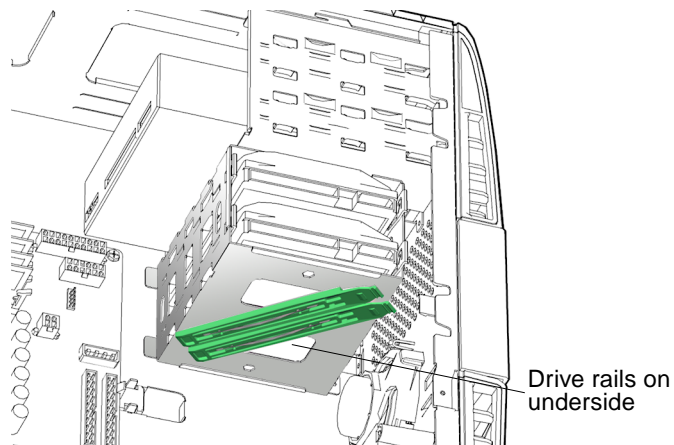
**Note** – If you are installing an additional hard drive, it might be installed in the remaining free slot in the hard drive bracket. The hard drive that you want to use to boot the system must be installed in slot HDD0, the slot closest to the top of the chassis.

---

**3. Remove the new hard drive from its packaging.**

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

The drive rails are stored on the underside of the hard drive bay. Remove them from their storage location. See [FIGURE 12-5](#).



**FIGURE 12-5** Removing the Drive Rails From Storage

**5. Install the drive rails.**

Snap both drive rails into the holes on both sides of the hard drive, with the lettering on the drive rails (HDD-L and HDD-R) upright, and the drive rail tabs toward the hard drive power and interface connectors. See [FIGURE 12-6](#).

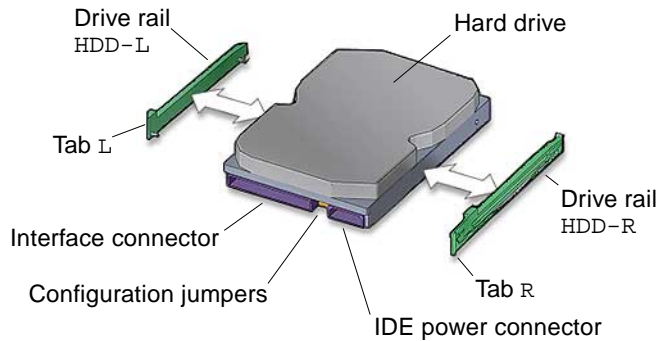


FIGURE 12-6 Installing the Drive Rails

**6. Verify that the hard drive configuration jumpers are set to Cable Select or CS.**

Refer to the hard drive documentation for configuration instructions.

**7. Install the hard drive.**

See [FIGURE 12-3](#). Place the boot drive into the upper drive bay HDD0. Slide the hard drive into the hard drive bay until the drive rail tabs click.

**8. Connect the hard drive interface cables to the installed hard drives.**

Connect the boot drive to the connector labeled HDD0 at the end of the interface cable. If a second drive is installed, attach the connector labeled HDD1 to it. See [FIGURE 12-7](#).

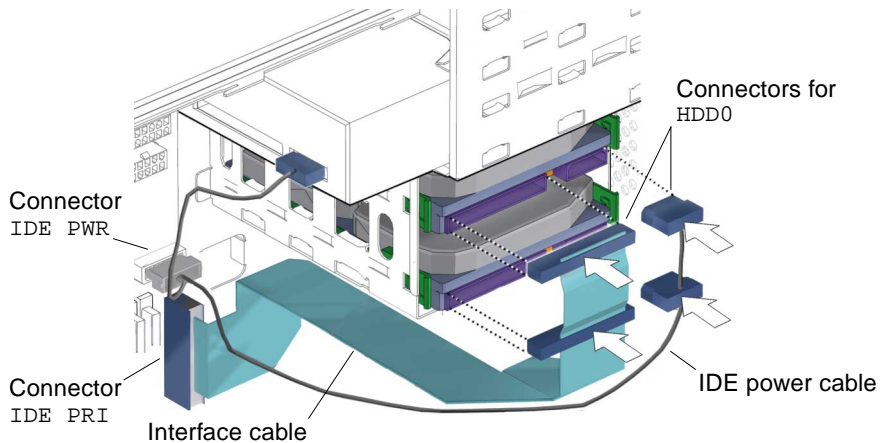


FIGURE 12-7 Installing the Hard Drive Cables



**9. Connect the hard drive power cables to the installed hard drives.**

See [FIGURE 12-7](#).

**10. Inspect the hard drive fasteners.**

- The hard drive rails are well seated on the hard drive.
- The hard drive is tight in the hard drive bay.

**11. Inspect the hard drive cabling.**

- The hard drive power cable is firmly connected to the motherboard at IDE PWR.
- The hard drive power cable is firmly connected to (both) hard drive(s).
- The hard drive interface cable is firmly connected to the motherboard at IDE PRI.
- The hard drive interface cable is firmly connected to (both) hard drive(s).

**12. Finishing up.**

Install the access panel, power on the system, and verify the hard drive installation. Refer to:

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

---

**Note** – If you installed an additional hard drive, remember to either boot or reboot the system with the `-r` option, so that the Solaris operating environment can reconfigure itself for the new hard drive.

---

---

## 12.2 Replacing the DVD-ROM Drive

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

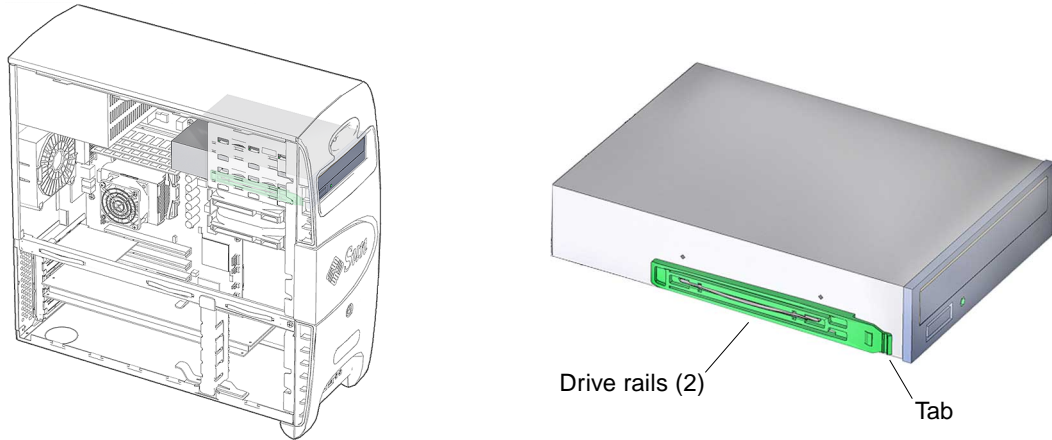
- [“Identifying the DVD-ROM Drive” on page 12-10](#)
- [“Removing the DVD-ROM Drive” on page 12-10](#)
- [“Installing the DVD-ROM Drive” on page 12-13](#)



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

## 12.2.1 Identifying the DVD-ROM Drive

The workstation supports a single DVD-ROM drive. The DVD-ROM drive is installed on drive rails that slide into the removable media bay. The power and interface connectors are accessible when the access panel is removed. The DVD-ROM drive bay is accessible when the bezel is removed. See [FIGURE 12-8](#).



**FIGURE 12-8** DVD-ROM Drive Location and Identification

[TABLE 12-2](#) lists the DVD-ROM drive specifications.

**TABLE 12-2** DVD-ROM Drive Specifications

Specification	Value
Speed	16x
Buffer	2 MBytes
Interface	ATA

## 12.2.2 Removing the DVD-ROM Drive

---

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

---

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

Refer to:

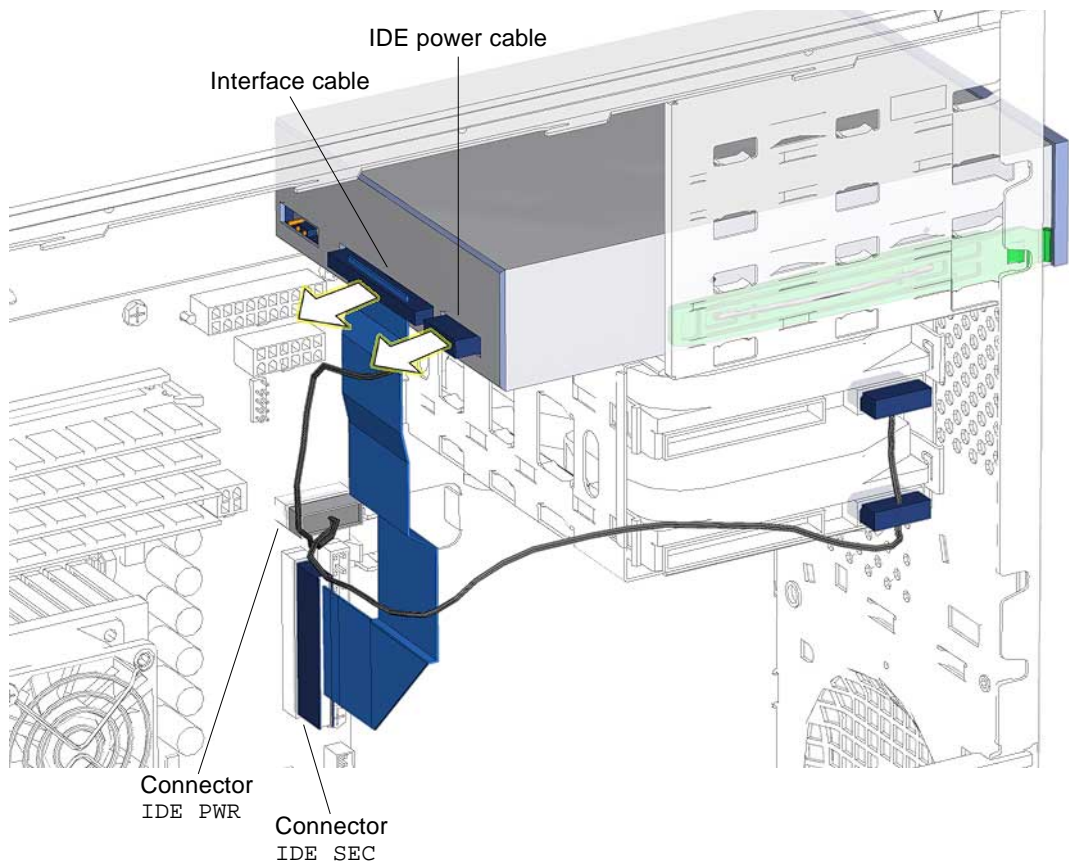
- “Powering Off the Workstation” on page 10-4
- “Removing the Access Panel” on page 10-12
- “Removing the Bezel” on page 10-14

**2. Locate the DVD-ROM drive.**

See [FIGURE 12-8](#).

**3. Disconnect the interface cable.**

The cable is located at the back of the DVD-ROM drive. See [FIGURE 12-9](#). Set the cables out of the way.



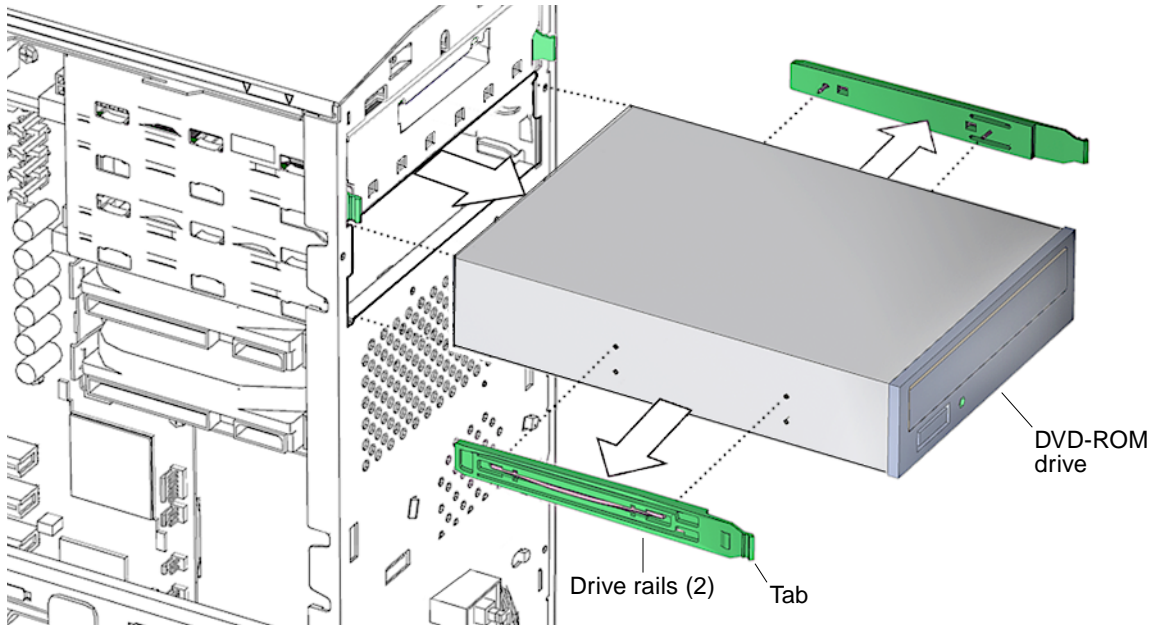
**FIGURE 12-9** Disconnecting Cables From the DVD-ROM Drive

**4. Disconnect the power cable.**

The cable is located at the back of the DVD-ROM drive. See [FIGURE 12-9](#). Set the cable out of the way.

### 5. Remove the DVD-ROM drive.

Facing the front of the chassis squeeze together the two green plastic tabs on the front sides of the DVD-ROM drive and pull the DVD-ROM drive straight out of the removable media bay. See [FIGURE 12-10](#). Set the DVD-ROM drive down on an antistatic mat.



**FIGURE 12-10** Removing the DVD-ROM Drive

### 6. Remove the drive rails.

Pull the green plastic drive rails off the sides of the DVD-ROM drive. See [FIGURE 12-10](#). Set them aside.

- If you removed the DVD-ROM drive to replace it, install the new DVD-ROM drive. Proceed to [“Installing the Hard Drive” on page 12-6](#).
- If you are not replacing the DVD-ROM drive you removed, install the bezel, the access panel, and power on the system. Refer to:
  - [“Installing the Bezel” on page 15-2](#)
  - [“Installing the Access Panel” on page 15-5](#)
  - [“Powering On the Workstation” on page 15-8](#)

## 12.2.3 Installing the DVD-ROM Drive

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

Refer to:

- “Powering Off the Workstation” on page 10-4
- “Removing the Access Panel” on page 10-12
- “Removing the Bezel” on page 10-14

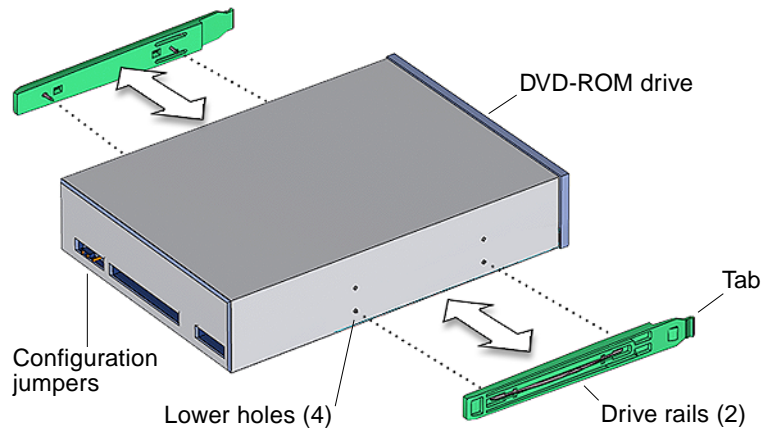
### 2. Locate the DVD-ROM drive bay.

The DVD-ROM drive installs into the removable media bay.

### 3. Remove the new DVD-ROM from its packaging.

### 4. Snap the drive rails onto the DVD-ROM drive.

Snap the drive rails, removed from the old DVD-ROM drive, into the lower pair of holes on both sides of the DVD-ROM drive. The flat end of the rails are toward the DVD-ROM drive power and interface connectors. The drive rail tabs are toward the front of the DVD-ROM drive media slot. See [FIGURE 12-11](#).



**FIGURE 12-11** Installing the Drive Rails

### 5. Verify that the DVD-ROM drive configuration jumpers are set to Master or MA.

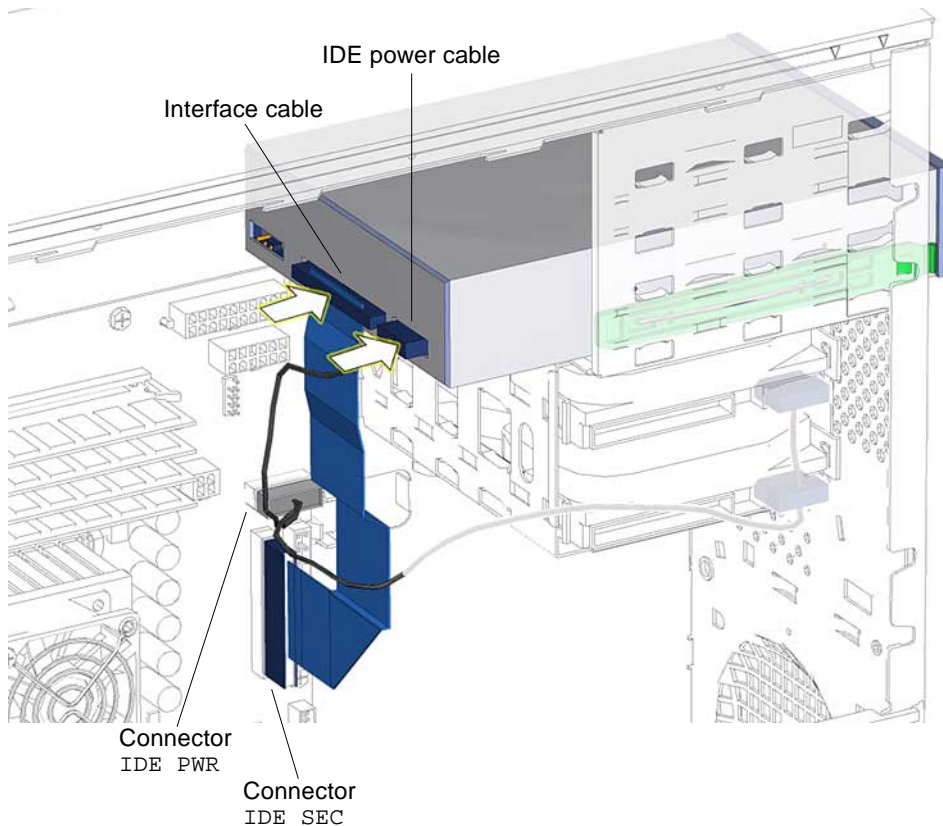
Refer to the DVD-ROM drive documentation for configuration instructions.

### 6. Slide the DVD-ROM drive into the removable media bay.

Slide the DVD-ROM drive into the removable media bay, located below the smart card reader, until the drive rails click. See [FIGURE 12-10](#).

**7. Connect the DVD-ROM drive power cable.**

See [FIGURE 12-12](#).



**FIGURE 12-12** Connecting Cables to the DVD-ROM Drive

**8. Connect the DVD-ROM drive interface cable.**

See [FIGURE 12-12](#).

**9. Inspect the DVD-ROM drive fasteners.**

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

**10. Inspect the DVD-ROM drive cabling.**

- The DVD-ROM drive power cable is firmly connected to the motherboard at IDE PWR.
- The DVD-ROM drive power cable is firmly connected to the DVD-ROM drive.

- The DVD-ROM drive interface cable is firmly connected to the motherboard at IDE SEC.
- The DVD-ROM drive interface cable is firmly connected to DVD-ROM drive.

## 11. Finishing up.

Install the bezel, the access panel, power on the system, and verify the DVD-ROM drive installation. Refer to:

- [“Installing the Bezel” on page 15-2](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

**Note** – If you installed a CD-RW drive, remember to either boot or reboot the system with the `-r` option, so that the Solaris operating environment can reconfigure itself for the new CD-RW drive.

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**Note** – If so equipped, do not remove the plastic rivet from the headphone jack of the DVD-ROM or CD-RW drive. Instead, use the headphone jack at the bottom of the front panel.

---

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## 12.3 Replacing the Smart Card Reader

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

- [“Identifying the Smart Card Reader” on page 12-15](#)
- [“Removing the Smart Card Reader” on page 12-16](#)
- [“Installing the Smart Card Reader” on page 12-20](#)



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

### 12.3.1 Identifying the Smart Card Reader

The workstation supports one smart card reader. The smart card reader is installed on the smart card reader bracket. The bracket has drive rails that enable it to slide into the removable media bay. See [FIGURE 12-13](#). The removable media bay is accessible when the front bezel is removed. The smart card reader connector is accessible when the access panel is removed.

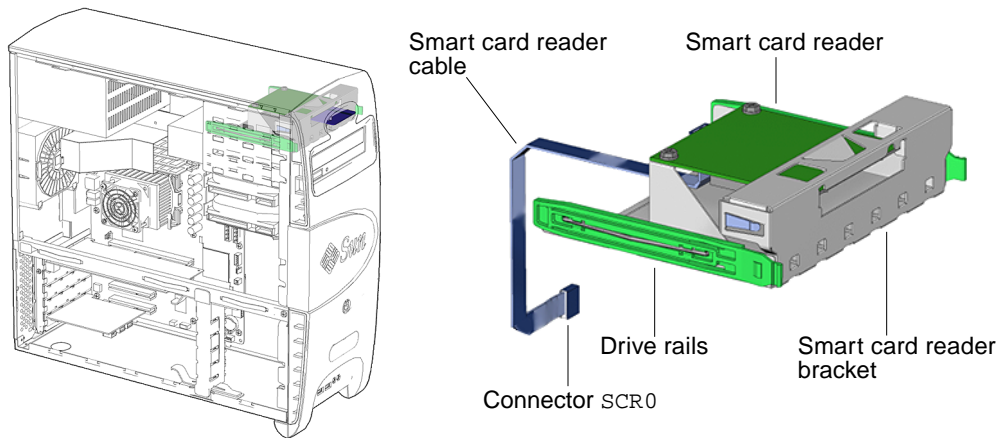


FIGURE 12-13 Smart Card Reader Location and Identification

## 12.3.2 Removing the Smart Card Reader

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

Refer to:

- “Powering Off the Workstation” on page 10-4
- “Removing the Access Panel” on page 10-12
- “Removing the Bezel” on page 10-14

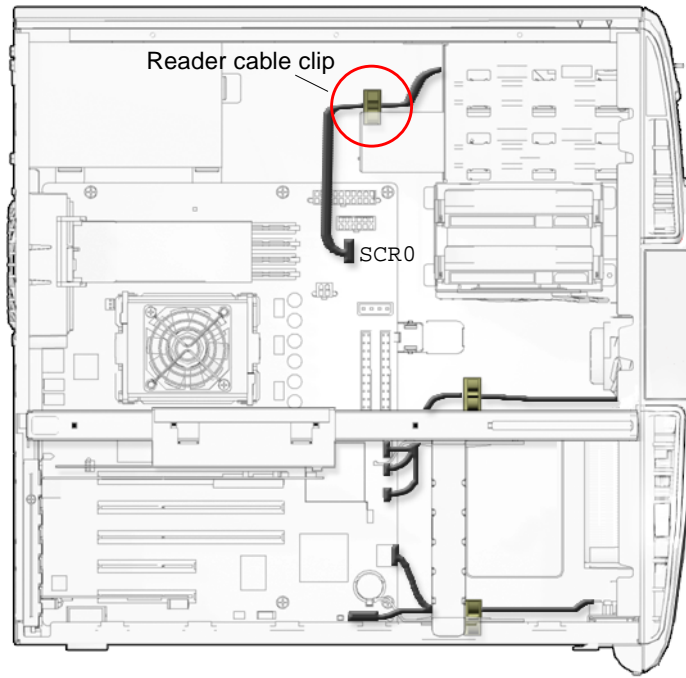
### 2. Locate the smart card reader.

The smart card is installed on a smart card reader bracket that fits into the top slot of the removable media bay. See [FIGURE 12-13](#).

### 3. Remove the smart card reader interface cable from the reader cable clip.

Open the reader cable clip at the top of the chassis and remove the smart card reader interface cable from the clip. See [FIGURE 12-14](#).

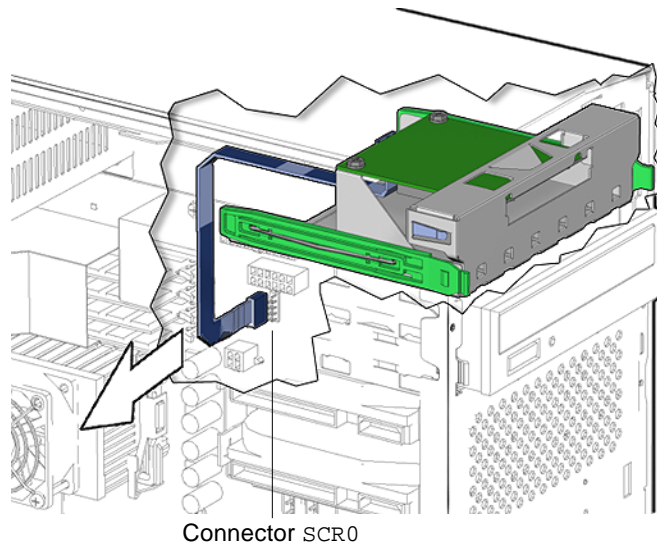




**FIGURE 12-14** Removing the Smart Card Reader Interface Cable From the Reader Cable Clip

**4. Disconnect the interface cable from the motherboard.**

The cable is connected on the motherboard at SCR0. See [FIGURE 12-15](#).



**FIGURE 12-15** Disconnecting the Smart Card Reader Interface Cable

---

**Note** – Do not remove the cable from the rear of the smart card reader.

---

**5. Remove the smart card reader bracket.**

Squeeze together the two green plastic tabs of the drive rails and pull the smart card reader bracket, with its cable attached, straight out of the removable media bay. See [FIGURE 12-16](#). Set the smart card reader bracket down on an antistatic mat.

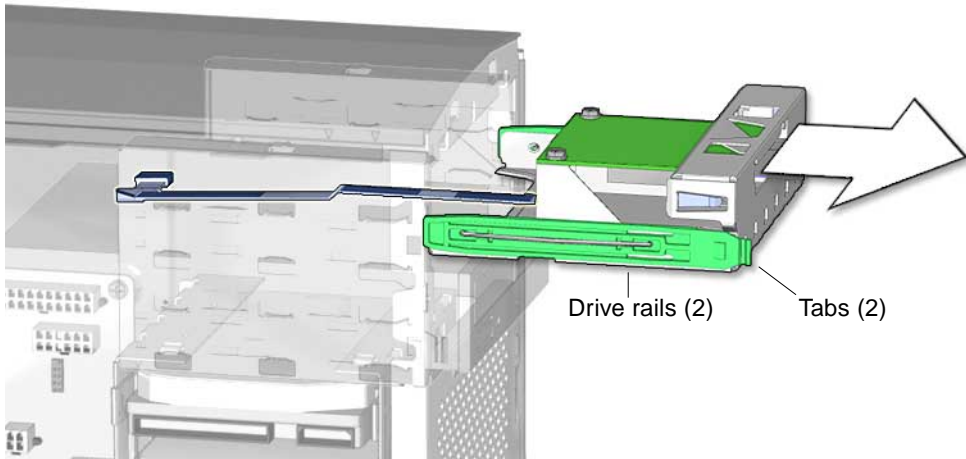


FIGURE 12-16 Removing the Smart Card Reader

**6. If you removed the smart card reader bracket to replace the interface cable, return to Step 3 of “Removing the Smart Card Reader Cable” on page 14-4.**

**7. Remove the interface cable from the smart card reader.**

Disconnect the interface cable from the smart card reader. See FIGURE 12-17. Set the cable aside.

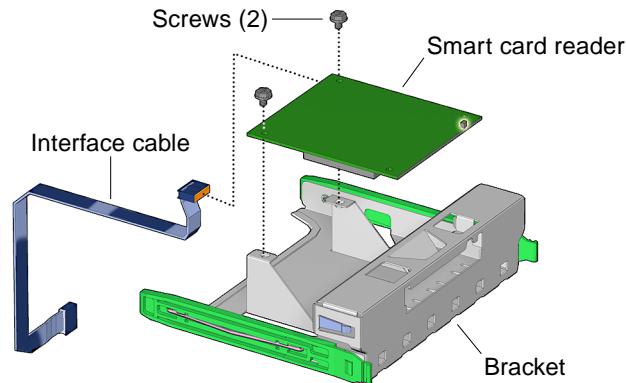


FIGURE 12-17 Removing Smart Card Reader Interface Cable

**8. Remove the smart card reader bracket screws.**

Using a No. 2 Phillips screwdriver, remove the two screws that secure the smart card reader to its bracket. See FIGURE 12-17. Set the screws aside in a container.

### 9. Remove the smart card reader from its bracket.

Tilt and lift the smart card reader from the bracket. See [FIGURE 12-17](#). Set the smart card reader aside.

- If you removed the smart card reader to replace it, install the new smart card reader. Proceed to [“Installing the Smart Card Reader”](#) on page 12-20.
- If you are not replacing the smart card reader, install the bezel, the access panel, and power on the system. Refer to:
  - [“Installing the Bezel”](#) on page 15-2
  - [“Installing the Access Panel”](#) on page 15-5
  - [“Powering On the Workstation”](#) on page 15-8

## 12.3.3 Installing the Smart Card Reader

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

Refer to:

- [“Powering Off the Workstation”](#) on page 10-4
- [“Removing the Access Panel”](#) on page 10-12
- [“Removing the Bezel”](#) on page 10-14

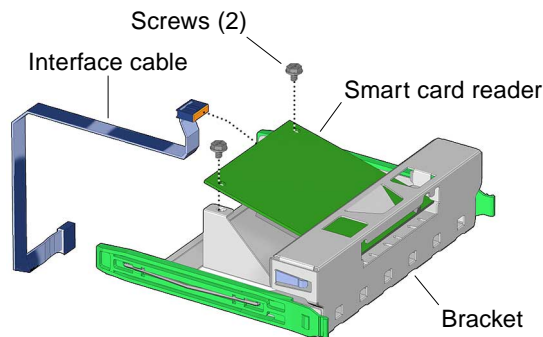
### 2. Locate the smart card reader bracket.

The smart card reader installs into the smart card reader bracket. See [FIGURE 12-13](#).

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

### 4. Insert the smart card reader into the smart card reader bracket.

Tilt the reader, component side down, into the bracket rails and slide in until it stops. See [FIGURE 12-18](#).



**FIGURE 12-18** Installing Smart Card Reader Into Bracket

**5. Fasten the smart card reader to the smart card reader bracket.**

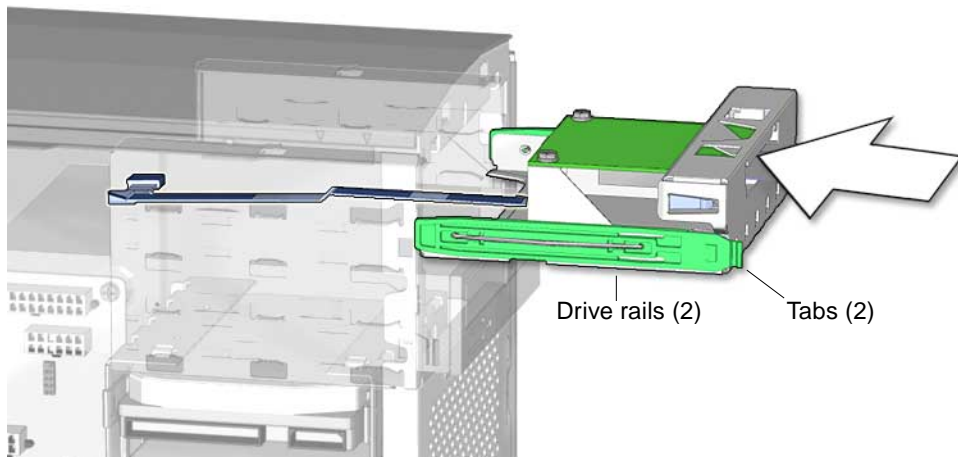
Using a No. 2 Phillips screwdriver, install both screws that secure the smart card reader to its bracket. See [FIGURE 12-18](#).

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

See [FIGURE 12-18](#).

**7. Feed the interface cable into and through the removable media bay.**

See [FIGURE 12-19](#).



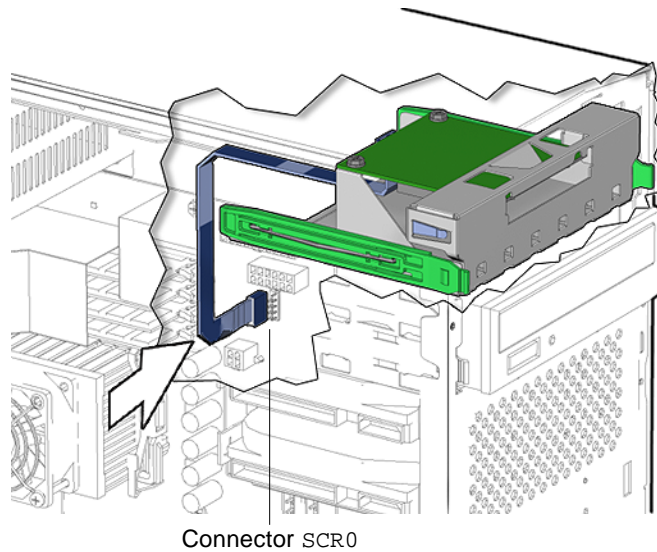
**FIGURE 12-19** Feeding Smart Card Cable Through Chassis

**8. Install the smart card reader bracket into the bay.**

Slide the smart card reader bracket into the removable media bay until the drive rails click. See [FIGURE 12-19](#).

**9. Reconnect the interface cable.**

Connect the smart card reader interface cable to the motherboard at connector SCR0. See [FIGURE 12-20](#).



**FIGURE 12-20** Connecting the Smart Card Reader Interface Cable

**10. Secure the smart card reader interface cable to the reader cable clip.**

Guide the smart card reader interface cable into the reader cable clip at the top of the chassis and close the clip. See [FIGURE 12-21](#).

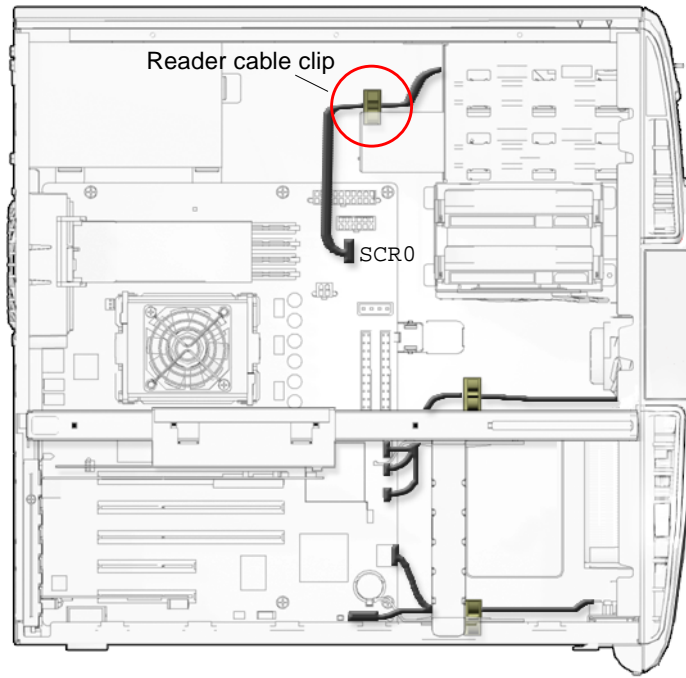


FIGURE 12-21 Securing the Smart Card Reader Interface Cable into the Reader Cable Clip

**11. Inspect the smart card reader bracket fasteners.**

- The drive rails are well seated on the smart card reader bracket.
- The bracket is tight in the removable media bay.

**12. If you installed the smart card reader bracket after replacing the interface cable, return to [Step 6 of “Installing the Smart Card Reader Cable” on page 14-5.](#)**

**13. Inspect the smart card reader cabling.**

- The smart card reader interface cable is firmly connected to the motherboard at SCR0.
- The interface cable is firmly connected to smart card reader.
- The interface cable is secure in the reader cable clip

**14. Finishing up.**

Install the bezel, the access panel, power on the system, and verify the smart card reader installation. Refer to:

- [“Installing the Bezel” on page 15-2](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)

- [“Verifying an Installation” on page 15-11](#)



## Replacing Chassis Components

---

This chapter describes the remove and install procedures for the Sun Blade 1500 workstation chassis components.

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

This chapter contains the following topics:

- “Replacing the Power Supply” on page 13-2
- “Replacing the Front Fan” on page 13-8
- “Replacing the Rear Fan” on page 13-15
- “Replacing the DIMM Cooling Duct” on page 13-22
- “Replacing the Audio USB Board” on page 13-31
- “Replacing the Speaker” on page 13-40
- “Replacing the PCI Card Support” on page 13-46
- “Replacing the Chassis Cross Brace” on page 13-50
- “Replacing the Drive Rails” on page 13-60



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**Caution** – To prevent equipment damage, review the safety requirements, safety symbols, and safety precautions in “Preparing to Replace Components” on page 10-1 before you perform any replacement procedure. Additional cautions, warnings, and instructions are provided in the *Sun Blade 1500 Safety and Compliance Guide*, 816-7566. The document is available from:

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

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

---



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

---

## 13.1 Replacing the Power Supply

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

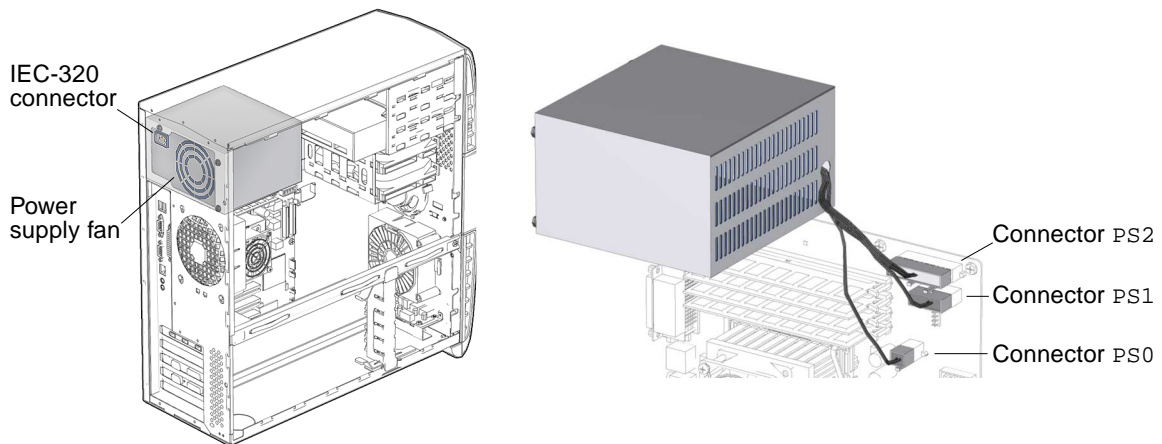
- [“Identifying the Power Supply” on page 13-2](#)
- [“Removing the Power Supply” on page 13-3](#)
- [“Installing the Power Supply” on page 13-5](#)



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

### 13.1.1 Identifying the Power Supply

The power supply is required for workstation operation. Power supply cables are directly connected to the motherboard. The power supply provides an IEC-320 power cord connector at the back of the chassis. See [FIGURE 13-1](#).



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

[TABLE 13-1](#) lists the power supply specifications.

**TABLE 13-1** Power Supply Specifications

Specification	Value
Input Voltage	100 - 240 VAC
Frequency	50 - 60 Hz
Current	8 amp, 4 amp
Wattage	360 W or 420 W maximum

## 13.1.2 Removing the Power Supply

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

Refer to:

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

### 2. Locate the power supply.

The power supply is fastened to the back panel of the workstation chassis. See [FIGURE 13-1](#).

### 3. Open the power supply cable routing clips.

Release the cables out of their routing clips. See [FIGURE 13-2](#).

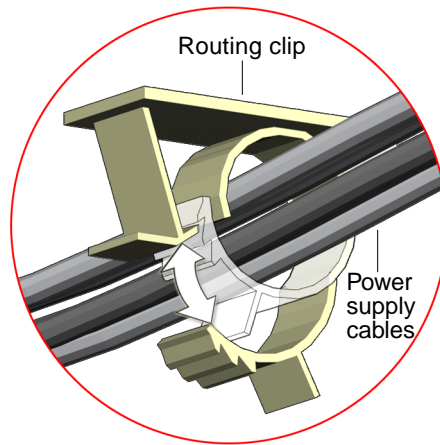


FIGURE 13-2 Releasing Cable From Routing Clip

**4. Disconnect power supply cables from motherboard.**

Disconnect the three power supply cables from the motherboard power connectors. See [FIGURE 13-3](#).

The power supply connectors have clips that fasten to the motherboard connectors, PS0, PS1, and PS2. Squeeze the power supply connector clip and pull the connector from the motherboard to disengage it. Lift the power supply cable up and away from the motherboard.

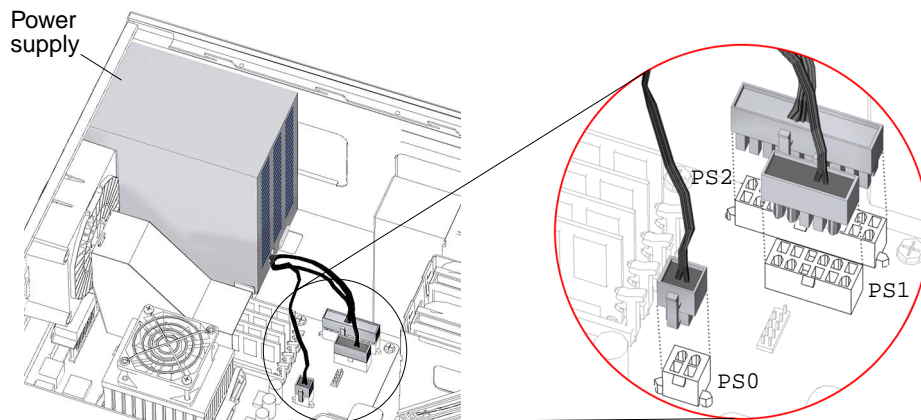


FIGURE 13-3 Power Supply Motherboard Connections

### 5. Remove the power supply chassis screws.

Using a No. 2 Phillips screwdriver, remove the three screws that secure the power supply to the back panel of the chassis. See [FIGURE 13-4](#). Set the screws aside in a container.

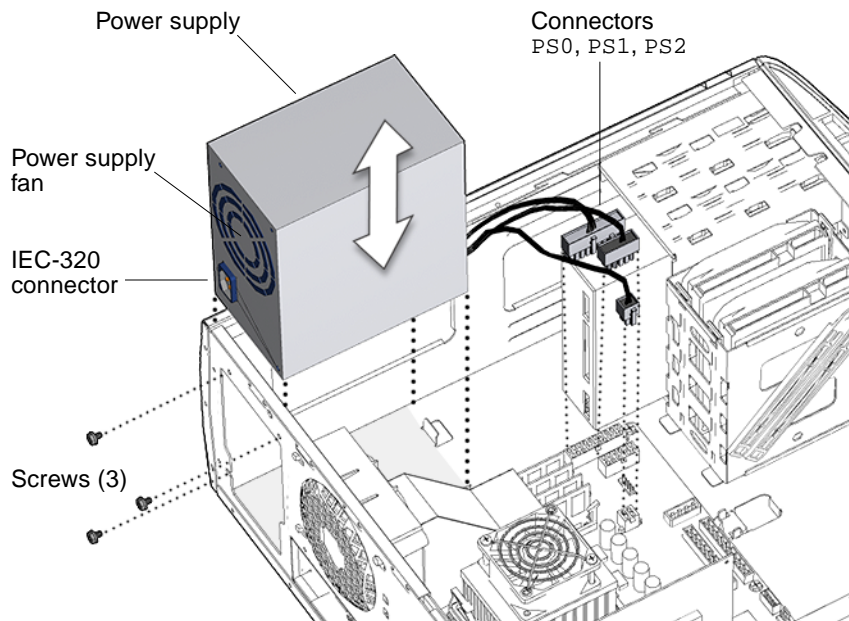


FIGURE 13-4 Removing Power Supply.

### 6. Remove the power supply from the chassis.

Rotate the back of the power supply slightly outward, then lift the power supply up and out of the chassis. See [FIGURE 13-4](#). Set the power supply aside on an antistatic mat.

Proceed to [“Installing the Power Supply” on page 13-5](#).

---

**Note** – The workstation cannot operate without the power supply.

---

## 13.1.3 Installing the Power Supply

### 1. Open and position the chassis.

Refer to:

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

- [“Positioning the Chassis” on page 10-16](#)

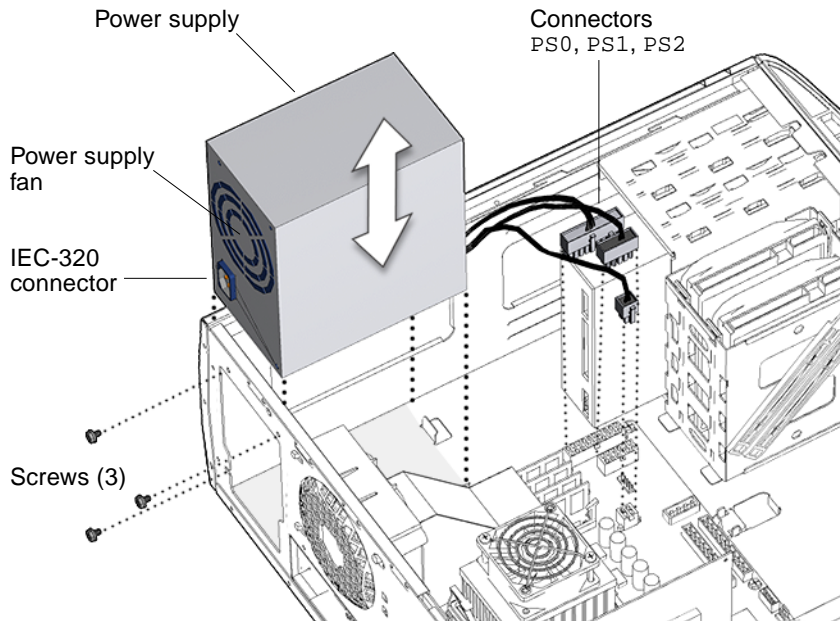
**2. Remove the new power supply from its package.**

**3. Locate where the power supply is to be installed.**

See [FIGURE 13-1](#).

**4. Place the power supply inside the chassis.**

Align the power supply IEC-320 connector (power cord socket) and fan with the chassis back panel opening. Position the power supply with the chassis power supply brackets. Rotate the power supply down and into the chassis. See [FIGURE 13-5](#).



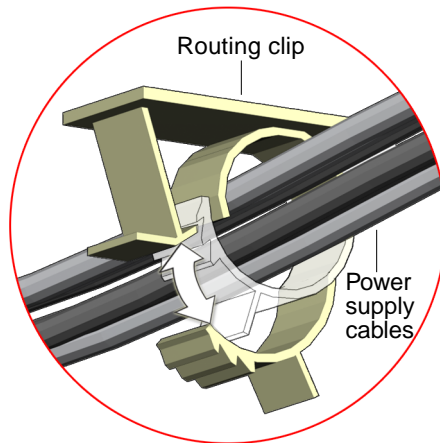
**FIGURE 13-5** Installing the Power Supply

**5. Fasten the power supply to the chassis.**

Using a No. 2 Phillips screwdriver, fasten the three screws that secure the power supply to the chassis. See [FIGURE 13-5](#)

**6. Secure the power supply cables.**

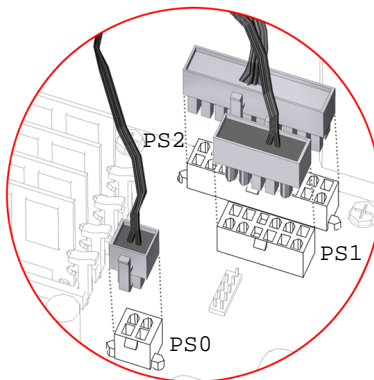
Feed the cables through the cable routing clips. Close the cable routing clips. See [FIGURE 13-6](#).



**FIGURE 13-6** Securing Cables Into Routing Clips

- 7. Connect the three power supply cables to the motherboard power connectors PS0, PS1, and PS2.**

See [FIGURE 13-7](#).



**FIGURE 13-7** Attaching Power Supply Connectors

- 8. Inspect the power supply fasteners.**
  - The power supply screws are in place and tight.
  - The power supply is well seated in the chassis guides.
- 9. Inspect the power supply cabling.**

- The three power supply cables are firmly connected to the motherboard at PS0, PS1, and PS2.
- The power supply cables are routed through and secure in the chassis routing clips.

## 10. Finishing up.

Reposition the chassis, install the access panel, power on the system, and verify the power supply installation. Refer to:

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

---

# 13.2 Replacing the Front Fan

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

- [“Identifying the Front Fan” on page 13-8](#)
- [“Removing the Front Fan” on page 13-9](#)
- [“Installing the Front Fan” on page 13-11](#)

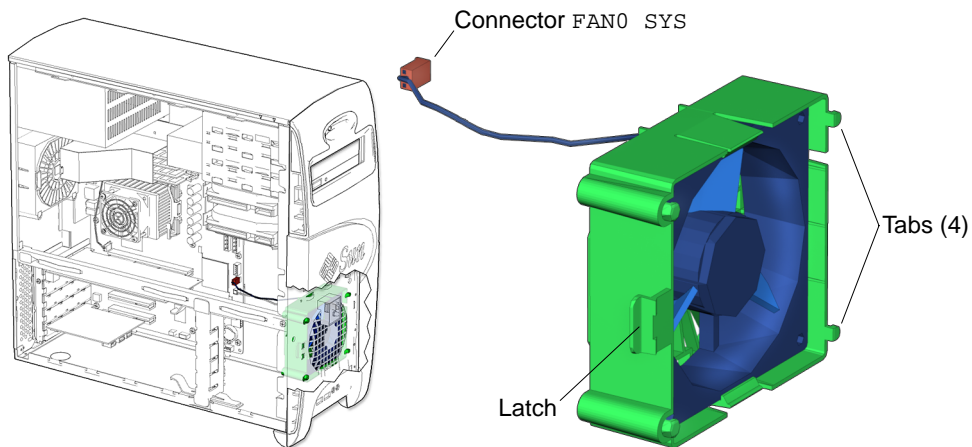


Click this film icon to view an animated version of these instructions.

## 13.2.1 Identifying the Front Fan

The front and rear fans on the Sun Blade 1500 workstation are contained in green brackets. Both fans must be operating to adequately cool the components in a closed chassis. Both fans are connected to the motherboard with a cable that carries power and signal. [FIGURE 13-8](#) shows the location of and identifies the front fan.





**FIGURE 13-8** Front Fan Location and Identification

---

**Note** – Though similar in appearance, the front and rear fan brackets are *not* interchangeable.

---

TABLE 13-2 lists the front fan specifications.

**TABLE 13-2** Front Fan Specifications

Specification	Value (Maximum)
Voltage	12 VDC
Current	0.490 AMPS
Speed	3600 RPM
Flow Rate	66 CFM (1.86 m <sup>3</sup> /min)

## 13.2.2 Removing the Front Fan

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

Refer to:

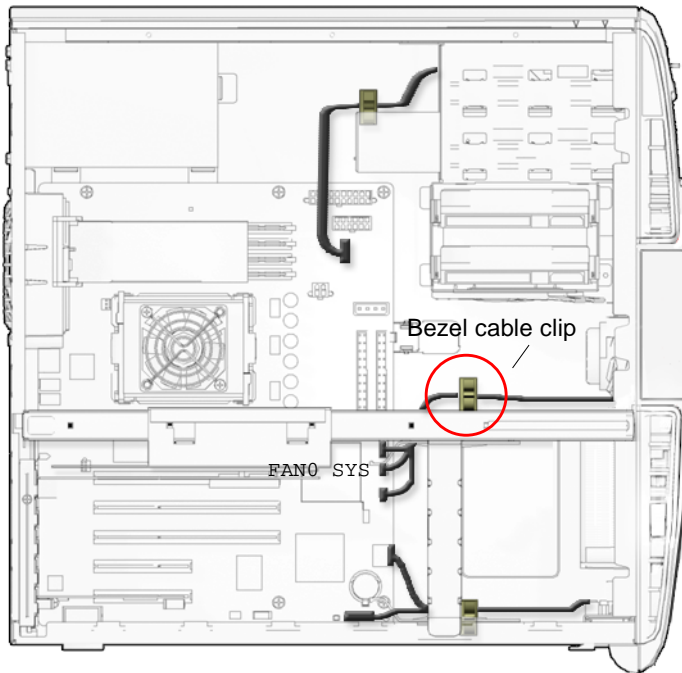
- “Powering Off the Workstation” on page 10-4
- “Removing the Access Panel” on page 10-12

**2. Locate the front fan.**

The front fan is housed in a green plastic rear fan bracket that connects to the workstation chassis. See [FIGURE 13-8](#).

**3. Remove the front fan cable from the bezel cable clip.**

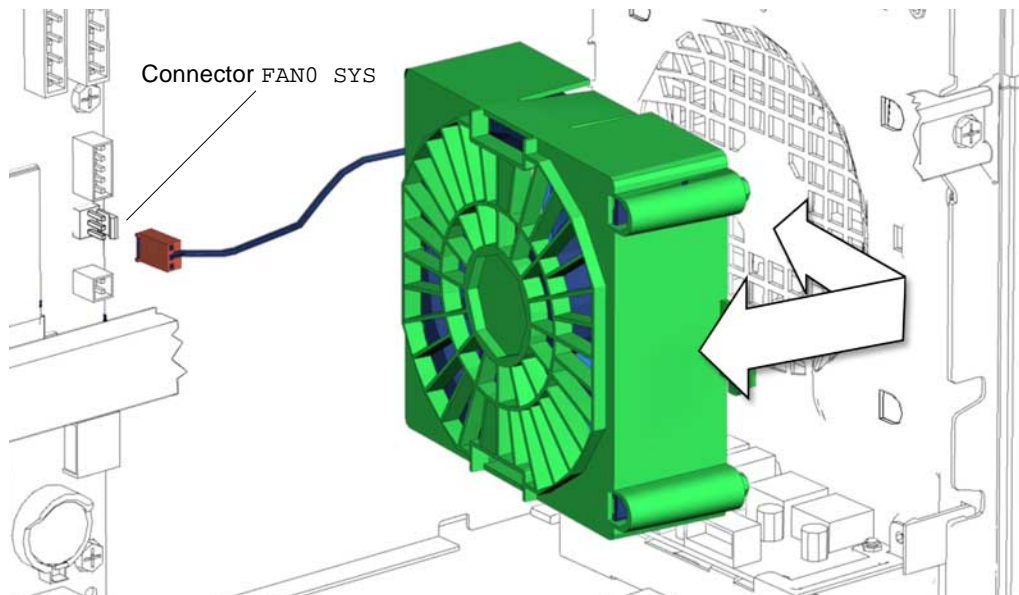
Open the bezel cable clip at the center of the chassis and remove the front fan cable from the clip. See [FIGURE 13-13](#).



**FIGURE 13-9** Removing the Front Fan Cable From the Bezel Cable Clip

**4. Disconnect the front fan cable.**

Disconnect the front fan cable from the motherboard front fan connector FAN0 SYS. See [FIGURE 13-10](#).



**FIGURE 13-10** Removing the Front Fan Bracket

**5. Release the front fan bracket.**

Squeeze the front fan bracket latch, then slide the front fan bracket toward the chassis opening. Lift the front fan bracket out of the system chassis and set it aside. See [FIGURE 13-10](#).

Proceed to [“Installing the Front Fan” on page 13-11](#).



---

**Caution** – Do not operate the workstation without the front fan.

---

## 13.2.3 Installing the Front Fan

**1. Open the chassis.**

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

**2. Locate where the front fan is to be installed.**

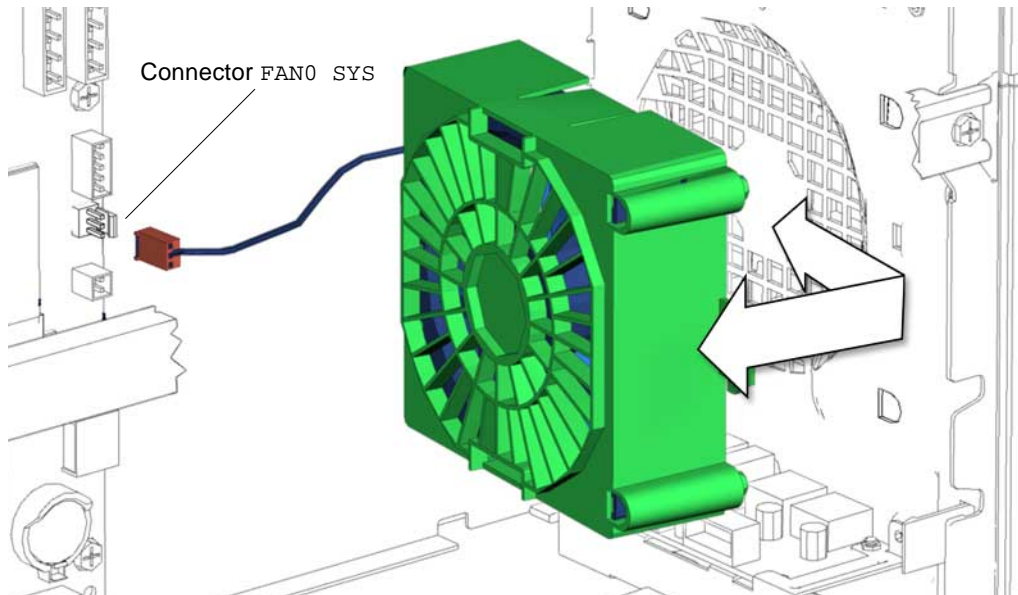
See [FIGURE 13-8](#).

**3. Remove the front fan assembly from its packaging.**

The front fan is shipped in its green bracket.

**4. Align the front fan bracket with the chassis.**

Align the four tabs on the open side of the fan bracket with their matching D-shaped holes in the chassis front panel. See [FIGURE 13-11](#).



**FIGURE 13-11** Installing the Front Fan Bracket

**5. Secure the front fan bracket.**

Slide the bracket sideways until the fan bracket latch clicks into place. The four tabs on the fan bracket protrude to the outside of the chassis. See [FIGURE 13-12](#).

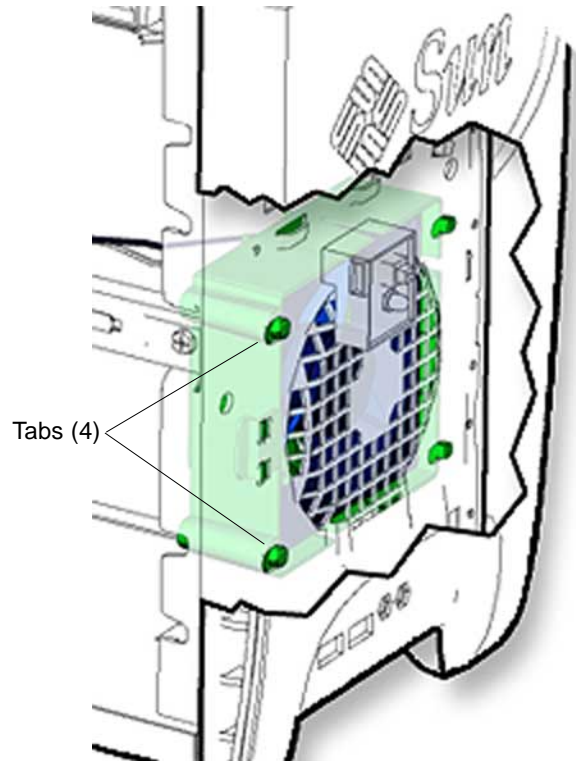


FIGURE 13-12 Securing the Front Fan Bracket

**6. Connect the front fan power cable to the motherboard connector FAN0 SYS.**  
See [FIGURE 13-11](#).

**7. Route the front fan cable through the bezel cable clip.**

Guide the front fan cable through the bezel cable clip at the center of the chassis and close the clip. See [FIGURE 13-13](#).

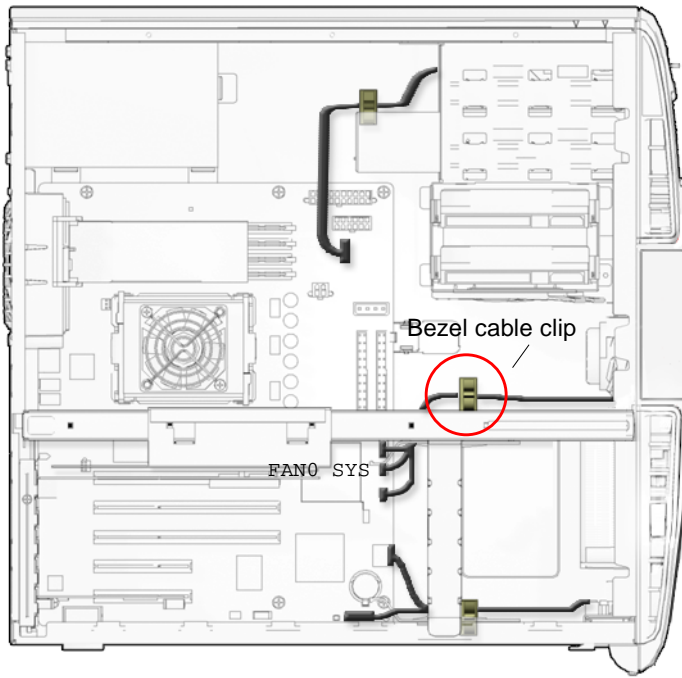


FIGURE 13-13 Securing the Front Fan Cable in the Bezel Cable Clip

**8. Inspect the front fan fasteners.**

- The fan bracket latch is locked into the chassis.
- The fan bracket tabs are well seated in the chassis.

**9. Inspect the front fan cabling.**

- The front fan cable is firmly connected to the motherboard at FAN0 SYS.
- The front fan cable is routed through the motherboard cable routing clip.
- The bezel cable clip is closed and locked.

**10. Finishing up.**

Install the access panel, power on the system, and verify the front fan installation.  
Refer to:

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

---

## 13.3 Replacing the Rear Fan

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

- [“Identifying the Rear Fan” on page 13-15](#)
- [“Removing the Rear Fan” on page 13-16](#)
- [“Installing the Rear Fan” on page 13-18](#)



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

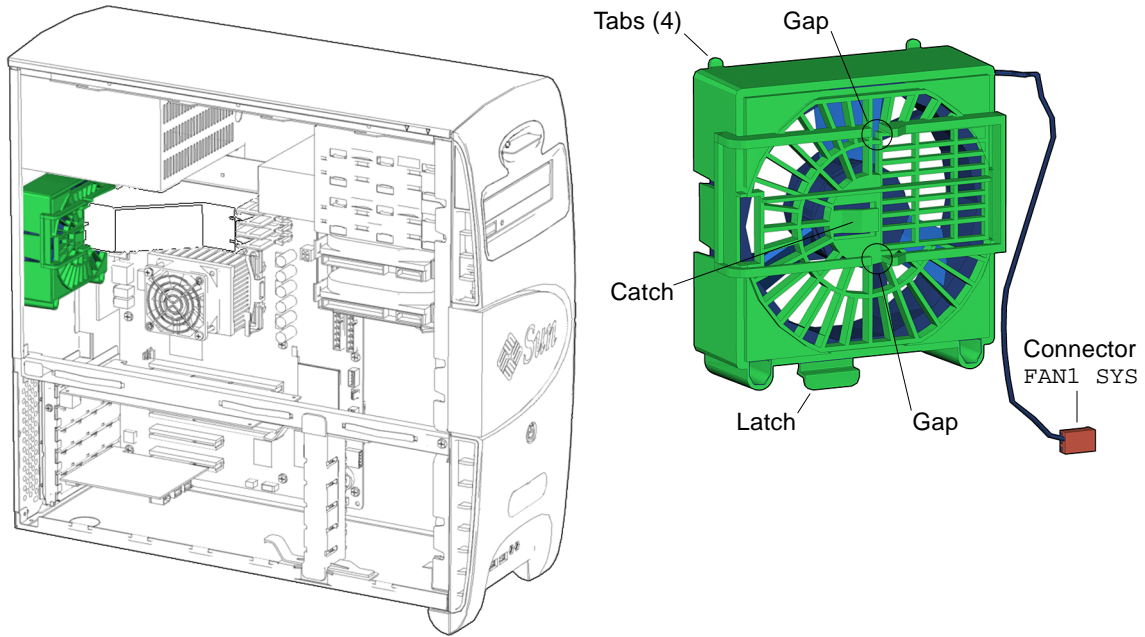
### 13.3.1 Identifying the Rear Fan

The front and rear fans on the Sun Blade 1500 workstation are contained in green brackets. Both fans must be operating to adequately cool the components in a closed chassis. Both fans are connected to the motherboard with a cable that carries power and signal. [FIGURE 13-14](#) shows the location of and identifies the rear fan.

---

**Note** – Though similar in appearance, the front and rear fan brackets are not interchangeable.

---



**FIGURE 13-14** Rear Fan Location and Identification

**TABLE 13-3** lists the rear fan specifications.

**TABLE 13-3** Rear Fan Specifications

Specification	Value (Maximum)
Voltage	12 VDC
Current	0.490 AMPS
Speed	3600 RPM
Flow Rate	66 CFM (1.86 m <sup>3</sup> /min)

## 13.3.2 Removing the Rear Fan

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

Refer to:

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



**2. Locate the rear fan.**

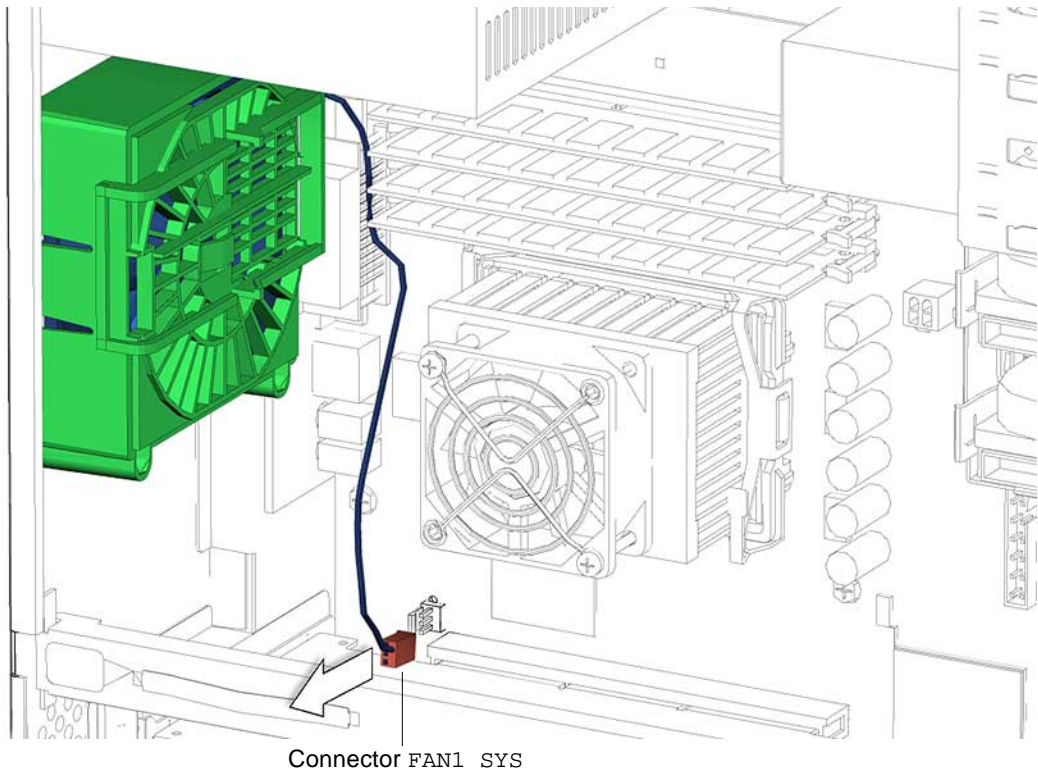
The rear fan is housed in a green plastic bracket that connects to the workstation chassis. See [FIGURE 13-14](#).

**3. Remove the DIMM cooling duct.**

Refer to “[Removing the DIMM Cooling Duct](#)” on page 13-23.

**4. Disconnect the rear fan cable.**

Disconnect the rear fan cable from the motherboard connector FAN1 SYS. See [FIGURE 13-15](#).



**FIGURE 13-15** Rear Fan Motherboard Connection

**5. Release the rear fan bracket.**

Lift the rear fan bracket latch while sliding the fan bracket down the chassis. Lift the rear fan assembly out of the system chassis and set it aside. See [FIGURE 13-16](#).

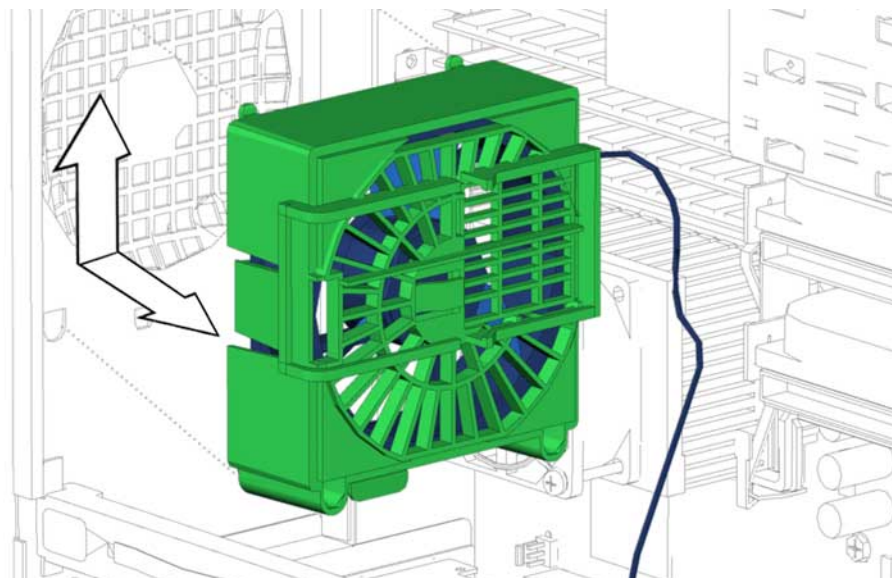


FIGURE 13-16 Removing the Rear Fan

**6. Consider your next step.**

- If you removed the rear fan prior to removing the motherboard, return to [Step 5](#) of [“Removing the Motherboard”](#) on page 11-48.
- If you removed the rear fan prior to removing the CPU fan and heatsink assembly, return to [Step 4](#) of [“Removing the CPU Fan and Heatsink Assembly”](#) on page 11-15.
- Otherwise, proceed to [“Installing the Rear Fan”](#) on page 13-18.



---

**Caution** – Do not operate the workstation without the rear fan.

---

### 13.3.3 Installing the Rear Fan

**1. Open the chassis.**

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

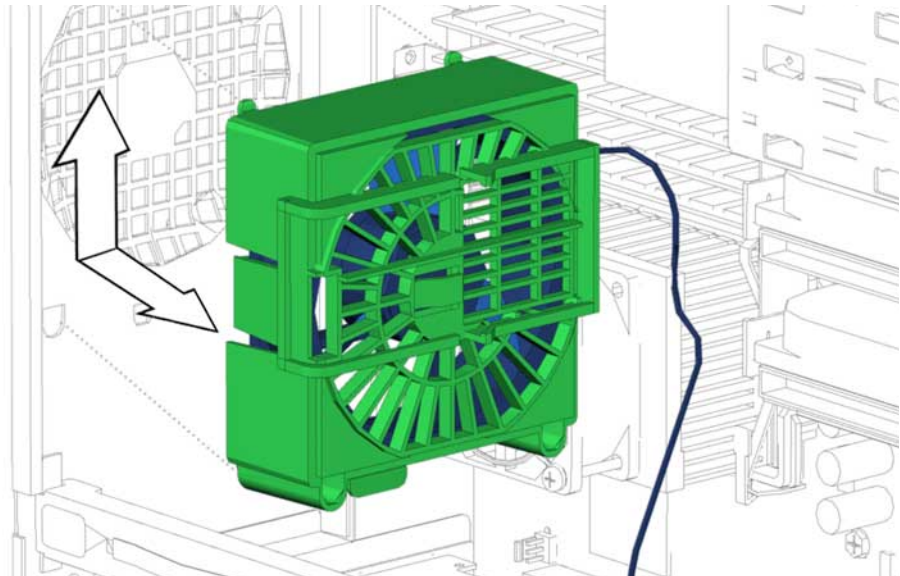
**2. Locate where the rear fan is to be installed.**

**3. Remove the rear fan assembly from its packaging.**

The rear fan is shipped in its green bracket.

**4. Align the rear fan bracket with the chassis.**

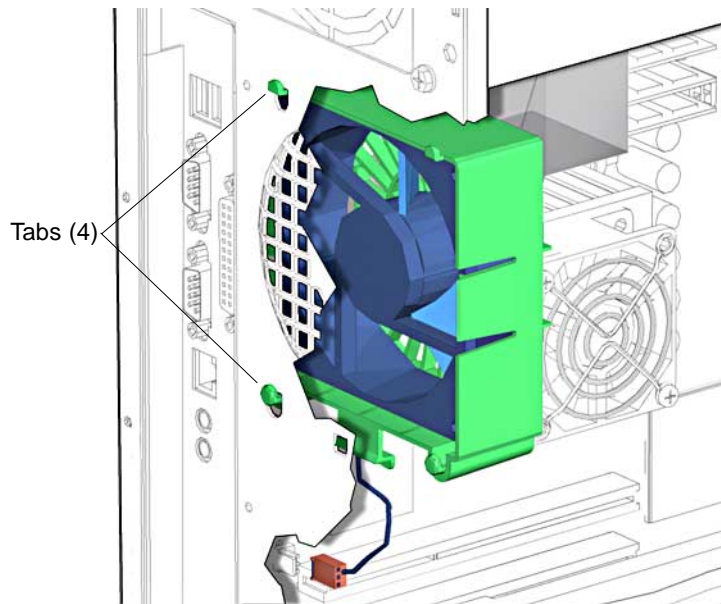
Align the four tabs on the open side of the fan bracket with their matching D-shaped holes in the chassis back panel. Have the rear fan cable leading down and toward the bottom of the chassis. See [FIGURE 13-17](#).



**FIGURE 13-17** Installing the Rear Fan Bracket

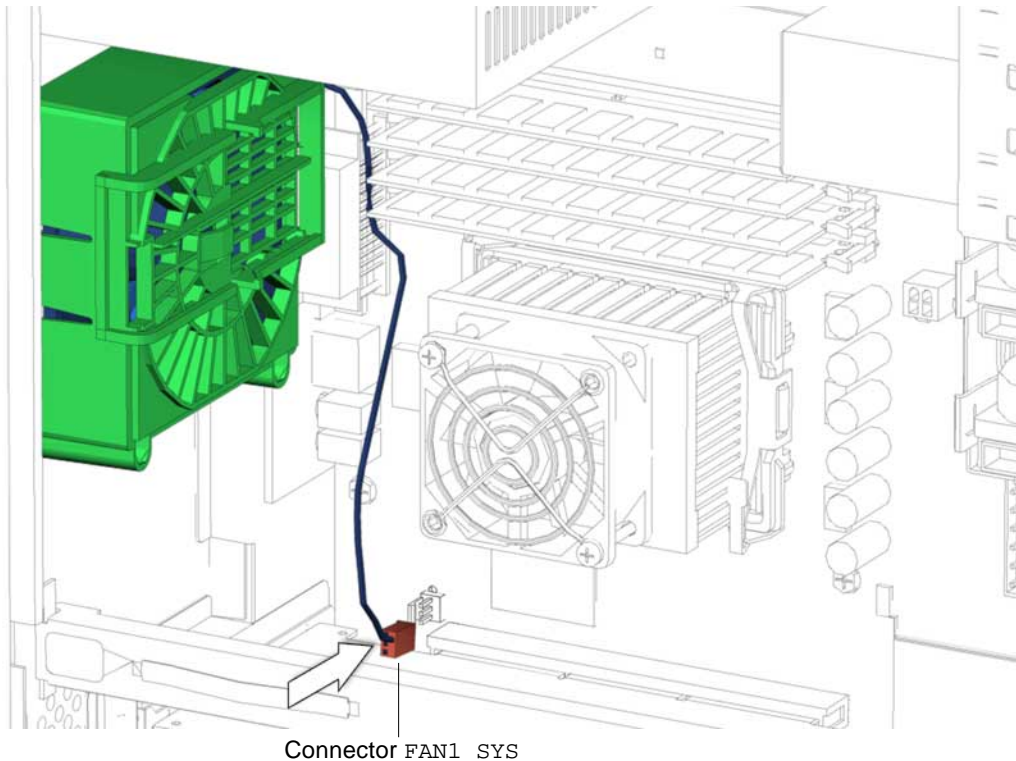
**5. Secure the rear fan bracket.**

Press the rear fan bracket to the chassis and slide the bracket up toward the power supply until the fan bracket latch clicks into place. See [FIGURE 13-18](#). The tabs on the fan bracket protrude to the outside of the chassis.



**FIGURE 13-18** Securing the Rear Fan Bracket

- 6. Connect the rear fan power cable to the motherboard connector FAN1 SYS.**  
See [FIGURE 13-19](#).



**FIGURE 13-19** Connecting the Rear Fan Cable to FAN1 SYS

**7. Install the DIMM cooling duct.**

Refer to [“Installing the DIMM Cooling Duct” on page 13-27.](#)

**8. Inspect the rear fan fasteners.**

- The rear fan bracket latch is locked into the chassis.
- The rear fan bracket tabs are well seated in the chassis.

**9. Inspect the rear fan cabling.**

- The rear fan cable is firmly connected to the motherboard at FAN1 SYS.
- The rear fan cable is routed through the motherboard cable routing clip.

**10. Consider your next step.**

- If you installed the rear fan after installing the CPU fan and heatsink assembly, return to [Step 12 of “Installing the CPU Fan and Heatsink Assembly” on page 11-19.](#)
- If you installed the rear fan after installing the motherboard, return to [Step 15 of “Installing the Motherboard” on page 11-52.](#)

- Install the access panel, power on the system, and verify the rear fan installation. Refer to:
  - [“Installing the Access Panel” on page 15-5](#)
  - [“Powering On the Workstation” on page 15-8](#)
  - [“Verifying an Installation” on page 15-11](#)

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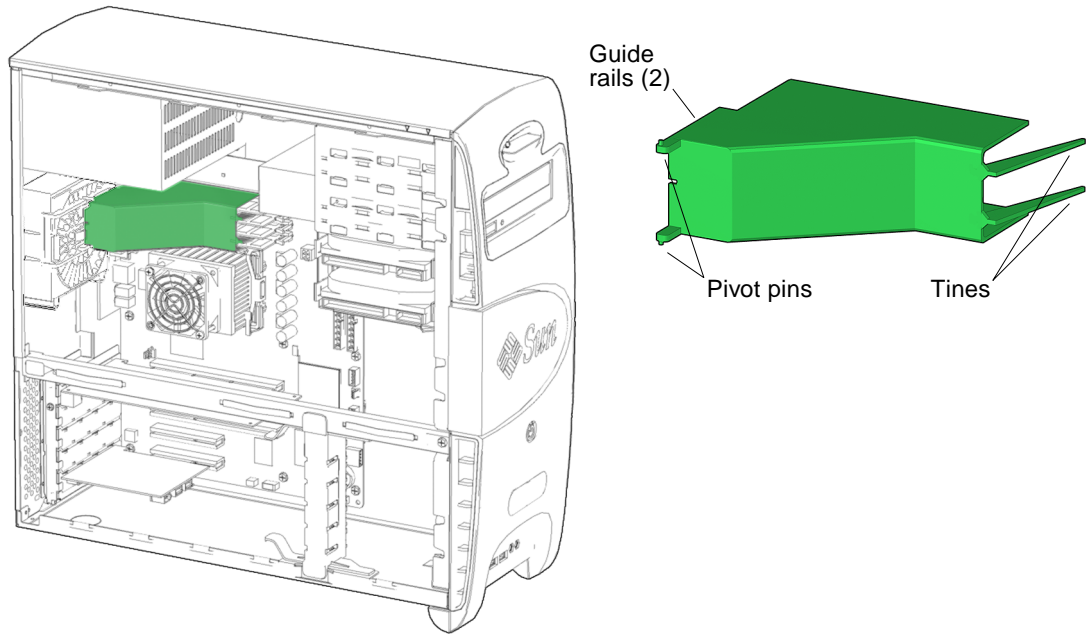
## 13.4 Replacing the DIMM Cooling Duct

This section describes removal and installation of the DIMM cooling duct. Topics include:

- [“Identifying the DIMM Cooling Duct” on page 13-22](#)
- [“Removing the DIMM Cooling Duct” on page 13-23](#)
- [“Installing the DIMM Cooling Duct” on page 13-27](#)

### 13.4.1 Identifying the DIMM Cooling Duct

The DIMM cooling duct is a plastic duct that attaches to the rear fan and covers the DIMMs installed in slots DIMM0 - DIMM3. The duct routes air from the right edge of the DIMMs, across the DIMM's surfaces, through the rear fan, and out the rear panel. See [FIGURE 13-20](#).



**FIGURE 13-20** DIMM Cooling Duct Location and Identification.

---

**Note** – Your system’s DIMM cooling duct might not have two tines at the front end. The absence of these tines does not affect the functionality of the duct.

---

## 13.4.2 Removing the DIMM Cooling Duct

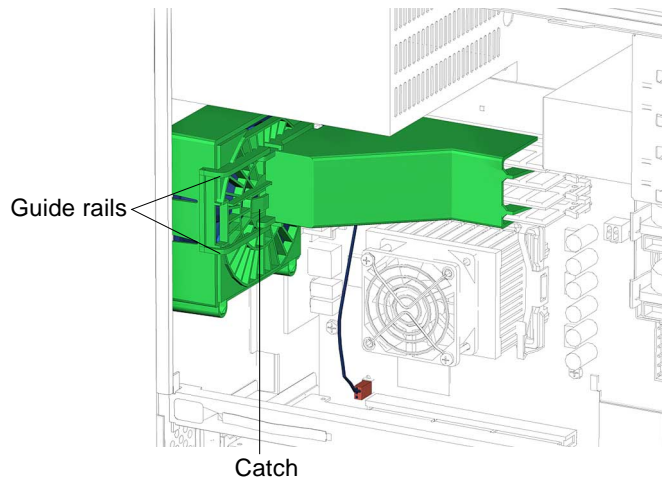
### 1. Power off the system and open the chassis.

Refer to:

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

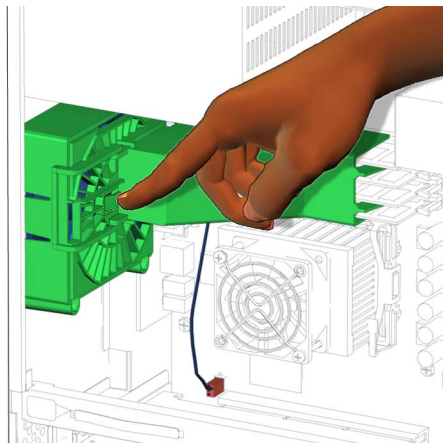
### 2. Locate the DIMM cooling duct.

The DIMM cooling duct is secured to the rear fan bracket by guide rails formed in the rear fan bracket. See [FIGURE 13-20](#) and [FIGURE 13-21](#).



**FIGURE 13-21** DIMM Cooling Duct Attachment to Rear Fan

- 3. Press the catch on the rear fan bracket and begin to slide the duct to the left.**  
See [FIGURE 13-22](#).



**FIGURE 13-22** Pressing the Catch on the Rear Fan Bracket

- 4. Continue to slide the duct to the left, until it is flush with the left side of the rear fan bracket.**  
See [FIGURE 13-23](#).



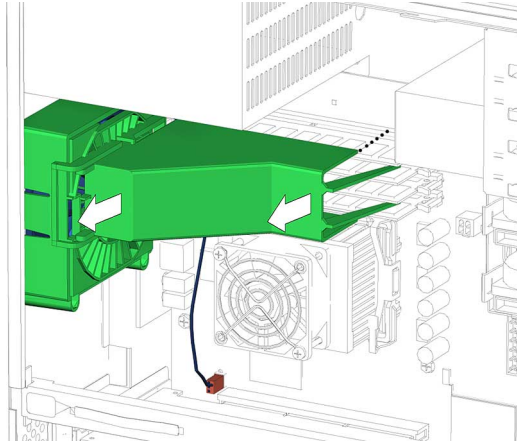


FIGURE 13-23 Sliding the Duct to the Left

5. Swing the duct out, so that it is perpendicular to its previous position.

See [FIGURE 13-24](#).

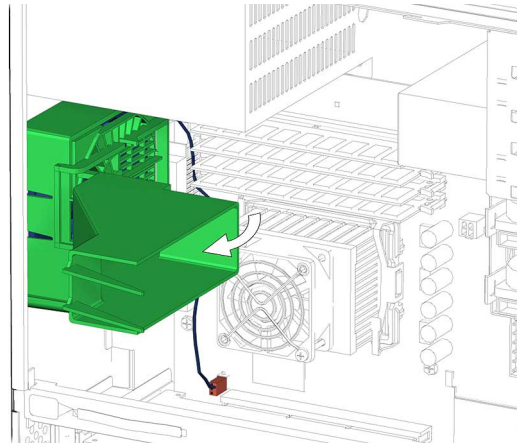


FIGURE 13-24 Swinging Out the Duct

6. Slide the duct back to the right, while slightly pulling the duct to the front of the chassis.

See [FIGURE 13-25](#).

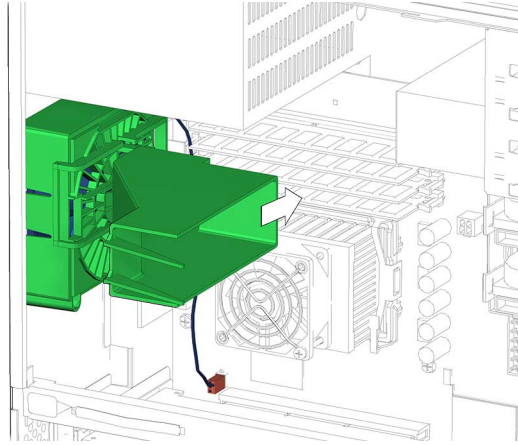


FIGURE 13-25 Sliding Duct Back to the Right

7. When the pivot pins reach the gap in the rear fan's guide rails, the duct pulls free. See [FIGURE 13-26](#). Set the duct aside.

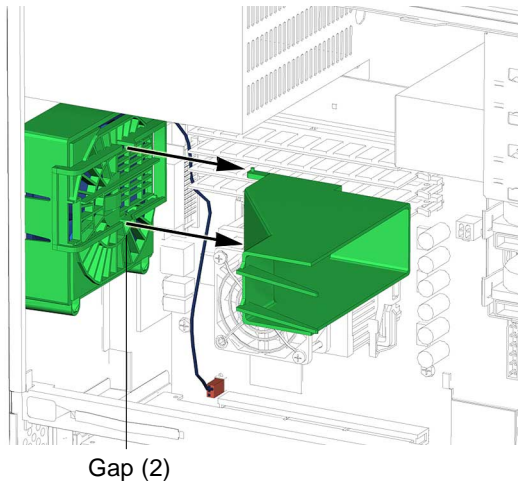


FIGURE 13-26 Pulling the Duct Free

8. Consider your next step.
  - If you removed the DIMM cooling duct prior to removing the motherboard, return to [Step 4](#) of [“Removing the Motherboard”](#) on page 11-48.

- If you removed the DIMM cooling duct prior to removing the rear fan, return to [Step 4 of “Removing the Rear Fan” on page 13-16](#).
- Otherwise, proceed to [“Installing the DIMM Cooling Duct” on page 13-27](#).

---

**Note** – For ideal DIMM cooling, do not operate the Sun Blade 1500 workstation without the DIMM cooling duct in place.

---

## 13.4.3 Installing the DIMM Cooling Duct

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

Refer to:

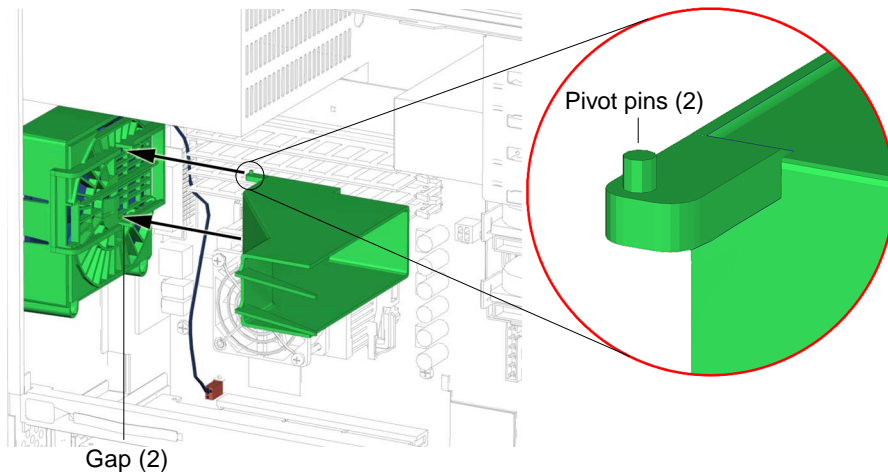
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

### 2. Locate where the DIMM cooling duct is to be installed.

The DIMM cooling duct attaches to the rear fan assembly. See [FIGURE 13-20](#). Make sure no cables interfere with the installation.

### 3. Align the pivot pins of the duct into the gaps in the rear fan bracket's guide rails.

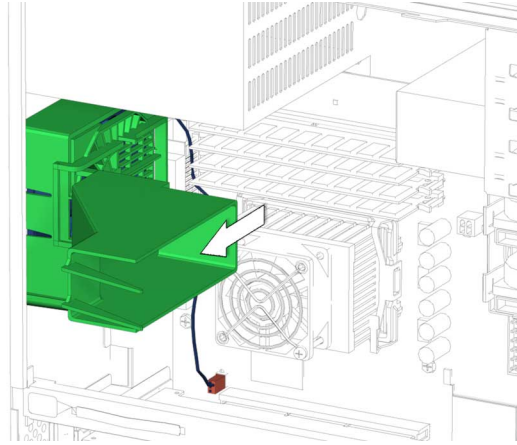
See [FIGURE 13-27](#).



**FIGURE 13-27** Aligning the Pivot Pins With the Gap

4. While maintaining a light pressure towards the rear fan bracket, move the duct to the left.

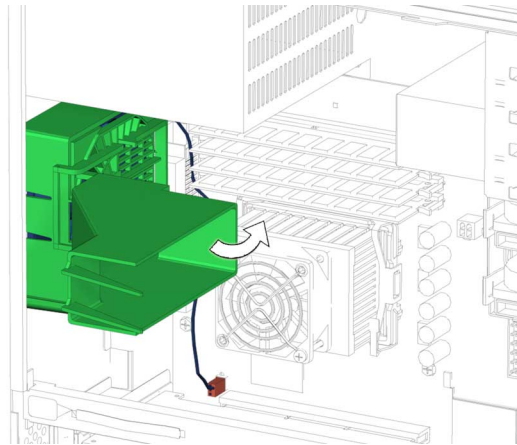
See [FIGURE 13-28](#).



**FIGURE 13-28** Moving the Duct to the Left

5. Swing the duct in, so that the guide rails of the duct are flush with the guide rails of the rear fan bracket.

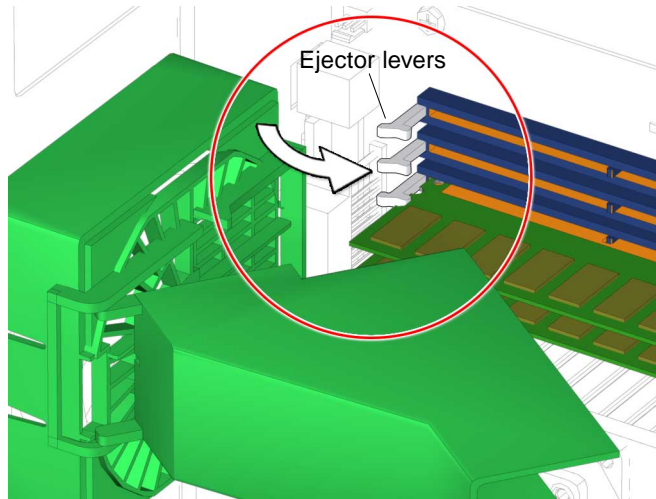
See [FIGURE 13-29](#).



**FIGURE 13-29** Swinging the Duct In

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

See [FIGURE 13-30](#).



**FIGURE 13-30** Ejector Levers Closed Position

7. While maintaining a light pressure towards the rear fan bracket, slide the duct to the right.

As you do so, make sure that the tines do not bind against the DIMMs. See [FIGURE 13-31](#).

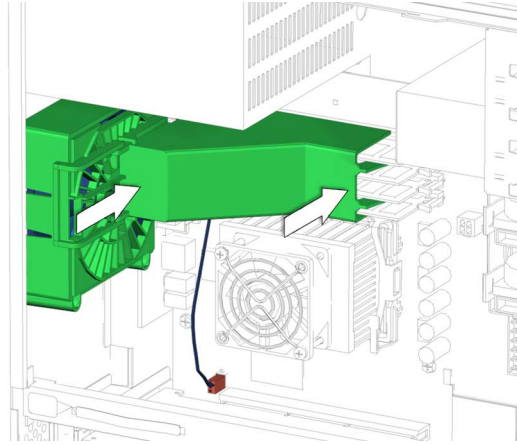


FIGURE 13-31 Sliding the Duct to the Right

8. Continue to slide the duct to the right until the catch on the rear fan bracket clicks.

See [FIGURE 13-32](#).

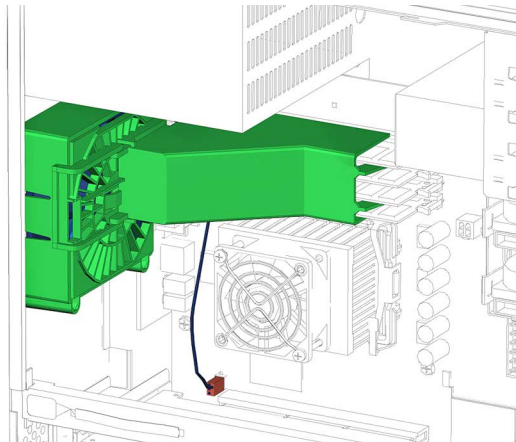


FIGURE 13-32 Duct Clicks Into Place

9. Inspect the DIMM cooling duct.

- The duct covers the DIMMs and the tines are not in a bind with the DIMMs.
- The guide rails of the duct are matched with the guide rails of the rear fan bracket.

## 10. Consider your next step.

- If you installed the DIMM cooling duct after installing the rear fan, return to [Step 8 of “Installing the Rear Fan” on page 13-18.](#)
- If you installed the DIMM cooling duct after installing the motherboard, return to [Step 16 of “Installing the Motherboard” on page 11-52.](#)
- Install the access panel and power on the system. Refer to:
  - [“Installing the Access Panel” on page 15-5](#)
  - [“Powering On the Workstation” on page 15-8](#)

---

# 13.5 Replacing the Audio USB Board

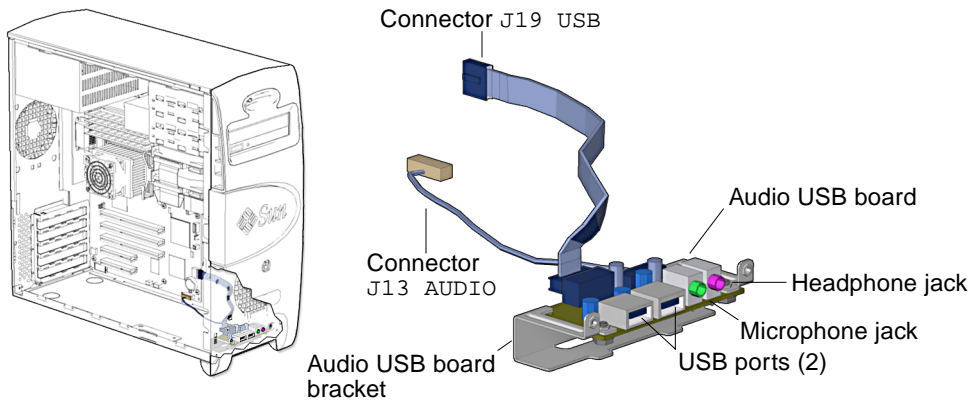
This section describes removal and installation of the audio and USB card. Topics include:

- [“Identifying the Audio USB Board” on page 13-31](#)
- [“Removing the Audio USB Board” on page 13-32](#)
- [“Installing the Audio USB Board” on page 13-36](#)

## 13.5.1 Identifying the Audio USB Board

The audio USB board is installed on the audio USB bracket that is attached to the front of the chassis. Two cables provide audio and USB signals. The chassis access panel and the front bezel must be removed to access the audio USB board.

[FIGURE 13-33](#) shows the location of and identifies the audio USB board.



**FIGURE 13-33** Audio USB board Location and Identification

## 13.5.2 Removing the Audio USB Board

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

Refer to:

- “Powering Off the Workstation” on page 10-4
- “Removing the Access Panel” on page 10-12
- “Removing the Bezel” on page 10-14

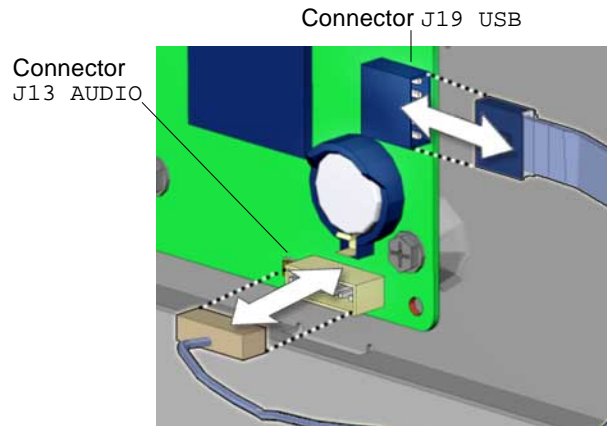
### 2. Locate the audio USB board.

The audio USB board is installed on the audio USB bracket that is fastened to the workstation chassis. See [FIGURE 13-33](#).

### 3. Disconnect the audio USB board cables.

The audio signal cable is connected to the motherboard at J13 AUDIO. The USB interface cable is connected to the motherboard at J19 USB. See [FIGURE 13-34](#).

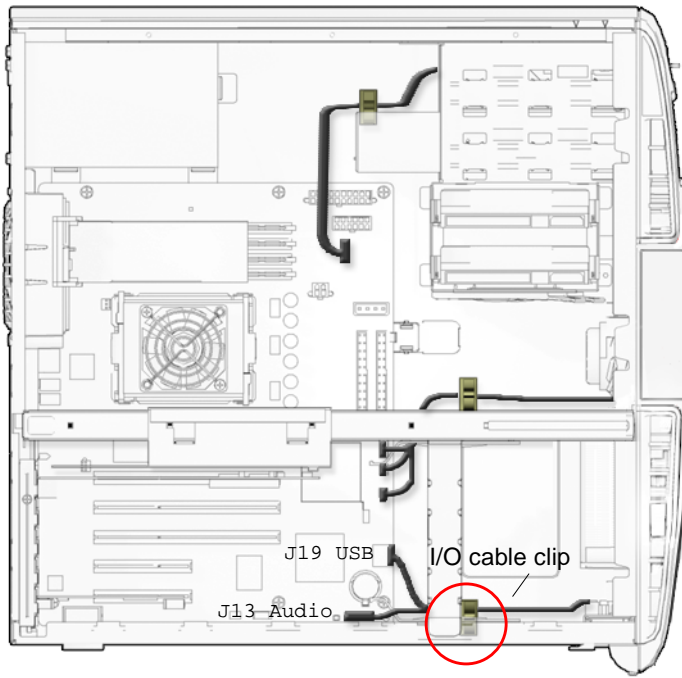




**FIGURE 13-34** Disconnecting the Cables From the Motherboard

**4. Remove the cables from the I/O cable clip.**

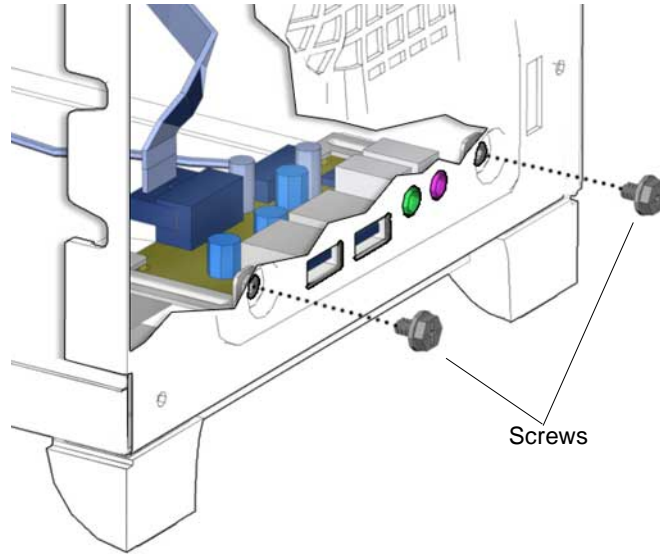
Open the I/O cable clip at the bottom of the chassis and remove the audio USB board cables from the clip. See [FIGURE 13-35](#).



**FIGURE 13-35** Removing the Audio USB Cables From the I/O Cable Clip

**5. Unfasten the audio USB assembly from the chassis.**

Using a No. 2 Phillips screwdriver, remove the two screws that secure the audio USB assembly to the inside front of the chassis. See [FIGURE 13-36](#). Set the screws aside in a container.

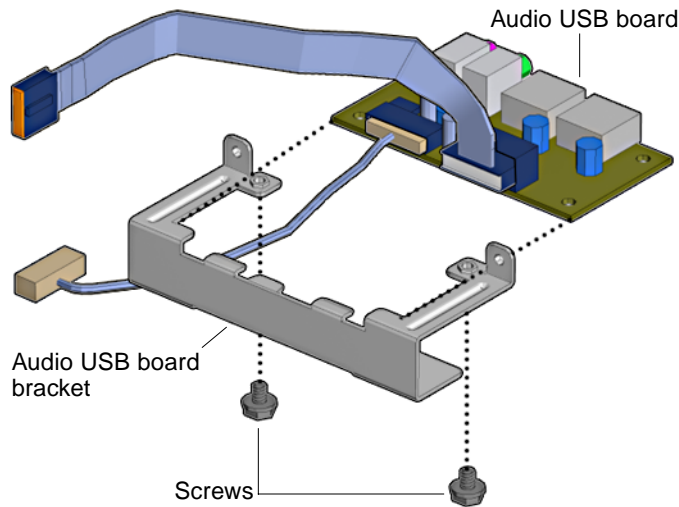


**FIGURE 13-36** Unfastening the Audio USB Assembly

Lift the audio USB assembly from the chassis. Set it aside on an antistatic mat.

**6. Remove the audio USB board from the audio USB bracket.**

Using a No. 2 Phillips screwdriver, remove the two screws that secure the audio USB board to the audio USB bracket. See [FIGURE 13-37](#). Set the screws aside in a container.



**FIGURE 13-37** Removing the Audio USB Board From the Bracket

Set the audio USB board on an antistatic mat. Set the bracket aside. Proceed to [“Installing the Audio USB Board” on page 13-36](#).

---

**Note** – Do not operate the workstation without the audio USB board installed.

---

## 13.5.3 Installing the Audio USB Board

### 1. Open the chassis and remove the bezel.

Refer to:

- [“Removing the Access Panel” on page 10-12](#)
- [“Removing the Bezel” on page 10-14](#)

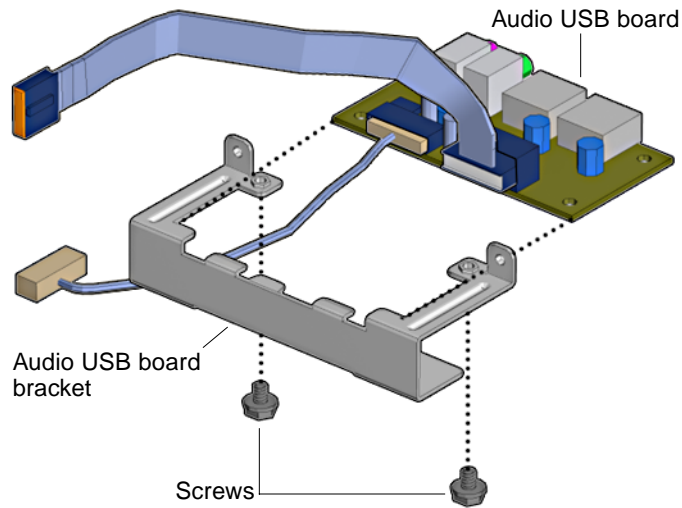
### 2. Position the audio USB board bracket.

Set the bracket on an antistatic mat. Position the bracket with the two arms facing up.

### 3. Remove the audio USB board from its packaging.

### 4. Slide the audio USB board into the audio USB board bracket.

Set the audio USB board with components facing up. See [FIGURE 13-38](#).



**FIGURE 13-38** Installing the Audio USB Board Into the Bracket

**5. Secure the audio USB board in the bracket.**

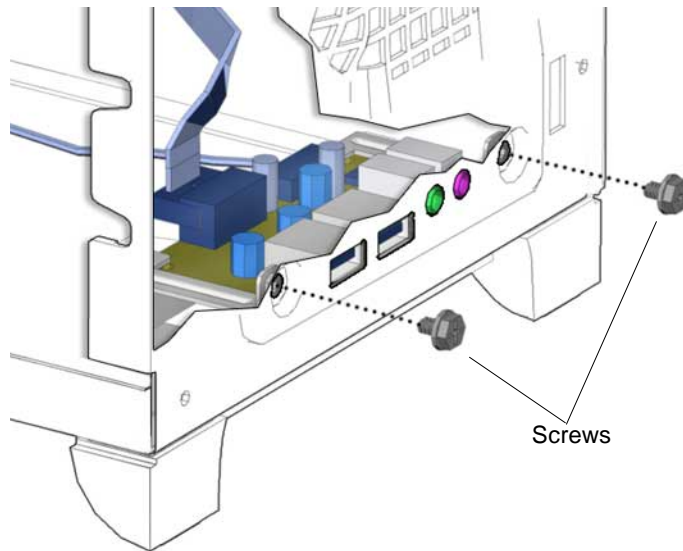
Using a No. 2 Phillips screwdriver, fasten the two screws that secure the audio USB board to the audio USB bracket. See [FIGURE 13-38](#).

**6. Align the audio USB board assembly with the chassis.**

Position the audio USB board assembly so that all the ports fit through the designated chassis holes.

## 7. Secure the audio USB assembly.

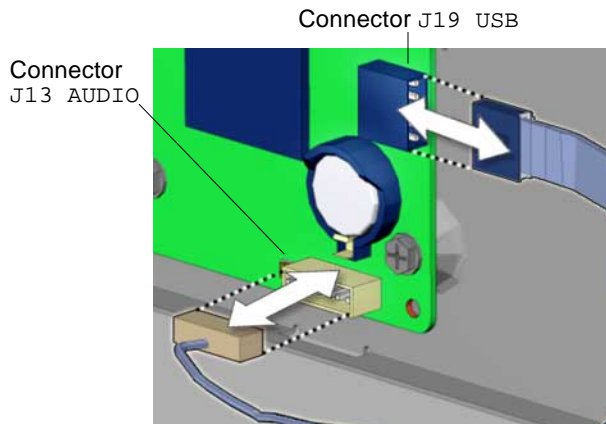
Using a No. 2 Phillips screwdriver, fasten the two screws that secure the audio USB board to the inside front of the chassis. See [FIGURE 13-39](#).



**FIGURE 13-39** Securing the Audio USB Assembly

## 8. Reconnect the audio USB board cables.

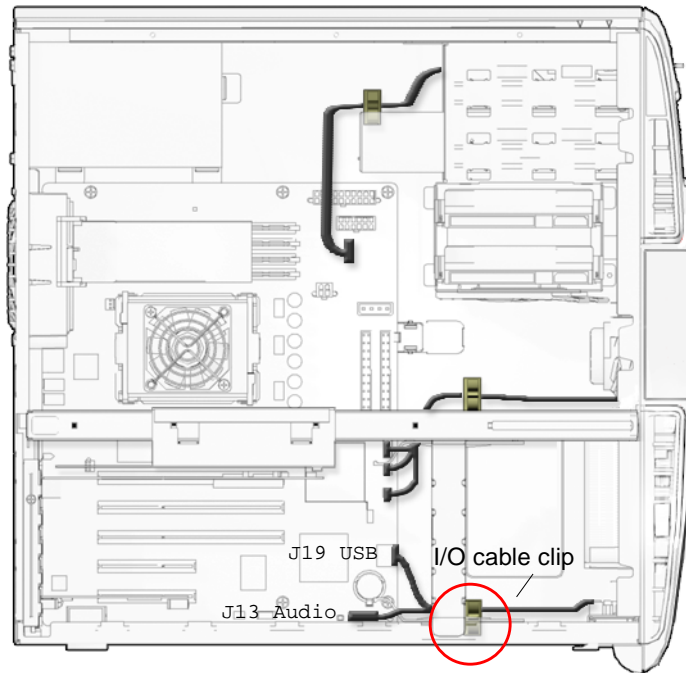
Reconnect the audio and USB cables to the connectors on the motherboard at J19 USB and J13 AUDIO. See [FIGURE 13-40](#).



**FIGURE 13-40** Reconnecting the Cables to the Motherboard

**9. Route the audio USB board cables through the I/O cable clip.**

Guide the cables through the I/O cable clip at the bottom of the chassis and close the clip. See [FIGURE 13-41](#).



**FIGURE 13-41** Securing the Audio USB Cables in the I/O Cable Clip

**10. Inspect the audio USB board fasteners.**

- The audio USB board to bracket screws are tight
- The audio USB assembly to chassis screws are tight.

**11. Inspect the audio USB board cabling.**

- The audio cable is firmly connected to the audio USB board and to the motherboard at J13 AUDIO.
- The USB cable is firmly connected to the audio USB board and to the motherboard at J19 USB.
- The I/O cable clip is closed and locked.

**12. Finishing up.**

Install the bezel, the access panel, power on the system, and verify the audio USB board installation. Refer to:

- “Installing the Bezel” on page 15-2
- “Installing the Access Panel” on page 15-5
- “Powering On the Workstation” on page 15-8
- “Verifying an Installation” on page 15-11

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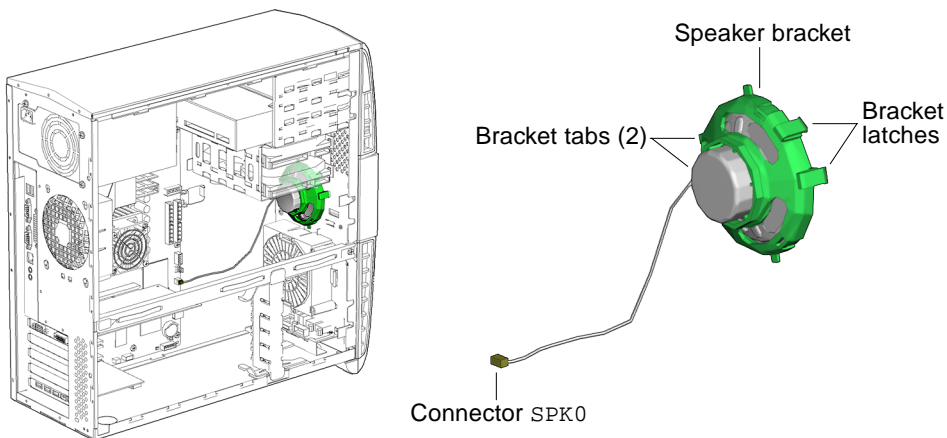
## 13.6 Replacing the Speaker

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

- “Identifying the Speaker” on page 13-40
- “Removing the Speaker” on page 13-41
- “Installing the Speaker” on page 13-43

### 13.6.1 Identifying the Speaker

The speaker is installed in the front of the chassis. The speaker cable is connected to the motherboard at `SPK0`. See [FIGURE 13-42](#).



**FIGURE 13-42** Speaker Location and Identification



[TABLE 13-4](#) lists the speaker specifications.

**TABLE 13-4** Speaker Specifications

Specification	Value
Impedance	8 Ohms
Wattage	3.5 W

## 13.6.2 Removing the Speaker

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

Refer to:

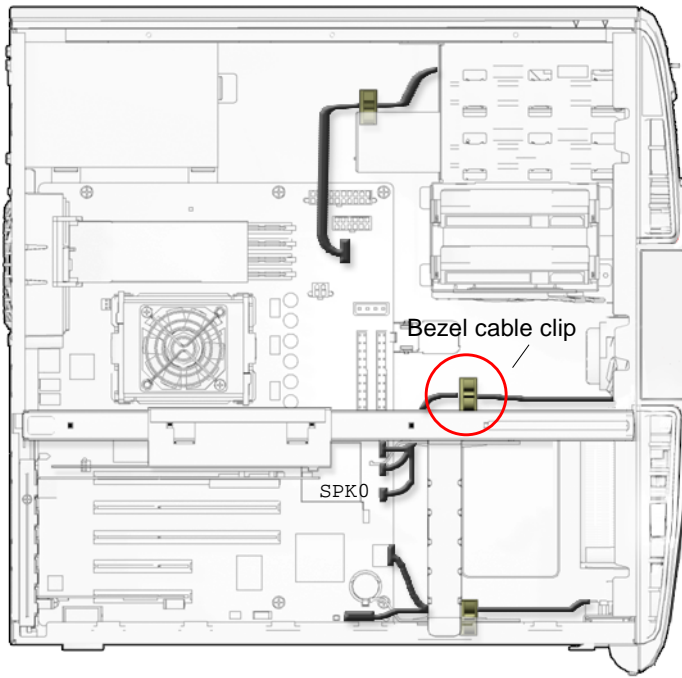
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)
- [“Removing the Bezel” on page 10-14](#)

### 2. Locate the speaker bracket.

The speaker is housed in a green plastic bracket that attaches to the workstation chassis. See [FIGURE 13-42](#).

### 3. Remove the speaker cable from the bezel cable clip.

Open the bezel cable clip at the center of the chassis and remove the speaker cable from the clip. See [FIGURE 13-43](#).



**FIGURE 13-43** Removing the Speaker Cable From the Bezel Cable Clip

**4. Disconnect the speaker cable.**

The speaker cable is connected to the motherboard at connector **SPK0**. See [FIGURE 13-44](#).

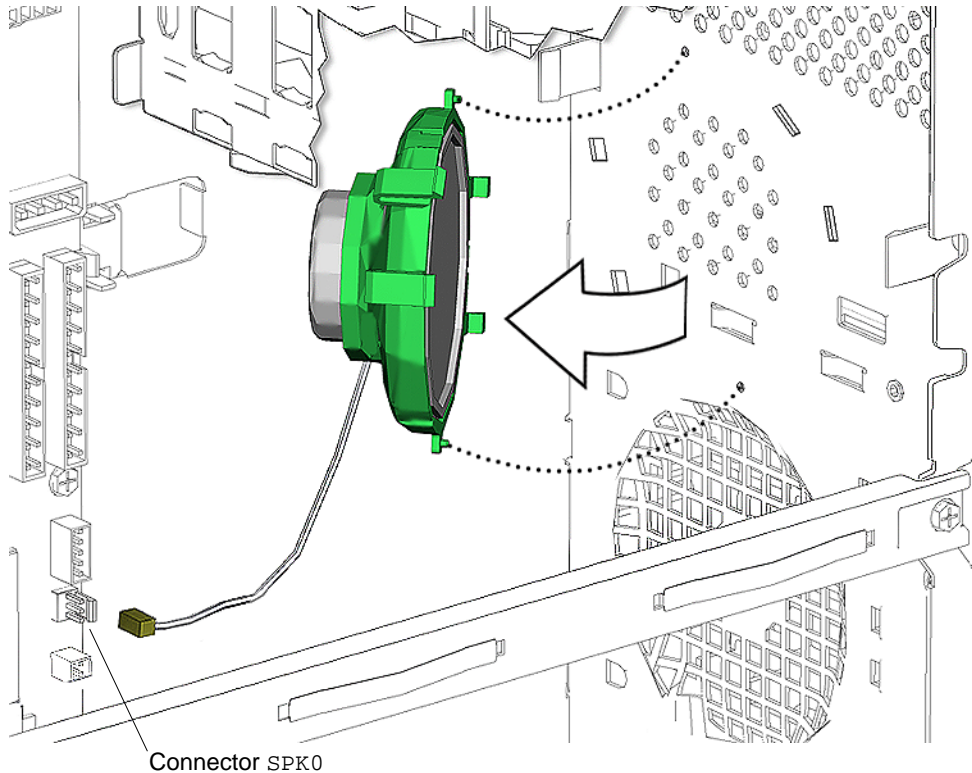


FIGURE 13-44 Removing the Speaker

**5. Remove the speaker bracket.**

Press both speaker bracket latches and swing the speaker bracket away from the chassis. See [FIGURE 13-44](#). Lift the speaker bracket out of the chassis and set it down on a flat surface, speaker facing down.

Proceed to [“Installing the Speaker” on page 13-43](#).

## 13.6.3 Installing the Speaker

**1. Open the chassis.**

Refer to:

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

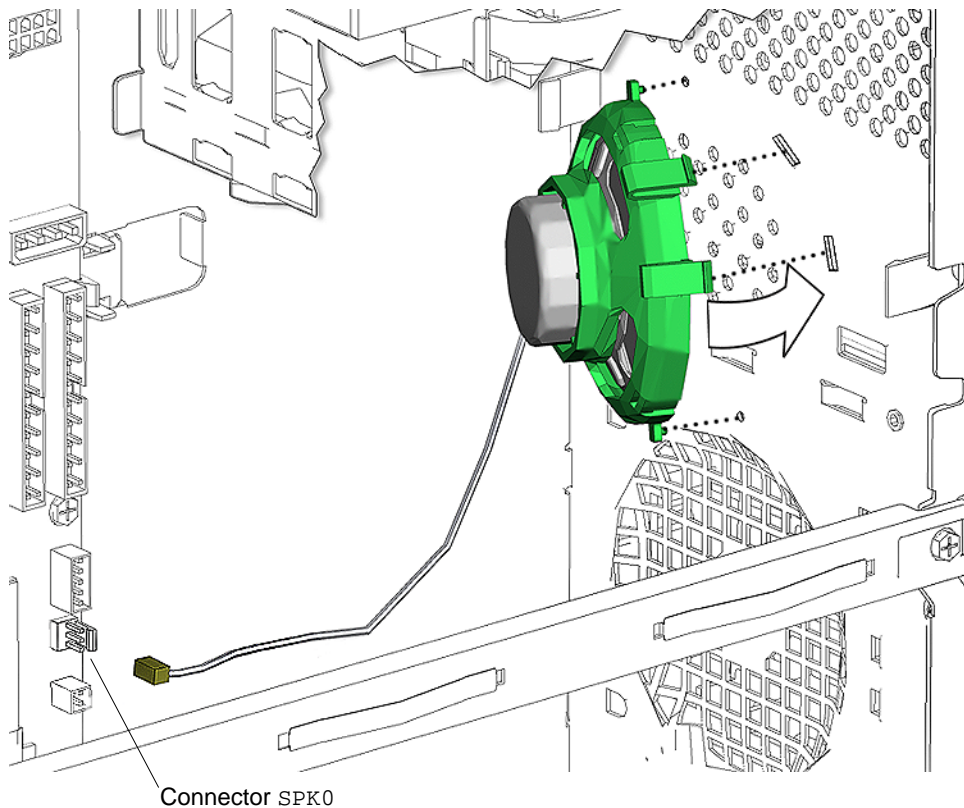
**2. Locate where the speaker is to be installed.**

See [FIGURE 13-42](#).

**3. Remove the speaker assembly from its packaging.**

**4. Align and secure the speaker bracket.**

Align the speaker bracket tabs to the D-shaped holes on the inside of the chassis front panel. The speaker is contained between the speaker bracket and the chassis. Press both speaker bracket latches into the chassis front until they click in place. See [FIGURE 13-45](#).



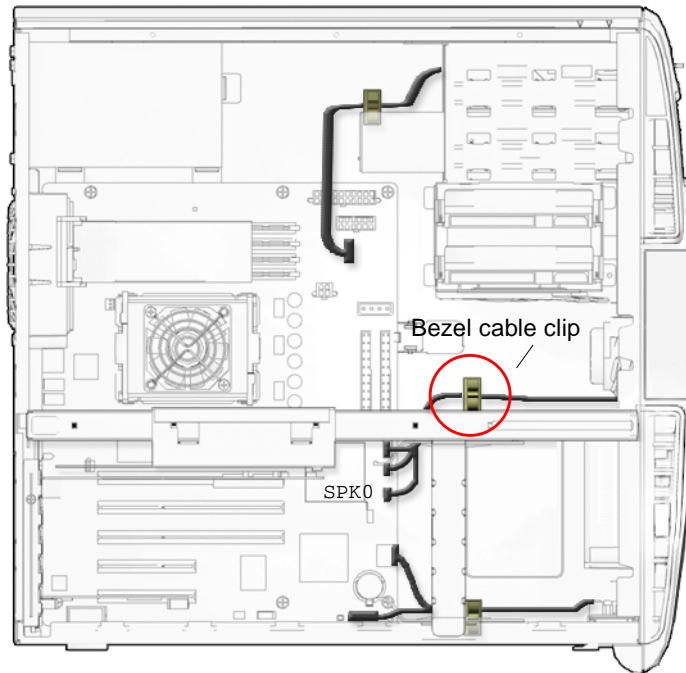
**FIGURE 13-45** Installing the Speaker

**5. Connect the speaker cable.**

Press the speaker cable connector into connector `SPK0` on the motherboard. See [FIGURE 13-45](#).

## 6. Route the speaker cable through the bezel cable clip.

Guide the speaker cable through the bezel cable clip at the center of the chassis and close the clip. See [FIGURE 13-46](#).



**FIGURE 13-46** Securing the Speaker Cable in the Bezel Cable Clip

## 7. Inspect the speaker fasteners.

- The speaker is secure in the bracket.
- The speaker bracket tabs are well seated in the chassis.

## 8. Inspect the speaker cabling.

- The speaker cable is firmly connected to the motherboard at SPK0.
- The speaker cable is routed through the bezel cable clip.
- The bezel cable clip is closed and locked.

## 9. Finishing up.

Install the bezel, the access panel, power on the system, and verify the speaker installation. Refer to:

- [“Installing the Bezel” on page 15-2](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)

- “Verifying an Installation” on page 15-11

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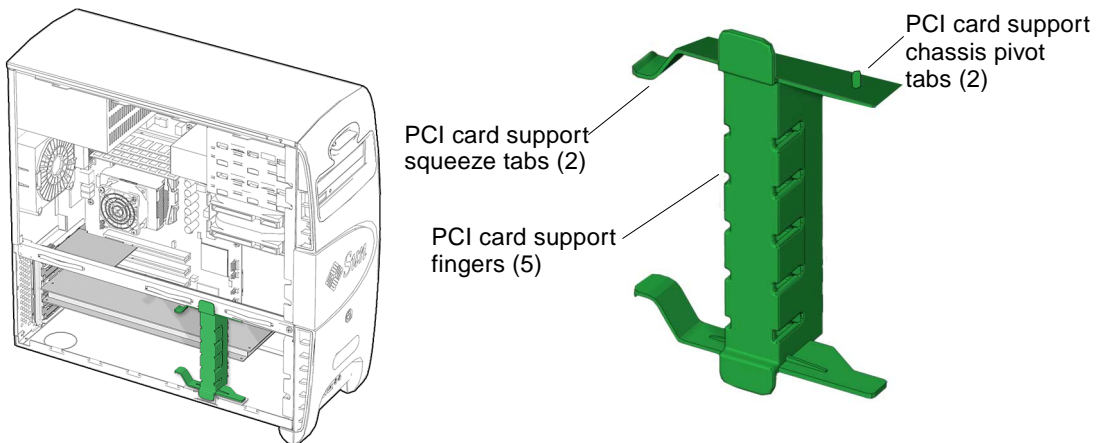
## 13.7 Replacing the PCI Card Support

This section describes removal and installation of the PCI card support. Topics include:

- “Identifying the PCI Card Support” on page 13-46
- “Removing the PCI Card Support” on page 13-46
- “Installing the PCI Card Support” on page 13-48

### 13.7.1 Identifying the PCI Card Support

The PCI card support provides shock and vibration protection for long PCI cards. It supports the PCI cards with spring-loaded fingers, one for each card. The PCI card support is held in place between the chassis cross brace and the bottom of the chassis. See [FIGURE 13-47](#).



**FIGURE 13-47** PCI Card Support Location and Identification

### 13.7.2 Removing the PCI Card Support

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

Refer to:

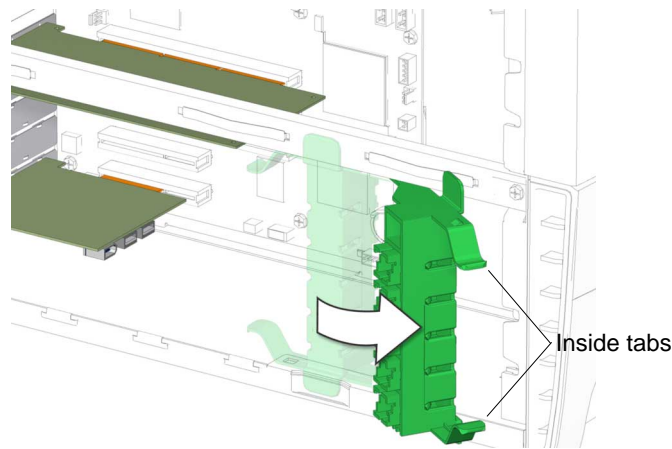
- “Powering Off the Workstation” on page 10-4
- “Removing the Access Panel” on page 10-12

**2. Locate the PCI card support.**

The PCI card support is a green bracket that fits between the chassis cross brace and the bottom of the chassis. See [FIGURE 13-47](#).

**3. Swing out the PCI card support.**

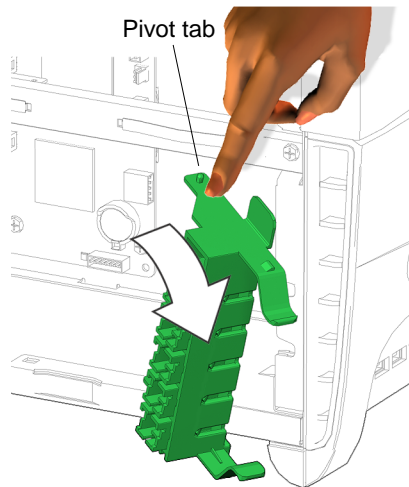
Compress the inside tabs together and swing the PCI card support out. See [FIGURE 13-48](#).



**FIGURE 13-48** Swinging Out the PCI Card Support

**4. Remove the PCI card support.**

Slightly depress the upper pivot tab and tilt the PCI card support out to separate the tab from the chassis cross brace. Lift the PCI card support up and out. See [FIGURE 13-49](#). Set it aside.



**FIGURE 13-49** Removing the PCI Card Support

---

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

---

Proceed to [“Installing the PCI Card Support” on page 13-48.](#)

---

**Note** – Do not operate the workstation without the PCI card support installed.

---

## 13.7.3 Installing the PCI Card Support

**1. Open the chassis.**

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

**2. Identify where the PCI card support is to be installed.**

See [FIGURE 13-47.](#)

**3. Install the PCI card support.**

Align the lower pivot tab with the hole in the chassis bottom. Slightly depress the upper pivot tab and slide it under the cross brace so that it clicks into place. See [FIGURE 13-50.](#)



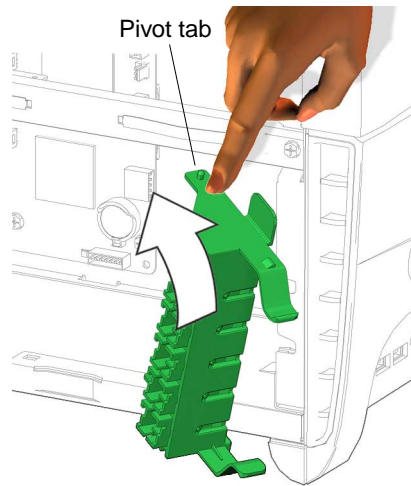


FIGURE 13-50 Installing the PCI Card Support

---

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

---

**4. Swing the PCI card support to the left until it clicks into position.**

See [FIGURE 13-51](#). For each PCI card installed, make sure the spring-loaded finger centers upon the edge of the PCI card.

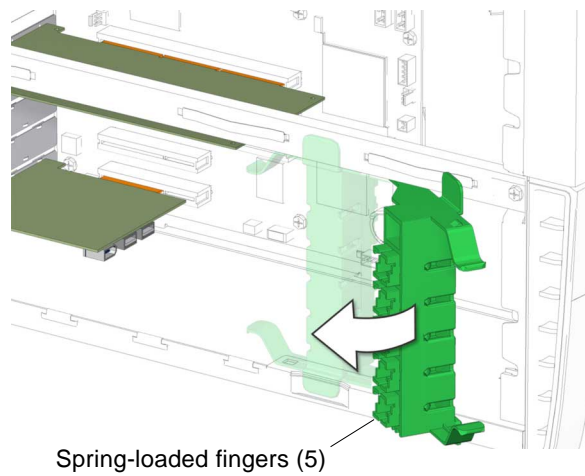


FIGURE 13-51 Closing the PCI Card Support

### 5. Inspect the PCI card support fasteners.

- The PCI card support is snug between the chassis cross brace and the chassis.
- The chassis cross brace is fastened tight to the chassis.
- The PCI card support fingers are snug against each respective PCI card.

### 6. Consider your next step.

- If you installed the PCI card support after installing the motherboard, return to [Step 17 of “Installing the Motherboard” on page 11-52](#).
- Install the access panel and power on the system. Refer to:
  - [“Installing the Access Panel” on page 15-5](#)
  - [“Powering On the Workstation” on page 15-8](#)

---

## 13.8 Replacing the Chassis Cross Brace

This section describes removal and installation of the chassis cross brace. Topics include:

- [“Identifying the Chassis Cross Brace” on page 13-50](#)
- [“Removing the Chassis Cross Brace” on page 13-51](#)
- [“Installing the Chassis Cross Brace” on page 13-54](#)

### 13.8.1 Identifying the Chassis Cross Brace

The chassis cross brace provides structural support to the chassis and holds the PCI card support in place. Attached to the chassis cross brace is the PCI shield.

[FIGURE 13-52](#) shows the location of and identifies the chassis cross brace.

---

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

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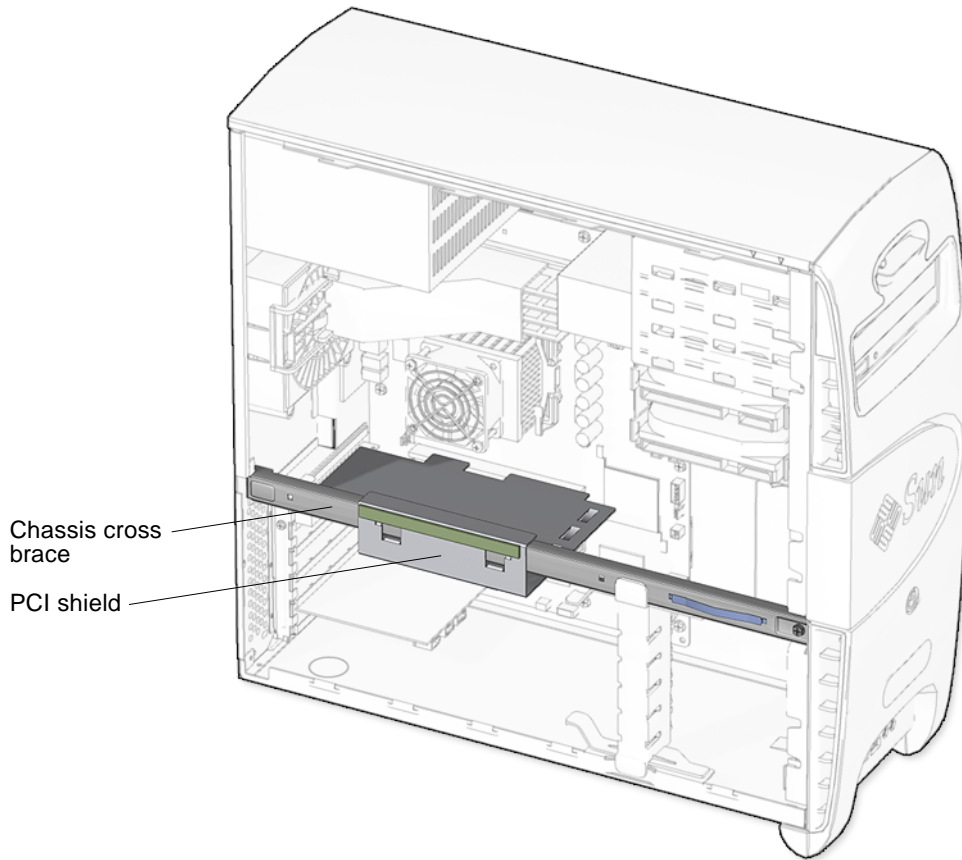


FIGURE 13-52 Chassis Cross Brace Location and Identification

## 13.8.2 Removing the Chassis Cross Brace

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

Refer to:

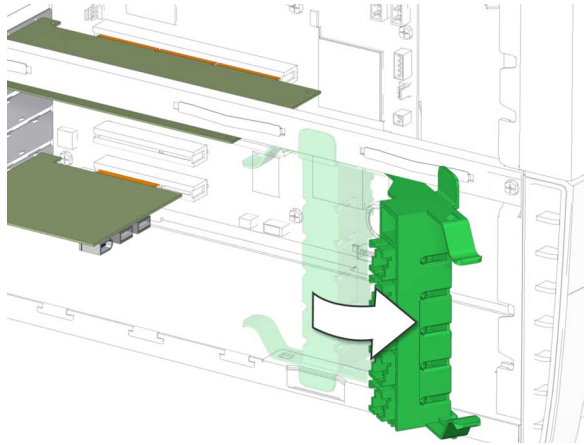
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

### 2. Locate the cross brace.

The cross brace is the long metal bar that extends the width of the chassis. It is engaged in a slot on the chassis back panel and it fastened to the chassis front panel with a screw. See [FIGURE 13-52](#).

### 3. Swing out the PCI card support.

Compress the squeeze tabs together and swing the PCI card support out. See [FIGURE 13-53](#).



**FIGURE 13-53** Swinging out the PCI Card Support

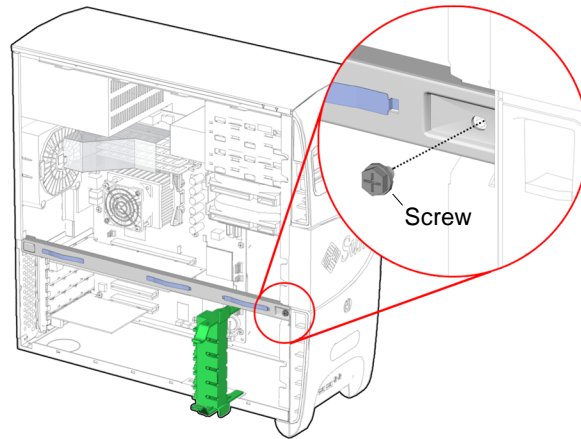
### 4. Remove the chassis cross brace.

---

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

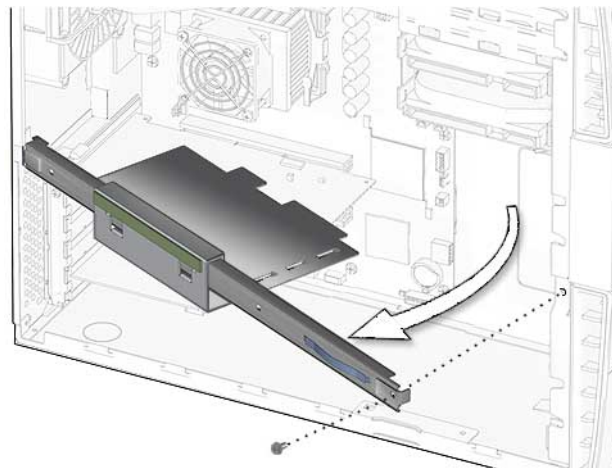
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Using a No. 2 Phillips screwdriver, remove the screw that secures the chassis cross brace to the chassis. See [FIGURE 13-54](#). Set the screw aside in a container.



**FIGURE 13-54** Removing the Cross Brace Screw

Angle the cross brace 6 inches (300 mm) away from where you removed the screw. Gently pull the back end of the cross brace away from the back panel. See [FIGURE 13-55](#).



**FIGURE 13-55** Removing the Chassis Cross Brace

The PCI card support falls free from the chassis. Set the cross brace and PCI card support aside.

**5. Consider your next step.**

- If you removed the chassis cross brace prior to removing the motherboard, return to [Step 4 of “Removing the Motherboard” on page 11-48.](#)
- Otherwise, proceed to [“Installing the Chassis Cross Brace” on page 13-54.](#)

---

**Note** – Do not operate the workstation without the cross brace installed.

---

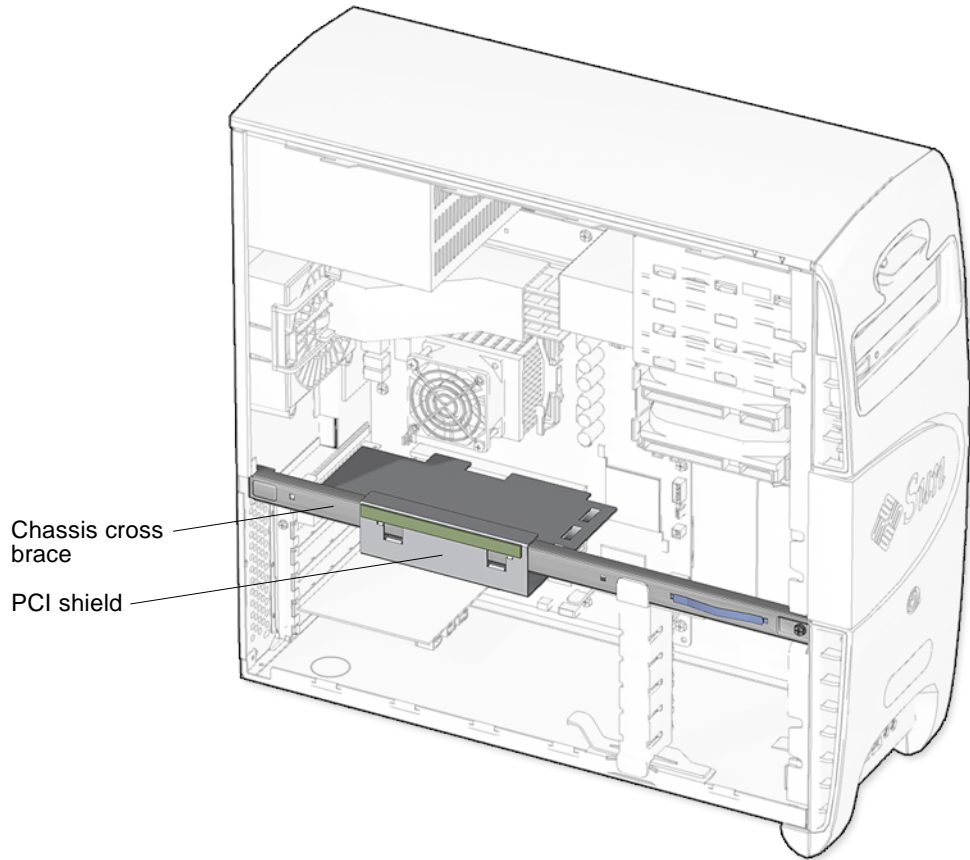
## 13.8.3 Installing the Chassis Cross Brace

1. **Open the chassis.**

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

2. **Locate where the cross brace is installed.**

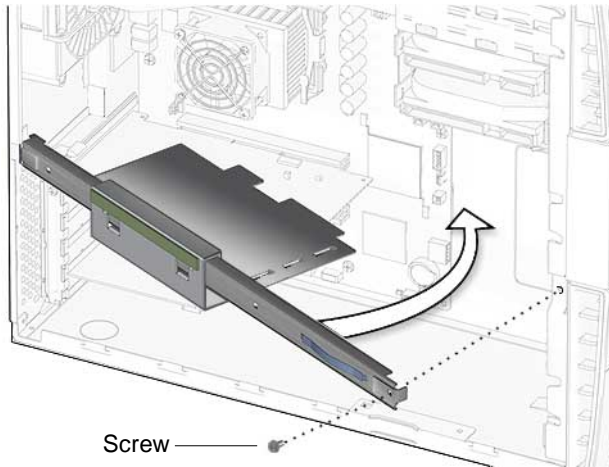
See [FIGURE 13-56.](#)



**FIGURE 13-56** PCI Shield on Chassis Cross Brace

**3. Install the chassis cross brace.**

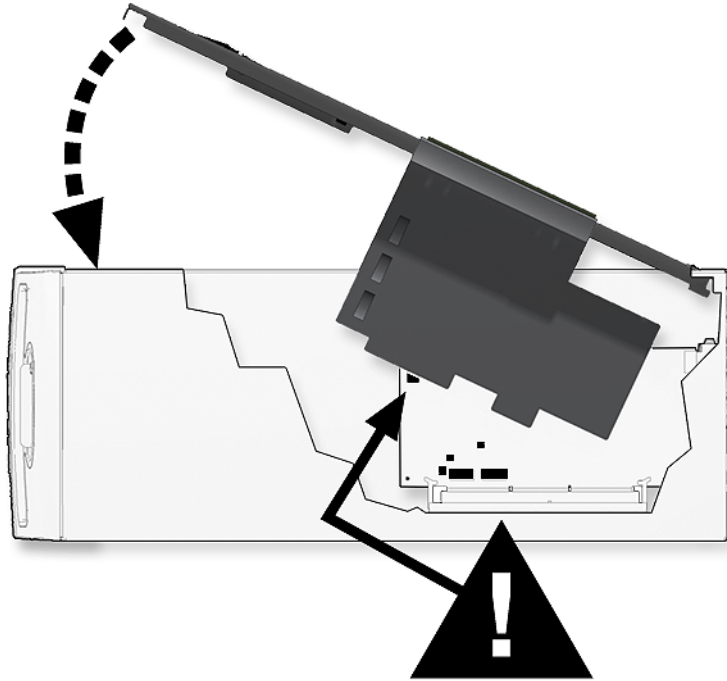
Insert the tab at the back end of the cross brace into the slot on the back panel of the chassis. Swing the front end of the cross brace toward the edge of the front panel. See [FIGURE 13-57](#).



**FIGURE 13-57** Swinging Chassis Cross Brace Into Position

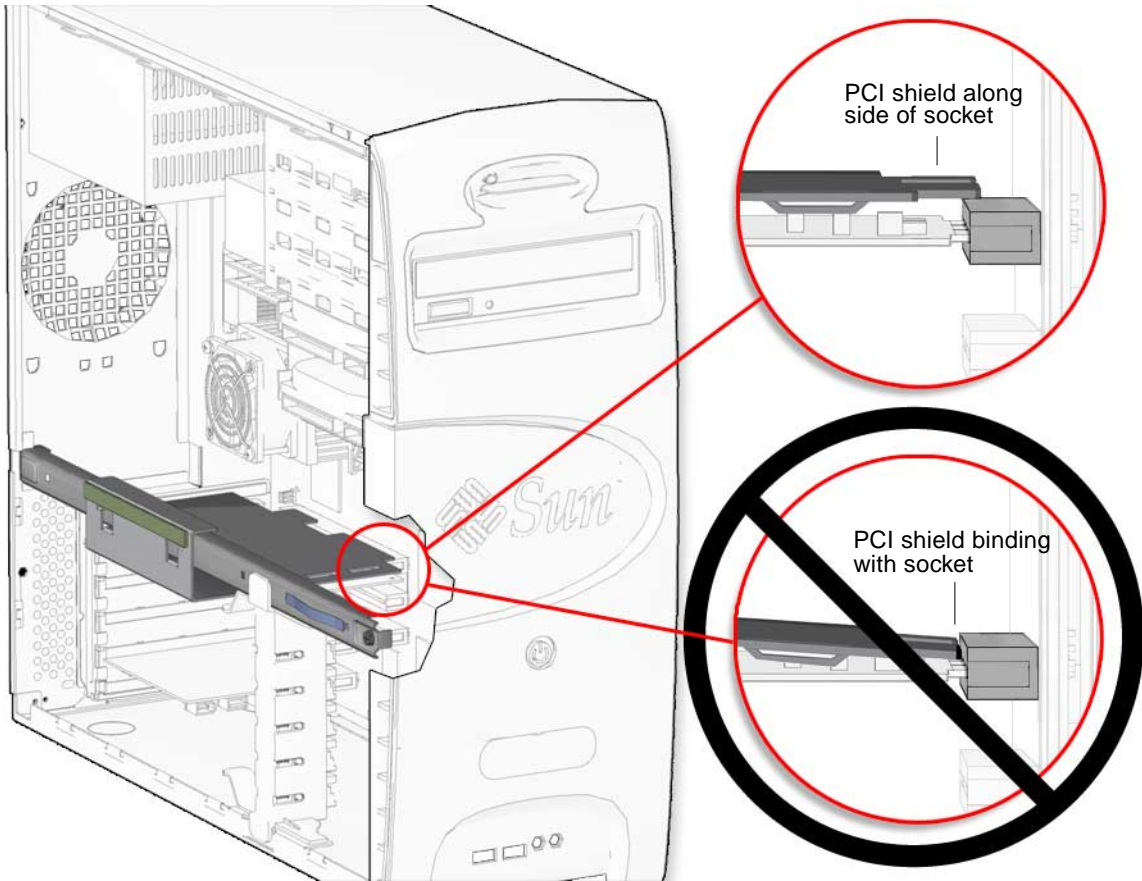
As you swing the chassis cross brace into position, check that the edge of the PCI shield does not strike components on the back of the PCI card in slot `PCI4`. See [FIGURE 13-58](#).





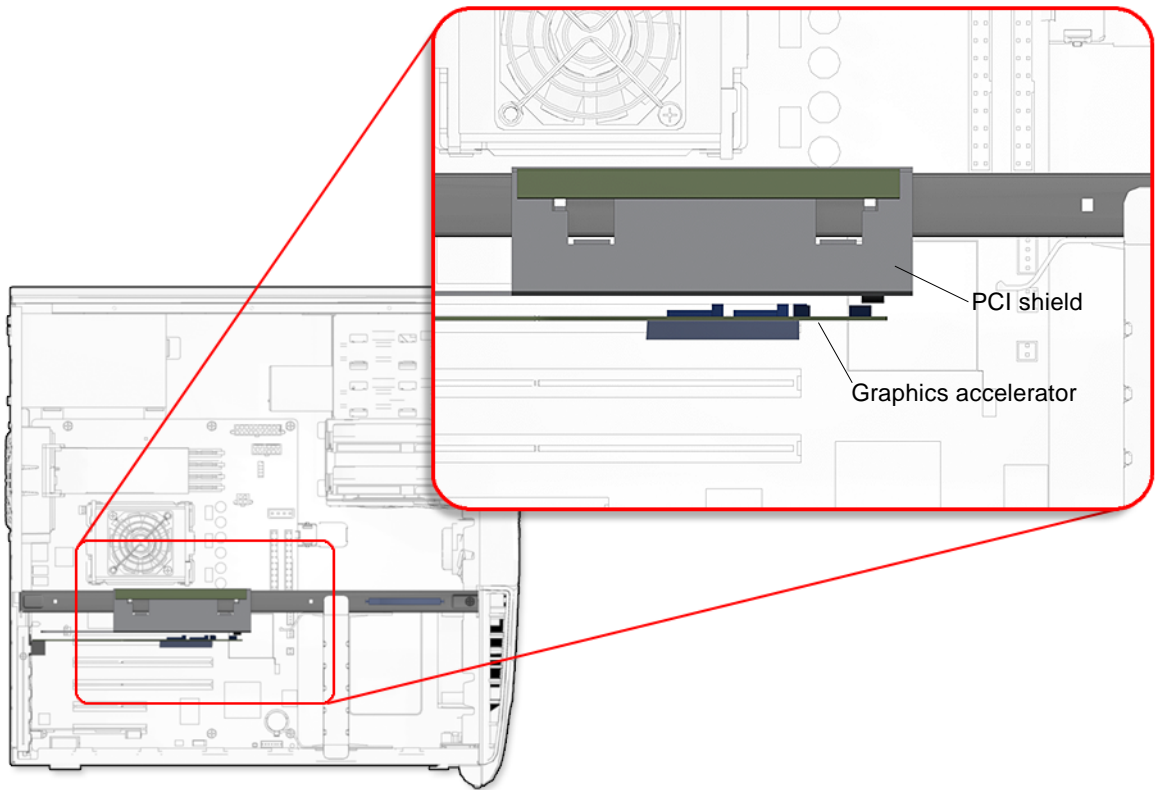
**FIGURE 13-58** Preventing PCI Shield From Striking Components

As the cross brace screw hole aligns with the respective hole in the chassis, ensure that the PCI shield is not binding on the socket of slot PCI4. See [FIGURE 13-59](#).



**FIGURE 13-59** Preventing PCI Shield From Binding With Socket

When properly installed, the PCI shield fits flat against the back side of the PCI card installed in slot PCI4. See [FIGURE 13-60](#).



**FIGURE 13-60** PCI Shield Fit to PCI Card in Slot PCI4

Using a No. 2 Phillips screwdriver, fasten the screw to secure the cross brace to the chassis.

#### **4. Decide your next step.**

- If you installed the chassis cross brace after installing the motherboard, return to [Step 16 of “Installing the Motherboard” on page 11-52.](#)
- Install the PCI card support, the access panel, and power on the system. Refer to:
  - [“Installing the PCI Card Support” on page 13-48](#)
  - [“Installing the Access Panel” on page 15-5](#)
  - [“Powering On the Workstation” on page 15-8](#)

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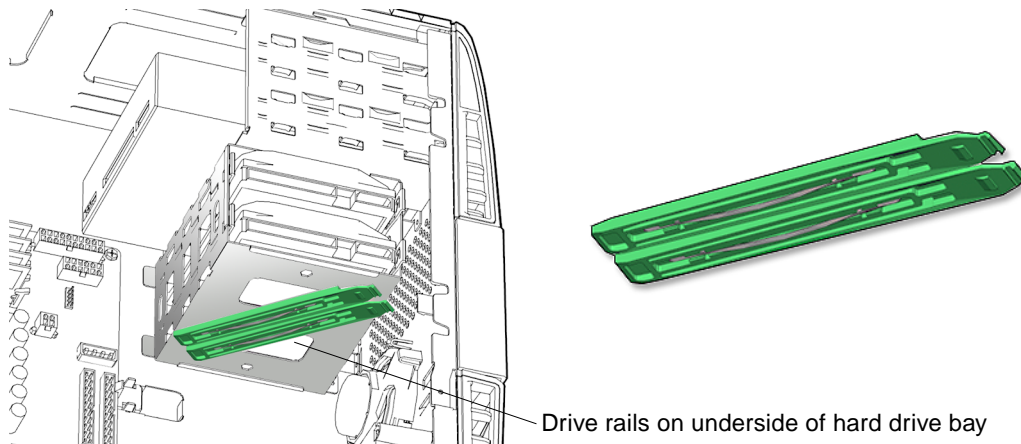
## 13.9 Replacing the Drive Rails

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

- “Identifying the Drive Rails” on page 13-60
- “Removing the Drive Rails” on page 13-60
- “Installing the Drive Rails” on page 13-62

### 13.9.1 Identifying the Drive Rails

The Sun Blade 1500 workstation drive rails guide the hard drives into the hard drive bay. The Sun Blade 1500 workstation supports up to two hard drives. When you are not using the second hard drive, the corresponding drive rails are stored on the underside of the hard drive bay. See [FIGURE 13-61](#).



**FIGURE 13-61** Drive Rails Location and Identification

### 13.9.2 Removing the Drive Rails

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

Refer to:

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

## 2. Remove the hard drive.

- If you are replacing an existing hard drive, refer to [“Replacing a Hard Drive” on page 12-2](#).
- If you are installing a new hard drive and not replacing an existing hard drive, proceed to [“Installing the Drive Rails” on page 13-62](#).

## 3. Locate the drive rails.

The drive rails are on the side of each hard drive.

## 4. Remove the drive rails.

Pull the green plastic drive rails off the sides of the hard drive. See [FIGURE 13-62](#). Set them aside.

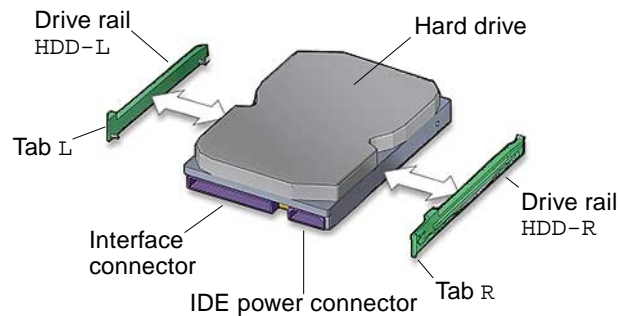


FIGURE 13-62 Removing the Drive Rails From the Hard Drive

## 5. If you are going to replace the hard drive, proceed to [“Installing the Drive Rails” on page 13-62](#).

## 6. Store the drive rails, if needed.

If you are not going to immediately replace the hard drive with a new one:

### a. Store the drive rails on the underside of the hard drive bay.

See [FIGURE 13-61](#).

### b. Install the access panel, and power on the system.

Refer to:

- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)

## 13.9.3 Installing the Drive Rails

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

Refer to:

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

### 2. Remove the spare drive rails from their storage position, if needed.

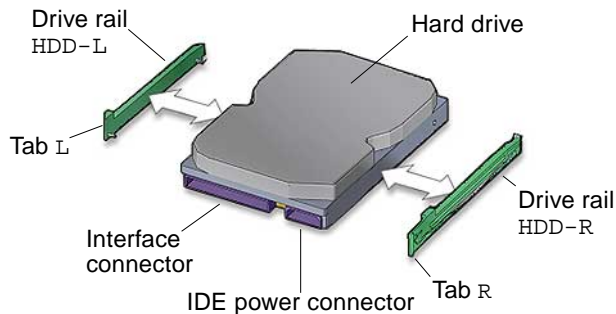
The drive rails are stored on the side of the underside of the hard drive bay. Unsnap them from their storage location. See [FIGURE 13-61](#).

### 3. Locate the hard drive.

Whether you are replacing an existing hard drive or installing a new second hard drive, refer to [“Replacing a Hard Drive” on page 12-2](#).

### 4. Install the drive rails.

Snap both drive rails into the holes on both sides of the hard drive, with the lettering on the drive rails (HDD-L and HDD-R) upright, and the drive rail tabs toward the hard drive power and interface connectors. See [FIGURE 13-63](#).



**FIGURE 13-63** Installing the Drive Rails to the Hard Drive

Proceed to and complete [“Replacing a Hard Drive” on page 12-2](#).

## Replacing Internal Cables

---

Components in the Sun Blade 1500 workstation is connected to the motherboard through a collection of interface, signal, and power cables. Interface cables, for the smart card reader, DVD-ROM drive, hard drives, and the audio USB board are of a ribbon style. This chapter describes the remove and installation procedures for the Sun Blade 1500 workstation internal cabling.

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

This chapter contains the following topics:

- “Replacing the Smart Card Reader Cable” on page 14-3
- “Replacing the DVD-ROM Drive Interface Cable” on page 14-6
- “Replacing the Hard Drive Interface Cable” on page 14-10
- “Replacing the IDE Power Cable” on page 14-13
- “Replacing the Power Switch Assembly” on page 14-17
- “Replacing the Audio USB Board Cables” on page 14-23



---

**Caution** – To prevent equipment damage, review the safety requirements, safety symbols, and safety precautions in “Preparing to Replace Components” on page 10-1 before you perform any replacement procedure. Additional cautions, warnings, and instructions are provided in the *Sun Blade 1500 Safety and Compliance Guide*, 816-7566. The document is available from:

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

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

---



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

---

The Sun Blade 1500 replaceable cables come as a set that includes:

- Smart card reader cable
- Removable media interface cable
- Hard drive interface cable
- IDE power cable
- Power switch assembly
- Audio USB board cables (two)

[FIGURE 14-1](#) shows cable connectors and slots for the Sun Blade 1500 motherboard.



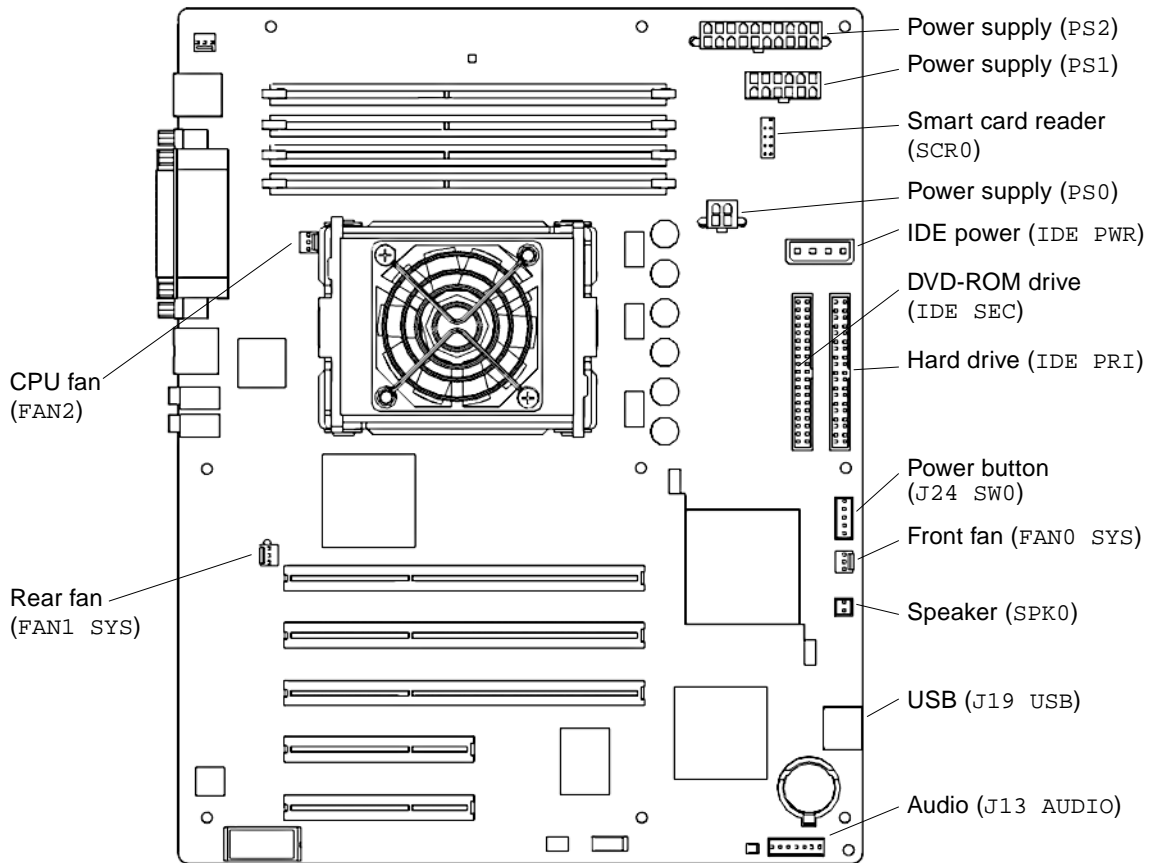


FIGURE 14-1 Sun Blade 1500 Workstation Motherboard Cable Connections

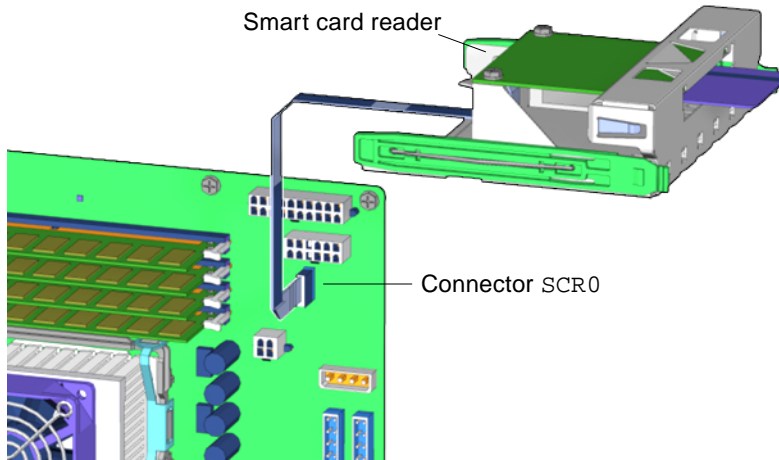
## 14.1 Replacing the Smart Card Reader Cable

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

- [“Identifying the Smart Card Reader Cable” on page 14-4](#)
- [“Removing the Smart Card Reader Cable” on page 14-4](#)
- [“Installing the Smart Card Reader Cable” on page 14-5](#)

## 14.1.1 Identifying the Smart Card Reader Cable

The smart card cable connects the smart card reader to the motherboard at SCR0. It is a 10-conductor ribbon cable. [FIGURE 14-2](#) shows the smart card reader cable connections.



**FIGURE 14-2** Smart Card Reader Cable Connection

## 14.1.2 Removing the Smart Card Reader Cable

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

Refer to:

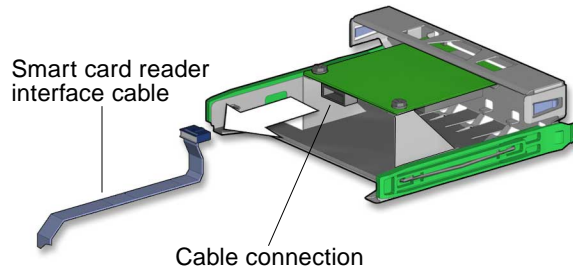
- [“Powering Off the Workstation”](#) on page 10-4
- [“Removing the Access Panel”](#) on page 10-12
- [“Removing the Bezel”](#) on page 10-14

- 2. Remove the smart card reader bracket.**

Refer to [“Removing the Smart Card Reader”](#) on page 12-16. Do not remove the smart card reader from the bracket.

- 3. Remove the interface cable from the smart card reader.**

Pull the interface cable from the connector on the smart card reader. Set the cable aside. See [FIGURE 14-3](#).



**FIGURE 14-3** Disconnecting the Cable From the Smart Card Reader

Proceed to [“Installing the Smart Card Reader Cable”](#) on page 14-5.

---

**Note** – The smart card reader will not operate without the interface cable.

---

## 14.1.3 Installing the Smart Card Reader Cable

### 1. Open the chassis and remove the bezel.

Refer to:

- [“Powering Off the Workstation”](#) on page 10-4
- [“Removing the Access Panel”](#) on page 10-12
- [“Removing the Bezel”](#) on page 10-14

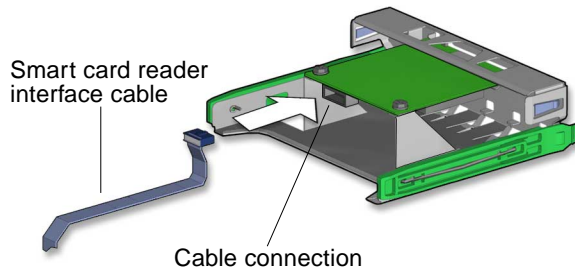
### 2. Locate where the smart card reader cable is to be installed.

The cable connects to the smart card reader and to the motherboard at SCR0. See [FIGURE 14-1](#) and [FIGURE 14-2](#).

### 3. Remove the smart card reader cable from its packaging.

### 4. Connect the interface cable to the smart card reader.

With the smart card reader bracket on an antistatic mat, plug the interface cable into the smart card reader. See [FIGURE 14-4](#).



**FIGURE 14-4** Connecting the Cable to the Smart Card Reader

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

Refer to [Step 7](#) of “[Installing the Smart Card Reader](#)” on page 12-20.

**6. Inspect the cabling.**

- The interface cable is routed correctly through the reader cable clip, with a minimum of kinks.
- The interface cable is secure in the smart card reader connector.
- The interface cable is secure in the motherboard connector SCR0.

**7. Finishing up.**

Install the bezel, the access panel, power on the system, and verify the smart card reader cable installation. Refer to:

- “[Installing the Bezel](#)” on page 15-2
- “[Installing the Access Panel](#)” on page 15-5
- “[Powering On the Workstation](#)” on page 15-8
- “[Verifying an Installation](#)” on page 15-11

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## 14.2 Replacing the DVD-ROM Drive Interface Cable

This section describes removal and installation of the DVD-ROM drive interface cables. Topics include:

- “[Identifying the DVD-ROM Drive Interface Cable](#)” on page 14-7
- “[Removing the DVD-ROM Drive Interface Cable](#)” on page 14-7
- “[Installing the DVD-ROM Drive Interface Cable](#)” on page 14-8

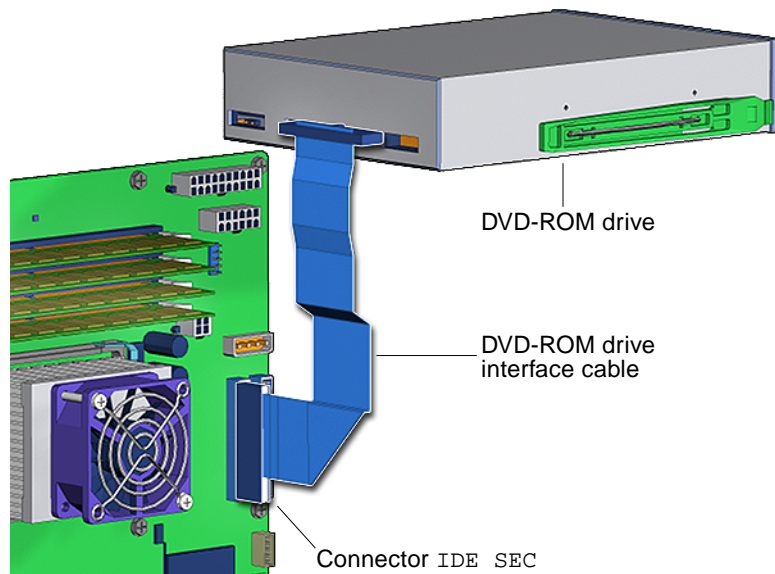
## 14.2.1 Identifying the DVD-ROM Drive Interface Cable

The DVD-ROM has separate power and interface cables. The power cable is a Y cable that connects to the motherboard at `IDE_PWR` and the other ends to the hard drives and DVD-ROM drive. The interface cable connects the DVD-ROM drive to the motherboard at `IDE_SEC`. The interface cable is a 40-conductor ribbon cable that is routed through the chassis. [FIGURE 14-5](#) shows the DVD-ROM drive interface cable connections.

---

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

---



**FIGURE 14-5** DVD-ROM Drive Interface Cable Connection

## 14.2.2 Removing the DVD-ROM Drive Interface Cable

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

Refer to:

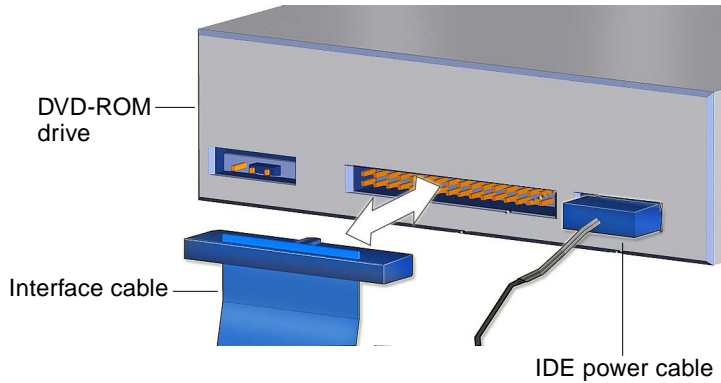
- [“Powering Off the Workstation” on page 10-4](#)
- [“Removing the Access Panel” on page 10-12](#)

**2. Locate the DVD-ROM drive interface cable.**

The DVD-ROM drive is located in the upper portion of the chassis. The DVD-ROM drive cable is located to the back of the DVD-ROM drive. See [FIGURE 14-5](#).

**3. Disconnect the DVD-ROM drive interface cable from the DVD-ROM drive.**

See [FIGURE 14-6](#).



**FIGURE 14-6** Disconnecting the Interface Cable From the DVD-ROM Drive

**4. Disconnect the DVD-ROM drive interface cable from the motherboard at IDE SEC.**

See [FIGURE 14-1](#) and [FIGURE 14-5](#).

Proceed to [“Installing the DVD-ROM Drive Interface Cable”](#) on page 14-8.

---

**Note** – The DVD-ROM drive will not operate without the interface cable.

---

## 14.2.3 Installing the DVD-ROM Drive Interface Cable

**1. Open the chassis.**

Refer to:

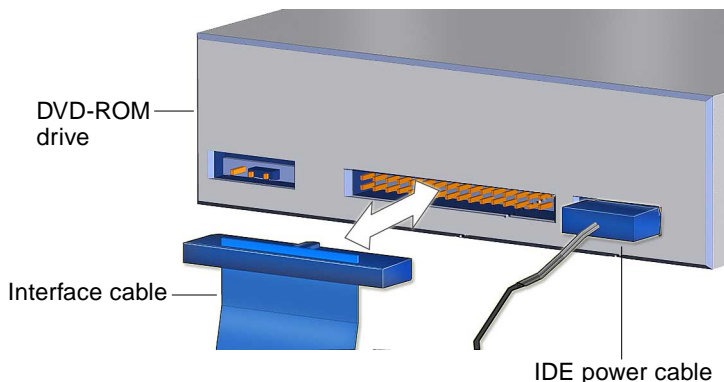
- [“Powering Off the Workstation”](#) on page 10-4
- [“Removing the Access Panel”](#) on page 10-12

**2. Locate where the DVD-ROM drive interface cable is to be installed.**

See [FIGURE 14-5](#).

### 3. Connect the interface cable to the DVD-ROM drive.

Connect the interface cable into the DVD-ROM drive interface connector. See [FIGURE 14-7](#).



**FIGURE 14-7** Connecting the Interface Cable to the DVD-ROM Drive

### 4. Route the interface cable through the chassis.

---

**Note** – The interface cable is a flat cable and can be bent to fit. Use caution not to fold the cable too much as it can be damaged.

---

### 5. Connect the interface cable into the motherboard at IDE SEC.

See [FIGURE 14-1](#) and [FIGURE 14-5](#).

### 6. Inspect the cabling.

- The interface cable is secure in the DVD-ROM drive connector.
- The interface cable is secure in the motherboard connector IDE SEC.

### 7. Finishing up.

Install the access panel, power on the system, and verify the DVD-ROM drive interface cable installation. Refer to:

- “Installing the Access Panel” on page 15-5
- “Powering On the Workstation” on page 15-8
- “Verifying an Installation” on page 15-11

---

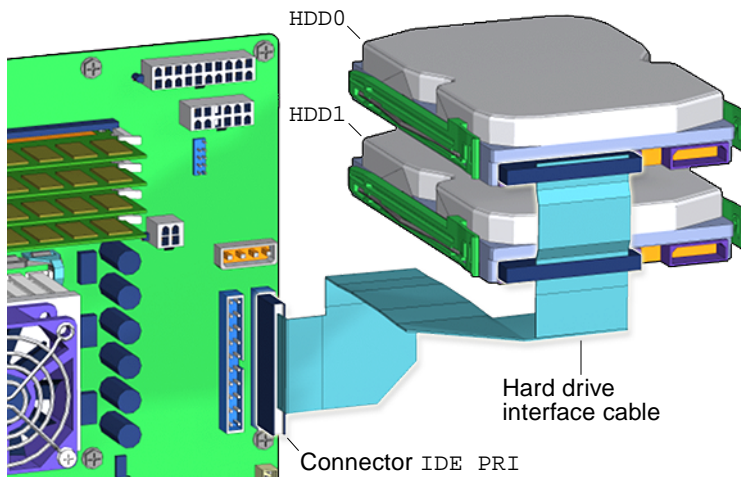
## 14.3 Replacing the Hard Drive Interface Cable

This section describes removal and installation of the hard drive interface cables. Topics include:

- “Identifying the DVD-ROM Drive Interface Cable” on page 14-7
- “Removing the DVD-ROM Drive Interface Cable” on page 14-7
- “Installing the DVD-ROM Drive Interface Cable” on page 14-8

### 14.3.1 Identifying the Hard Drive Interface Cable

The hard drives have separate power and interface cables. Both cables have two inline connectors to support up to two drives. The power cable is a Y cable that connects to the motherboard at IDE PWR and the other ends to the hard drives and DVD-ROM drive. The interface cable connects the hard drives to the motherboard. The interface cable is an 80-conductor ribbon cable that is routed through the chassis. [FIGURE 14-8](#) shows the hard drive interface cable connections.



**FIGURE 14-8** Hard Drive Interface Cable Connection



## 14.3.2 Removing the Hard Drive Interface Cable

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

Refer to:

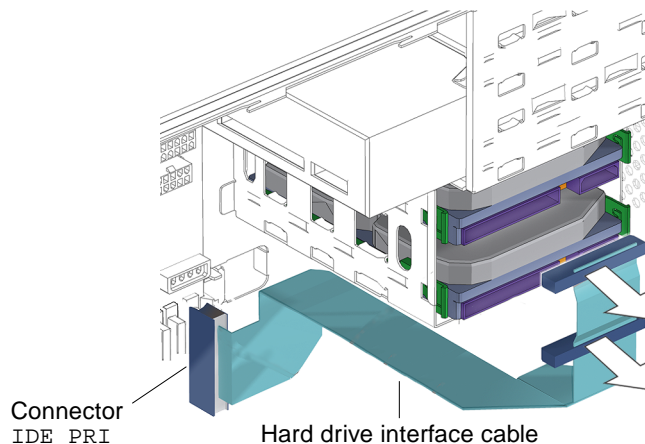
- “Powering Off the Workstation” on page 10-4
- “Removing the Access Panel” on page 10-12

### 2. Locate the hard drive interface cable.

The hard drive is located in the mid-front portion of the chassis. The hard drive cables are easily accessible. See [FIGURE 14-8](#).

### 3. Disconnect the hard drive interface cable from the upper hard drive.

See [FIGURE 14-9](#).



**FIGURE 14-9** Disconnecting the Interface Cable From the Hard Drive(s)

### 4. Disconnect the interface cable from the lower hard drive (if installed).

See [FIGURE 14-9](#).

### 5. Disconnect the hard drive interface cable from the motherboard at IDE PRI.

See [FIGURE 14-1](#) and [FIGURE 14-9](#).

Proceed to “[Installing the Hard Drive Interface Cable](#)” on page 14-12.

---

**Note** – The hard drive will not operate without the interface cable.

---

## 14.3.3 Installing the Hard Drive Interface Cable

### 1. Open the chassis.

Refer to:

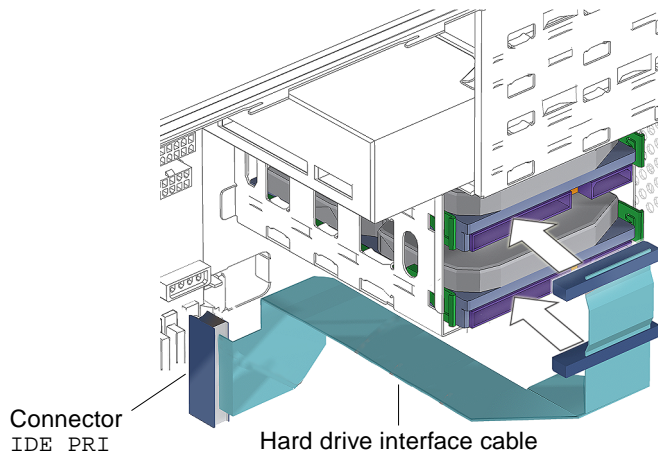
- “Powering Off the Workstation” on page 10-4
- “Removing the Access Panel” on page 10-12

### 2. Locate where the hard drive interface cable is to be installed.

See [FIGURE 14-8](#).

### 3. Connect the interface cable to the hard drive.

Connect the interface cable into the hard drive interface connector. Connect the upper drive using the connector at the end of the interface cable labeled HDD0. If you have two hard drives, connect the lower drive using the interface cable's inline connector HDD1. See [FIGURE 14-10](#).



**FIGURE 14-10** Connecting the Interface Cable to the Hard Drive(s)

### 4. Route the interface cable through the chassis.

---

**Note** – The interface cable is a flat cable and can be bent to fit. Use caution not to fold the cable too much as it can be damaged.

---

### 5. Connect the interface cable into the motherboard at IDE PRI.

See [FIGURE 14-1](#) and [FIGURE 14-10](#).

### 6. Inspect the cabling.

- The interface cable is secure in the hard drive connector.
- The interface cable is secure in the motherboard connector `IDE_PRI`.

#### 7. Finishing up.

Install the access panel, power on the system, and verify the hard drive interface cable installation. Refer to:

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

---

## 14.4 Replacing the IDE Power Cable

This section describes the removal and installation of the IDE power cable. Topics include:

- [“Identifying the IDE Power Cable” on page 14-13](#)
- [“Removing the IDE Power Cable” on page 14-14](#)
- [“Installing the IDE Power Cable” on page 14-16](#)

### 14.4.1 Identifying the IDE Power Cable

The IDE power cable is a Y cable that attaches to the motherboard at `IDE_PWR`. One branch of the cable goes to the power connector on the rear of the DVD-ROM drive. The other branch has two connectors and attaches to the hard drives; the end connector attaches to `HDD0`, the other connector to `HDD1`. [FIGURE 14-11](#) shows the IDE power cable connections.

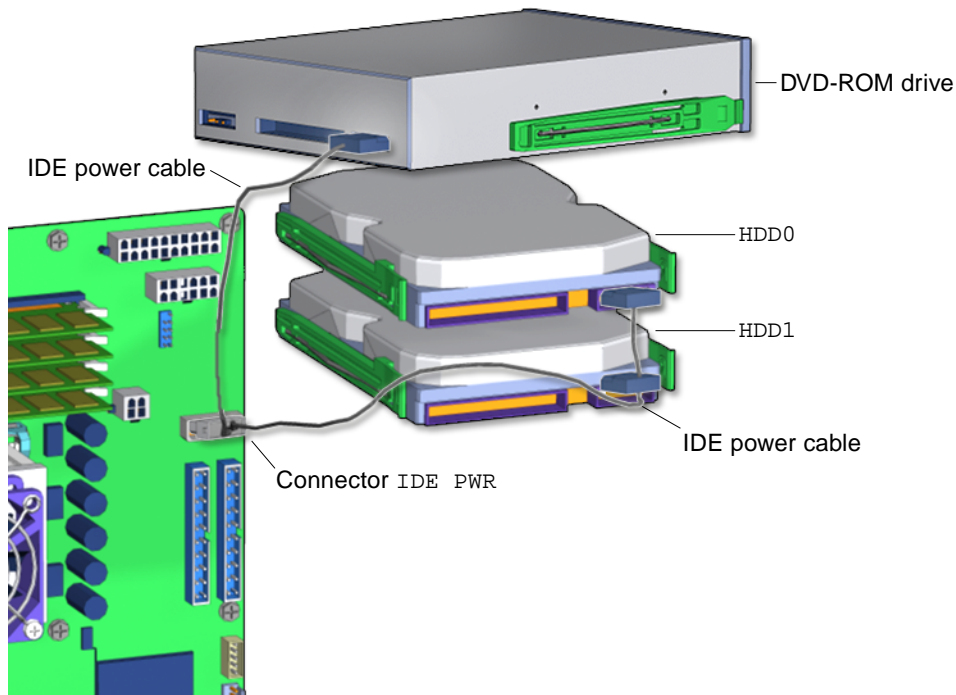


FIGURE 14-11 IDE Power Cable Connections

## 14.4.2 Removing the IDE Power Cable

---

**Note** – IDE power connectors fit tightly. Disconnect the cable by wiggling the connector side to side while pulling it away from the drive or motherboard.

---

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

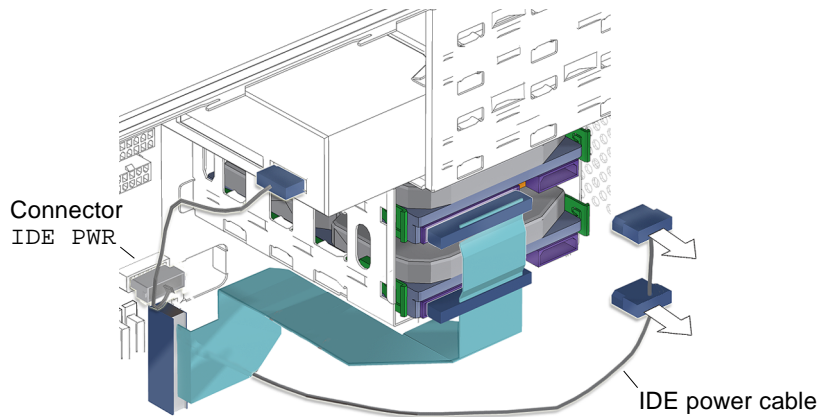
Refer to:

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

### 2. Locate the IDE power cable.

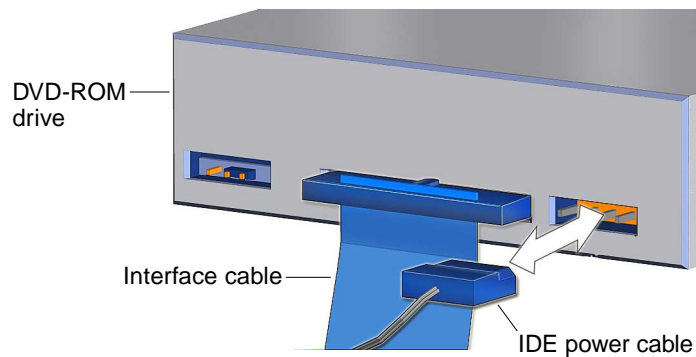
The IDE power cable is located in the upper portion of the chassis. It connects to the DVD-ROM drive, the hard drive(s), and the motherboard. See [FIGURE 14-11](#).

3. **Disconnect the IDE power cables from the upper hard drive HDD0.**  
See [FIGURE 14-12](#).



**FIGURE 14-12** Disconnecting the IDE Power Cable From the Hard Drive(s)

4. **If installed, disconnect the IDE power cable from the lower hard drive HDD1.**  
See [FIGURE 14-12](#).
5. **Disconnect the IDE power cable from the DVD-ROM drive.**  
See [FIGURE 14-13](#).



**FIGURE 14-13** Disconnecting the IDE Power Cable From the DVD-ROM Drive

**6. Disconnect the IDE power cable from the motherboard at IDE PWR.**

See [FIGURE 14-1](#) and [FIGURE 14-12](#).

Proceed to “[Installing the IDE Power Cable](#)” on page 14-16.

---

**Note** – The DVD-ROM drive and hard drive(s) do not operate without the IDE power cable.

---

## 14.4.3 Installing the IDE Power Cable

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

Refer to:

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

**2. Locate where the IDE power cable is to be installed.**

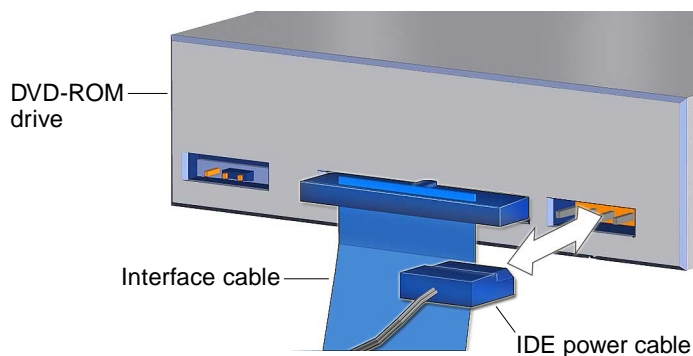
See [FIGURE 14-11](#).

**3. Connect the center connector of the IDE power cable to the motherboard at IDE PWR.**

The center connector is at the vertex of the Y. See [FIGURE 14-1](#) and [FIGURE 14-15](#).

**4. Connect the branch of the IDE power cable with the solitary connector to the DVD-ROM drive.**

See [FIGURE 14-14](#).

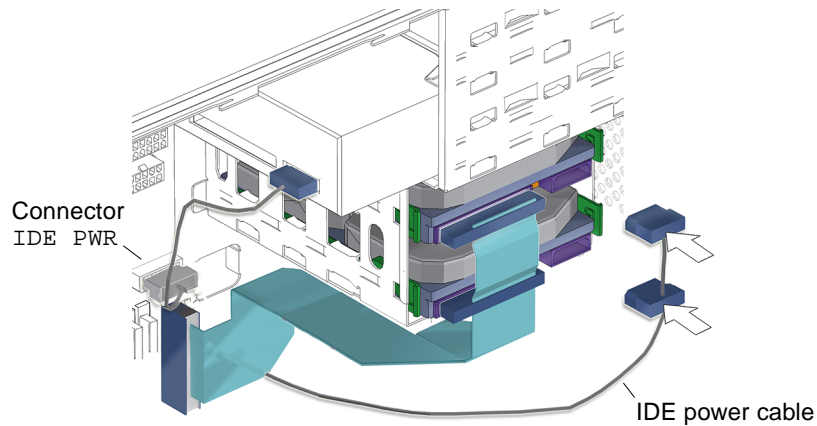


**FIGURE 14-14** Connecting the IDE Power Cable to the DVD-ROM Drive

**5. Connect the other branch to the hard drive(s).**

**a. Attach the end connector to the upper hard drive HDD0.**

See [FIGURE 14-15](#).



**FIGURE 14-15** Connecting the IDE Power Cable to the Hard Drive(s)

**b. If installed, attach the remaining connector to the lower hard drive HDD1.**

See [FIGURE 14-15](#).

**6. Inspect the cabling.**

- The IDE power cable is secure in the DVD-ROM drive connector.
- The IDE power cable is secure in the hard drive connector(s).
- The IDE power cable is secure in the motherboard connector `IDE PWR`.

**7. Finishing up.**

Install the access panel, power on the system, and verify the IDE power cable installation. Refer to:

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

---

## 14.5 Replacing the Power Switch Assembly

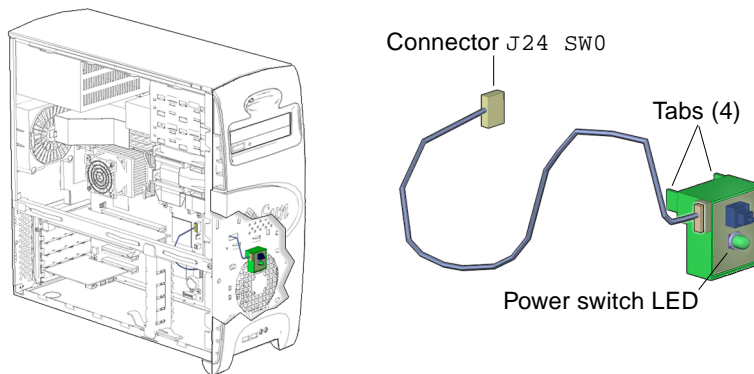
This section describes removal and installation of the power switch assembly. Topics include:

- [“Identifying the Power Switch Assembly” on page 14-18](#)

- [“Removing the Power Switch Assembly” on page 14-18](#)
- [“Installing the Power Switch Assembly” on page 14-20](#)

## 14.5.1 Identifying the Power Switch Assembly

The power switch assembly signals the workstation to power up or power down. It has a single LED light to indicate power-on status. Signal and power is provided through a cable connected to the motherboard at J24 SW0. [FIGURE 14-16](#) shows the location of and identifies the power switch assembly.



**FIGURE 14-16** Power Switch Assembly Location and Identification

[TABLE 14-1](#) lists the power switch assembly specifications.

**TABLE 14-1** Power Switch Assembly Specifications

Specification	Value
Voltage	1-20 Volts
Current	5 Amps
Type	SPST intermittent

## 14.5.2 Removing the Power Switch Assembly

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

Refer to:

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



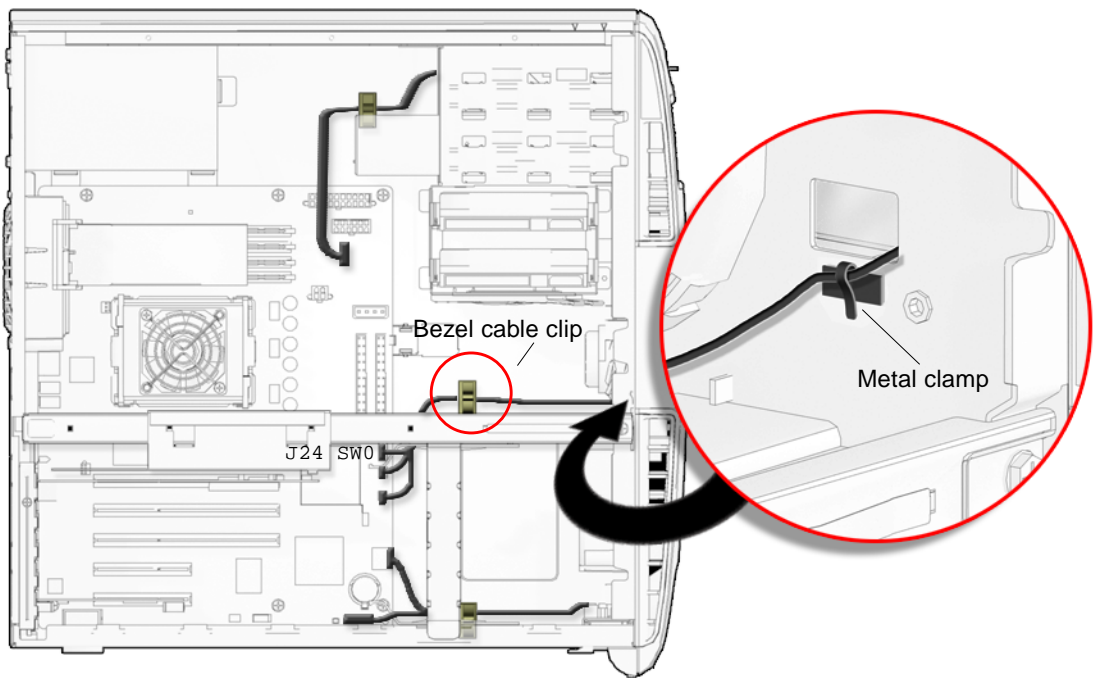
- “Removing the Access Panel” on page 10-12
- “Removing the Bezel” on page 10-14

**2. Locate the power switch assembly.**

The power switch assembly cable is fed through the front of the chassis, just above the front fan, and is fastened to the chassis with a small green bracket. See [FIGURE 14-16](#).

**3. Remove the power switch assembly cable from the bezel cable clip and metal clamp.**

Open the bezel cable clip in the center of the chassis and remove the power switch assembly cable from the clip. See [FIGURE 14-17](#).

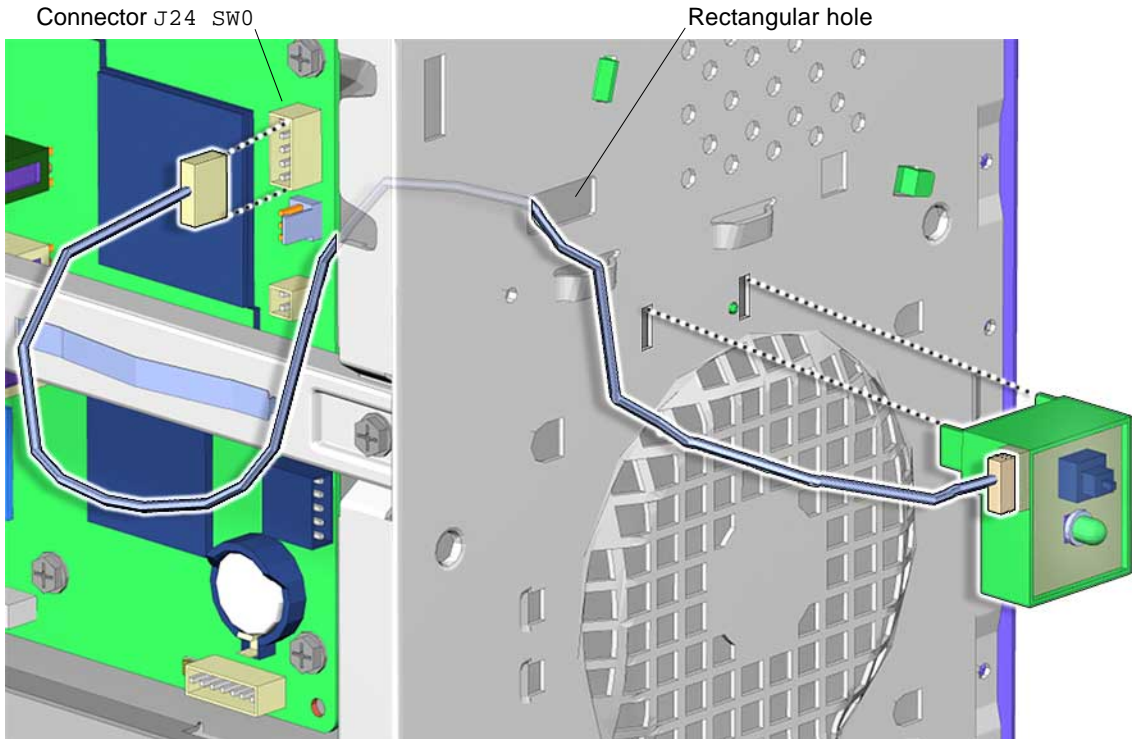


**FIGURE 14-17** Removing the Power Switch Assembly Cable From the Bezel Cable Clip and Metal Clamp

Open the metal clamp and remove the power switch assembly cable. See [FIGURE 14-17](#).

**4. Disconnect the power switch assembly cable from the motherboard.**

The power switch assembly cable is connected to connector J24 SW0 on the motherboard. See [FIGURE 14-18](#).



**FIGURE 14-18** Removing the Power Switch Assembly

**5. Release the power switch assembly.**

Squeeze the tabs on either side of the power switch assembly and tilt it out and away from the front panel. Lift the power switch assembly up and away from the chassis. Feed the power switch assembly cable through the opening in the front panel as you lift away the power switch assembly. See [FIGURE 14-18](#).

Proceed to [“Installing the Power Switch Assembly”](#) on page 14-20.

---

**Note** – The workstation will not operate without the power switch assembly.

---

## 14.5.3 Installing the Power Switch Assembly

**1. Open the chassis and remove the bezel.**

Refer to:

- “Removing the Access Panel” on page 10-12
- “Removing the Bezel” on page 10-14

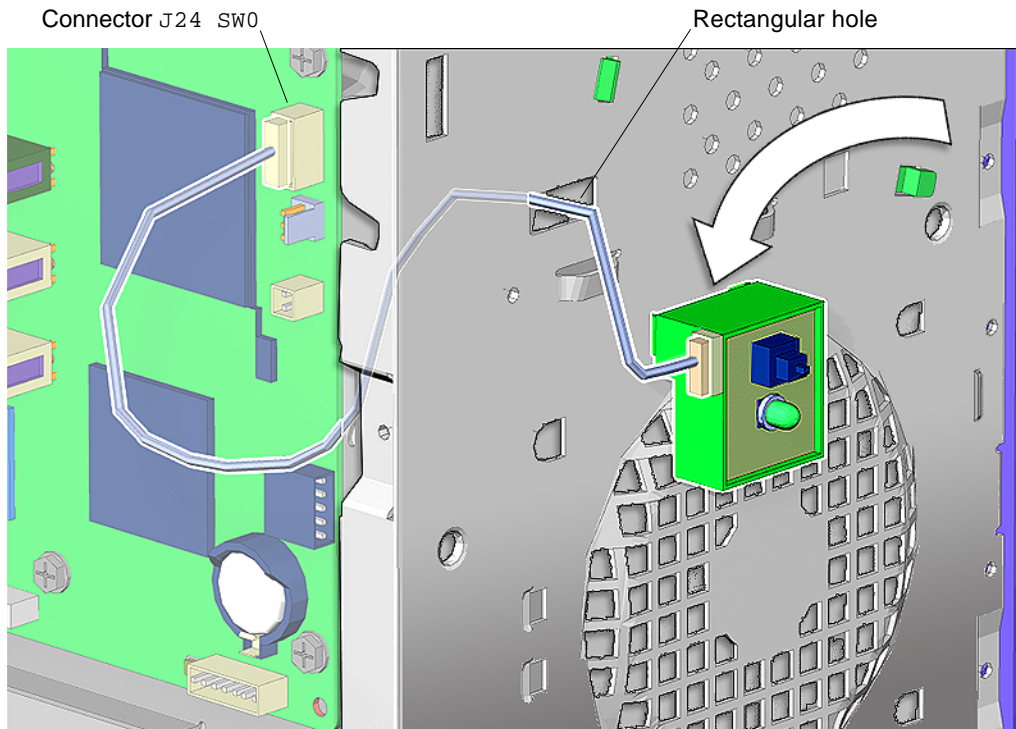
**2. Locate where the power switch assembly is to be installed.**

The power switch assembly mounts to the chassis front panel. It attaches to the front fan grille and to the four holes above the grille. See [FIGURE 14-16](#).

**3. Remove the new power switch assembly from its packaging.**

**4. Route the power switch assembly cable.**

The power switch assembly cable routes through the rectangular hole in the chassis front panel above the front fan, through the metal clamp, and through the bezel cable clip. The cable connects to the connector on the motherboard at J24 SW0. See [FIGURE 14-19](#) and [FIGURE 14-20](#).



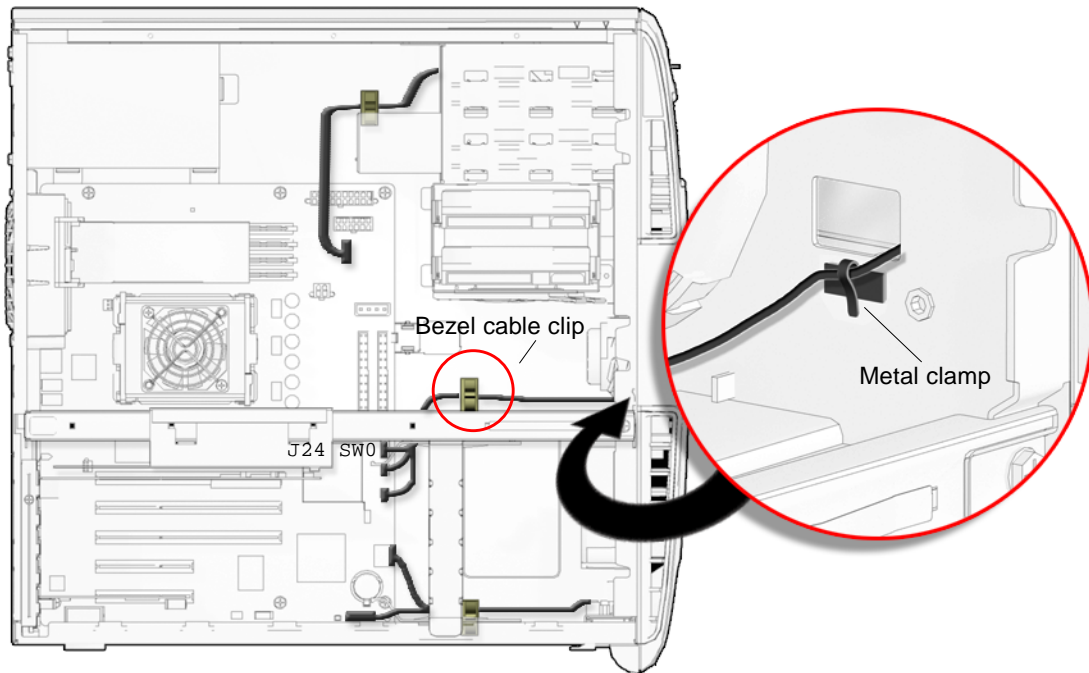
**FIGURE 14-19** Routing the Power Switch Assembly Cable

**5. Fasten the power switch assembly.**

Hook the two lower feet of the power switch assembly into the third and fourth holes in the second row of the front fan grille. Rock the power switch assembly back to snap the two upper feet and tabs into the four holes. Make sure the power switch assembly is fully seated against the chassis front panel. See [FIGURE 14-19](#).

**6. Secure the power switch assembly cable to the metal clamp and bezel cable clip.**

See [FIGURE 14-20](#).



**FIGURE 14-20** Securing the Power Switch Assembly Cable to the Bezel Cable Clip and Metal Clamp

**7. Inspect the power switch assembly fasteners.**

The power switch assembly bracket feet are well seated in the chassis.

**8. Inspect the power switch assembly cabling.**

- The power switch assembly cable is firmly connected to the motherboard at J24 SW0.
- The power switch assembly cable is secure in the metal clamp and bezel cable clip.

## 9. Finishing up.

Install the bezel, the access panel, power on the system, and verify the power switch assembly installation. Refer to:

- [“Installing the Bezel” on page 15-2](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

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# 14.6 Replacing the Audio USB Board Cables

This section describes removal and installation of the audio USB board interface cables. Topics include:

- [“Identifying Audio USB Board Cables” on page 14-23](#)
- [“Removing the Audio USB Board Cables” on page 14-24](#)
- [“Installing the Audio USB Board Cables” on page 14-27](#)

## 14.6.1 Identifying Audio USB Board Cables

The audio USB board has two separate cable sets, one for audio and one for USB. The audio signals are carried by three shielded multi-conductor cables connecting to the motherboard at J13 AUDIO. The USB interface cable is a 10-conductor ribbon cable connecting at J19 USB. [FIGURE 14-21](#) shows the audio USB board cable connections.

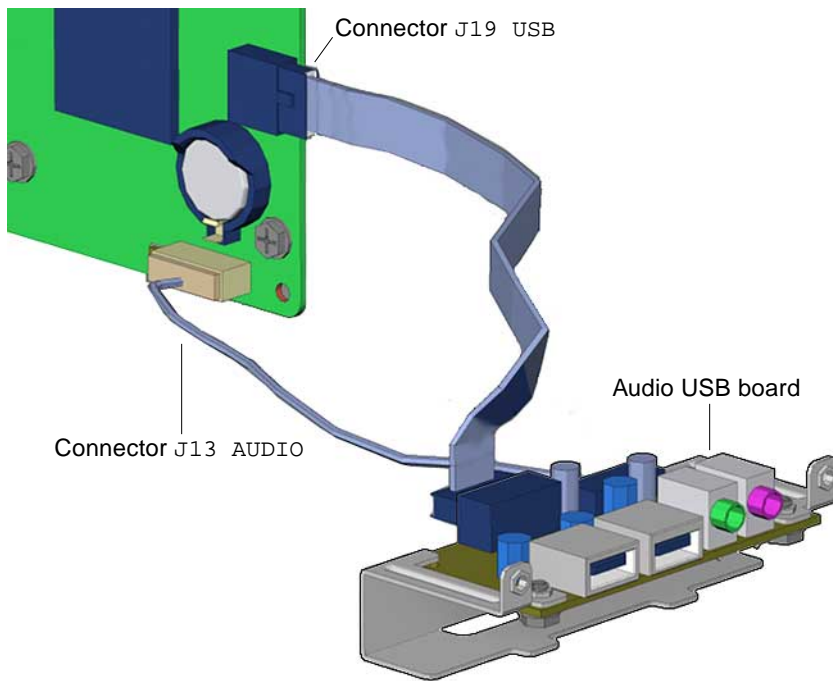


FIGURE 14-21 Audio USB Board Cable Connections

## 14.6.2 Removing the Audio USB Board Cables

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

Refer to:

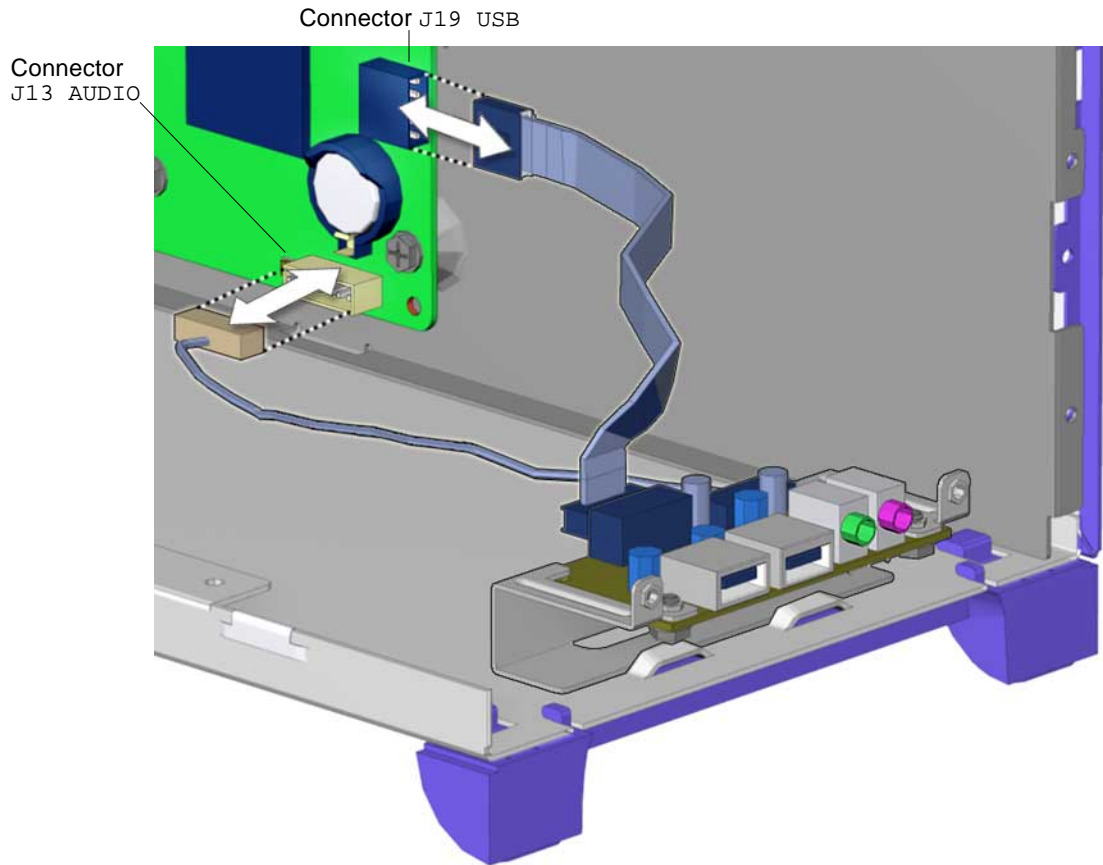
- “Powering Off the Workstation” on page 10-4
- “Removing the Access Panel” on page 10-12

### 2. Locate the audio USB board cables.

The audio USB board is located in the lower front portion of the chassis. The audio USB board cables are located on the back of the audio USB board. See [FIGURE 14-21](#).

### 3. Disconnect the audio USB board interface cables from the motherboard.

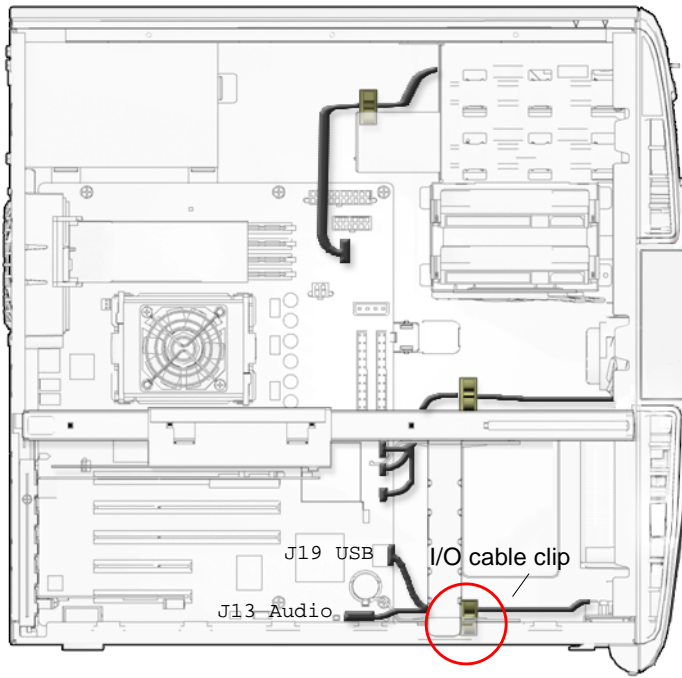
The audio signal cable is connected to the motherboard at J13 AUDIO. The USB interface cable is connected to the motherboard at J19 USB. See [FIGURE 14-22](#).



**FIGURE 14-22** Removing Audio and USB Cables From the Motherboard

**4. Remove the cables from the I/O cable clip.**

Open the I/O cable clip at the bottom of the chassis and remove the audio USB board cables from the clip. See [FIGURE 14-23](#).



**FIGURE 14-23** Removing the Audio USB Cables From the I/O Cable Clip

- 5. Disconnect the cables from both the audio and the USB connectors on the audio USB board.**

See [FIGURE 14-24](#).



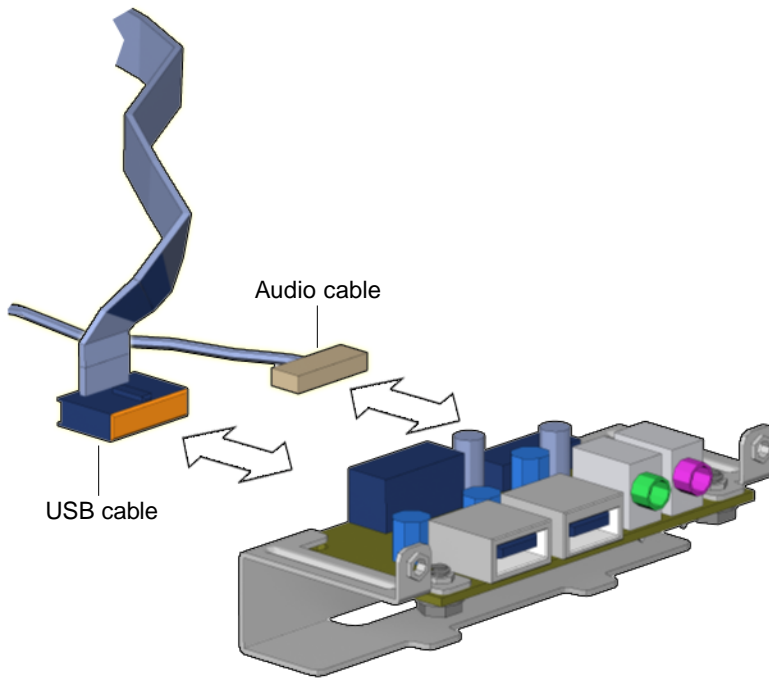


FIGURE 14-24 Disconnecting Cables From the Audio USB Board

Proceed to [“Installing the Audio USB Board Cables”](#) on page 14-27.

---

**Note** – The audio USB board will not operate without the cables.

---

## 14.6.3 Installing the Audio USB Board Cables

### 1. Open the chassis.

Refer to:

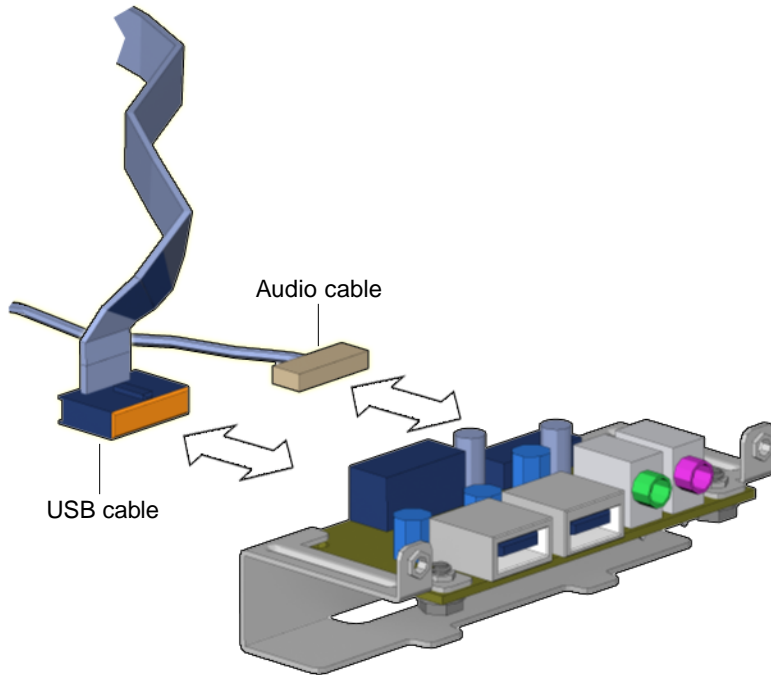
- [“Powering Off the Workstation”](#) on page 10-4
- [“Removing the Access Panel”](#) on page 10-12

### 2. Locate where the audio USB board interface cables are to be installed.

The audio USB board has two cables: the audio signal cable and the USB interface cable. See [FIGURE 14-21](#).

**3. Connect the audio USB board cables to the audio USB board.**

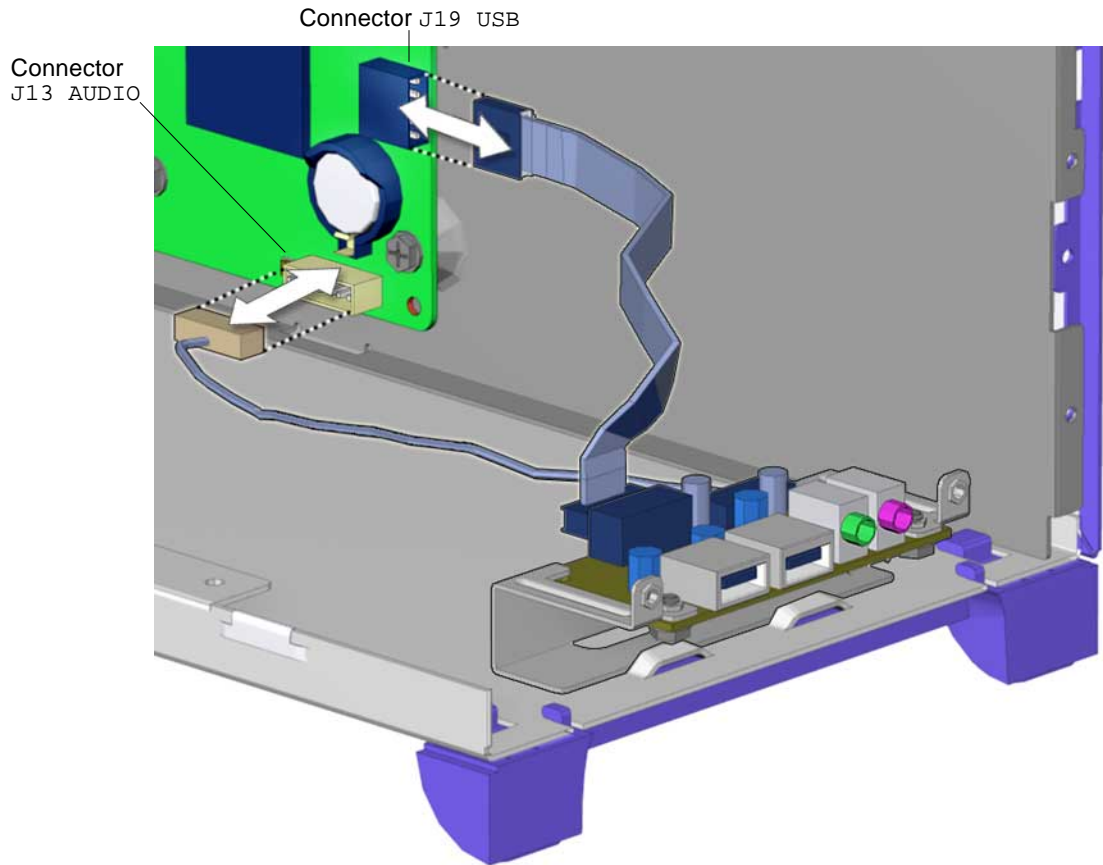
Connect the cables to both the audio and the USB connectors on the audio USB board. See [FIGURE 14-25](#).



**FIGURE 14-25** Connecting Cables to the Audio USB Board

**4. Connect the audio USB board cables to the motherboard.**

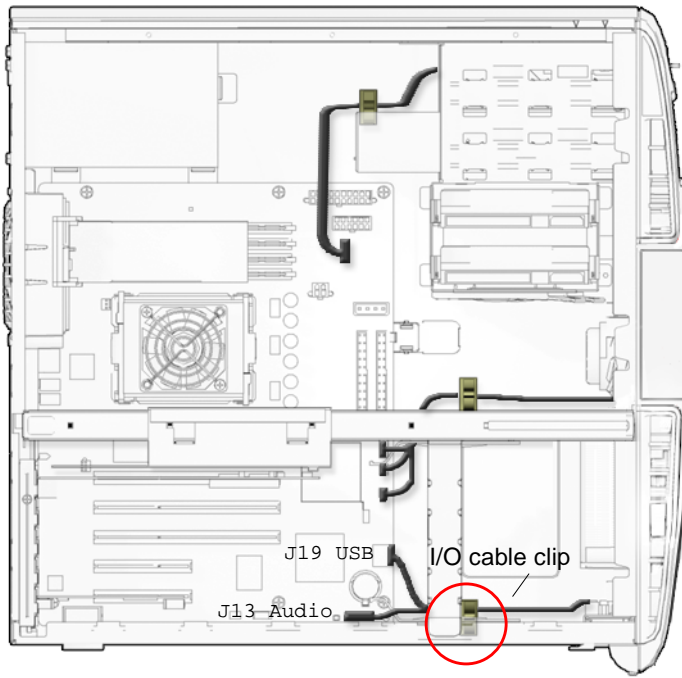
The audio signal cable is connected to the motherboard at J13 AUDIO. The USB interface cable is connected to the motherboard at J19 USB. See [FIGURE 14-22](#).



**FIGURE 14-26** Connecting the Audio and USB Cables to the Motherboard

**5. Route the audio USB board cables through the I/O cable clip.**

Guide the cables through the I/O cable clip at the bottom of the chassis and close the clip. See [FIGURE 14-27](#).



**FIGURE 14-27** Securing the Audio USB Cables to the I/O Cable Clip

**6. Inspect the cabling.**

- The audio signal cable is secure in the audio USB board connector.
- The audio signal cable is secure in the motherboard connector at J13 AUDIO.
- The USB interface cable is secure in the audio USB board connector.
- The USB interface cable is secure in the motherboard connector at J19 USB.
- The I/O cable clip is closed and locked.

**7. Finishing up.**

Install the access panel, power on the system, and verify the audio and USB cable installations. Refer to:

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

# Finishing Component Replacement

---

This chapter describes how to finish the replacement of internal workstation replaceable components, close the system and prepare it for operation.

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

This chapter contains the following topics:

- [“Repositioning the Chassis” on page 15-1](#)
- [“Installing the Bezel” on page 15-2](#)
- [“Installing the Access Panel” on page 15-5](#)
- [“Powering On the Workstation” on page 15-8](#)
- [“Verifying an Installation” on page 15-11](#)

---

## 15.1 Repositioning the Chassis

After completing any procedures that required the chassis to be on its side, reposition the chassis to its normal upright stance.

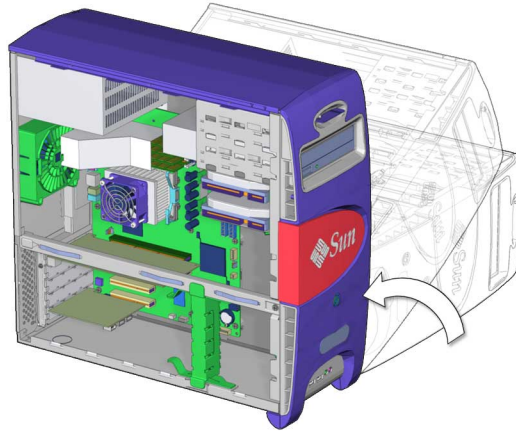
- **Set the chassis upright.**

Using both hands, lift the system chassis from its side, with the opening facing out. See [FIGURE 15-1](#).

---

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

---



**FIGURE 15-1** Positioning the Chassis Upright

---

## 15.2 Installing the Bezel

**1. Place the chassis into its upright position.**

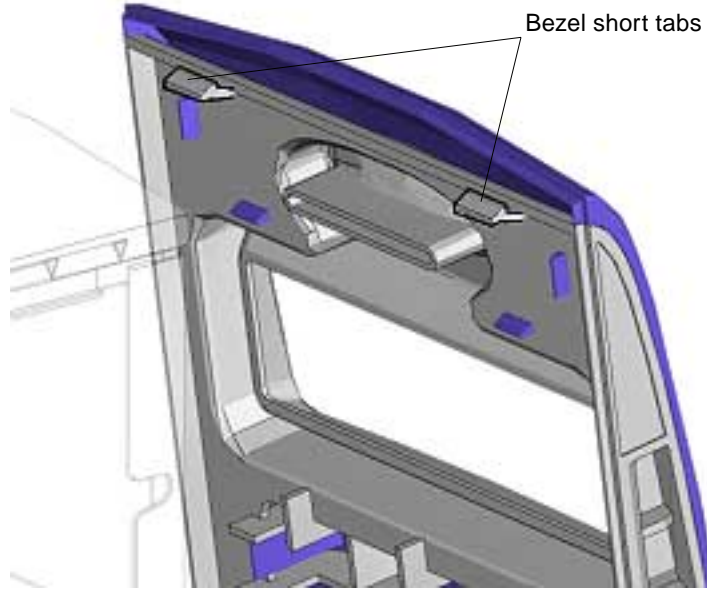
Refer to [“Repositioning the Chassis”](#) on page 15-1.

**2. Locate where the bezel is to be installed.**

The bezel installs at the front face of the chassis, Sun logo upright.

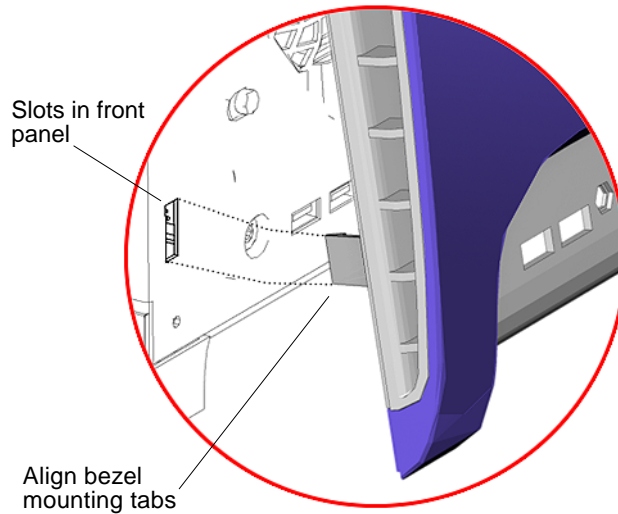
**3. Align the bezel to the chassis.**

The short tabs on the top of the bezel align with matching rectangular slots at the top front of the chassis. See [FIGURE 15-2](#).



**FIGURE 15-2** Locating Bezel Short Tabs

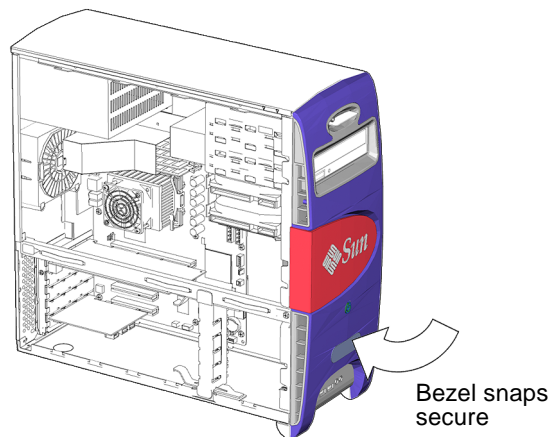
Align the bezel mounting tabs with the slots in the front panel. The bottom edge of the bezel is about two inches (5cm) out from the bottom edge of the chassis. See [FIGURE 15-3](#).



**FIGURE 15-3** Aligning the Bezel

**4. Fasten the bezel to the chassis.**

Carefully press the middle and bottom of the bezel into the chassis front panel until the mounting tabs click. See [FIGURE 15-4](#).



**FIGURE 15-4** Securing the Bezel

**5. Inspect the bezel fasteners.**

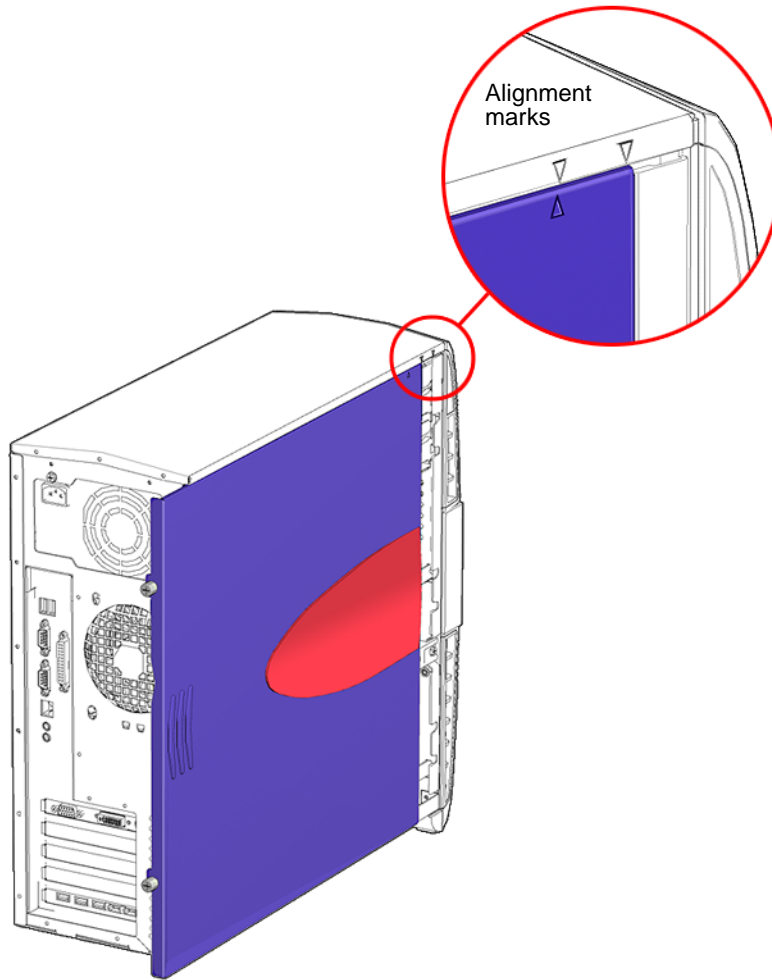


- The left and right side tabs are tight against the chassis.
- The bezel and chassis sides align.

---

## 15.3 Installing the Access Panel

1. **Place the chassis into its upright position.**  
Refer to [“Repositioning the Chassis” on page 15-1](#).
2. **Verify that you have not left any tools, loose screws, or loose components inside the system.**
3. **Remove the antistatic wrist strap.**
  - a. **Peel the copper foil end of the antistatic wrist strap from the system chassis.**
  - b. **Unwrap the strap from your wrist.**
  - c. **Discard the wrist strap and the antistatic mat.**
4. **Align the bottom of the access panel with the chassis.**  
Tilt the access panel so that it fits into the bottom groove of the chassis. An arrow on the top edge of the chassis indicates where the edge of the access panel should be. See [FIGURE 15-5](#).



**FIGURE 15-5** Aligning the Access Panel

**5. Align the top of the access panel with the chassis.**

Align the arrows on the access panel with the arrows on the chassis. See [FIGURE 15-5](#).

**6. Slide the access panel toward the front of the system chassis until it stops.**

See [FIGURE 15-6](#).

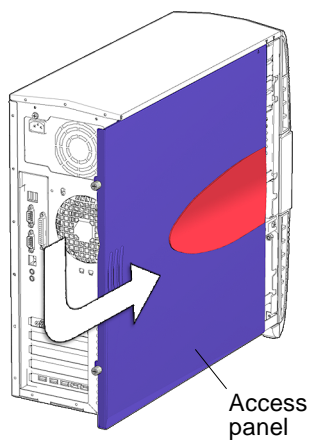


FIGURE 15-6 Closing the Access Panel

**7. Tighten the access panel thumbscrews.**

See [FIGURE 15-7](#).

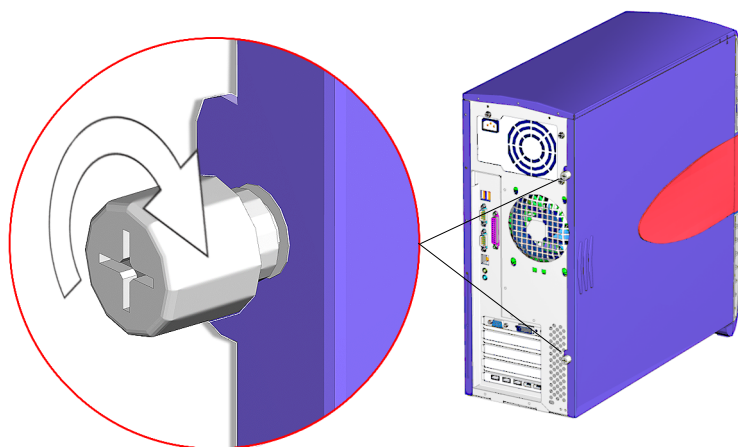


FIGURE 15-7 Tightening the Access Panel Thumbscrews

---

**Note** – Do not use a screwdriver to tighten the thumbscrews. Tighten the thumbscrews only finger tight.

---

---

## 15.4 Powering On the Workstation

This section describes powering on the workstation after finishing a service procedure. Topics include:

- [“Reconnecting Power and External Peripherals” on page 15-8](#)
- [“Choosing the Boot Mode” on page 15-10](#)



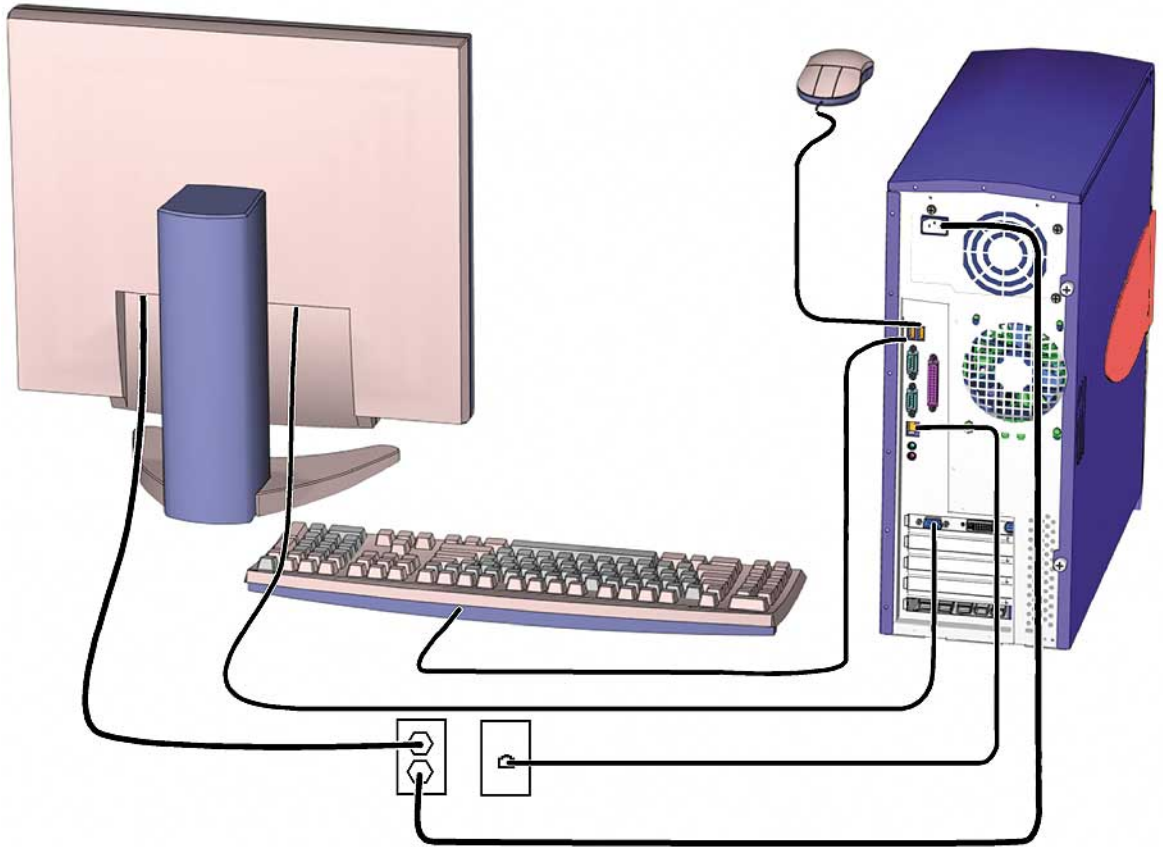
Click this film icon to view an animated version of these instructions.

### 15.4.1 Reconnecting Power and External Peripherals

After completing any replacement procedure, the external cabling must be installed.

- 1. Reconnect the keyboard, mouse, monitor, and network connections.**

See [FIGURE 15-8](#).



**FIGURE 15-8** Reconnecting the Keyboard, Mouse, Monitor, and Network Connections

- 2. Reconnect any other external peripherals.**
- 3. Power on those peripherals.**

---

**Note** – The monitor must be powered on before the system so that the monitor can communicate with the graphics accelerator when the system powers on.

---

- 4. Reconnect the power cord between the power source and the system power supply connector.**

See [FIGURE 15-9](#).

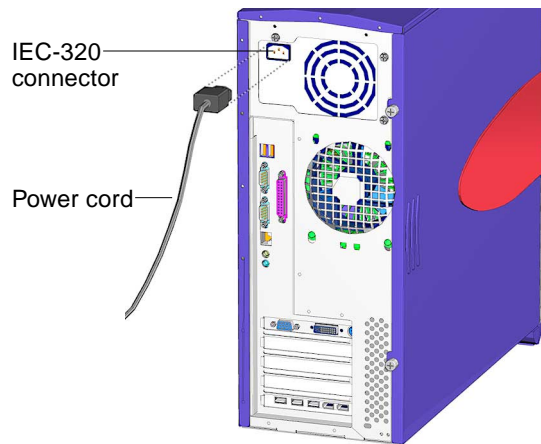


FIGURE 15-9 Reconnecting the Power Cord

## 15.4.2 Choosing the Boot Mode

When the workstation is powered up, the initial action is the boot sequence.

There are several methods for booting the workstation.

- **Booting from the hard drive**

Default when an operating system disk is not in the DVD-ROM drive.

- **Booting from DVD-ROM**

Default when an operating system disk is in the DVD-ROM drive.

- **Booting in single-user mode**

Occurs when an `init 1` command was specified during the power down sequence.

- **Booting in multi-user mode**

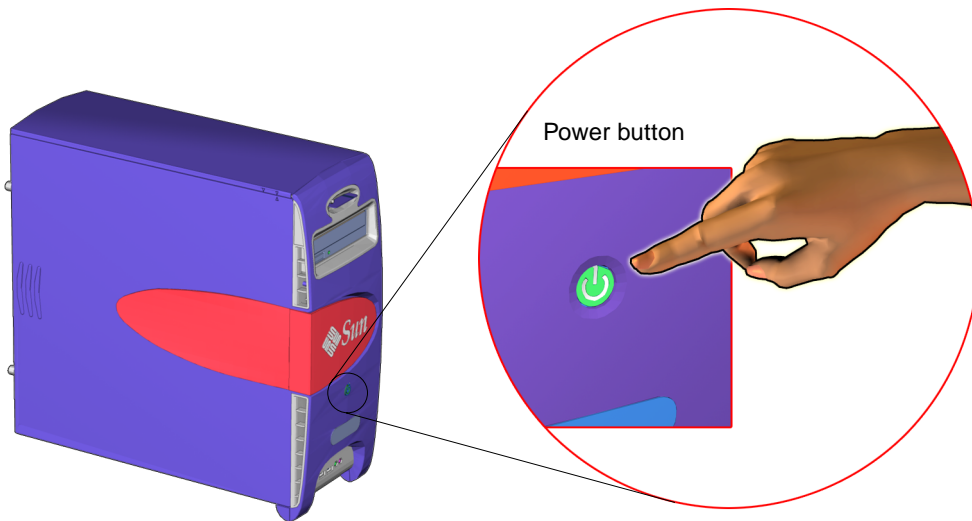
Default mode when the workstation was shut down gracefully.

1. **Select the boot source:**

- If from a DVD-ROM, insert an operating system disk in the DVD-ROM drive.
- If from the hard disk, make sure there is no operating system disc in the DVD-ROM drive.

2. **Press and release the Power button.**

The Power button is located on the bezel of the workstation. See [FIGURE 15-10](#). You should hear the internal fans or the hard drive spin up.



**FIGURE 15-10** Powering Up the Workstation

The system proceeds with its power-on sequence until the operating system shell displays or the CDE environment is started, as specified in the `init_default` files.

3. If you installed a hard drive, PCI card, or CD-RW drive, become super and reboot the system with the `-r` option. For example:

```
# reboot -- -r
```

This forces the system to recognize newly installed hardware.

---

## 15.5 Verifying an Installation

You can verify the functionality of the component you replaced or installed using the following procedure.

1. **Power on the system.**  
Refer to [“Powering On the Workstation” on page 15-8](#).
2. **Follow the power-on flowchart.**  
Refer to [“Basic Troubleshooting” on page 3-1](#).

### 3. Monitor the boot messages.

If any warning messages are found, refer to [“Displayed Messages” on page 3-10](#) for information on interpreting messages and possible corrective action.

### 4. If you are uncertain that the problem has been resolved, refer to [“Troubleshooting Flowcharts” on page 4-1](#), or consider these alternatives:

- Configure the NVRAM to enable the Power-On Self-Test (POST).  
Refer to [“Power-On Self-Test” on page 7-1](#) for information on POST output and interpreting the response. This might require rebooting the workstation.
- Run selected OpenBoot Diagnostics tests.  
Refer to [“OpenBoot PROM” on page 8-1](#) for information on availability and implementation of tests.
- Run the SunVTS (Validation Test Suite) software.  
Refer to [“SunVTS” on page 9-1](#) for information on running the SunVTS software and interpreting the results.



# Customizing Your System

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This chapter describes optional PCI card and component upgrades to customize your Sun Blade 1500 system.

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 1500 system has three 33 MHz PCI slots available. PCI1 is 32-bit, PCI2 and PCI3 are 64-bit.

The top slot, PCI4, is preconfigured with the Sun XVR-600, Sun XVR-500, or Sun XVR-100 graphics accelerator. Removing this card provides a 66 MHz 64-bit slot.

The bottom slot, PCI0, is preconfigured with the IEEE 1394 USB combination card. Removing this card provides an additional 33 MHz 32-bit slot.

Sun Microsystems provides many optional PCI cards that are supported by the Sun Blade 1500 system. TABLE 16-1 lists the supported cards and conditions to their installation and use.

TABLE 16-1 Optional PCI Cards

Card Type	Product	Conditions for Installation
Graphics accelerators	Sun XVR-600	<p>There are no special conditions for basic installation.</p> <p><b>To configure for 24-bit color depth:</b></p> <ol style="list-style-type: none"> <li>1. Create this directory: % <code>mkdir /etc/dt/config</code></li> <li>2. Copy the Xservers file % <code>cp /usr/dt/config/Xservers /etc/dt/config</code></li> <li>3. Edit <code>/etc/dt/config/Xservers</code> to have this line: :0 Local local_uid@console root /usr/openwin/bin/Xsun</li> <li>4. Edit <code>/etc/dt/config/Xservers</code> to have the following line respective of the graphics accelerator: :0 -nobanner -dev /dev/fbs/jfb0 defdepth 24 (XVR-600) :0 -nobanner -dev /dev/fbs/ifb0 defdepth 24 (XVR-500) :0 -nobanner -dev /dev/fbs/pfb0 defdepth 24 (XVR-100)</li> <li>5. Save the file.</li> <li>6. Log out then log in again.</li> </ol>
	Sun XVR-500	
	Sun XVR-100	
SCSI host adapters	Sun StorEdge™ PCI Dual Ultra3 SCSI Adapter	<p>Install the following packages:</p> <ul style="list-style-type: none"> <li>• SUNWqus</li> <li>• SUNWqusu</li> <li>• SUNWqusux</li> <li>• SUNWqusx</li> </ul> <p>Install the following qpatches:</p> <ul style="list-style-type: none"> <li>• Q905806</li> <li>• Q905807</li> </ul>
	Dual-Channel Differential Ultra/Wide SCSI PCI adapter	<p>These devices have no Fcode, so they are not recognized by the OpenBoot PROM and cannot be used as bootable host adapters for hard drives or removable media drives. These devices are not supported or reported by the <code>probe-scsi</code> command.</p>
	Dual-Channel Single Ended Ultra/Wide SCSI PCI adapter	
	Single-Ended Ultra/Wide SCSI PCI adapter	
	Dual FastEthernet and Dual SCSI PCI Adapter SunSwift™ PCI	<p>When used with Sun StorEdge Multipacks containing Fujitsu drives having MAA/MAB series identifiers, read/write errors might occur.</p> <p>The SunSwift PCI card might not fit properly upon first insertion into the PCI slot. Recheck installation before powering on.</p>

**TABLE 16-1** Optional PCI Cards (*Continued*)

Card Type	Product	Conditions for Installation
Fibre channel host adapters	Single-Loop PCI FC-AL Host Adapter Dual-Loop PCI FC-AL Host Adapter	There are no special conditions for basic installation.
	2GB PCI Single Fiber Channel Network Host Bus Adapter 2GB PCI Dual Fiber Channel Network Host Bus Adapter	Install the following packages: <ul style="list-style-type: none"> <li>• SUNWsan</li> <li>• SUNWcfcpl</li> <li>• SUNWcfcplx</li> </ul> Install the following qpatches: <ul style="list-style-type: none"> <li>• Q958611</li> <li>• Q958612</li> </ul>
Communication interfaces	SunHSI/P™ High Speed Serial Interface - 4 port 2.0	The SunHSI/P card does not fit into the 66 MHz slot, PCI4. Install the following packages from the supplemental software CD-ROM: <ul style="list-style-type: none"> <li>• SUNWhsip</li> <li>• SUNWhsipm</li> <li>• SUNWhsipu</li> </ul>
	SunSAI/P Serial Asynchronous Interface - 8 port 3.0	Installing more than one card requires additional considerations and running the <code>saipconfig</code> configuration script. Refer to the <i>SunSAI/P User's Guide</i> , 806-4206, for more information. <p>Install the following packages:</p> <ul style="list-style-type: none"> <li>• SUNWsaip</li> <li>• SUNWsaipu</li> </ul>
Ethernet interfaces	GigaSwift Ethernet Gigabit Ethernet 3.0 SunFastEthernet™	There are no special conditions for basic installation.
	Sun Quad FastEthernet™	PCI card to Sun Blade 1500 system chassis tolerances are tight. Connecting some network cables might require additional effort. <p>Install only in slot PCI4.</p>
Fibre network interfaces	SunATM/P-622/MMF 5.0	Install the following packages from the supplemental software CD-ROM:
	SunATM™-155/MMF 5.0	<ul style="list-style-type: none"> <li>• SUNWatm</li> <li>• SUNWatmu</li> </ul>
	Sun ATM-155/UTP 5.0	<ul style="list-style-type: none"> <li>• SUNWatma</li> </ul>

**TABLE 16-1** Optional PCI Cards (*Continued*)

Card Type	Product	Conditions for Installation
Sun PCi co-processor	SunPCi III	<p>Optional installation of the USB/Firewire® backplate and/or serial/parallel port backplate occupies adjacent PCI slots.</p> <p>Install the following packages:</p> <ul style="list-style-type: none"> <li>• SUNWspci3</li> <li>• SUNWspvn3</li> </ul> <p>For Microsoft Windows functionality, a licensed version of Windows must be installed.</p>
Cryptographic	Sun Crypto Accelerator 1000	<p>Install the following packages from the supplemental software CD-ROM:</p> <ul style="list-style-type: none"> <li>• SUNWcrypm</li> <li>• SUNWcrypr</li> <li>• SUNWcrypu</li> <li>• SUNWcrysl</li> <li>• SUNWcrysu</li> <li>• SUNWdcamn</li> <li>• SUNWdcar</li> <li>• SUNWdcav</li> </ul>

---

**Note** – The SunPCi III 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 the Sun Blade 1500 workstation is configured with a SunPCi III coprocessor card, the following message *might* appear on the console during boot or in the /var/adm/messages file:

```
Hardware Reboot: X86 failed to respond
There is no action necessary and you may ignore this message.
```

---



---

**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 11-29.](#)

---

## 16.2 Internal Component Upgrades

You can customize the Sun Blade 1500 system with additional memory and drives. [TABLE 16-2](#) lists upgrades, conditions for installation, and where to find the installation instructions.

**TABLE 16-2** Sun Blade 1500 Internal Component Upgrades

Component	Conditions for Installation	Procedure
1 GB DIMM	Install in pairs (DIMM0 and DIMM1, DIMM2 and DIMM3).	<a href="#">“Installing DIMMs” on page 11-8</a>
512 MB DIMM	Install in pairs (DIMM0 and DIMM1, DIMM2 and DIMM3).	<a href="#">“Installing DIMMs” on page 11-8</a>
256 MB DIMM	Install in pairs (DIMM0 and DIMM1, DIMM2 and DIMM3).	<a href="#">“Installing DIMMs” on page 11-8</a>
80 GB hard drive	First drive installs in HDD0 (upper bay), second drive installs in HDD1 (lower bay). Drives are set as “Cable Select.” Note: Internal drive mirroring is not supported.	<a href="#">“Installing the Hard Drive” on page 12-6</a>
40 GB hard drive	First drive installs in HDD0 (upper bay), second drive installs in HDD1 (lower bay). Drives are set as “Cable Select.” Note: Internal drive mirroring is not supported.	<a href="#">“Installing the Hard Drive” on page 12-6</a>
CD-RW drive	Removable media drive is installed into lower bay and replaces DVD-ROM drive. Drive is set as “Master.” Write capabilities with the <code>cdrw</code> command require installation of the <code>SUNWcdrw</code> package from the supplemental CD-ROM.	<a href="#">“Replacing the DVD-ROM Drive” on page 12-9</a>
DDS-4 tape drive	Tape drive is installed into lower bay and replaces DVD-ROM drive. Internal SCSI connection to SCSI host adapter. Configuration checked with Single-Ended Ultra/Wide SCSI PCI adapter. See condition in <a href="#">TABLE 16-1</a> .	<a href="#">“Replacing the DVD-ROM Drive” on page 12-9</a>

## 16.3 External Peripherals

The Sun Blade 1500 system supports external Sun peripherals. [TABLE 16-3](#) lists peripherals and their conditions of use.

**TABLE 16-3** External Peripherals

Peripheral	Product	Conditions for Use
Fibre channel hard drives	Sun StorEdge T3 Array	There are no special conditions for use.
	Sun Multipack FC-AL	Only supported with the Dual Loop PCI FC-AL Host Adapter. Loop with Multipack FC-AL is Multipack FC-AL exclusive.
	Sun StorEdge A5x00	Only supported with the Dual Loop PCI FC-AL Host Adapter. Loop with Sun StorEdge A5x00 is Sun StorEdge A5x00 exclusive.
SCSI hard drives	Sun Multipack SCSI	SunSwift PCI host adapters used in conjunction with Multipack SCSI units containing Fujitsu drives having MAA/MAB series identifiers might cause read/write errors.
	Sun StorEdge A1000	There are no special conditions for use.
	Sun StorEdge D1000	Sun StorEdge D1000 drive assemblies cannot be daisy-chained.
SCSI tape drives	Sun StorEdge L1000 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.
USB devices	ZIP drive	Removable media drives require the volume manager <code>vold</code> to run.
	CD-RW drive	CD-R and CD-RW write capabilities require installation of the <code>SUNWcdrw</code> package from the supplemental CD-ROM.
Network printers	HP Texas Instruments	There are no special conditions for use.
Smart cards	payflex cyberflex	There are no special conditions for use.

# Product Specifications

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This appendix discusses the various specifications of the Sun Blade 1500 workstation. Topics covered are:

- “Physical Specifications” on page A-1
- “Electrical Specifications” on page A-2
- “Acoustic Specifications” on page A-2
- “Environmental Requirements” on page A-2
- “Shock and Vibration Specifications” on page A-3

---

## A.1 Physical Specifications

TABLE A-1 lists the physical specifications of the Sun Blade 1500 workstation.

**TABLE A-1** Sun Blade 1500 Physical Specifications

Length	Width	Height	Weight
18.3 in. (465.1 mm)	6.89 in. (175.0 mm)	18.1 in. (459.9 mm)	33 lbs (15 kgs)

If the Sun Blade 1500 is to be enclosed, allow adequate airflow from front to rear. The enclosure interior dimensions should be no less than the following:

**TABLE A-2** Enclosure Interior Dimensions for Sun Blade 1500

Length	Width	Height
25.2 in. (640 mm)	13.8 in. (350 mm)	18.9 in. (480 mm)

---

## A.2 Electrical Specifications

TABLE A-3 lists electrical specifications for the Sun Blade 1500 workstation.

TABLE A-3 Sun Blade 1500 Workstation Electrical Specifications

Specification	Value
Voltage	100 - 240 VAC
Current	8 / 4 Amps
Wattage	360 Watts or 420 Watts (maximum)
Frequency	50 / 60 Hz

---

## A.3 Acoustic Specifications

TABLE A-4 lists acoustic specifications for the Sun Blade 1500 workstation.

TABLE A-4 Sun Blade 1500 Workstation Acoustic Specifications

Specification	Value
Sound pressure	< 42 dBA operating, < 37 dBA Idling at 19.7 in (50 cm)
Sound power	< 5.0 Bels operating, < 4.5 Bels idling

---

## A.4 Environmental Requirements

TABLE A-5 lists environmental requirements for the Sun Blade 1500 workstation.

TABLE A-5 Sun Blade 1500 Workstation Environmental Requirements

Specification	Value
Temperature	41 - 104 F (5 - 40 C) operating -26 - 149 F (-32 - 65 C) nonoperating
Humidity	10 - 93% RH (noncondensing) operating 93% RH (noncondensing) nonoperating



**TABLE A-5** Sun Blade 1500 Workstation Environmental Requirements (*Continued*)

Specification	Value
Pressure	9.43 PSI (65 KPa), 95 F (35 C) operating 3.62 PSI (25 KPa), 77 F (25 C) nonoperating

## A.5 Shock and Vibration Specifications

[TABLE A-6](#) lists vibration specifications for the Sun Blade 1500 workstation.

**TABLE A-6** Sun Blade 1500 Workstation Shock and Vibration Values

Constraint	Operating	Nonoperating
Shock	6 G, 11 msec	20 G, 11 msec
Vibration	0.001 G <sup>2</sup> /Hz random, 5 to 500 Hz (0.70 Grms)	0.0025 G <sup>2</sup> /Hz random, 5 to 500 Hz (1.11 Grms)
Drop	N/A	1.97 in. (50 mm)



## Signal Descriptions

---

This appendix provides pinouts for certain Sun Blade 1500 workstation internal and external connectors.

### External:

- “Audio Jacks” on page B-2
- “IEEE 1394 Ports” on page B-2
- “Parallel Port” on page B-3
- “Serial Ports” on page B-4
- “Twisted-Pair Ethernet Port” on page B-5
- “USB Ports” on page B-6
- “Video Ports” on page B-7

### Internal:

- “Fan Connectors” on page B-10
- “Front Audio Connector” on page B-10
- “Front USB Connector” on page B-11
- “IDE Interface Connectors” on page B-12
- “IDE Power Connector” on page B-14
- “Power Supply Connectors” on page B-14
- “Power Switch Connector” on page B-17
- “Smart Card Reader Connector” on page B-17
- “Speaker Connector” on page B-18

---

**Note** – Information in this chapter is referenced to the connectors on the motherboard, audio USB board, or combination card. It is not referenced from a cable.

---

## B.1 External Connectors

### B.1.1 Audio Jacks

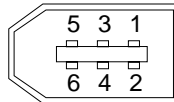
There are four audio connections called “jacks”. They are the headphone jack and microphone jack on the bezel, and the audio-in jack and audio-out jack on the back panel. [TABLE B-1](#) lists the pinouts of these four jacks.

**TABLE B-1** Audio Jack Pinouts

Pin	Headphones	Microphone	Audio-In	Audio-Out
Tip	Left channel	Left channel	Left channel	Left channel
Ring (center)	Right channel	Right channel	Right channel	Right channel
Shield	Ground	Ground	Ground	Ground

### B.1.2 IEEE 1394 Ports

There are two IEEE 1394A ports on the IEEE 1394 / USB 2 combination card. [FIGURE B-1](#) identifies a IEEE 1394A port.



**FIGURE B-1** IEEE 1394A Port

[TABLE B-2](#) lists the pinouts for these ports.

**TABLE B-2** IEEE 1394A Port Pinouts

Pin	Signal
1	Cable power
2	Ground
3	TPB-
4	TPB+

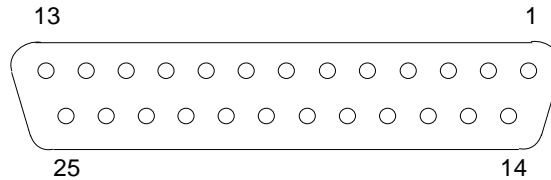
**TABLE B-2** IEEE 1394A Port Pinouts (*Continued*)

Pin	Signal
5	TPA-
6	TPA+

### B.1.3 Parallel Port

Located adjacent to the serial ports, is the parallel port. It uses a DB-25F connector.

[FIGURE B-2](#) identifies the Sun Blade 1500 workstation parallel port.



**FIGURE B-2** Parallel Port

[TABLE B-3](#) lists the pinout of this DB-25F connector.

**TABLE B-3** Parallel Port Pinouts

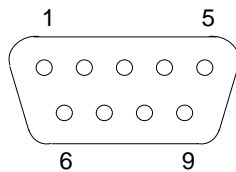
Pin	Signal
1	nstrobe
2	Data0
3	Data1
4	Data2
5	Data3
6	Data4
7	Data5
8	Data6
9	Data7
10	nAck
11	Busy
12	Perror

**TABLE B-3** Parallel Port Pinouts (*Continued*)

Pin	Signal
13	Select
14	nAutoEd
15	nFault
16	nInit
17	nSelect_in
18	Ground
19	Ground
20	Ground
21	Ground
22	Ground
23	Ground
24	Ground
25	Ground

## B.1.4 Serial Ports

There are two serial ports on the back panel of the workstation using DB-9M connectors. One serial port is identified in [FIGURE B-3](#).



**FIGURE B-3** Serial Port

Both ports have the same pinouts, as described in [TABLE B-4](#).

**TABLE B-4** Serial Port Pinouts

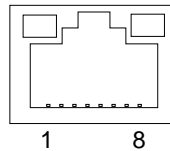
Pin	Signal	Description
1	DCD_	Data Carrier Detect
2	RXD_	Receive Data

**TABLE B-4** Serial Port Pinouts (*Continued*)

Pin	Signal	Description
3	TXD_	Transmit Data
4	DTR_	Data Terminal Ready
5	GND	Ground
6	DSR_	Data Set Ready
7	RTS_	Request To Send
8	RXC_	Receive Clock
9	RI	Ring Indicator

## B.1.5 Twisted-Pair Ethernet Port

The back panel of the Sun Blade 1500 workstation has an RJ-45 10/100/1000BASE-T TPE port. [FIGURE B-4](#) identifies the TPE port.

**FIGURE B-4** Twisted-Pair Ethernet Port

[TABLE B-5](#) lists the pinout of this connector.

**TABLE B-5** Twisted-Pair Ethernet Port Pinouts

Pin	Signal	Description
1	RJ_TXD+	Transmit Data+
2	RJ_TXD-	Transmit Data-
3	RJ_RXD+	Receive Data+
4	RJ_4T_D3P	Filter I/O
5	RJ_4T_D3P	Filter I/O
6	RJ_RXD-	Receive Data-
7	RJ_4T_D4P	Filter I/O
8	RJ_4T_D4P	Filter I/O

TABLE B-6 describes the behavior of the status LEDs.

TABLE B-6 Twisted-Pair Ethernet LED Status

LED	Status
Amber - Link	When illuminated, a 10/100/1000 Mbps link exists.
Green - Activity	When flashing, indicates transmit or receive activity.

## B.1.6 USB Ports

There are 7 external USB ports for the Sun Blade 1500 workstation in standard configurations. The two USB ports on the bezel and the two USB ports on the back panel are USB 1.1 standard. The three USB ports on the IEEE 1394 / USB 2 combination card are USB 2.x standard. Though the ports are of different standards, they have the same pinouts. FIGURE B-5 identifies a USB port.

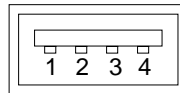


FIGURE B-5 USB Port

TABLE B-7 lists the pinouts.

TABLE B-7 USB Port Pinouts

Pin	Signal
1	VCC, 5VDC
2	Data -
3	Data +
4	Ground



## B.1.7 Video Ports

The Sun Blade 1500 workstation is configured with a Sun XVR-600, Sun XVR-500, or Sun XVR-100 graphics accelerator. [TABLE B-8](#) describes the connectors on the graphics accelerators.

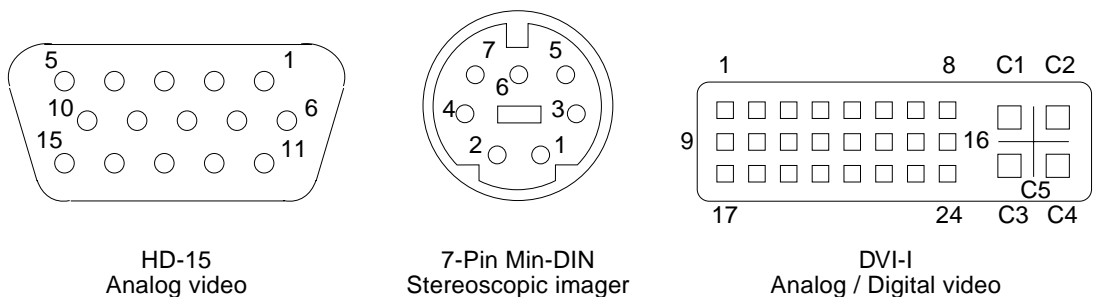
**TABLE B-8** Graphics Accelerator Connectors

Graphics Accelerator	HD-15 Analog	DVI-I Analog/Digital	Mini-DIN7 Stereoscopic
Sun XVR-600	No	Yes	Yes
Sun XVR-500	Yes	No	Yes
Sun XVR-100	Yes	Yes	No

**Note** – Although the DVI-I connector supports both analog and digital resolutions, you cannot use both simultaneously.

The graphics accelerators provide DDC2 monitor support and Display Power Management Signaling (DPMS).

[FIGURE B-6](#) identifies the Sun XVR-600, Sun XVR-500, and XVR-100 graphics accelerators' video output ports.



**FIGURE B-6** Sun XVR-600, Sun XVR-500, and Sun XVR-100 Graphics Accelerator Ports

TABLE B-9 lists the pinouts of the HD-15 video output port.

TABLE B-9 HD15 Video Output Port Pinouts

Pin	Signal
1	Red analog video
2	Green analog video
3	Blue analog video
4	No Connect
5	Ground
6	Ground
7	Ground
8	Ground
9	+5V Supply
10	Ground
11	No Connect
12	DDC Bidirectional Data (SDA)
13	Horizontal/Composite Sync
14	Vertical Sync
15	DDC Data Clock (SCL)

TABLE B-10 lists the pinouts of the stereoscopic imager interface connector

TABLE B-10 Stereoscopic Imager Interface Connector Pinouts

Pin	Signal
1	Signal ground
2	5.0V (Fused, will supply up to 300mA, limited to 1.0A)
3	12.0V (Fused, will supply up to 300mA, limited to 1.0A)
4	Master stereo field Select Out
5	Slave stereo field Select In
6	No connect
7	No connect

More information about attaching a stereoscopic imager is available in the *Sun XVR-600 Graphics Accelerator Installation and User's Guide*, 817-2195 and the *Sun XVR-500 Graphics Accelerator Installation Guide*, 816-3028.

TABLE B-11 lists the pinouts of the DVI-I video output port.

TABLE B-11 DVI-I Video Output Port Pinouts

Pin	Signal
1	TMDS Data2 -
2	TMDS Data2 +
3	TMDS Data2/4 Shield
4	TMDS Data4 - (no connect XVR-600)
5	TMDS Data4 + (no connect XVR-600)
6	DDC Clock (SCL)
7	DDC Data (SDA)
8	Analog Vertical Sync
9	TMDS Data1 -
10	TMDS Data1 +
11	TMDS Data1/3 Shield
12	TMDS Data3 - (no connect XVR-600)
13	TMDS Data3 + (no connect XVR-600)
14	+5V Power
15	Gnd (+5, Analog V/H Sync)
16	Hot Plug Detect
17	TMDS Data0 -
18	TMDS Data0 +
19	TMDS Data0/5 Shield
20	TMDS Data5 - (no connect XVR-600)
21	TMDS Data5 + (no connect XVR-600)
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 (R, G, and B return)

---

## B.2 Internal Connectors

### B.2.1 Fan Connectors

The three fan connectors, FAN0 SYS, FAN1 SYS, and FAN2, have the same pinouts. [FIGURE B-7](#) identifies these fan connectors.



**FIGURE B-7** Fan Connector

[TABLE B-12](#) lists these signals.

**TABLE B-12** Fan Connectors FAN0 SYS, FAN1 SYS, and FAN2 Pinouts

Pin	Signal
1	Ground
2	8 - 12 V
3	Tachometer Signal



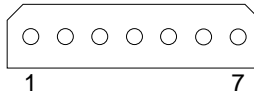
---

**Caution** – Though the connectors have the same pinouts, they are *not* interchangeable. Do *not* connect the CPU fan cable to connector FAN1 SYS. Similarly, do *not* connect the rear fan cable to FAN2. Transposing the cables may result in system overheating and CPU failure.

---

### B.2.2 Front Audio Connector

The front audio connector, J13 AUDIO, provides audio signals for the audio USB board. [FIGURE B-8](#) identifies the front audio connector.



**FIGURE B-8** Front Audio Connector

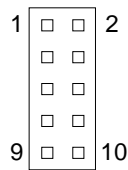
**TABLE B-13** lists the pinouts for connector J13 AUDIO.

**TABLE B-13** Front Audio Connector J13 AUDIO Pinouts

Pin	Signal
1	Microphone signal
2	Microphone ground
3	Ground
4	Headphone left channel
5	Headphone ground
6	Headphone right channel
7	+5 V

## B.2.3 Front USB Connector

The front USB connector, J19 USB, provides a USB interface for the audio USB board. **FIGURE B-9** identifies the front USB connector.



**FIGURE B-9** Front USB Connector

**TABLE B-14** lists the pinouts for connector J19 USB.

**TABLE B-14** Front USB Connector J19 USB Pinouts

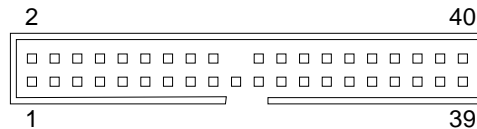
Pin	Signal
1	Data -, left USB port

**TABLE B-14** Front USB Connector J19 USB Pinouts (Continued)

Pin	Signal
2	Data +, left USB port
3	Ground
4	Ground
5	Data +, right USB port
6	Data -, right USB port
7	Ground
8	+5 V, right USB port
9	+5 V, left USB port
10	Shield

## B.2.4 IDE Interface Connectors

The two IDE interface connectors, IDE PRI and IDE SEC have similar pinouts. [FIGURE B-10](#) identifies the IDE interface connector.



**FIGURE B-10** IDE Interface Connector

The connector pinouts are described in [TABLE B-15](#).

**TABLE B-15** IDE Interface Connectors IDE PRI and IDE SEC Pinouts

Pin	Signal
1	HDRST#
2	Ground
3	D7
4	D8
5	D6
6	D9

**TABLE B-15** IDE Interface Connectors IDE PRI and IDE SEC Pinouts (*Continued*)

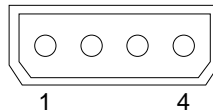
Pin	Signal
7	D5
8	D10
9	D4
10	D11
11	D3
12	D12
13	D2
14	D13
15	D1
16	D14
17	D0
18	D15
19	Ground
20	none
21	DRQ
22	Ground
23	IOW#
24	Ground
25	IOR#
26	Ground
27	IURDY
28	Ground
29	DACK#
30	Ground
31	IRQ
32	none
33	A1
34	CBLID
35	A0
36	A2

**TABLE B-15** IDE Interface Connectors IDE PRI and IDE SEC Pinouts (Continued)

Pin	Signal
37	CS1
38	CS3#
39	none
40	Ground

## B.2.5 IDE Power Connector

Power for the hard drive and the DVD-ROM drive is supplied from the motherboard through connector IDE PWR. [FIGURE B-11](#) identifies the IDE power connector.



**FIGURE B-11** IDE Power Connector

[TABLE B-16](#) lists the pinout for this connector.

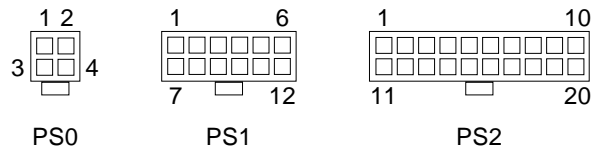
**TABLE B-16** IDE Power Connector IDE PWR Pinouts

Pin	Signal
1	+12 V
2	Ground
3	Ground
4	+5 V

## B.2.6 Power Supply Connectors

There are three connectors which attach the power supply to the motherboard: PS0, PS1, and PS2. [FIGURE B-12](#) identifies the three connectors.





**FIGURE B-12** Power Supply Connectors

### B.2.6.1 PS0 Information

Connector PS0 supplies power for the CPU. [TABLE B-17](#) lists the pinout for PS0.

**TABLE B-17** Power Supply Connector PS0 Pinouts

Pin	Signal
1	Ground
2	Ground
3	+12 V
4	+12 V

### B.2.6.2 PS1 Information

Connector PS1 provides supplemental power for the Sun Blade 1500 motherboard. [TABLE B-18](#) lists the pinout for PS1.

**TABLE B-18** Power Supply Connector PS1 Pinouts

Pin	Signal
1	+5 V
2	+5 V
3	Ground
4	+3.3 V
5	Ground
6	Ground
7	+5 V
8	Ground
9	Ground

**TABLE B-18** Power Supply Connector PS1 Pinouts (*Continued*)

Pin	Signal
10	+3.3 V
11	+3.3 V
12	Ground

### B.2.6.3 PS2 Information

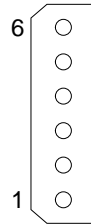
Connector PS2 supplies primary power for the Sun Blade 1500 motherboard. [TABLE B-19](#) lists the pinout for PS2.

**TABLE B-19** Power Supply Connector PS2 Pinouts

Pin	Signal
1	+3.3 V
2	+3.3 V
3	Ground
4	+5 V
5	Ground
6	+5 V
7	Ground
8	P.G.S
9	+5 VSB
10	+12 V
11	+3.3 V
12	-12 V
13	Ground
14	PS-On
15	Ground
16	Ground
17	Ground
18	None
19	+5 V
20	+5 V

## B.2.7 Power Switch Connector

The power switch connector, J24 SW0, provides signal and power for the power LED. It is identified in [FIGURE B-13](#).



**FIGURE B-13** Power Switch Connector

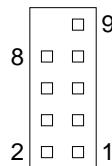
[TABLE B-20](#) lists the pinouts for connector J24 SW0.

**TABLE B-20** Power Switch Connector J24 SW0 Pinouts

Pin	Signal
1	none
2	none
3	LED +
4	LED -
5	Switch signal
6	Switch return

## B.2.8 Smart Card Reader Connector

The smart card reader connector, SCR0, is identified in [FIGURE B-14](#).



**FIGURE B-14** Smart Card Reader Connector

The connector pinouts are described in [TABLE B-21](#).

**TABLE B-21** Smart Card Reader Connector SCR0 Pinouts

Pin	Signal	Description
1	+12 V	+12 VDC power
2	GND	Ground
3	GND	Ground
4	SC_SCL	I <sup>2</sup> C_clock
5	+5 V	+5 VDC power
6	I2C_SDA	I <sup>2</sup> C_data
7	GND	Ground
8	GND	Ground
9	SMCARD_INT#	Interrupt

## B.2.9 Speaker Connector

Connector *SPK0* provides the signal to the speaker. [FIGURE B-15](#) identifies the speaker connector.



**FIGURE B-15** Speaker Connector

[TABLE B-22](#) lists the pinout for this connector.

**TABLE B-22** Speaker Connector SPK0 Pinouts

Pin	Signal
1	Signal
2	Ground

# Functional Description

---

This appendix describes the inner workings of the Sun Blade 1500 workstation. Topics include:

- “Hardware Architecture” on page C-1
- “Motherboard” on page C-4
- “CPU and Memory” on page C-9
- “Internal Interfaces” on page C-15
- “System Clocks and Interrupts” on page C-28
- “External Interfaces” on page C-31
- “System Thermal Management” on page C-36
- “System Power Management” on page C-37

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## C.1 Hardware Architecture

This section provides an overview of the Sun Blade 1500 workstation.

### C.1.1 Component Introduction

The Sun Blade 1500 system has four primary motherboard components:

- “CPU” on page C-1
- “I/O Bridge Chip” on page C-2
- “I/O Subsystem” on page C-2
- “Gigabit Ethernet” on page C-2

#### C.1.1.1 CPU

- UltraSPARC IIIi CPU running at 1.06 GHz

- EPIC-7 Cu copper technology
- Integrated L1 caches (data, instruction, prefetch, and write)
- Integrated 1 Mbyte L2 data cache
- System bus — JIO I/O bridge, JBus frequency of up to 200 MHz.
- Integrated DDR-1 memory controller
- Memory — 4 DDR-1 (up to 133/266 MHz) SDRAM DIMMs
- Maximum 4 GB memory supported

### C.1.1.2 I/O Bridge Chip

- Sun Microsystems JIO custom I/O bridge ASIC
- JBus
  - 200 MHz bandwidth
  - 128-bit wide MUX address and data bus
- Dual PCI buses
  - PCI V2.2 compliant
  - 64-bit 66 MHz or 32- and 64-bit 33 MHz capable
  - 8 x 64-byte I/O cache each bus
  - Fully associative I/O memory management unit on each bus
  - Eight external masters with internal arbiters on each bus

### C.1.1.3 I/O Subsystem

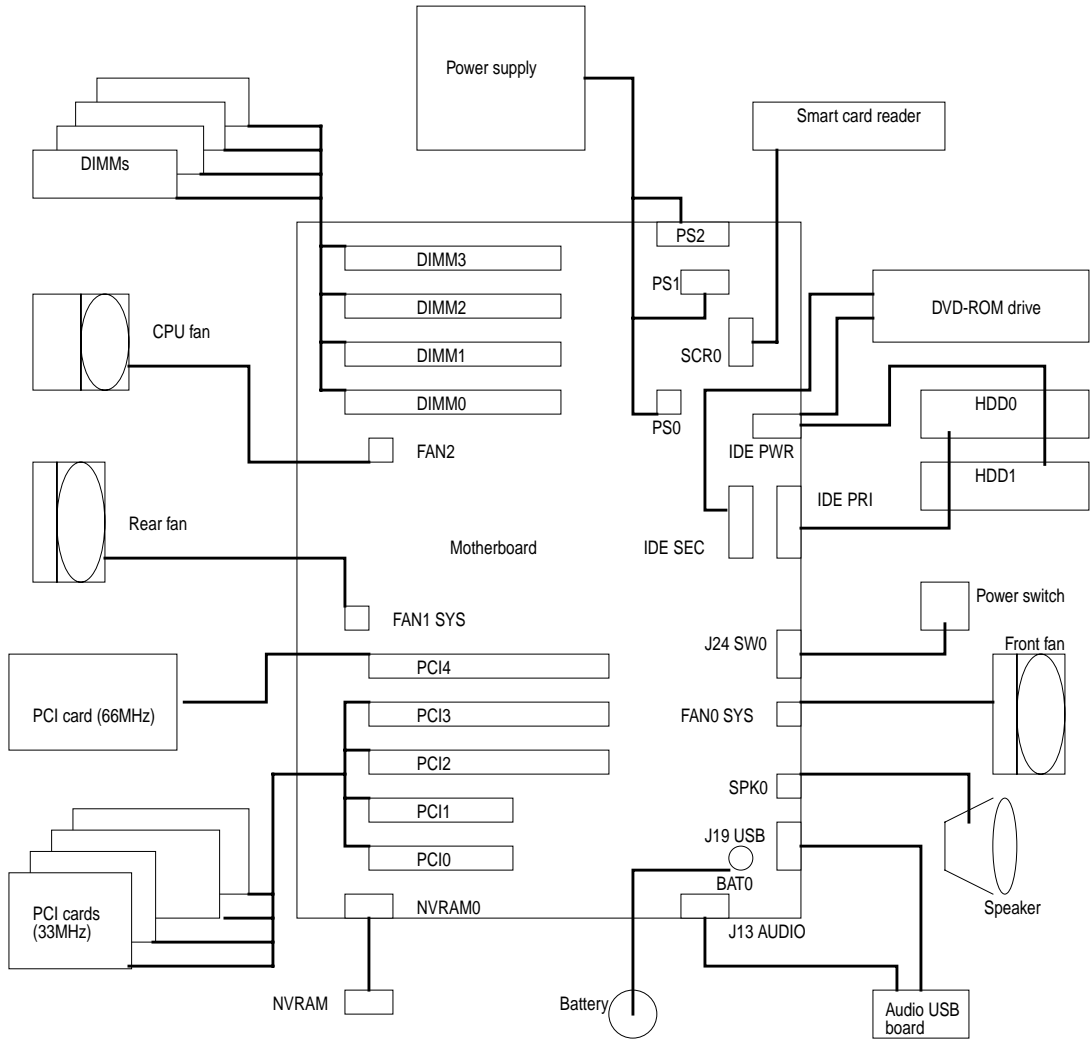
- Acer Labs M1535D+
- PCI to ISA bridge
- Super I/O interface
- UltraDMA 100 controller
- AC97 compliant audio interface
- I<sup>2</sup>C interface
- USB 1.1 interface

### C.1.1.4 Gigabit Ethernet

- Broadcom BCM5703C
- 10/100/1000BASE-T Ethernet LAN controller
- 3rd-generation technology
- Integrated MAC and PHY

## C.1.2 System Block Diagram

[FIGURE C-1](#) shows the system block diagram.



**FIGURE C-1** Sun Blade 1500 System Block Diagram

### C.1.3 Enclosure

This section describes features of the Sun Blade 1500 system.

- **Chassis**
  - ATX form factor tower case
  - ATX compatible power supply

- Snap-on drive rails for hard drives, optical media drive, and smart card reader bracket
  - Easy swing-out PCI card support
  - Snap-fit chassis fans
  - Single screw PCI card retainer
  - Single tool serviceability
  - Motherboard
    - UltraSPARC IIIi 64-bit processor
    - 128-bit JBus
    - Direct interface of CPU to DDR-1 memory
    - Four 144-bit DIMM memory slots
    - Front and rear USB 1.1 compliant ports
    - Two 32-bit 33 MHz PCI slots
    - Two 64-bit 33 MHz PCI slots
    - One 64-bit 66 MHz PCI slot
  - Peripherals
    - Support for IEEE 1394 and USB 2.0 high-speed external interfaces
    - Support for Cyberflex and Payflex smart cards
    - Legacy support for parallel and serial external interfaces
- 

## C.2 Motherboard

### C.2.1 Motherboard Block Diagram

**FIGURE C-2** shows the block diagram for the Sun Blade 1500 workstation motherboard.



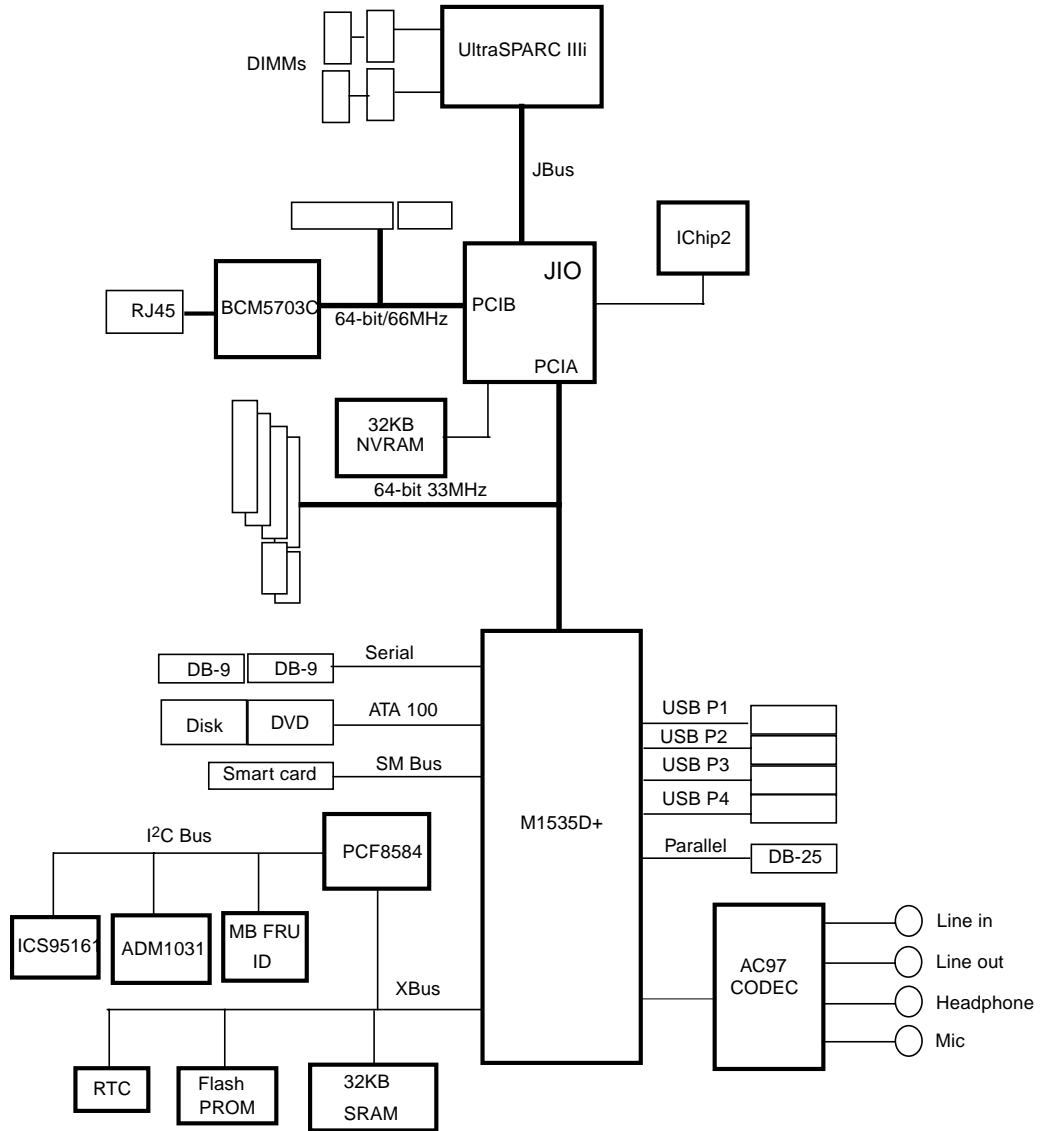
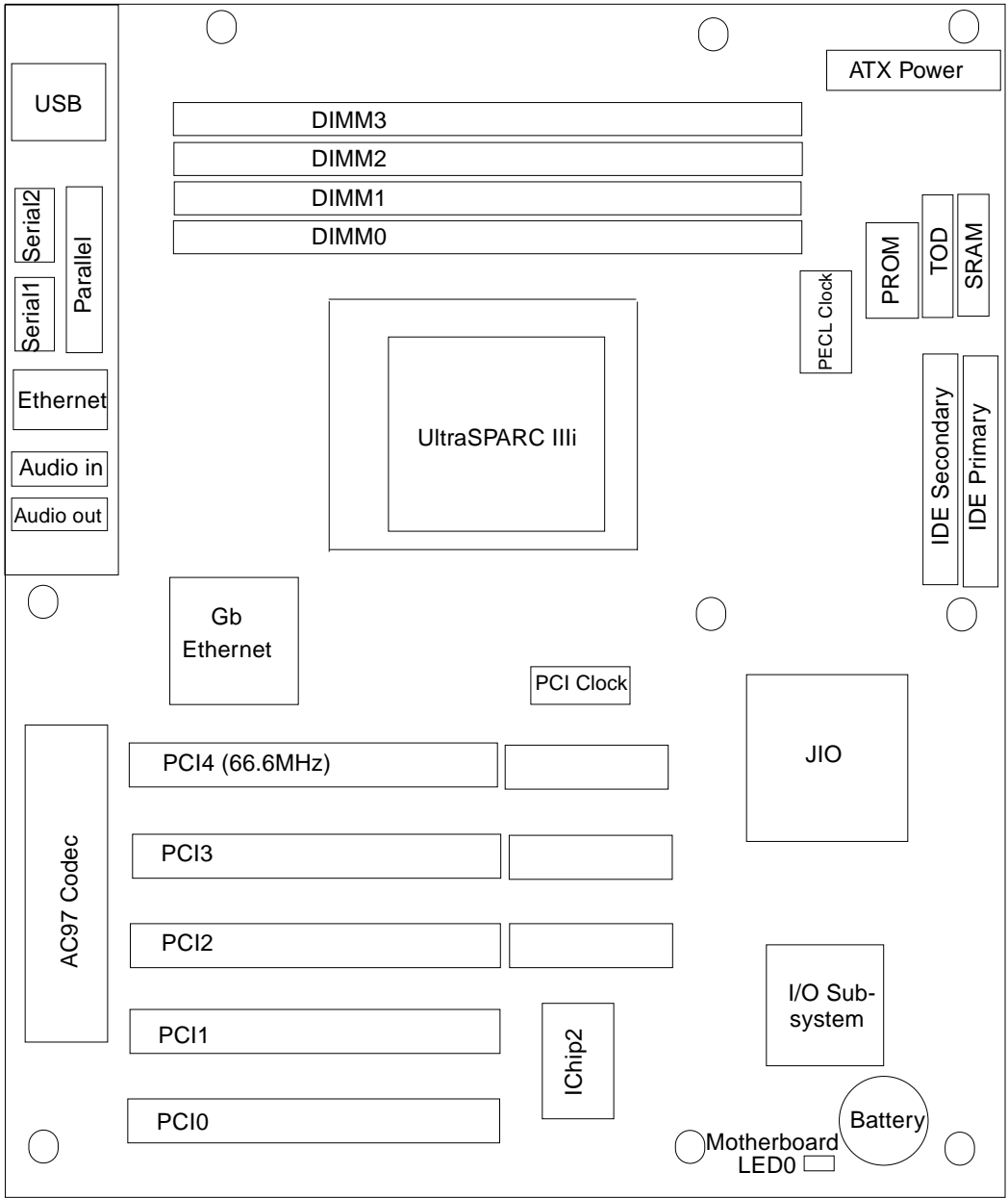


FIGURE C-2 Sun Blade 1500 Motherboard Block Diagram

## C.2.2 Motherboard Layout Diagram

FIGURE C-3 shows the layout of the motherboard, including connector and jumper locations.





**FIGURE C-3** Sun Blade 1500 Motherboard Layout Diagram

The following table lists connector and jumper locations on the Sun Blade 1500 motherboard, and the common terminology for each location.

**TABLE C-1** Sun Blade 1500 Motherboard Locations and Common Terminology

<b>Location</b>	<b>Common Terminology</b>
BAT0	Battery socket
CPU0	UltraSPARC IIIi CPU
DIMM0	Bottom memory slot
DIMM1	Second from bottom memory slot
DIMM2	Second from top memory slot
DIMM3	Top memory slot
FAN0 SYS	Front system fan connector
FAN1 SYS	Rear system fan connector
FAN2	CPU fan connector
IDE PRI	Primary IDE controller for hard drives
IDE SEC	Secondary IDE controller for optical media drive
IDE PWR	Hard drive and optical media drive power connector
J13 AUDIO	Microphone and headphone connector
J19 USB	Front panel USB connector
J24 SW0	Power switch connector
J28 USB	Rear panel USB connector
LED0	Motherboard stand-by power indicator
NVRAM0	Nonvolatile random access memory, boot parameters chip, SEEPROM
PARALLELO	Parallel port
PCI0	Bottom PCI slot
PCI1	Second from bottom PCI slot
PCI2	Middle PCI slot
PCI3	Second from top PCI slot
PCI4	Top PCI slot
PS0	CPU power connector
PS1	Supplemental power connector
PS2	Primary power connector

**TABLE C-1** Sun Blade 1500 Motherboard Locations and Common Terminology

Location	Common Terminology
SCRO	Smart card reader connector
SERIAL0 TTYA	Serial port A (com1)  1
SERIAL1 TTYB	Serial port B (com2)  2
SPK0	Speaker connector
TPE0	Ethernet connector

## C.2.3 Motherboard Jumpers

The Sun Blade 1500 motherboard has many jumpers which are used for manufacturing and testing purposes. Do not change these jumpers. [TABLE C-2](#) lists the motherboard jumpers and their correct settings.

**TABLE C-2** Correct Motherboard Jumper Settings

Jumper Label	Jumper Block Settings
B SCAN	1-2, 3-4, 5-6
DEBUG ONLY	no connection
J9 JTAG CONNECTOR	no connection
J10 CPU SPEED	5-6
J11	1-2, 3-4, 9-10
J14	1-2
J18	1-2
J21 RESET	no connection
J25 ROMBO CONN-	no connection
J26	1-2
J27	1-2
J29	no connection

---

## C.3 CPU and Memory

### C.3.1 CPU Description

The UltraSPARC IIIi processor is a high-performance, highly integrated superscalar processor. It is capable of sustained execution of four instructions per cycle, even with conditional branches and cache misses. Instructions are issued in program order to multiple functional units, and executed in parallel. Instructions from two basic blocks are issued in the same group to further increase the number of instructions executed per cycle.

The UltraSPARC IIIi CPU supports full implementation of the 64-bit SPARC-V9 architecture, a 64-bit virtual address space, and a 43-bit physical address space. The core instruction set includes graphics instructions that provide the most common operations used for two-dimensional image processing, two and three-dimensional graphics, image compression algorithms, and parallel operations on pixel data with 8 and 16-bit components.

### C.3.2 Caches

#### C.3.2.1 L1 Data Cache

- 64 KBytes
- Four-way set associative
- Write-through
- Nonallocating (no write allocate)
- Virtually indexed (doesn't go through D-TLB), physically tagged (goes through D-TLB)
- Address aliasing as side effect
- 32-byte line size, no sub-lines
- Data and tags are parity protected
- Not included in L2 cache. Is snooped in parallel with L2
- Need to flush if alias is created

### C.3.2.2 L1 Instruction Cache

- 32 KBytes
- Pseudo four-way set associative
- Physically indexed (goes through I-TLB), physically tagged (goes through I-TLB)
- Write invalidate
- 32-byte line size, no sub-lines
- Data and tags are parity protected
- Not included in L2 cache. Is snooped in parallel with L2
- No flushing is required

### C.3.2.3 L1 Prefetch Cache

- Used by software prefetch instruction and autonomous HW prefetch from L2
- 2 KBytes
- Four-way set associative
- Physically indexed (goes through D-TLB), physically tagged (goes through D-TLB)
- Write invalidate
- 64-byte line size, two 32-byte sub lines
- Not included in L2 cache. Is snooped in parallel with L2
- No flushing is required

### C.3.2.4 L2 Data Cache

- 1 MByte
- Four-way set associative
- Physically indexed (goes through D-TLB), physically tagged (goes through D-TLB)
- Write back, allocating
- 64-byte line size
- Data is ECC protected, tag is parity protected
- L2 tag address able to cache 16 GB of local memory
- Required flushing for stable storing

### C.3.2.5 L2 Write Cache

- Used to reduce bandwidth to L2 Cache by coalescing and bursting stores to L2 cache
- 2 KBytes
- Four-way set associative
- 64-byte line size, two 32-byte sub-lines
- Physically indexed (goes through Data Translation Look-aside Buffers (D-TLB)), physically tagged (goes through D-TLB)
- Included in L2 cache
- Required flushing for stable storing

## C.3.3 Memory Controller

The memory system consists of the Memory Control Unit (MCU) in the CPU, and two physical banks (A and B) of DDR-1 Synchronous DRAM memory. Only registered DIMMS are supported.

Clock buffering with a PLL is provided on the DIMMs. Each physical bank consists of two 72-bit DDR-1 SDRAM DIMMs. These two DIMMs share an 8-byte data bus plus ECC data bus. Both physical banks have shared address/control bus. Since each DIMM could be dual sided (upper/lower banks), there are maximum of four data loads per physical bank. The cache line is split across the two physical banks. Both banks are controlled by the memory controller.

---

**Note** – DIMMs are always loaded in pairs.

---

A memory controller pipelines requests, making use of 16 memory banks when fully loaded.

## C.3.4 Memory Block Diagram

[FIGURE C-4](#) shows the memory block diagram for the Sun Blade 1500 workstation.

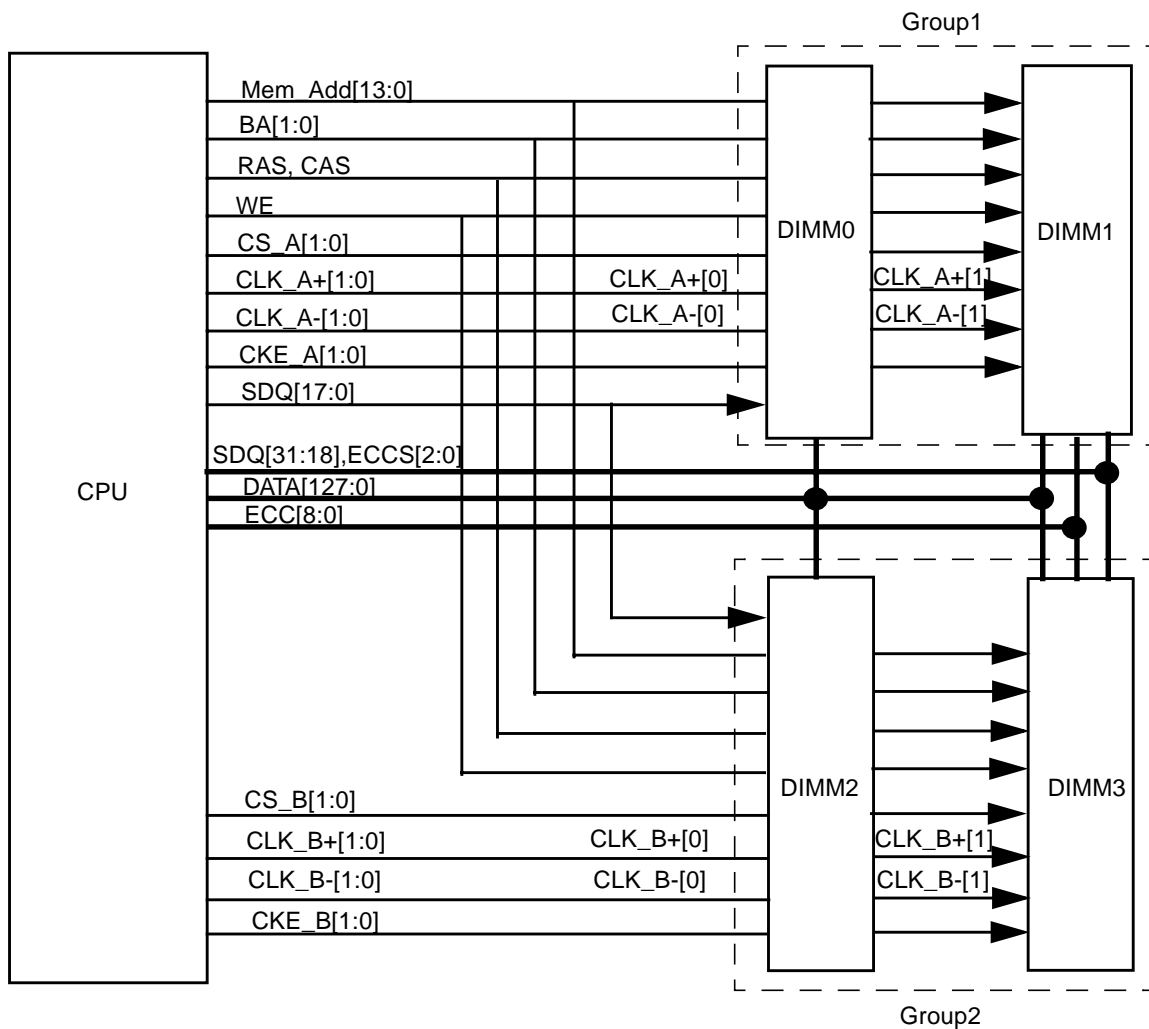


FIGURE C-4 Sun Blade 1500 Memory Block Diagram



## C.3.5 DIMM Configurations

TABLE C-3 describes supported DIMM memory configurations for the Sun Blade 1500 workstation.

TABLE C-3 Sun Blade 1500 Workstation Supported DIMM Configurations

SDRAM Organization	Number of DRAMs	Physical Bank per DIMM	Module Configuration	DIMM Capacity	Minimal Memory	Maximum Memory
128Mbit (32Mx4)	18	1	32Mx72	256MB	512MB	1GB
128Mbit (16Mx8)	18	2	2x(16Mx72)	256MB	512MB	1GB
256Mbit (32Mx8)	9	1	32Mx72	256MB	512MB	1GB
256Mbit (64Mx4)	18	1	64Mx72	512MB	1GB	2GB
256Mbit (32Nx8)	18	2	2x(32Mx72)	512MB	1GB	2GB
512Mbit (64Mx8)	9	1	64Mx72	512MB	1GB	2GB
512Mbit (128Mx4)	18	1	128Mx72	1GB	2GB	4GB
512Mbit (64Mx8)	18	2	2x(64Mx72)	1GB	2GB	4GB
1Gbit (256Mx4)	18	1	256Mx72	2GB	4GB	8GB
1Gbit (128Mx8)	18	2	2x(128Mx72)	2GB	4GB	8GB

## C.3.6 Memory Interleaving

The UltraSPARC IIIi supports four interleaving modes:

- Bank
- Rank
- DIMM
- XOR

### C.3.6.1 Bank Interleaving

Bank interleaving is interleaving within a single device on a DDR1 SDRAM. Each DDR SDRAM used by the workstation contains 18 devices.

## C.3.6.2 Rank Interleaving

Rank interleaving is interleaving between a pair of memory devices on a single DIMM. Each DDR SDRAM used in by the workstation contains 18 devices, nine on one half and nine on the other half. To perform rank interleaving, one discrete device on the left half of the memory module must pair with its adjacent memory module on the right half of the module.

## C.3.6.3 DIMM Interleaving

DIMM interleaving is interleaving between pairs of DIMMs. Interleaving between DIMMs can be done only if all four DIMMs are the same. If the pairs are different, it is still possible to interleave external banks (in double bank DIMMs) and internal banks.

For maximum interleaving performance all DIMMs need to be the same Sun part number.

---

**Note** – There are no constraints for bank or rank interleaving within the same pair.

---

TABLE C-4 shows the different interleaving modes supported based on the DIMMs used.

TABLE C-4 Interleaving Modes

DIMM Pairs	DIMM Type	Interleaving Mode Support
1	Single bank	Bank
1	Dual bank	Bank/rank
2	Diff, single-single	Bank
2	Diff, single-double	Bank/rank, bank/rank
2	Diff, double-double	Bank/rank, bank/rank
2	Same, single-single	Bank/DIMM
2	Same, single-double	Bank/DIMM/rank (on double)
2	Same, double-double	Bank/DIMM/rank

### C.3.6.4 XOR Interleaving

The Sun Blade 1500 workstation also supports a fourth interleaving mode called XOR interleaving. This interleaving mode is used to distribute L2 cache conflict misses and L2 cache read/writeback pairs across more banks.

To use XOR interleaving, all DIMMs must be identical. XOR interleaving is a special case that is not described in [TABLE C-4](#).

---

## C.4 Internal Interfaces

This section discusses system buses and interfaces that are on the motherboard:

- “JBus and JIO” on page C-15
- “PCI Bus and ASICS” on page C-17
- “Graphics Accelerators” on page C-20
- “Other Buses” on page C-27

### C.4.1 JBus and JIO

#### C.4.1.1 JBus Information

JBus is a 128-bit MUX address and data bus running at 200MHz SDR with approximately 171 DTL signals. JBus is a multidrop with a peak bandwidth of 2.56GB/s@200MHz. JBus can insert a dead cycle between transactions of 2 different masters if needed. The bus supports two loads — the UltraSPARC IIIi processor and the JIO I/O bridge.

#### *Key Features*

The following are the key features of JBus:

- Simple SMP protocol that is SPARC-V9 and Sun4u correct, high performance for 1-4 CPUs
- 128-bit wide bus
- Full duplex shared multidrop bus up to four loads
- DTL driver/receiver technology
- Snoopy MOESI protocol

- Separate flow-controlled address and data transaction
- Multiplexed address and data bus
- Variable snoop return delay using sideband signals (no hard latency or throughput requirements in the protocols)
- Distributed arbitration
- Distributed snoop results stalling for resource management
- Pushed writes, slit transID based read returns
  - Out-of-order data return for different cache addresses. In-order data return from single noncacheable port. In-order data return for same cacheable address. Order determined by address bus order.
  - Out-of-order data return values are according to the address bus order. Data return implies completion of prior coherency events, by the requestor, which is a minimal requirement, but also by all other ports, implicitly.
- Four TransIDs per Device ID
- Optional dead cycle for bus turnaround

### C.4.1.2 JIO

The Sun Blade 1500 workstation uses the JIO I/O bridge as the bridge from the JBus to the PCI buses. JIO is a companion core-logic ASIC to the UltraSPARC IIIi CPU. The I/O bridge and UltraSPARC IIIi communicate through JBus. The central task of I/O bridge is to be the point of access to I/O, and system interrupts.

#### *Key Features*

The following are key features of the JIO:

- JBus interface
- Two 64-bit/66MHz PCI leafs
- I/O cache (8 x 64-bytes)
  - One per leaf
  - Fully associative
  - In JBus coherency space
- I/O MMU
  - One per leaf
  - Fully associative TLB
- Mondo dispatch unit
- Byte twisting



The PCI-A leaf includes an interrupt block (Mondo Dispatch) that receives system interrupts from the external IChip2 and the PCI interface unit itself. The interrupt unit communicates with the JBus cluster to send out the interrupt onto the JBus.

### *PCI-B Leaf*

The PCI-B interface is a 64-bit/66MHz PCI leaf with an internal arbiter that supports two masters on the PCI bus.

### *PCI I/O Cache*

Each PCI leaf has an I/O cache. Each PCI I/O cache has eight entries, each of which contains 64 bytes of data. The I/O cache can also perform data prefetching, to minimize DMA read latency.

### *PCI-ISA Bridge*

The ISA bus is an I/O bus that runs at 8MHz. The Sun Blade 1500 workstation uses only a subset of this bus called the XBus.

### *PCI Configuration and I/O Space*

The PCI configuration and I/O space in UltraSPARC IIIi based systems conforms to the *PCI Local Bus Specification Revision 2.2* and are partitioned through a software/firmware convention. 32 MB of space is reserved for each PCI bus in the system:

- 16 MB (lower) for the PCI configuration space
- 16 MB (upper) for the PCI I/O space

The PCI specification defines the configuration space for software initialization and configuration of PCI devices. This space is limited to a maximum size of 16 MB per device. Accesses in this space generate PCI transactions called “Configuration Cycles” which are decoded by the JIO.

The PCI specification also defines a 32-bit I/O space for each device. The I/O space is accessed through dedicated transactions and is provided so as to support devices that are “noncompliant”.

### C.4.2.2 M1535D+

The Sun Blade 1500 workstation uses the M1535D+ I/O subsystem from Acer Labs. The M1535D+ is a highly integrated system I/O chipset in a 328-pin BGA package. The M1535D+ interfaces the PCI A bus and the following interfaces:

- USB 1.1
- ATA 100
- SMBus
- XBus
- Parallel
- Serial
- AC97

### C.4.2.3 BCM5703C

The Sun Blade 1500 workstation uses the BCM5703C Gigabit Ethernet controller from Broadcom. The BCM5703C is a high-performance network interface operating at 10, 100, and 1000 Mbits/second link rates.

#### *Key Features*

The following are key features of the BCM5703C:

- Integrated 10BASE-T/100BASE-TX/1000BASE-T transceivers
- Full-duplex support in Gb mode
- 10/100/1000 tri-speed MAC
- 64-bit/66MHz PCI 2.2 host interface
- MII/GMII/TBI interfaces for external transceivers
- 96 KB on chip packet buffer
- Dual high-speed RISC cores with 16-KB caches
- Programmable, inline packet classification
- TCP, IP, UDP checksum
- TCP segmentation
- CPU task off load
- Adaptive interrupts
- Priority queuing-802.1p Layer 2 priority encoding support for four priority queues
- Virtual LANs-802.1q VLAN tagging support for up to 64 VLANs
- Jumbo frames (9KB)
- 802.3 flow control

- Link aggregation-802.3ad, GEC/FEC, smart load balancing (supports heterogeneous teams)
- 300-pin HBGA package
- 3.3v I/O

#### C.4.2.4 BCM5703C Block Diagram

FIGURE C-6 shows the block diagram for the BCM5703C.

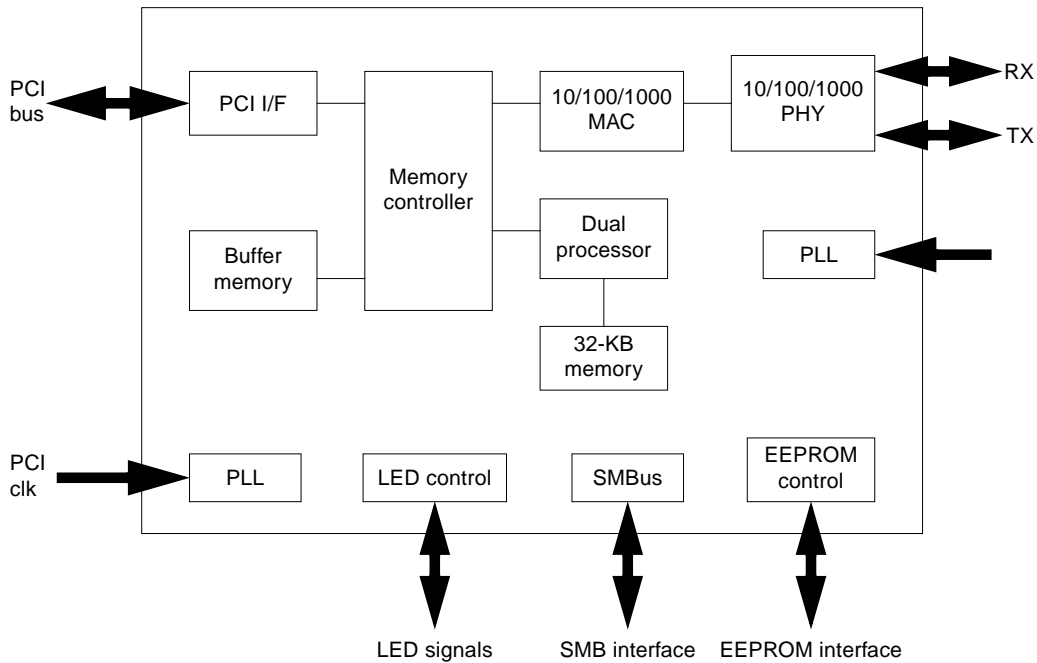


FIGURE C-6 BCM5703C Block Diagram

### C.4.3 Graphics Accelerators

The Sun Blade 1500 workstation base configurations include either the Sun XVR-600, Sun XVR-500, or Sun XVR-100 graphics accelerators.



### C.4.3.1 Sun XVR-600

The Sun XVR-600 graphics accelerator provides the following features and benefits:

- FRU ID (field replaceable unit identification enables you to identify the Sun XVR-600 graphics accelerator serial number and other data using `fbconfig`)
- OpenGL 1.3 and 1.2.3 for Solaris implementations. For more information access this URL:  
`http://opengl.org`
- Geometry acceleration
  - Model view matrix transformation of vertex and normal coordinates
  - Texture matrix transformation of texture coordinates
  - Full lighting calculations with up to 32 light sources
  - Up to six user clip planes
  - Perspective transformation
  - Viewport transformation
  - View volume clipping
- OpenGL operations
  - Cube-mapping
  - Points (2D, 3D, wide)
  - Vectors (2D and 3D lines and line strips; wide, stippled)
  - Polygons (triangles, triangle strips, quads, quad strips, polygons, point/line polygon mode)
  - Antialiased points, vectors, and polygons
  - Image support (multiple formats, zoom, bilinear scaling, color matrix, color tables)
  - Alpha operations
  - Scissoring
  - Window clipping
  - Masking
  - Fogging (linear, exponential, exponential<sup>2</sup>, user-defined)
  - Texture mapping (point, bilinear, trilinear, multiple internal formats)
  - Stencil operations
  - Dithering
  - Rich set of blending operations
  - Fast window clears
  - Fast window-mode double buffering
  - Frame-sequential stereo support

- Support of OpenGL extensions
  - Imaging extensions such as pixel buffer, color table, and color matrix
  - Blend extensions such as blend color, blend minmax, and blend function separate
  - Texture extensions (edge clamp, border clamp, LOD clamp, generate mipmap)
  - Texture color table
  - Post-texturing specular
  - Stencil operation wrap

### *Additional Features*

- 32 Mbytes of DDR display list memory
- 32 Mbytes of texture memory
- 64 Mbytes of frame buffer memory
- 10-bit gamma correction
- Resolution up to  $2048 \times 1536 \times 40$  Hz at 24-bit color
- $1920 \times 1200$  screen support
- $1280 \times 1024$  stereo screen support
- Hardware cursor
- Stereoscopic viewing support (frame sequential)
- Stereo output
- Display Data Channel (DDC) monitor support for bidirectional communication
- Display Power Management Signaling (DPMS) to enable monitor power-saving mode
- High-speed, full-featured DMA over the PCI bus
- PCI 66/33 MHz 64-bit interface
- Multiscreen support using multiple cards in a single workstation
- Framelocking of the video timing to an external timing source
- Multiview functionality for framelocking of multiple cards
- Two video lookup tables
- DVI-I video out

## Screen Resolutions and Video Formats

TABLE C-5 lists the monitor screen resolutions and video formats supported by the Sun XVR-600 graphics accelerator:

TABLE C-5 Sun XVR-600 Graphics Accelerator Monitor Screen Resolutions

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio Format	Maximum Number of SPP <sup>1</sup> Single Screen
2048 x 1536	40 Hz	Sun	4:3	1
1920 x 1200	60, 70, 75 Hz	Sun	16:10	1
1920 x 1200	60_240T Hz	Sun	16:10	1
1920 x 1080	72 Hz	Sun	16:9	1
1792 x 1344	75 Hz	VESA	4:3	1
1600 x 1280	76 Hz	Sun	5:4	1
1600 x 1200	60, 75 Hz	VESA	4:3	1
1600 x 1000	66, 76 Hz	Sun	16:10	1
1440 x 900	76 Hz	Sun	16:10	1
1280 x 1024	60, 75, 85 Hz	VESA	5:4	2
1280 x 1024	67, 76 Hz	Sun	5:4	2
1280 x 1024	112 Hz	Sun-stereo	5:4	1
1280 x 800	112 Hz	Sun-stereo	16:10	1
1280 x 800	76 Hz	Sun	16:10	2
1152 x 900	66, 76 Hz	Sun	5:4	1
1152 x 900	120 Hz	Sun-stereo	5:4	1
1024 x 800	84 Hz	Sun	5:4	2
1024 x 768	75 Hz	VESA	4:3	2
1024 x 768	60, 70, 77 Hz	Sun	4:3	2
960 x 680	108, 112 Hz	Sun-stereo	7:5	2
800 x 600	75	VESA	4:3	4
640 x 480	60 Hz	VESA	4:3	8

1. Samples Per Pixel (SPP).

### C.4.3.2 Sun XVR-500

The Sun XVR-500 graphics accelerator provides the following features and benefits:

- FRU ID (field replaceable unit identification enables you to identify the Sun XVR-500 graphics accelerator serial number and other data using `fbconfig`)
- OpenGL 1.2 implementation. 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 24 light sources
  - Up to six user clip planes
  - Perspective transformation
  - Viewport transformation
  - View volume clipping
  - Image processing
- OpenGL operations
  - Points (2D, 3D, wide)
  - Vectors (2D and 3D lines and line strips; wide, stippled)
  - Polygons (triangles, triangle strips, quads, quad strips, polygons, point/line polygon mode)
  - Antialiased points, vectors, and polygons
  - Image support (multiple formats, zoom, bilinear scaling, color matrix, color tables)
  - Alpha operations
  - Scissoring
  - Window clipping
  - Masking
  - Fogging (linear, exponential, exponential<sup>2</sup>, user-defined)
  - Texture mapping (point, bilinear, trilinear, multiple internal formats)
  - Stencil operations
  - 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)
- Texture color table
- Post-texturing specular
- Stencil operation wrap

### *Additional Features*

- 16 Mbytes of SDRAM display list memory
- 16 Mbytes on-board SDRAM texture memory with full mip-mapped trilinear interpolated texture processing
- 32 Mbytes of frame buffer SDRAM memory
- 10-bit gamma correction
- Hardware cursor
- Stereoscopic viewing support (frame sequential)
- Multisample for antialiased Sun OpenGL for Solaris
- 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-64 bus
- Multiscreen support using multiple boards in a single workstation
- Two video lookup tables

### *Screen Resolutions and Video Formats*

TABLE C-6 lists the monitor screen resolutions and video formats supported by the Sun XVR-500 graphics accelerator:

**TABLE C-6** Sun XVR-500 Graphics Accelerator Monitor Screen Resolutions

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio Format
1920 x 1080	72 Hz	Sun	16:9
1600 x 1280	76 Hz	Sun	5:4
1600 x 1200	75 Hz	VESA	4:3
1600 x 1000	66, 76 Hz	Sun	16:10

**TABLE C-6** Sun XVR-500 Graphics Accelerator Monitor Screen Resolutions *(Continued)*

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio Format
1440 x 900	76 Hz	Sun	16:10
1280 x 800	112Hz	Sun-stereo	16:10
1280 x 800	76 Hz	Sun	16:10
1280 x 1024	60, 75, 85 Hz	VESA	5:4
1280 x 1024	67, 76 Hz	Sun	5:4
1152 x 900	112, 120 Hz	Sun-stereo	5:4
1152 x 900	66, 76 Hz	Sun	5:4
1024 x 800	84 Hz	Sun	5:4
1024 x 768	75 Hz	VESA	4:3
1024 x 768	60, 70, 77 Hz	Sun	4:3
960 x 680	108, 112 Hz	Sun-stereo	Sun-Stereo
768 x 575	50i Hz	PAL	PAL
640 x 480	60 Hz	VESA	4:3
640 x 480	60i Hz	NTSC	NTSC

---

**Note** – The 640 x 480 resolutions support Sun OpenGL for Solaris multisampling capable of two samples per pixel. You can find configuration details with `fbconfig -help`, `/usr/lib/fbconfig/SUNwifb_config -help`, or in the `SUNwifb_config` man page.

---

### C.4.3.3 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-7 lists the monitor screen resolutions and video formats supported by the Sun XVR-100 graphics accelerator.

TABLE C-7 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
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.4.4 Other Buses

Other buses are used in the Sun Blade 1500 workstation for interfacing various components:

- I<sup>2</sup>C — for fan control, motherboard FRUID, PCI clock generator, and DIMM flash PROMs

- Ichip2 — interrupt concentrator
- XBus — for real-time clock, firmware, 32K SRAM, and I<sup>2</sup>C master
- SMBus — for smart card reader
- ATA 100 — for hard drives and optical media drive

---

**Note** – A second I<sup>2</sup>C bus interfaces the NVRAM with the JIO I/O bridge.

---

## C.5 System Clocks and Interrupts

### C.5.1 Clock Generation

There are four clock domains in the Sun Blade 1500 workstation:

- PECL — for UltraSPARC IIIi and JIO
- Differential — from UltraSPARC IIIi to DDR memory subsystem
- Single-ended PCI — for PCI devices
- Miscellaneous clocks

The clocks in the four domains are generated from clock synthesizers or dedicated crystals on the motherboard. The SDRAM clocks are generated by the UltraSPARC IIIi processor.

[TABLE C-8](#) lists all the clocks present in the Sun Blade 1500 system.

**TABLE C-8** Clock Frequencies

Component	Clock	Frequency (MHz)	Source	Description
UltraSPARC IIIi CPU	J_CLK+	125 ~ 350	MC12429/MC100LVEP14	LVPECL (JBus)
UltraSPARC IIIi CPU	J_CLK-	125 ~ 350	MC12429/MC100LVEP14	LVPECL(JBus)
UltraSPARC IIIi CPU	STICK	12	Oscillator	System tick clock
JIO I/O Bridge	J_REFCLK+	125 ~ 350	MC12429/MC100LVEP14	LVPECL(JBus)
JIO I/O Bridge	J_REFCLK-	125 ~ 350	MC12429/MC100LVEP14	LVPECL(JBus)
JIO I/O Bridge	P_REFCLK	33.33	ICS951601	PCI clock
JIO I/O Bridge	G_PCI_REFCLK	66.66	ICS951601	PCI clock



**TABLE C-8** Clock Frequencies (*Continued*)

Component	Clock	Frequency (MHz)	Source	Description
M1535D+ I/O subsystem	PCI_CLK	33.33	ICS951601	PCI clock
M1535D+ I/O subsystem	OSC32KI OSC32KII	32.768KHz	Dedicated crystal	Real-time clock
M1535D+ I/O subsystem	USB_CLK	48.00	ICS951601	USB Clock
M1535D+ I/O subsystem	OSC14M	14.3182	ICS951601	Reference clock
IChip2	PCIClk	33.33	ICS951601	PCI clock
BCM5703C Gigabit Ethernet	PCICLK	66.66	ICS951601	PCI clock
BCM5703C Gigabit Ethernet	XIN	25.000	Dedicated crystal	Integrated PHY Clk
CPLD	PCICLK	33.33	ICS951601	PCI clock
PCI0 (33.3MHz)	PCICLK	33.33	ICS951601	PCI clock
PCI1 (33.3MHz)	PCICLK	33.33	ICS951601	PCI clock
PCI2 (33.3MHz)	PCICLK	33.33	ICS951601	PCI clock
PCI3 (33.3MHz)	PCICLK	33.33	ICS951601	PCI clock
PCI4 (66.6MHz)	PCICLK	66.66	ICS951601	PCI clock

## C.5.2 Interrupt Map

[TABLE C-9](#) lists the interrupts handled by the IChip2 interrupt concentrator.

**TABLE C-9** Sun Blade 1500 Interrupt Map

Ichip2 Pin	Pin Number	Interrupt	INT_NUM	Type	Priority
PCI1_INT0#	108	PCI0, INTA#	0x04	Active low	4
PCI1_INT1#	109	PCI0, INTB#	0x05	Active low	4
PCI1_INT2#	112	PCI0, INTC#	0x06	Active low	4
PCI1_INT3#	113	PCI0, INTD#	0x07	Active low	4
PCI2_INT0#	114	PCI1, INTA#	0x08	Active low	4
PCI2_INT1#	115	PCI1, INTB#	0x09	Active low	4

**TABLE C-9** Sun Blade 1500 Interrupt Map (Continued)

Ichip2 Pin	Pin Number	Interrupt	INT_NUM	Type	Priority
PCI2_INT2#	117	PCI1, INTC#	0x0A	Active low	4
PCI2_INT3#	118	PCI1, INTD#	0x0B	Active low	4
PCI3_INT0#	119	PCI2, INTA#	0x0C	Active low	4
PCI3_INT1#	120	PCI2, INTB#	0x0D	Active low	5
PCI3_INT2#	123	PCI2, INTC#	0x0E	Active low	6
PCI3_INT3#	124	PCI2, INTD#	0x0F	Active low	7
PCI4_INT0#	125	PCI3, INTA#	0x10	Active low	2
PCI4_INT1#	126	PCI3, INTB#	0x11	Active low	1
PCI4_INT2#	127	PCI3, INTC#	0x12	Active low	1
PCI4_INT3#	128	PCI3, INTD#	0x13	Active low	3
PCI5_INT0#	1	PCI4, INTA#	0x14	Active low	4
PCI5_INT1#	6	PCI4, INTB#	0x15	Active low	6
PCI5_INT2#	7	PCI4, INTC#	0x16	Active low	6
PCI5_INT3#	8	PCI4, INTD#	0x17	Active low	6
PCI6_INT0#	9	Primary IDE interrupt	0x18	Active low	6
PCI6_INT1#	10	RTC power on	0x19	Active low	1
PCI6_INT2#	11	Secondary IDE interrupt	0x1A	Active low	1
PCI6_INT3#	12	I/O subsystem management interrupt (power off, thermal, SMB, etc)	0x1B	Active low	3
PCI7_INT0#	13	LAN interrupt	0x1C	Active low	4
PCI7_INT1#	16	Undefined	0x1D	Active low	5
PCI7_INT2#	17	Undefined	0x1E	Active low	6
PCI7_INT3#	18	Undefined	0x1F	Active low	7
OBDIO0_INT0#	19	Power button interrupt	0x20	Active low	3
OBDIO0_INT1#	20	PCIA PME#	0x21	Active low	3
OBDIO0_INT2#	22	Smart card interrupt	0x22	Active low	2
OBDIO0_INT3#	23	PCIB PME#	0x23	Active low	5
OBDIO0_INT4#	24	Audio interrupt	0x24	Active low	8
OBDIO0_INT5#	27	Undefined	0x25	Active low	8
OBDIO0_INT6#	28	USB2 interrupt	0x26	Active low	5

**TABLE C-9** Sun Blade 1500 Interrupt Map (Continued)

lchip2 Pin	Pin Number	Interrupt	INT_NUM	Type	Priority
OBDIO0_INT7#	29	USB1 interrupt	0x27	Active low	4
OBDIO0_INT8#	30	Undefined	0x28	Active low	7
OBDIO0_INT9#	31	Undefined	0x29	Active low	8
OBDIO1_INT0#	32	Serial port interrupt	0x2C	Active high	3
OBDIO1_INT1#	33	Parallel port interrupt	0x2D	Active high	4
OBDIO1_INT2#	38	I <sup>2</sup> C device interrupt	0x2E	Active high	7
OBDIO1_INT3#	39	CPU overheat interrupt	0x2F	Active high	

## C.6 External Interfaces

This section discusses buses and interfaces that are off the motherboard or external to the system chassis. Topics include:

- [“ATA 100” on page C-31](#)
- [“Smart Card Reader” on page C-32](#)
- [“USB” on page C-32](#)
- [“Audio” on page C-33](#)
- [“PCI Slots” on page C-33](#)
- [“IEEE 1394 USB 2 Combination Card” on page C-33](#)
- [“Ethernet” on page C-34](#)
- [“Parallel” on page C-34](#)
- [“Serial” on page C-34](#)

### C.6.1 ATA 100

The M1535D+ I/O subsystem provides two channels of IDE within the IDE controller to support up to a maximum of four devices. Each channel can operate at DMA mode 5 independently. The standard configuration is an UltraDMA/100-capable hard drive on the primary channel and a DVD-ROM optical media drive on the secondary channel. Key features of the IDE controllers are:

- Supports PCI bus mastering at 200 MB/sec transfer rate.
- Two separate IDE channels that support UltraDMA/100 high performance ATA bus for 100 MB transfer rate and concurrent operation.
- Dedicated ATA bus pins and buffers for each channel

---

**Note** – The hard drives of the Sun Blade 1500 workstation share the same IDE controller channel. Therefore, internal drive mirroring is not supported.

---

## C.6.2 Smart Card Reader

The M1535D+ provides a System Management Bus (SMBus) host controller. The controller provides a communication channel for I<sup>2</sup>C devices using the SMBus protocol. In the Sun Blade 1500 workstation, the smart card reader is the only device on the SMBus.

The smart card reader is ISO7816-compliant and supports Payflex and Cyberflex smart cards. [TABLE C-10](#) lists the functions of the smart card reader LED.

**TABLE C-10** Smart Card Reader LED Status

LED Activity	Condition
Solid amber	Read or write error to the smart card.
Solid green	Device within smart card is open and ready for access.
Flashing green	Reading or writing to smart card.

---

**Note** – The LED indicates the condition of the smart card itself, not the reader.

---

## C.6.3 USB

The USB interface for the Sun Blade 1500 workstation is provided by the M1535D+ I/O subsystem. The M1535D+ supports four USB 1.1 ports. USB 1.1 is an industry standard serial bus intended for slower peripheral devices such as the keyboard and mouse. The protocol on the USB is of a master/slave polling nature with the following features:

- OpenHCI Host Controller
- 1.5 and 12 Mb/s transfer rate
- Four host ports

## C.6.4 Audio

Within the M1535D+ I/O subsystem is a AC97-compliant link controller that provides a cost-effective audio solution when interfaced with any AC97 ver2.1 compliant audio CODEC. For the Sun Blade 1500 workstation, an Analog Devices AD1881 CODEC is used.

Audio outputs and inputs are provided at the front and rear of the Sun Blade 1500 workstation. On the bezel are the monaural microphone and stereo headphone jacks. On the back panel are the audio-out and audio-in jacks, both of which are stereo.

---

**Note** – If so equipped, do not remove the plastic rivet from the headphone jack of the DVD-ROM or CD-RW drive. Instead, use the headphone jack at the bottom of the front panel.

---

## C.6.5 PCI Slots

Four 33 MHz and one 66 MHz PCI slots are provided on the Sun Blade 1500 motherboard. The 33 MHz slots are comprised of two 32-bit and two 64-bit. These slots provide 5 VDC power. The 66 MHz slot is 64-bit and supplies 3.3 VDC.

In standard configurations, the bottom slot, `PCI0`, is preconfigured with the IEEE 1394 USB 2.0 combination card. The second to the bottom slot, `PCI1`, might have a Sun XVR-100 graphics accelerator, or the top slot, `PCI4`, might have a Sun XVR-500 graphics accelerator preinstalled.

## C.6.6 IEEE 1394 USB 2 Combination Card

Supported in standard Sun Blade 1500 workstation configurations, the IEEE 1394 USB 2.0 combination (combo) card adds three USB ports compliant to the USB 2.0 standard. These ports provide 480 Mbps throughput. The card also has two IEEE 1394A ports for additional connectivity at 400 Mbps throughput.

## C.6.7 Ethernet

The BD5703C Gigabit Ethernet controller on the Sun Blade 1500 motherboard provides the MAC and PHY functionality to support one twisted pair Ethernet (TPE) RJ-45 connector at the back of the system. There are two LEDs at the TPE connector, an amber and a green. [TABLE C-11](#) list the functions of these LEDs.

**TABLE C-11** TPE LED Status

LED	Status
Amber - Link	When illuminated, a 10/100/1000 Mbps link exists.
Green - Activity	When flashing, indicates transmit or receive activity.

## C.6.8 Parallel

The M1535D+ provides the Sun Blade 1500 workstation with a parallel port capable of ECP, EPP, and SPP modes, and compliant to IEEE 1284 standards.

## C.6.9 Serial

The M1535D+ I/O subsystem supports 2 serial ports having 16450 and 16550 compatible UARTs with 16-byte FIFO buffers. The UARTs are baud rate programmable and provide dedicated pins for infrared transmissions.

When powering off, the Sun Blade 1500 workstation sends a BREAK signal out the serial ports. This break could interfere with the workstation controlling a server through a TIP connection. Four solutions are available:

- Configure for an alternate BREAK key sequence on the server.
- “Filter” the TIP connection through a network terminal concentrator
- Disable the keyboard abort on the server
- Disable the TIP connection on the server

### C.6.9.1 Configuring for an Alternate BREAK Key Sequence on the Server

As superuser, open a terminal window and configure the alternate BREAK key sequence. Type:

```
# kbd -a alternate
```

To invoke a keyboard abort, type: Return, ~, Ctrl-B.

---

**Note** – You must reconfigure the alternate BREAK key sequence after a server power cycle.

---

### C.6.9.2 Filtering the TIP Connection Through a Network Terminal Concentrator

The network terminal concentrator acts as a proxy between the Sun Blade 1500 workstation and the server under TIP control. The network terminal concentrator communicates with the host Sun Blade 1500 workstation through the telnet protocol. If the workstation sends the BREAK signal, it is ignored by the network terminal concentrator. Additionally, the concentrator does not send the BREAK signal upon powering off.

### C.6.9.3 Disabling the Keyboard Abort on the Server

This procedure configures the server to ignore the BREAK signal.

- **As superuser, open a terminal window and disable the keyboard abort. Type:**

```
# kbd -a disable
```

To re-enable keyboard abort, type:

```
# kbd -a enable
```

---

**Note** – You must reconfigure the keyboard abort after a server power cycle.

---

### C.6.9.4 Disabling the TIP Connection on the Server

- **To disable the TIP connection, turn the server key switch to the lock position.**

This action prevents any serial communication with the server. To re-establish serial communications, turn the key to the unlock position.

### C.6.9.5 Permanently Disabling the Keyboard Abort or Configuring an Alternate BREAK Key Sequence on the Server

1. **As superuser, edit the `/etc/default/kbd` file.**

- To disable the keyboard abort, uncomment this line:

```
#KEYBOARD_ABORT=disable
```

- To configure the alternate BREAK key sequence, uncomment this line:

```
#KEYBOARD_ABORT=alternate
```

2. **Save the file.**

3. **Re-initialize the `kbd` drivers. Type:**

```
# kbd -i
```

---

## C.7 System Thermal Management

The Sun Blade 1500 workstation uses an on-demand cooling system. The CPU fan and system chassis fans flowrate is determined from values provided by temperature sensors located on the motherboard and within the UltraSPARC IIIi processor.

### C.7.1 Cooling Fan Control

The Sun Blade 1500 workstation uses an Analog Devices ADM1031 thermal fan controller to interface temperature sensors and cooling fans. The ADM1031 provides a three-channel digital thermometer and over temperature alarms. Two pulse width modulated outputs control the fan speeds by varying the output duty cycle from 33% to 100%. The speed of each fan is monitored from fan tachometer feedback and adjusted appropriately.

There are two alarm outputs from ADM1031:

- Programmable interrupt output, INT#
- Emergency power off output, THERM#



The signal from the temperature sensors is analyzed by the OpenBoot PROM which instructs the ADM1031 to set an optimal fan speed for cooling. Should an overheat condition occur, an interrupt is triggered to inform the Solaris software of the situation.

If the temperature exceeds a programmed threshold value, the ADM1031 goes to an alarm state and sends an emergency power-off interrupt directly to the M1535D+ I/O subsystem, powering off the Sun Blade 1500 workstation to prevent CPU damage.

FIGURE C-7 shows a block diagram of the cooling fan control system.

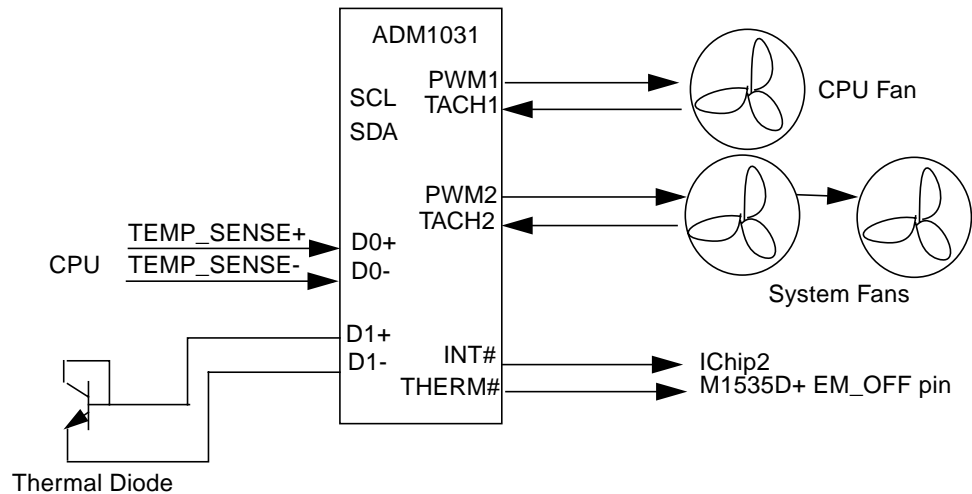


FIGURE C-7 Cooling Fan Control Block Diagram

---

**Note** – Though there are two system fans, only the front system fan provides tachometer feedback to the ADM1031.

---

## C.8 System Power Management

This section outlines Sun Blade 1500 workstation Energy Star compliance and power budget. For information about setting up power management, see [“Power Management” on page D-1](#).

## C.8.1 Energy Star

The Sun Blade 1500 workstation is designed to meet Energy Star Tier 2, Guideline B conditions. Because a 360 W or 420 W power supply is provided for the Sun Blade 1500 system, the power budget in sleep mode to fulfill Energy Star compliance is 54 W or 63 W respectively. The following list describes the requirements of Guideline B:

1. The computer must enter a sleep mode after a period of inactivity.
2. If the computer is shipped with the capability to be on a network, it must have the ability to enter a sleep mode irrespective of the network technology.
3. The computer must retain in sleep mode its ability to respond to all types of network requests. There must be no loss in network functionality available to the user. For example, the network functionality available to the user during the sleep mode must be the same as that was available before the computer entered the sleep mode.
4. The computer must consume in the sleep mode, no more than 15% of the maximum continuous power rating of its power supply.

## C.8.2 Power Budget

TABLE C-12 lists the maximum power consumption for components of the Sun Blade 1500 workstation, in both normal operation and Energy Star modes.

TABLE C-12 Sun Blade 1500 Component Power Consumption

Component	Maximum Power Consumption	
	Normal Operation	Energy Star Mode
UltraSPARC IIIi CPU	68W @ 1.06 Ghz	4.3W @ 1/32 full speed
I/O I/O bridge	11.25 W	3.75 W
Memory	18.5 W	5.75 W
M1535D+ I/O subsystem	2.0 W	0.05 W
BCM5703C Ethernet	7.0 W	3.450 W
Other	19.68 W	7.38 W
Motherboard Total	126.41 W	24.68 W
XVR-500	30 W	3.5 W
PCI cards x4	80.0 W	3.5 W
System fans x 2	7.2 W	0.0 W

**TABLE C-12** Sun Blade 1500 Component Power Consumption (*Continued*)

Component	Maximum Power Consumption	
	Normal Operation	Energy Star Mode
Hard drive, ATA 100, 80 GB	32.3 W	0.0 W
DVD-ROM, ATA 66	11.5 W	0.0 W
USB keyboard and mouse	5 W	0.5 W
Power supply		22.53 (56% efficiency)
<b>TOTAL</b>	<b>290.91 W</b>	<b>51.21 W</b>

### C.8.3 Peripheral Power Supply

[TABLE C-13](#) lists the power available from various interfaces in the Sun Blade 1500 workstation.

**TABLE C-13** Power Supplied at Various Interfaces

Interface	Voltage	Power
USB 1.1	5 VDC	5 Watts across each pair
USB 2.0	5 VDC	5 Watts across all three
IEEE 1394	8 - 40 VDC	6 Watts across both
PCI slots 0 - 3	5 VDC	20 Watts each
PCI slot 4	3.3 VDC	30 Watts
IDE power connector	5 VDC, 12 VDC	52.3 Watts

Installing peripherals or PCI cards which exceed these power requirements might damage the Sun Blade 1500 workstation or violate Energy Star compliance.



# Power Management

---

This chapter discusses power management. Topics include:

- [“Enabling Power Management” on page D-2](#)
- [“Disabling Power Management” on page D-5](#)

To help conserve energy, the Sun Blade 1500 workstation has power management features that are configured using the Dtpower application. The Dtpower application reads and writes its configuration to the `/etc/power.conf` file. You can configure power management by editing the `power.conf` file, however use of the Dtpower application is much easier.

---

**Note** – Your Sun Blade 1500 workstation might ship with power management disabled.

---

Dtpower has two preconfigured power management modes: minimal and standard. There is also a customizable mode. The following table 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.
Customized	Displays are configured: 15 min, 30 min, 1 hr, 2 hr, or Always On Disks are configured: 15 min, 30 min, 1 hr, 2 hr, or Always On Autoshutdown is configured: 15 min, 30 min, 45 min, 1 hr, 2 hr, 3 hr, 4 hr, 6 hr, or 0 hr at any time

---

Before configuring power management, consider the role the Sun Blade 1500 system 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 autoshtutdown times.
- Is it used in a multiple user environment? If so, weigh the idle time against the expected demand.

---

## D.1 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 disks 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 disks and for what idle time.**

For example, you might want the display to go to low-power mode after 15 minutes, the hard disk 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 Autos shutdown Enabled and click Edit.**

The Dtpower (autos shutdown) 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 will be 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.1.1 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	Disk goes to low-power mode.

**TABLE D-2** First Scenario Timeline (*Continued*)

<b>Time</b>	<b>Event</b>
12:59 pm	Entire system goes to low-power mode.
1:01 pm	User returns from lunch and taps keyboard to bring system, disk, 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

<b>Time</b>	<b>Event</b>
4:25 pm	User logs out and leaves to go home.
4:40 pm	Display goes to low-power mode.
4:55 pm	Disk goes to low-power mode.
5:20 pm	User logs in remotely. Disk 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.1.2 Activating the Workstation From Low-Power Mode

You can tell when the Sun Blade 1500 workstation is in low-power mode by observing the power LED. In low-power mode, the LED will flash at a rate of one time every two seconds.

The simplest way to reactivate the Sun Blade 1500 workstation from low-power mode is to tap the spacebar on the keyboard. Additionally, moving the mouse can also bring the system out of low-power mode.



---

## D.2 Disabling Power Management

This section describes how to disable hard drive and system power management.

### D.2.1 Disabling Hard Drive Power Management

When the system goes to low-power mode, the hard drive spins down to conserve power. Later, when you perform a task that accesses the hard drive, the hard drive spins up. You might have to wait a few seconds for the hard drive to reach full speed. If this delay is inconvenient, you can turn off hard drive power management, which prevents the hard drive from entering the low-power mode.

1. **As superuser, edit the `/etc/power.conf` file to include the following line:**

```
device-thresholds /dev/dsk/c0t0d0s0 always-on
```

2. **Reinitialize power management, type:**

```
# /usr/sbin/pmconfig
```

This procedure configures the power management framework to keep the hard drive spinning all of the time, regardless of system usage. To completely turn off all power-saving features of the Sun Blade 1500 workstation, use the procedure in [“Disabling All System Power Management” on page D-5](#).

### D.2.2 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 disk stay in normal-power mode and autoshtutdown is disabled.

# Glossary

---

---

## A

- address** (1) A number used by system software to identify a data storage location.  
(2) In networking, a unique code that identifies a node to the network.
- ASIC** Application-specific integrated circuit.
- ATA** Advanced Technology Attachment. Synonymous with IDE. See IDE.

---

## B

- bank** A bank can be:  
(1) Interleaving within a single device on a DDR1 SDRAM.  
(2) A pair of adjacent DIMMS.  
See interleaving.
- BGA** Ball grid array.
- boot** The process of reading initial software into the computer.
- bus** A set of conductors that connect various functional units within a computer.

---

## C

- cache** A smaller, faster accessible set of memory used to speed up operations of CPUs, storage, and networking components. Typically found within the component it serves.
- CDE** Common Desktop Environment.
- CD-ROM** Compact disc read-only memory. A CD-ROM drive reads data recorded on the CD-ROM optical disc.
- CD-RW** Rewritable compact disc.
- CODEC** (1) Coder/decoder. A CODEC uses analog-to-digital conversion and digital-to-analog conversion in the same chip.
- (2) compression/decompression. An algorithm or computer program for reducing byte consumption in large files and programs.

---

## D

- DDC2** Display data channel version 2. DDC2 is the I<sup>2</sup>C interface used to communicate with the monitor. This interface is the same for both the HD15 and DVI-I connectors.
- DDR-1 SDRAM** Double data rate synchronous dynamic random access memory.
- default** A preset value that is assumed to be correct unless changed by the user.
- DIMM** Dual 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.
- DRAM** Dynamic random-access memory. A read/write dynamic memory in which the data can be read or written in approximately the same amount of time for any memory location.
- drive rails** Mounting hardware used to secure hard drives and other peripherals inside the workstation.
- D-TLB** Data translation look-aside buffer.
- DVD-ROM** Digital versatile disc read-only memory.

---

## E

- ECC** Error checking and correction. The detection and correction of all single-bit errors, plus the detection of double-bit and some multiple-bit errors.
- ECP** Extended capabilities port.
- EEPROM** Electrically erasable programmable read only memory.
- EMI** Electromagnetic interference. An electrical characteristic that directly or indirectly contributes to a degradation in performance of an electronic system.
- EPIC-7** Texas Instruments Inc. 0.13 micron chip fabrication process.
- EPP** Enhanced parallel port.
- ESD** Electrostatic discharge.
- Ethernet** A type of network hardware that provides communication between systems connected directly together by transceiver taps, transceiver cables, and various cable types such as coaxial, twisted-pair, and fiber-optic.

---

## F

- flash PROM** Flash programmable read-only memory.
- FPU** Floating-point unit. A device (board or integrated circuit) that performs floating-point calculations.

---

## G

- Gbit** (Gb) Gigabit. 1024 megabits. Commonly used term in ethernet: Gigabit Ethernet.
- Gbyte** (GB) Gigabyte. A gigabyte is 1024 megabytes. Usually refers to data transfer speeds or the capacity of a storage device.
- GHz** Gigahertz. One billion cycles per second.
- GUI** Graphical user interface.

---

## H

**HBGA** High-density ball grid array. The mechanical connection between a chip and a printed circuit board.

---

## I

**I<sup>2</sup>C** Inter-integrated circuits. A chip-to-chip serial bus.

**IChip2** Interrupt concentrator chip.

**IDE** Integrated drive electronics. An interface for mass storage devices. The controller is integrated with the disk or CD-ROM drive.

**IEEE** Institute of Electrical and Electronics Engineers, Inc. The organization establishes standards for some computers and electrical components.

**IEEE 1394** A high-speed communications protocol.

**interleaving** Memory access that alternates between DIMMs and banks based on the lower order address bits.

DIMM interleaving interleaves between pairs of DIMMS.

Bank interleaving is interleaving within a single device on a DDR1 SDRAM.

Rank interleaving interleaves between a pair of memory devices on a single DIMM.

XOR Interleaving. Exclusive-OR interleaving. A DIMM interleaving mode that is used to distribute L2 cache conflict misses and L2 cache read/writeback pairs across more banks than other interleaving modes. To use XOR interleaving, all DIMMS must be identical.

**I/O** Input/output.

**ISA bus** The ISA bus is an I/O bus that runs at 8MHz and is used in the PCI-ISA bridge.

**I-TLB** Instruction translation look-aside buffer.

---

## J

**JIO** The input/output bridge chip that uses the Jbus architecture.

**JBus** The system bus developed for the UltraSPARC IIIi series of processors.

---

## K

**Kbyte** (KB) Kilobyte. 1024 bytes of data.

---

## L

**LAN** Local area network.

**leaf** Any node (location in a tree structure) that is farthest from the primary node.

**LED** Light-emitting diode.

---

## M

**MAC** Media access controller.

**Mbit** (Mb) Megabit. 1,048,576 bits.

**MByte** (MB) Megabyte. One million bytes.

**Mbps** Megabits per second.

**MCU** Memory controller unit.

**MHz** Megahertz. One million cycles per second.

**MII** Media independent interface.

**MOESI** Modified, owned, exclusive, shared, and invalid.

- mondo** Mondo dispatch unit. An interrupt construction on the JBus.
- MUX** Multiplex, multiplexer. A multiplexer merges information from multiple signals to a single channel.
- 

## N

- node** An addressable point on a network.
- NVRAM** Nonvolatile random access memory. Stores system variables used by the boot PROM. Contains the system host ID number and Ethernet address. NVRAM retains the data when the workstation is powered off.
- 

## O

- OpenBoot PROM** OpenBoot PROM contains the PROM monitor program, a command interpreter used for booting, resetting, low-level configuration, and simple test procedures. OpenBoot software initially boots the system to a state in which the system can further load an operating system.
- OpenGL** OpenGL is an application programming interface (API) for developing portable, interactive 2D and 3D graphics applications.
- 

## P

- PCI** Peripheral component interconnect. A high-performance 32- or 64-bit-wide bus with multiplexed address and data lines.
- peripheral** Removable media assembly. A device such as a smart card reader, CD-ROM drive, DVD-ROM drive, 4-mm tape drive, or a diskette drive.
- PHY** Physical access layer. Part of the digital-to-analog connection between the MAC and the physical Ethernet wire.
- PID** Process ID.
- POR** Power-on reset.



- POST** Power-on self-test. A series of tests that verify motherboard components are operating properly. 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

- registered DIMM** A DIMM that includes a register buffer.
- RISC** Reduced instruction set computer. A computer using the RISC architecture.

---

## S

- SCSI** Small computer system interface.
- SDR** Single data rate.
- SDRAM** Synchronous DRAM.
- SEEPROM** Serial electrically erasable programmable read only memory.
- SMBus** System management bus. The SMBus protocol is a subset of the I<sup>2</sup>C protocol.
- smart card** A card used for user authentication or storing individual user preferences.
- snoop** A search for the latest data in memory.
- snoopy MOESI protocol** Cache coherency protocol. Modified, owned, exclusive, shared, and invalid (MOESI).
- Southbridge** ALI M1535D+ highly integrated system I/O chip. One of three I/O subsystem bridge chips.
- SPOR** System power-on reset.
- SPP** Standard parallel port.
- SRAM** Static random access memory.
- SunVTS** A diagnostic application designed to test hardware.
- superscalar** A processor that can execute more than one instruction per cycle.

**superuser** A privileged account with unrestricted access to all files and commands.

---

## T

**TIP connection** A connection that enables a remote shell window to be used as a terminal to display test data from a system using the terminal interface protocol (TIP).

**TPE** Twisted-pair Ethernet.

**TOD** Time of day. A timekeeping integrated circuit.

---

## U

**UART** Universal asynchronous transmitter-receiver.

**UltraDMA** Ultra direct memory access. A DMA mode within an IDE controller.

**UltraSPARC IIIi** The high-performance central processing unit used in the Sun workstations. The CPU uses SPARC V9, 64-bit reduced instruction set computer (RISC) architecture.

**USB** Universal Serial Bus. USB 1.1 can transfer data up to 12 Mbps. USB 2.0 can transfer data up to 480 Mbps.

**UTP** Unshielded twisted-pair.

---

## V

**VCC** Voltage at the common collector (positive [+] electrical connection).

---

## X

**XOR** Exclusive OR. Also see interleaving.

# Index

---

## SYMBOLS

.version utility, 8-4

## A

AC 97 codec, C-33

access panel

removing, 10-12

replacing, 15-5

service label, 10-13

antistatic

tools, 10-3

wrist strap, attaching, 10-13

ASIC, C-16, C-17

ATA 100, C-31

audio

jacks, B-2

problem flowchart, 4-8

responses, 3-8

testing

OpenBoot Diagnostics, 8-10, 8-18

SunVTS

connection mode, 9-5

functional mode, 9-9

audio USB board

bracket, 13-36, 13-37

cables, 13-32, 13-38

identifying, 13-31

installing, 13-36

removing, 13-32

replaceable component, 2-9

replacing, 13-31

## B

bank, 11-13, C-13

banner utility, 8-3

battery

identifying, 11-24

installing, 11-25

problem flowchart, 4-34

removing, 11-24

replaceable component, 2-9

replacing, 11-23

bezel

removing, 10-14

replacing, 15-2

BGA, C-19

boot mode, 15-10

bracket

audio USB board, 13-36, 13-37

fan

front, 13-8

rear, 13-15

smart card reader, 12-19, 12-21

BREAK

alternate key sequence, C-34

signal, C-34

buses

I<sup>2</sup>C, C-5, C-27

IChip2, C-28

JBus, C-15

- other, C-27
- PCI, C-5, C-17
- SMBus, C-28, C-32
- XBus, C-5, C-28

## C

- cable select mode, 12-8

### cables

- audio USB board
  - disconnecting, 13-32
  - identifying, 14-23
  - installing, 14-27
  - reconnecting, 13-38
  - removing, 14-24
  - replacing, 14-23

- crossover, 7-4

- disconnecting, 11-50

### DVD-ROM drive interface

- identifying, 14-7
- installing, 14-8
- removing, 14-7
- replacing, 14-6

### fan

- front, 13-10
- rear, 13-15

### hard drive interface

- identifying, 14-10
- installing, 14-12
- removing, 14-11
- replacing, 14-10

### IDE power

- identifying, 14-13
- installing, 14-16
- removing, 14-14
- replacing, 14-13

### power

- supply, 13-2
- switch assembly, 14-17

- reconnecting, 11-54

- replacement set, 14-2

- replacing, 14-1

### smart card reader

- disconnecting, 12-17
- identifying, 14-4
- installing, 14-5
- reconnecting, 12-21
- removing, 14-4

- replacing, 14-3
- speaker, 13-42, 13-44
- TIP, 7-4

- card-reader@0, 40 test, 8-11

### cautions

- chassis cross brace, 13-50
- definitions, 10-2
- ESD, 10-2
- Stop-A command, 6-9

- CDE, 5-6, 5-7, 15-11

- CD-ROM, 9-1

### CD-RW drive

- identifying, 12-10
- installing, 12-13
- removing, 12-10
- replaceable component, 2-9
- replacing, 12-9

### chassis

- cross brace
  - identifying, 13-50
  - installing, 13-54
  - removing, 11-49, 13-51
  - replacing, 13-50
- positioning, 10-16
- repositioning, 15-1
- set on side, 11-1
- set upright, 15-1

### clocks

- frequencies, C-28
- motherboard layout, C-6
- real time

- motherboard block diagram, C-5

- testing with OpenBoot
  - Diagnostics, 8-9, 8-17
  - PROM, 8-4
  - TOD, C-6

- CODEC, 8-10, C-5, C-6, C-33

### combination card

- keyboard and mouse, 6-9
- overview, C-33
- replaceable component, 2-9

### commands

- eeprom, 1-2, 5-2, 7-3
- exit, 10-9
- iostat, 3-17
- kill, 10-10
- netstat, 3-26

- obdiag, 8-5
- ping, 3-28
- prstat, 3-32
- prtconf, 3-23
- prtdiag, 3-19
- ps, 3-30
- Stop-A, 6-9
- Stop-N equivalent, 6-10
- troubleshooting, 3-17
- configuration
  - basic, 2-2
  - DIMM, C-13
  - obdiag, 8-7
- connectors
  - external
    - audio, B-2
    - Ethernet, B-5
    - IEEE 1394, B-2
    - parallel, B-3
    - serial, B-4
    - TPE, B-5
    - USB, B-6
    - video, B-7
  - internal
    - fan, B-10
    - front
      - audio, B-10
      - USB, B-11
    - IDE
      - interface, B-12
      - power, B-14
    - power
      - supply, B-14
      - switch, B-17
    - smart card reader, B-17
    - speaker, B-18
- CPU
  - description, C-9
  - fan and heatsink
    - identifying, 11-14
    - installing, 11-19
    - problem flowchart, 4-5
    - removing, 11-15
    - replaceable component, 2-9
    - replacing, 11-14
  - testing
    - POST, 7-6
    - SunVTS

- connection mode, 9-6
  - functional mode, 9-9
- crossover cable, 7-4
- customizing
  - component upgrades, 16-5
  - external peripherals, 16-6
  - PCI cards, 16-1

## D

- date utility, 8-4
- DDC2, B-7
- DDR-1, 2-2
- diagnostic
  - test summary, 5-3
  - tools, 1-1
- DIMM cooling duct
  - identifying, 13-22
  - installing, 13-27
  - removing, 13-23
  - replacing, 13-22
- DIMMs
  - bank, 11-13
  - configurations, 11-3
  - handling caution, 11-2, 11-8
  - identifying, 11-2
  - installation rules, 11-8
  - installing, 11-8
  - messages, 11-13
  - PROM testing with SunVTS
    - connection mode, 9-3
    - functional mode, 9-8
  - registered, C-11
  - removing, 11-3
  - replaceable component, 2-8
  - replacing, 11-2
  - slot locations, 11-8
  - testing
    - POST, 7-10
    - SunVTS
      - connection mode, 9-3
      - functional mode, 9-8
- directional terms, 10-17
- disconnecting
  - cables, 11-50
  - peripherals, 10-8, 10-11
  - power cord, 10-14

- displayed
  - messages, 3-10
  - screens, 3-5
- DMA, C-18, C-22, C-31
- documentation
  - accessing, -xxxvi
  - improving, -xxxvi
  - related, -xxxv
- DRAM, C-11
- drive rails
  - DVD-ROM drive, 12-12, 12-13
  - hard drive, 12-5, 12-7
  - identifying, 13-60
  - installing, 13-62
  - removing, 13-60
  - replacing, 13-60
  - smart card reader, 12-15
  - storing, 12-6
- D-TLB, C-9
- Dtpower application, D-1
- DVD-ROM drive
  - boot mode, 15-10
  - drive rails, 12-12, 12-13
  - identifying, 12-10
  - installing, 12-13
  - interface cable, 12-11
  - LEDs, 1-2, 2-5
  - master mode, 12-13
  - problem flowchart, 4-20
  - removing, 12-10
  - replaceable component, 2-8
  - replacing, 12-9
  - testing
    - OpenBoot
      - Diagnostics, 8-9, 8-13
      - PROM, 8-3
    - SunVTS
      - connection mode, 9-3
      - functional mode, 9-7

## E

- ECC, 2-2, 2-8
- ECP, C-34
- eeprom command, 1-2, 5-2, 7-3
- electrostatic discharge, 10-2

- EMI, -xxxiv
- Energy Star, C-38
- environmental requirements, A-2
- EPIC-7, C-2
- ESD cautions, 10-2
- Ethernet
  - basic configuration, 2-3
  - block diagram, C-20
  - connector, B-5
  - LEDs, C-34
  - symbol, 2-7
- exit command, 10-9
- external views, 2-3

## F

- fan
  - block diagram, C-37
  - control, C-36
  - front
    - bracket, 13-8
    - cables, 13-10
    - identifying, 13-8
    - installing, 13-11
    - problem flowchart, 4-5
    - removing, 13-9
    - replaceable component, 2-9
    - replacing, 13-8
  - rear
    - bracket, 13-15
    - cables, 13-15
    - identifying, 13-15
    - installing, 13-18
    - problem flowchart, 4-5
    - removing, 13-16
    - replaceable component, 2-9
    - replacing, 13-15
- flash PROM
  - available tests, 5-3
  - evidence of failure, 8-3
  - testing
    - OpenBoot Diagnostics, 8-9, 8-12
    - SunVTS
      - connection mode, 9-3
      - functional mode, 9-8
- flashprom@2,0 test, 8-12

## flowchart

- about, 1-4
  - audio output problem, 4-8
  - battery problem, 4-34
  - data access and running applications problems, 4-19
  - DVD-ROM drive problem, 4-20
  - graphical user interface problem, 4-18
  - hard drive problem, 4-4
  - IEEE 1394 problem, 4-25
  - keyboard problem, 4-15
  - login problem, 4-16
  - memory problem, 4-31
  - monitor problem, 4-10
  - motherboard problem, 4-28
  - network problem, 4-13
  - NVRAM problem, 4-33
  - PCI card problem, 4-23
  - power problem, 4-2
  - smart card reader problem, 4-27
  - start here, 1-5
  - system fan problem, 4-5
  - troubleshooting, 4-1
  - USB problem, 4-6
- forced shutdown, 10-9
- FPU, 5-3, 7-9

## G

- Gbyte, 2-1, 7-15
  - GHz, 2-1
  - Gigabit Ethernet, 8-9, C-6, C-19
  - graceful shutdown, 10-6
  - graphics accelerators
    - overview, C-20
    - replaceable component, 2-9
    - Sun XVR-100, C-26
    - Sun XVR-500, C-24
    - Sun XVR-600, C-21
  - testing
    - OpenBoot Diagnostics, 8-9, 8-11
    - SunVTS functional mode, 9-8
- GUI
- displayed, 3-5
  - problem flowchart, 4-18

## H

- hard drive
  - boot mode, 15-10
  - cable select mode, 12-8
  - disabling power management, D-5
  - drive rails, 12-5, 12-7
  - identifying, 12-2
  - installing, 12-6
  - problem flowchart, 4-4
  - removing, 12-3
  - replaceable component, 2-8
  - replacing, 12-2
  - SCSI, 16-6
  - slot locations, 12-2
  - testing
    - OpenBoot
      - Diagnostics, 8-9, 8-13
      - PROM, 8-3
    - SunVTS
      - connection mode, 9-3
      - functional mode, 9-7
- HBGA, C-20
- headphone jack, 2-6
- hung process shutdown, 10-9

## I

- I/O
  - activity, 3-17
  - bridge
    - block diagram, C-17
    - testing with POST, 7-6
  - cache, C-18
  - space, C-18
  - subsystem, C-6
- I<sup>2</sup>C
  - bus, 8-9, C-5, C-27
  - interface, C-2
  - testing with OpenBoot Diagnostics, 8-9, 8-12
- i2c@0, 320 test, 8-12
- IChip2
  - bus, C-28
  - interrupts, C-29
  - motherboard
    - block diagram, C-5
    - layout, C-6
  - PCI-A leaf, C-18

- IDE
  - connectors, 11-47
  - testing
    - OpenBoot
      - Diagnostics, 8-9, 8-13
      - PROM, 8-3
    - SunVTS
      - connection mode, 9-3
      - functional mode, 9-7
- ide@d test, 8-13
- identifying
  - audio USB board, 13-31
  - battery, 11-24
  - cables
    - audio USB board, 14-23
    - DVD-ROM drive interface, 14-7
    - hard drive interface, 14-10
    - IDE power, 14-13
    - smart card reader, 14-4
  - CD-RW drive, 12-10
  - chassis cross brace, 13-50
  - CPU fan and heatsink, 11-14
  - DIMM cooling duct, 13-22
  - DIMMs, 11-2
  - drive rails, 13-60
  - DVD-ROM drive, 12-10
  - fan
    - front, 13-8
    - rear, 13-15
  - hard drive, 12-2
  - memory, 11-2
  - motherboard, 11-46
  - NVRAM, 11-27
  - PCI
    - card slots, 11-35
    - card support, 13-46
    - cards, 11-30
  - power
    - supply, 13-2
    - switch assembly, 14-18
  - smart card reader, 12-15
  - speaker, 13-40
- IEEE 1394
  - card
    - basic configuration, 2-3
    - replaceable component, 2-9
  - devices, 16-6
  - ports, 2-7, B-2
    - problem flowchart, 4-25
    - symbol, 2-7
- Install Check
  - downloading, 5-7
  - overview, 5-7
- installing
  - audio USB board, 13-36
  - battery, 11-25
  - cables
    - audio USB board, 14-27
    - DVD-ROM drive interface, 14-8
    - hard drive interface, 14-12
    - IDE power, 14-16
    - smart card reader, 14-5
  - CD-RW drive, 12-13
  - chassis cross brace, 13-54
  - CPU fan and heatsink, 11-19
  - DIMM cooling duct, 13-27
  - DIMMs, 11-8
  - drive rails, 13-62
  - DVD-ROM drive, 12-13
  - fan
    - front, 13-11
    - rear, 13-18
  - hard drive, 12-6
  - memory, 11-8
  - motherboard, 11-52
  - NVRAM, 11-28
  - PCI
    - card support, 13-48
    - cards, 11-40
  - power
    - supply, 13-5
    - switch assembly, 14-20
  - smart card reader, 12-20
  - Software Enhancement Script, 5-9
  - speaker, 13-43
- interfaces
  - external
    - ATA 100, C-31
    - audio, C-33
    - Ethernet, C-34
    - IEEE 1394, C-33
    - overview, C-31
    - parallel, C-34
    - PCI slots, C-33
    - serial, C-34
    - SMBus, C-32



- USB, C-32
- USB 2, C-33
- internal
  - JBus, C-15
  - other, C-27
  - overview, C-15
  - PCI, C-17
- interleaving memory, C-13
- interrupts, C-29
- iostat command
  - examples, 3-18
  - options, 3-17
  - overview, 3-17

## J

- jacks
  - headphone, 2-6
  - line-in, 2-7
  - line-out, 2-7
  - microphone, 2-6
  - symbols, 2-7
- JBus, C-15
- JIO
  - block diagram, C-17
  - JBus, C-15
  - motherboard
    - block diagram, C-5
    - layout, C-6
  - overview, C-16
  - testing with POST, 7-6

## K

- keyboard
  - abort, C-35
  - problem flowchart, 4-15
  - testing, 5-4
  - USB, 2-2, 6-9, 6-10
- kill command, 10-9

## L

- LAN
  - controller, C-2

- interrupt, C-30
- leaf, C-16, C-17
- LEDs
  - DVD-ROM drive, 1-2, 2-5
  - Ethernet, C-34
  - motherboard, C-6
  - power button, 2-6
  - smart card reader, 2-5, C-32
  - system, 1-2
  - TPE, 1-2
- login problem flowchart, 4-16
- low-power mode
  - configuring, D-2
  - exiting, D-4

## M

- MAC, 3-27, C-20, C-34
- manual organization, -xxxii
- master mode, 12-13
- Mbit, C-13
- Mbps, B-6, C-19, C-33
- MByte, 12-10
- MCU, C-11
- Megabit, C-13
- memory
  - bank, 11-13, C-13
  - block diagram, C-11
  - caches, C-9
  - controller, C-11
  - DDR-1, 2-2
  - DIMM configurations, C-13
  - DRAM, C-11
  - ECC, 2-2, 2-8
  - identifying, 11-2
  - installation rules, 11-8
  - installing, 11-8
  - interleaving, C-13
  - messages, 11-13
  - problem flowchart, 4-31
  - removing, 11-3
  - replacing, 11-2
  - SDRAM, 2-2, C-2
  - testing
    - POST, 7-10
    - SunVTS

- connection mode, 9-3
  - functional mode, 9-8
- messages
  - DIMMs, 11-13
  - displayed, 3-10
  - memory, 11-13
  - OpenBoot PROM, 3-11
  - other, 3-16
  - POST
    - info, 7-17
    - warning, 7-16
  - POST error, 7-15
  - Solaris error, 3-13
- MHz, 2-3
- microphone jack, 2-6
- MII, C-19
- mondo, C-16, C-18
- monitor
  - problem flowchart, 4-10
  - supported, 2-10
- motherboard
  - block diagram, C-4
  - connector
    - descriptions, 11-47
    - layout, 11-47
  - identifying, 11-46
  - installing, 11-52
  - jumpers, C-8
  - layout diagram, C-5
  - LEDs, C-6
  - problem flowchart, 4-28
  - removing, 11-48
  - replaceable component, 2-9
  - replacement procedures, 11-1
  - replacing, 11-46
  - retaining clip, 11-51
- multimedia, -xxxi
- MUX, C-15

## N

- netstat command
  - examples, 3-27
  - options, 3-26
  - overview, 3-26
- network

- problem flowchart, 4-13
- testing
  - OpenBoot
    - Diagnostics, 8-9, 8-13
    - PROM, 8-2
  - SunVTS
    - connection mode, 9-5
    - functional mode, 9-9
- network@2 test, 8-13
- node, 3-12, 3-28, 8-6
- NVRAM
  - identifying, 11-27
  - installing, 11-28
  - overview, 5-1
  - problem flowchart, 4-33
  - removing, 11-27
  - replacing, 11-26
  - resetting
    - permanently, 6-11
    - temporarily, 6-10

## O

- obdiag
  - command, 8-5
  - configuring, 8-7
  - menu, 8-6
  - tests, 8-9
- OBP, see OpenBoot PROM
- ok prompt, 5-2
- OpenBoot
  - Diagnostics
    - configuring, 8-7
    - menu, 8-6
    - overview, 8-5
    - purpose, 1-2
    - starting, 8-5
    - tests
      - card-reader@0,40, 8-11
      - flashprom@2,0, 8-12
      - i2c@0,320, 8-12
      - ide@d, 8-13
      - initiating, 8-7
      - network@2, 8-13
      - output, 8-7
      - parallel@0,378, 8-16
      - pmu@6, 8-16

- rtc@0,70, 8-17
- serial@0,2e8, 8-17
- serial@0,3f8, 8-17
- sound@8, 8-18
- SUNW,XVR-500@3, 8-11
- usage, 8-9
- usb@a, 8-19
- usb@b, 8-20
- verifying component installation, 15-12

**PROM**

- messages, 3-11
- overview, 5-5
- utilities
  - .version, 8-4
  - banner, 8-3
  - date, 8-4
  - overview, 8-1
  - probe-ide, 8-3
  - show-devs, 8-2
  - watch-clock, 8-4
  - watch-net, 8-2

**OpenGL**

- extensions, C-22
- implementation, C-21
- multisampling, C-26
- operations, C-21

other messages, 3-16

## **P**

**parallel port**

- pinout, B-3
- symbol, 2-7
- testing
  - OpenBoot Diagnostics, 8-9, 8-16
  - SunVTS
    - connection mode, 9-5
    - functional mode, 9-9

parallel@0,378 test, 8-16

**PCI**

- acronym, 2-3
- bus
  - Gigabit Ethernet, C-19
  - I/O subsystem, C-19
  - motherboard block diagram, C-5
  - overview, C-17
- card retainer, 11-41

- card support
  - closing, 11-44
  - identifying, 13-46
  - installing, 13-48
  - opening, 11-40
  - removing, 13-46
  - replacing, 13-46
- cards
  - identifying, 11-30
  - installing, 11-40
  - optional, 16-1
  - problem flowchart, 4-23
  - removing, 11-30
  - replacing, 11-29
- leaf
  - A, C-17
  - B, C-18
- slots, C-33

**peripherals**

- disconnecting, 10-8, 10-11
- external, 16-6
- reconnecting, 15-9

**PHY, C-20, C-34**

**PID, 3-30, 10-9**

**ping command**

- examples, 3-29
- options, 3-29
- overview, 3-28

**pinouts**

- audio jacks, B-2
- Ethernet, B-5
- fan (FAN0 SYS, FAN1 SYS, FAN2), B-10
- front
  - audio (J13 AUDIO), B-11
  - USB (J19 USB), B-11
- IDE
  - interface (IDE PRI and IDE SEC), B-12
  - power (IDE PWR), B-14
- IEEE 1394, B-2
- parallel port, B-3
- power
  - supply (PS0, PS1, PS2), B-15
  - switch (J24 SW0), B-17
- serial port, B-4
- smart card reader (SCRO), B-18
- TPE, B-5
- USB, B-6
- video, B-8

- pmu@6 test, 8-16
- ports
  - IEEE 1394, 2-7
  - parallel, 2-7
  - serial, 2-7
  - USB, 2-6, 2-7
  - USB 2, 2-7
- positioning chassis, 10-16, 15-1
- POST
  - acronym, 7-1
  - enabling
    - ok prompt, 7-2
    - terminal window, 7-3
  - error messages, 7-15
  - info messages, 7-17
  - levels, 7-1
  - output
    - comparison
      - maximum level, 7-10
      - minimum level, 7-6
    - viewing
      - second system, 7-4
      - serial terminal, 7-3
  - overview, 5-4
  - purpose, 1-2
  - running, 7-5
  - setting up, 7-2
  - verifying component installation, 15-12
  - warning messages, 7-16
- power
  - budget, C-38
  - button, 10-4, 10-10
    - LED, 2-6
    - location, 2-6
  - cord
    - disconnecting, 10-11, 10-14
    - reconnecting, 15-9
  - cycling, 10-5
  - management
    - disabling
      - hard drive, D-5
      - system, D-5
    - enabling, D-2
    - example timeline, D-3
    - modes, D-1
    - overview, D-1
    - unit testing with OpenBoot Diagnostics, 8-9, 8-16
  - off
    - forced, 10-9
    - graceful, 10-6
    - manual, 10-6
    - procedures, 10-4
  - problem flowchart, 4-2
  - supplied to peripherals, C-39
  - supply
    - cables, 13-2
    - identifying, 13-2
    - installing, 13-5
    - removing, 13-3
    - replaceable component, 2-9
    - replacing, 13-2
  - switch assembly
    - identifying, 14-18
    - installing, 14-20
    - removing, 14-18
    - replaceable component, 2-9
    - replacing, 14-17
  - powering on workstation, 15-8
  - power-on
    - flowchart, 3-2
    - reset, 7-7, 7-10
    - sequence, 3-1
  - precautions, -xxxiii, 10-2
  - preparing for replacement procedures, 10-1
  - probe-ide utility, 8-3
  - process ID, 3-30, 10-9
  - product overview, 2-1
  - prompt
    - obdiag, 8-7
    - ok, 5-2
    - shell, -xxxv
  - prstat command
    - examples, 3-33
    - options, 3-32
    - overview, 3-32
  - prtconf command
    - examples, 3-25
    - options, 3-24
    - overview, 3-23
  - prtdiag command
    - examples, 3-21
    - options, 3-20
    - overview, 3-19
  - ps command

- examples, 3-31
- options, 3-30
- overview, 3-30

## R

- reboot definition, 10-5

- reconnecting

- cables, 11-54
  - peripherals, 15-9
  - power cord, 15-9

- registered DIMMs, C-11

- removing

- access panel, 10-12
  - audio USB board, 13-32
  - battery, 11-24
  - bezel, 10-14
  - cables
    - audio USB board, 14-24
    - DVD-ROM drive interface, 14-7
    - hard drive interface, 14-11
    - IDE power, 14-14
    - smart card reader, 14-4

- CD-RW drive, 12-10
  - chassis cross brace, 13-51
  - CPU fan and heatsink, 11-15
  - DIMM cooling duct, 13-23
  - DIMMs, 11-3
  - drive rails, 13-60
  - DVD-ROM drive, 12-10
  - fan
    - front, 13-9
    - rear, 13-16
  - hard drive, 12-3
  - memory, 11-3
  - motherboard, 11-48
  - NVRAM, 11-27
  - PCI
    - card support, 13-46
    - cards, 11-30
  - power
    - supply, 13-3
    - switch assembly, 14-18
  - smart card reader, 12-16
  - speaker, 13-41

- replaceable components, 2-7

- replacement procedures

- preparing for, 10-1
  - table, 10-18

- replacing

- access panel, 15-5
  - audio USB board, 13-31
  - battery, 11-23
  - bezel, 15-2
  - cables
    - audio USB board, 14-23
    - DVD-ROM drive interface, 14-6
    - hard drive interface, 14-10
    - IDE power, 14-13
    - overview, 14-1
    - smart card reader, 14-3
  - CD-RW drive, 12-9
  - chassis cross brace, 13-50
  - CPU fan and heatsink, 11-14
  - DIMM cooling duct, 13-22
  - DIMMs, 11-2
  - drive rails, 13-60
  - DVD-ROM drive, 12-9
  - fan
    - front, 13-8
    - rear, 13-15
  - hard drive, 12-2
  - memory, 11-2
  - motherboard, 11-46
  - NVRAM, 11-26
  - PCI
    - card support, 13-46
    - cards, 11-29
  - power
    - supply, 13-2
    - switch assembly, 14-17
  - smart card reader, 12-15
  - speaker, 13-40

- required tools, 10-3

- RISC, C-19

- rtc@0,70 test, 8-17

## S

- safety

- precautions, 10-2
  - symbols, 10-2

- screen

- displayed, 3-5

- resolutions
  - Sun XVR-100, C-27
  - Sun XVR-500, C-25
  - Sun XVR-600, C-23
- SCSI
  - error, 3-14
  - hard drives, 16-6
  - host adapters, 16-2
  - tape drives, 16-6
- SDR, C-15
- SDRAM, 2-2, C-2
- SEEPROM
  - NVRAM, 5-1
  - testing
    - OpenBoot Diagnostics, 8-9, 8-12
    - SunVTS
      - connection mode, 9-3
      - functional mode, 9-8
- serial port
  - parameters, 7-4
  - pinout, B-4
  - symbol, 2-7
  - testing
    - OpenBoot Diagnostics, 8-10, 8-17
    - SunVTS
      - connection mode, 9-5
      - functional mode, 9-9
- serial@0,2e8 test, 8-17
- serial@0,3f8 test, 8-17
- service label, 10-13
- show-devs utility, 8-2
- shutdown
  - definitions, 10-5
  - forced, 10-9
  - graceful, 10-6
- Sleep key, 10-4
- smart card reader
  - basic configuration, 2-2
  - bracket, 12-19, 12-21
  - cables, 12-17, 12-21
  - drive rails, 12-15
  - identifying, 12-15
  - installing, 12-20
  - LEDs, 2-5, C-32
  - problem flowchart, 4-27
  - removing, 12-16
  - replaceable component, 2-9
  - replacing, 12-15
  - testing
    - OpenBoot Diagnostics, 8-9, 8-11
    - SunVTS
      - connection mode, 9-4
      - functional mode, 9-9
- smart cards, 16-6, C-4
- SMBus, C-19, C-28, C-32
- snoop, C-9, C-16
- snoopy MOESI protocol, C-15
- Software Enhancement Script
  - installing, 5-9
  - overview, 5-8
  - using, 5-10
- Solaris error messages, 3-13
- sound@8 test, 8-18
- SouthBridge, 7-9, 7-14
- speaker
  - cables, 13-42, 13-44
  - identifying, 13-40
  - installing, 13-43
  - removing, 13-41
  - replaceable component, 2-9
  - replacing, 13-40
  - testing
    - OpenBoot Diagnostics, 8-10, 8-18
    - SunVTS
      - connection mode, 9-5
      - functional mode, 9-9
- specifications
  - acoustic, A-2
  - electrical, A-2
  - physical, A-1
  - vibrational, A-3
- SPOR, 3-1
- SRAM, C-5, C-6, C-28
- Stop-A command, 6-9
- Stop-N command, 6-10
- Sun XVR-100
  - documentation, -xxxv
  - overview, C-26
  - screen resolutions, C-27
  - testing
    - OpenBoot Diagnostics, 8-9
    - SunVTS functional mode, 9-8
- Sun XVR-500
  - additional features, C-25

- documentation, -xxxv
- overview, C-24
- screen resolutions, C-25
- testing
  - OpenBoot Diagnostics, 8-9, 8-11
  - SunVTS functional mode, 9-8
- Sun XVR-600
  - additional features, C-22
  - overview, C-21
  - screen resolutions, C-23
  - testing
    - OpenBoot Diagnostics, 8-9
- SunPCI documentation, -xxxv
- SunVTS
  - component testing
    - connection mode, 9-2
    - functional mode, 9-7
  - connection mode, 9-2
  - documentation, -xxxv
  - functional mode, 9-6
  - installing, 9-1
  - other testing, 9-10
  - overview, 5-6
  - purpose, 1-2
  - verifying component installation, 15-12

SUNW, XVR-500@3 test, 8-11

superuser  
 commands, 3-17

support resources, 1-2

system
 

- block diagram, C-2
- disabling power management, D-5
- LEDs, 1-2
- overview, C-1
- testing sensors with SunVTS
  - connection mode, 9-5
  - functional mode, 9-9

## T

TIP
 

- cable, 7-4
- making connection, 7-5

TOD, C-6

tools required, 10-3

TPE

- basic configuration, 2-3
- block diagram, C-20
- connector, B-5
- LEDs, 1-2, C-34
- symbol, 2-7
- troubleshooting
  - commands, 3-17
  - flowcharts, 4-1
- typographic conventions, -xxxiv

## U

UART, C-34

UltraDMA, C-2, C-31

UltraSPARC IIIi
 

- basic configuration, 2-2
- description, C-9
- motherboard
  - block diagram, C-5
  - layout, C-6
- testing
  - POST, 7-6
  - SunVTS
    - connection mode, 9-6
    - functional mode, 9-9

UNIX commands, -xxxiv

USB

- devices, 16-6
- keyboard, 6-9, 6-10
- overview, C-32
- ports, 2-6, 2-7, B-6
- problem flowchart, 4-6
- symbol, 2-7
- testing
  - OpenBoot Diagnostics, 8-10, 8-19
  - SunVTS
    - connection mode, 9-6
    - functional mode, 9-10

USB 2

- card
  - basic configuration, 2-3
  - replaceable component, 2-9
- ports, 2-7
- symbol, 2-7

usb@a test, 8-19

usb@b test, 8-20

user qualifications, -xxxi  
UTP, 16-3

## **V**

VCC, B-6  
verifying component installation, 15-11  
vold, 4-20, 16-6  
volume manager, 3-13, 3-15, 4-20, 16-6

## **W**

watch-clock utility, 8-4  
watch-net utility, 8-2

## **X**

XBus, C-5, C-28  
XOR, C-15