Sun Blade™ 150 Service Manual

Please
Recycle

Adobe PostScript™

Contents

Figures

Tables

Code Examples

Preface

The *Sun Blade 150 Service Manual* provides detailed procedures that describe the removal and replacement of replaceable parts in the Sun Blade™ 150 computer system. The service manual also includes information about the use and maintenance of the system. This book is written for technicians, system administrators, authorized service providers (ASPs), and advanced computer system end users who have experience troubleshooting and replacing hardware.

About the Multimedia Links in This Manual

Removal and replacement procedures for selected system components are also illustrated with interactive multimedia audio and video instructions in the *Sun Blade 150 Hardware Documentation* CD-ROM, which is linked to the online version of this manual. These multimedia links can be accessed wherever you see the film-clip icon Shown in FIGURE P-1 .

FIGURE P-1   Link to Multimedia Instructions

How This Book Is Organized

Chapter 1 describes the major components of the system.

Chapter 2 describes the execution of individual tests for verifying hardware configuration and functionality.

Chapter 3 describes the execution of Power-on Self-test (POST) and provides examples of POST output patterns.

Chapter 4 provides troubleshooting advice and suggested corrective actions for hardware problems.

Chapter 5 explains how to work safely when replacing system components. This Chapter provides procedures for powering off the system, removing the system cover, and attaching the wrist strap.

Chapter 6 provides procedures for removing and replacing major subassemblies.

Chapter 7 provides procedures for removing and replacing storage devices.

Chapter 8 provides procedures for removing and replacing the motherboard and related components.

Chapter 9 provides procedures for replacing the system cover and powering on the system.

Chapter 10 provides OpenBoot™ Emergency procedures specific to the USB keyboard.

Appendix A provides specifications on power and environment, system dimensions, weight, memory mapping, and peripheral component interconnect (PCI) card slots.

Appendix B provides signal descriptions, instructions for connecting the system unit to a 10BASE-T/100BASE-T twisted-pair Ethernet (TPE) local area network (LAN), and modem settings for systems used in specific network telecommunication applications.

Appendix C provides functional descriptions of the system and components.

Appendix D provides procedures for setting the defualt console display and for disabling power management.

Appendix E provides information on USB devices, special key commands, related power management information, and USB man pages.

Using UNIX Commands

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

See one or more of the following for this information:

- *Solaris Handbook for Sun Peripherals*
- AnswerBook2™ online documentation for the Solaris™ software environment
- Other software documentation that you received with your system

The *Sun Blade 150 Getting Started Guide* gives more information on how to use these documents.

Typographic Conventions

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

Shell Prompts

Shell	Prompt
C shell	*machine_name*%
C shell superuser	*machine_name*#
Bourne shell and Korn shell	$
Bourne shell and Korn shell superuser	#

Accessing Sun Documentation Online

You can obtain copies of Sun Blade 150 documents at the following URL:

```
http://www.sun.com/products-n-solutions/hardware/docs/
Workstation_Products/Workstations/Sun_Blade_Workstations/
index.html
```

The `docs.sun.com`[SM] web site enables you to access Sun technical documentation on the Web. You can browse the `docs.sun.com` archive or search for a specific book title or subject at:

```
http://docs.sun.com
```

SunService Solution Center

For answers to your technical questions, contact your nearest SunService[SM] Solution Center. Phone numbers and contact information for SunService Centers can be found at this web site:

```
http://www.sun.com/service/contacting/solution.html
```

Sun Welcomes Your Comments

We are interested in improving our documentation and welcome your comments and suggestions. You can email your comments to us at:

`docfeedback@sun.com`

Please include the part number (816-4379-10) of your document in the subject line of your email.

Product Description

The Sun Blade 150 workstation is a uniprocessor system that uses the UltraSPARC-IIi processor. FIGURE 1-1 shows the Sun Blade 150 workstation.

This chapter contains the following topics:

- Section 1.1, "Product Overview" on page 1-3
- Section 1.2, "Supported Sun Monitors" on page 1-4
- Section 1.3, "System Description" on page 1-4
- Section 1.4, "Replaceable Components" on page 1-6
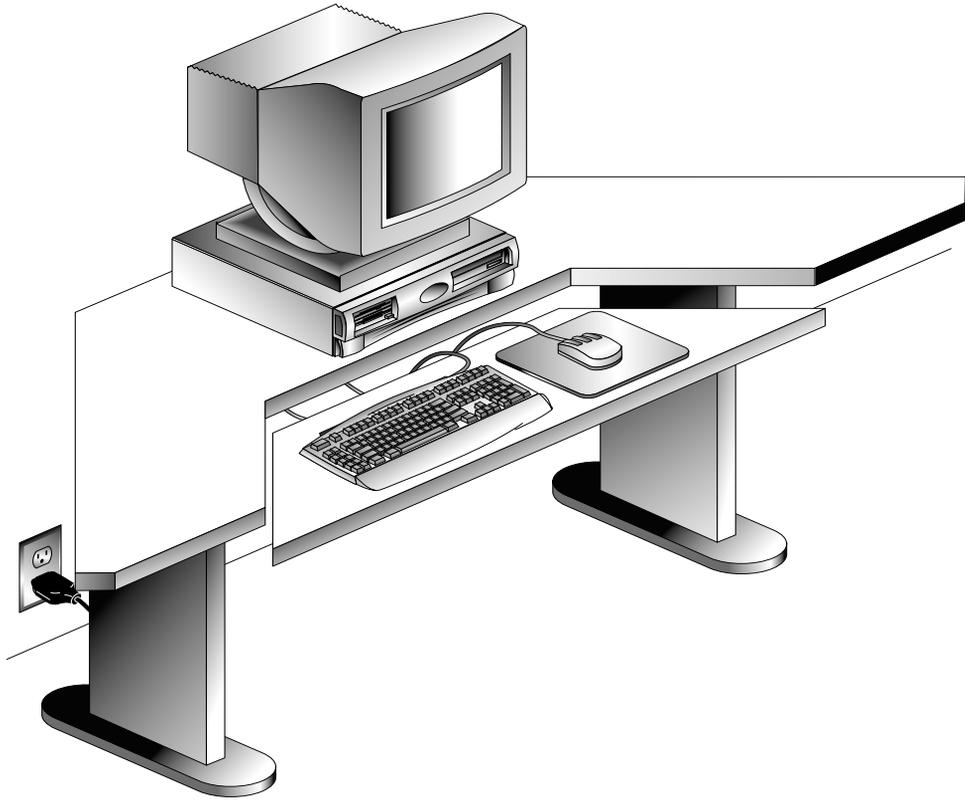
FIGURE 1-1   Sun Blade 150 System

1.1 Product Overview

The Sun Blade 150 system provides the following features:

- Desktop-style system enclosure
- Power supply: 250-watt
- CPU options: 550-MHz or 650-MHz UltraSPARC-IIi processor with 512-Kbyte internal cache, heatsink, and fan
- Hard drives:
    - One 40 gigabyte, 7,200 RPM hard drive with ATA66 interface
    - Additional hard drive available as an optional component
- Diskette drive: 1.44-megabyte (Mbyte) manual eject
- Smart card reader
- One optical drive: CD-ROM drive or DVD-ROM drive
- Audio: CD-quality
- PCI connectors:
    - 33-MHz, 32-bit peripheral component interconnect (PCI)
    - Three long PCI connectors accept both long and short PCI cards
- ATI Rage XL on-board graphics, 8 Mbyte RAM
- Two serial ports
    - One serial port on the chassis back panel
    - One serial port on the riser card (requires one PCI slot to access the connector)
- One parallel port
- Ethernet: 10-megabit/100-megabit per second
- Two IEEE 1394 ports (Firewire)
- Four USB ports, (two are required for keyboard and mouse)
- Keyboard: Sun™ USB Type-6 AT 101 layout
- Mouse: Sun USB 3-button, crossbow mouse

1.2　Supported Sun Monitors

The monitors listed in TABLE 1-1 can be used with the Sun Blade 150 system.

For more detailed information on these monitors contact your Sun representative or see the following web site:

`http://www.sun.com/products-n-solutions/hw/peripherals/`

TABLE 1-1　　Supported Sun Monitors

I/O Device	Description
17-inch color CRT monitor	Supports resolutions up to 1152x900
18.1-inch TFT LCD color monitor	1280x1024 resolution
21-inch CRT color monitor, flat display	Supports resolutions up to 1600x1200
24.1-inch LCD flat panel monitor	Supports resolutions up to 1920x1200

1.3　System Description

System components are housed in a desktop-style enclosure. Overall chassis dimensions for the Sun Blade 150 system are listed in TABLE 1-2.

TABLE 1-2　　Sun Blade 150 System Physical Dimensions

Width	Height	Depth
17.52 inches (44.5 cm)	4.65 inches (11.8 cm)	18.00 inches (45.7 cm)

System electronics are contained on a single plug-in printed circuit board (motherboard). The motherboard contains the CPU, memory modules, system control application-specific integrated circuits (ASIC), and I/O ASICs. The motherboard plugs into a riser board that provides the system power and integrated drive electronics (IDE) hard drive data interface. FIGURE 1-2 and FIGURE 1-3 show the Sun Blade 150 system front and back panels.
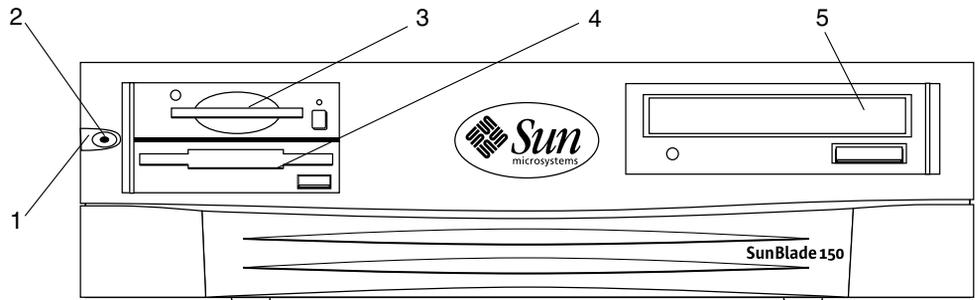
FIGURE 1-2 Front Panel Overview

1. Power switch

2. Power-indicator LED

3. Smart card reader

4. 3.5-inch diskette drive

5. 5.25-inch optical drive bay (CD-ROM or DVD-ROM)
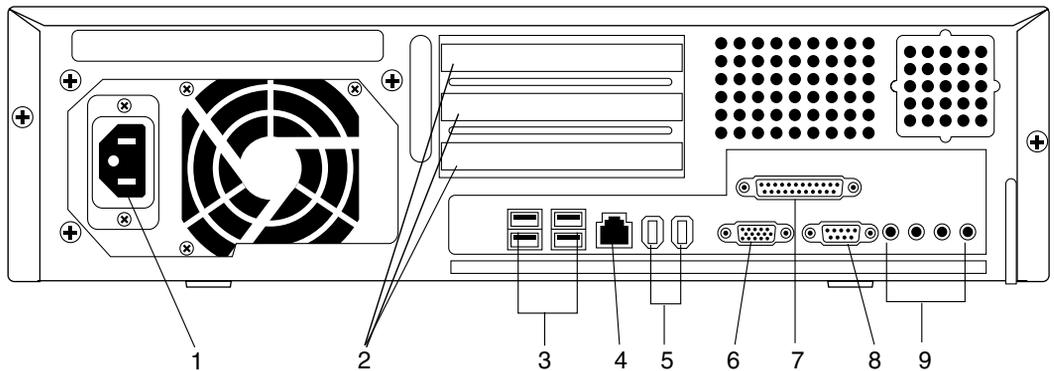
FIGURE 1-3 Back Panel Overview

TABLE 1-3   Back Panel Description and Connector Symbols

Item in Figure 1-3	Explanation	Back Panel Symbol
1	Power connector	None
2	PCI card slot 3 (33 MHz)	**PCI-3**
2	PCI card slot 2 (33 MHz)	**PCI-2**
2	PCI card slot 1 (33 MHz)	**PCI-1**
3	Universal serial bus (USB) connectors (four)	
4	Twisted-pair Ethernet (TPE) connector	
5	IEEE 1394 connectors (two)	
6	VGA video connector	
7	Parallel connector, DB-25	//
8	Serial connector (RS-232)	**SERIAL**
9	Audio module headphones connector	
9	Audio module line-out connector	
9	Audio module line-in connector	
9	Audio module microphone connector	

.

1.4   Replaceable Components

This section lists the replaceable components for the Sun Blade 150 system. The numbered components in FIGURE 1-4 correlate to the numbered components listed in TABLE 1-4. Consult your authorized Sun sales representative or service provider to confirm a part number before ordering a replacement part.
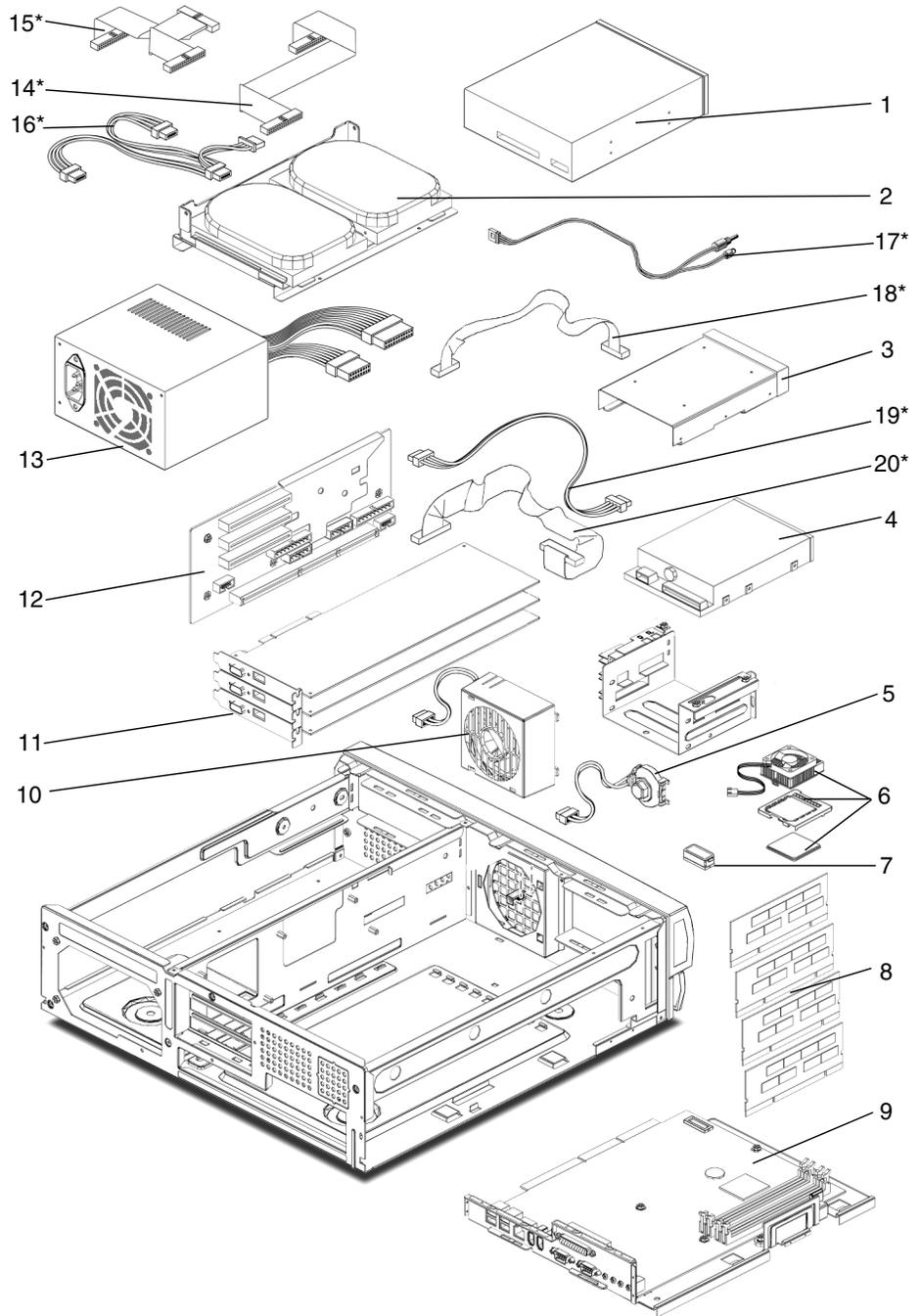
FIGURE 1-4 Sun Blade 150 System Replaceable Parts

TABLE 1-4   Sun Blade 150 Replaceable Components

Item	Component	Description
1	CD-ROM drive	CD-ROM drive or DVD-ROM drive
2	Hard drive (second drive is optional)	Hard disk drive
3	Smart card reader	Smart card reader with enclosure
4	Manual eject diskette drive	Internal diskette drive
5	Speaker assembly	System speaker with cable
6	Central processing unit (CPU)	550 MHz or 650 MHz, 512-Kbyte internal cache
7	NVARAM/TOD	Nonvolatile RAM/Time of day
8	128-Mbyte DIMM	128-Mbyte DIMM
8	256-Mbyte DIMM	256-Mbyte DIMM
8	512-Mbyte DIMM	512-Mbyte DIMM
9	Motherboard	System main logic board
10	Fan assembly	System cooling fan with cable
11	PCI card	Generic PCI card
12	Riser board	3-slot PCI expansion and power interface card
13	Power supply	250-watt power supply with power cable
*	*Cable kit (items with asterisk)*	*Cables for major components*
14*	Secondary IDE cable	Secondary HDD and riser board IDE2 cable
15*	Primary IDE cable	Primary HDD, CD/DVD-ROM, riser board IDE1 cable
16*	Hard drive and optical drive power cable	CD/DVD-ROM, primary hard drive, secondary hard drive power cable
17*	Power switch and LED cable	Power switch, LED, and power cable assembly
18*	Smart card reader cable	Smart card reader cable
19*	Diskette drive power cable	Diskette drive power cable
20*	Diskette drive data cable	diskette drive data cable

Note – Consult your authorized Sun sales representative or service provider before ordering a replacement part.

SunVTS Overview

This chapter contains an overview of the SunVTS™ diagnostic tool.

This chapter contains the following topics:

- Section 2.1, "SunVTS Description" on page 2-1
- Section 2.2, "SunVTS Requirements" on page 2-2
- Section 2.3, "SunVTS References" on page 2-2

2.1 SunVTS Description

SunVTS is an online Validation Test Suite. SunVTS is a comprehensive software diagnostic package that tests and validates hardware by verifying the connectivity and functionality of most hardware controllers, devices, and platforms.

SunVTS can be tailored to run on various types of systems ranging from desktops to servers with customizable features to meet the varying requirements of many diagnostic situations.

Use SunVTS to validate a system during development, production, receiving inspection, troubleshooting, periodic maintenance, and system or subsystem stressing.

SunVTS executes multiple diagnostic tests from one graphical user interface (GUI) that provides test configuration and status monitoring. The user interface can run in the Common Desktop Environment (CDE) or OPEN LOOK environments or through a TTY-mode interface for situations when running a GUI is not possible.

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

SunVTS is distributed with each SPARC™ Solaris operating environment release. It is located on the Sun Computer Systems Supplement CD.

2.2 SunVTS Requirements

Your system must meet the following requirements to run SunVTS:

- The SunVTS packages must be installed. The main package is SUNWvtx for 64-bit systems. There are additional supporting packages that differ based on the version of the Solaris operating environment that is installed. For specific details, refer to the corresponding SunVTS documentation (described below).

- The system must be booted to the multiuser level (level 3).

- To run SunVTS with a GUI, that GUI must be installed. Otherwise, run SunVTS with the TTY-mode interface.

2.3 SunVTS References

To find out more information about the use of SunVTS, refer to the SunVTS documentation that corresponds to the Solaris software version that you are running.

The following list describes the contents of each SunVTS document:

- *SunVTS 4.x User's Guide* describes how to install, configure, and run the SunVTS diagnostic software.

- *SunVTS 4.x Quick Reference Card* provides an overview of how to use the SunVTS CDE interface.

- *SunVTS 4.x Test Reference Manual* provides details about each individual SunVTS test.

These documents are part of the *Solaris on Sun Hardware* AnswerBook2 collection. The part number for each document is different for each version of Solaris: check the version of Solaris that you are using and find the appropriate part number for the document. This collection is distributed on the *Sun Computer Systems Supplement* CD with each SPARC Solaris release and is also accessible at `http://docs.sun.com`.

Power-On Self-Test

This chapter describes how to initiate power-on self-test (POST) diagnostics. POST is a firmware program that can help determine if a portion of the system has failed. POST verifies the core functionality of the system, including operation the CPU, motherboard, memory, and some on-board I/O devices. POST can be run even if the system is unable to boot.

This chapter contains the following topics:

3.1 POST Overview

POST detects most system faults and is located in the system board OpenBoot™ PROM. POST can be invoked at power up by the OpenBoot program, depending on the setting of two environment variables, the diag-switch? and the diag-level flag. The diag-switch? and the diag-level flag are stored in nonvolatile RAM (NVRAM).

POST diagnostic and error message reports are displayed on a console terminal.

Note – Both POST and OpenBOOT PROM on Sun Blade 150 systems report the CPU as an UltraSPARC IIe processor. The CPU in your system is an UltraSPARC IIi processor.

3.2 How to Use POST

When the workstation power is applied, POST runs automatically if both of the following conditions apply:

- The `diag-switch?` NVRAM parameter is set to `true`.
- The `diag-level` is set to either `min  or  max`.

In the event of an automatic workstation reset, POST runs if the `diag-switch?` NVRAM parameter is set to `true` and the `diag-level` flag is set to either `max` or `min`.

Note – If `diag-switch = false`, POST is disabled. If `diag-switch = true` and `diag-level = max`, then POST runs in `max` mode. If `diag-switch = true` and `diag-level = min`, then POST runs in `min` mode.

3.3 Pre-POST Preparation

To Prepare for POST you should:

- Set up a terminal interface processor (TIP) connection to another workstation or terminal to view POST progress and error messages. See Section 3.3.1, "Setting Up a TIP Connection" on page 3-3.
- Verify the baud rates between the tested workstation and another workstation with a monitor, or a terminal display. See Section 3.3.3, "Verifying the Baud Rate" on page 3-4.

3.3.1 Setting Up a TIP Connection

A TIP connection enables a remote shell window to be used as a terminal to display test data from the system you are testing. The easiest method is to connect serial port A of the system you plan to test to another Sun workstation monitor or a TTY-type terminal.

Note – There is a second serial port (serial port B) on the Sun Blade 150 system riser card. However, you will need a special connector and cable, and you will need an empty PCI card slot to access the serial port. See Appendix C, FIGURE C-5.

To set up a TIP connection, proceed as follows:

1. **Connect the serial port of the tested system to the serial port of a second Sun workstation using a serial null modem cable.**

   Connect cable pins 2-3, 3-2, 7-20, and 20-7), as shown in FIGURE 3-1.
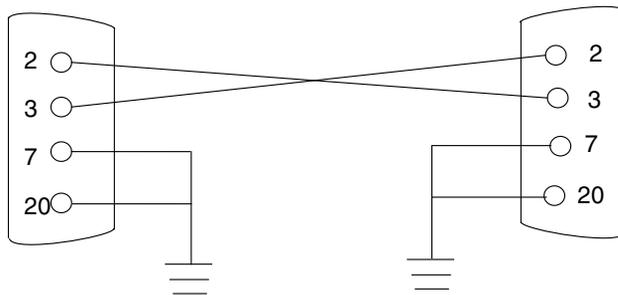
FIGURE 3-1   Setting Up a TIP Connection

2. **At the second Sun workstation, check the** /etc/remote **file by changing to the** /etc **directory and editing the** remote **file.**

   The sample remote file text below shows connection to serial port B of the second Sun workstation:

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

3. **In a shell window on the second Sun workstation, type** `tip hardwire`**.**

```
% tip hardwire
connected
```

The terminal (shell) window on the second workstation becomes a TIP window directed to the serial port of the workstation under test. When power is applied to the workstation under test, POST messages are displayed in this shell window.

3.3.2 Disconnecting a TIP Connection

When POST is completed, disconnect the TIP connection as follows:

1. **Open another shell window at the second workstation.**

2. **Type** `ps -a` **to view the active TIP line and process ID (PID) number.**

3. **Type the following to disconnect the TIP hardware process.**

```
% kill -9 PID#
```

3.3.3 Verifying the Baud Rate

To verify the baud rate between the tested system and a terminal or another Sun workstation monitor:

1. **Open a terminal (shell) window.**

2. **Type** `eeprom`**.**

3. **Verify the following serial port default settings:**

```
tty-mode = 9600,8,n,1
```

Note – Ensure that the settings are consistent with TTY-type terminal or workstation monitor settings.

3.4 Viewing the POST Menus

To use the POST menus:

1. **At the system prompt, type:**

```
ok% setenv diag-switch? true
ok% setenv diag-level = menus
```

3.5 Initializing POST

POST can be initialized in two ways:

- maximum POST reporting, or `max`
- minimum POST reporting, or `min`

Note – The default POST setting is `max`.

To run POST you must:

- Set `diag-switch?` to `true`.
- Set the `diag-level` to either `max` or `min`.
- Power-cycle the system.

To set the `diag-switch?` to `true` and power-cycle the system:

1. **At the system prompt, type:**

```
ok% setenv diag-switch? true
ok% setenv diag-level = min
```

Note – Type either `min` or `max`, depending on the functions you need to test.

---

2. **Power-cycle the system by pressing and releasing the power switch on the front panel.**

3. **Observe the terminal monitor to verify that POST is executing.**

4. **When POST is complete, type the following at the system prompt:**

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

Note – You should always reset the diag-switch to false when you are finished. If you do not reset the diag-switch, the system will run POST every time that the system is power-cycled, which delays system boot-up.

3.6 Maximum and Minimum POST Levels

Two levels of POST are available: maximum (max) level and minimum (min) level. The system initiates the selected level of POST based upon the setting of diag-level, an NVRAM variable. The default setting for diag-level is max.

To set the diag-level variable to min before power-cycling the system, type:

```
ok% setenv diag-level min
```

To return to the default setting:

```
ok% setenv diag-level max
```

An example of a max-level POST output at the serial port is provided in Section 3.6.1, "diag-level Variable Set to max" on page 3-6. An example of a min-level POST output at the serial port is provided in Section 3.6.2, "diag-level Variable Set to min" on page 3-18.

3.6.1 diag-level Variable Set to max

When you set the diag-level variable to max, POST enables an extended set of diagnostic-level tests. This mode requires approximately two minutes to complete (with 128 Mbytes of DIMM installed). CODE EXAMPLE 3-1 shows a typical serial port POST output with diag-level set to max and a single 512 Mbyte DIMM installed.

Note – Both POST and OpenBoot PROM report the CPU as an UltraSPARC IIe processor. The CPU in your system is an UltraSPARC IIi processor.

Note – Video output is disabled while POST is initialized.

CODE EXAMPLE 3-1   `diag-level` Variable Set to `max`

```
Speed Jumper is set to 0000.0000.0000.0008
Hardware Power ON

@(#)OBP 4.6.0 2002/04/03 12:28

Executing Power On SelfTest

@(#) Sun (Grover) POST 2.0.1 05:13 PM on 04/23/02

Processor Module Identification
        UltraSPARC-IIe+ (Phantom) Version 1.3
Init POST BSS
        Init System BSS
NVRAM Tests
        NVRAM Battery Detect Test
        NVRAM Scratch Addr Test
        NVRAM Scratch Data Test
DMMU TLB Tags
        DMMU TLB Tag Access Test
DMMU TLB RAM
        DMMU TLB RAM Access Test
Probe Ecache
        Probe Ecache
        Ecache Size = 0x00080000 bytes = 512 KBytes
Measure CPU Clock
        Initializing Southbridge
        Nominal CPU speed is 650 MHz
All CPU Basic Tests
        V9 Instruction Test
        CPU Tick and Tick Compare Reg Test
        CPU Soft Trap Test
        CPU Softint Reg and Int Test
All Basic MMU Tests
```

CODE EXAMPLE 3-1   `diag-level` Variable Set to max   *(Continued)*

```
        DMMU Primary Context Reg Test
        DMMU Secondary Context Reg Test
        DMMU TSB Reg Test
        DMMU Tag Access Reg Test
        DMMU VA Watchpoint Reg Test
        DMMU PA Watchpoint Reg Test
        IMMU TSB Reg Test
        IMMU Tag Access Reg Test
All Basic Cache Tests
        Dcache RAM Test
        Dcache Tag Test
        Icache RAM Test
        Icache Tag Test
        Icache Next Test
        Icache Predecode Test
MCU Control & Status Regs Init
        Initializing Memory and MC registers
        DIMM 0: 256 MBytes = 0x10000000 bytes
        DIMM 1: 256 MBytes = 0x10000000 bytes
        DIMM 2: 256 MBytes = 0x10000000 bytes
        DIMM 3: 256 MBytes = 0x10000000 bytes
        Found 4 DIMMs in bank 0
        Bank 0: 1024 MBytes
        DIMM0 is a 32M x 8 device
        DIMM1 is a 32M x 8 device
        DIMM2 is a 32M x 8 device
        DIMM3 is a 32M x 8 device
        MC0 = 0x00000000.96a0cf06
        MC1 = 0x00000000.80008000
        MC2 = 0x00000000.cff0eeee
        MC3 = 0x00000000.00600b5f
        CPU MODULE upa_config is 0x0000003a.00000000
Ecache Tests
        Displacement Flush Ecache
        Ecache RAM Addr Test
        Ecache Tag Addr Test
        Ecache RAM Test
        Ecache Tag Test
Memory Init
        Malloc Post Memory
        Memory Addr Check w/o Ecache
        Load Post In Memory
        Run POST from MEM
```

CODE EXAMPLE 3-1 `diag-level` Variable Set to max *(Continued)*

```
        .........
        Map PROM/STACK/NVRAM in DMMU
        Update Master Stack/Frame Pointers
All FPU Basic Tests
        FPU Regs Test
        FPU Move Regs Test
        FPU State Reg Test
        FPU Functional Test
        FPU Trap Test
All Basic IOMMU Tests
        PIO Decoder and BCT Test
        PCI Byte Enable Test
        CPU's IOMMU Regs Test
        CPU's IOMMU RAM Addr Test
        CPU's IOMMU CAM Address Test
        IOMMU TLB Compare Test
        IOMMU TLB Flush Test
        PBMA PCI Config Space Regs Test
        PBMA Control/Status Reg Test
        PBMA Diag Reg Test
        CPU's IO Regs Test
All Advanced CPU Tests
        DMMU Hit/Miss Test
        IMMU Hit/Miss Test
        DMMU Little Endian Test
        IU ASI Access Test
        FPU ASI Access Test
        Ecache Thrash Test
All CPU Error Reporting Tests
        CPU Data Access Trap Test
        CPU Addr Align Trap Test
        DMMU Access Priv Page Test
        DMMU Write Protected Page Test
Audio Tests
        Map Audio Device PCI Config Registers Test
        Audio Device ID and Vendor ID (0x545110b9) Test
        Init Audio Device IO Registers Test
        Audio Device Memory Registers Test
Memory Tests
        Init Memory
                Info : 256MB at Dimm Slot 0
                Start Addr: 0x00000000.00800000  Size: 248 MBytes
Init with 0x00000000.00000000:
```

CODE EXAMPLE 3-1 `diag-level` Variable Set to `max`   *(Continued)*

```
................................................................
................
               Info : 256MB at Dimm Slot 1
               Start Addr: 0x00000000.40000000  Size: 256 MBytes
Init with 0x00000000.00000000:
................................................................
................
               Info : 256MB at Dimm Slot 2
               Start Addr: 0x00000000.80000000  Size: 256 MBytes
Init with 0x00000000.00000000:
................................................................
................
               Info : 256MB at Dimm Slot 3
               Start Addr: 0x00000000.c0000000  Size: 256 MBytes
Init with 0x00000000.00000000:
................................................................
................
       Memory Addr Check with Ecache Test
               Info : 256MB at Dimm Slot 0
               Start Addr: 0x00000000.00800000  Size: 248 MBytes
Write 0xffffffff.ffffffff:
................................................................
Read:
................................................................
Write 0xaaaaaaaa.aaaaaaaa:
................................................................
Read:
................................................................
Write 0x55555555.55555555:
................................................................
Read:
................................................................
Write 0x00000000.00000000:
................................................................
Read:
................................................................
               Info : 256MB at Dimm Slot 1
               Start Addr: 0x00000000.40000000  Size: 256 MBytes
Write 0xffffffff.ffffffff:
................................................................
Read:
................................................................
Write 0xaaaaaaaa.aaaaaaaa:
................................................................
```

```
Read:
.....................................................................
Write 0x55555555.55555555:
.....................................................................
Read:
.....................................................................
Write 0x00000000.00000000:
.....................................................................
Read:
.....................................................................
              Info : 256MB at Dimm Slot 2
              Start Addr: 0x00000000.80000000  Size: 256 MBytes
Write 0xffffffff.ffffffff:
.....................................................................
Read:
.....................................................................
Write 0xaaaaaaaa.aaaaaaaa:
.....................................................................
Read:
.....................................................................
.................
Write 0x55555555.55555555:
.....................................................................
Read:
.....................................................................
Write 0x00000000.00000000:
.....................................................................
Read:
.....................................................................
              Info : 256MB at Dimm Slot 3
              Start Addr: 0x00000000.c0000000  Size: 256 MBytes
Write 0xffffffff.ffffffff:
.....................................................................
Read:
.....................................................................
Write 0xaaaaaaaa.aaaaaaaa:
.....................................................................
Read:
.....................................................................
Write 0x55555555.55555555:
.....................................................................
Read:
.....................................................................
```

```
Write 0x00000000.00000000:
.................................................................
Read:
.................................................................
Block Memory Addr Test
                Info : 256MB at Dimm Slot 0
                Start Addr: 0x00000000.00800000  Size: 248 MBytes
                Info : 256MB at Dimm Slot 1
                Start Addr: 0x00000000.40000000  Size: 256 MBytes
                Info : 256MB at Dimm Slot 2
                Start Addr: 0x00000000.80000000  Size: 256 MBytes
                Info : 256MB at Dimm Slot 3
                Start Addr: 0x00000000.c0000000  Size: 256 MBytes
       Block Memory Check Test
                Info : 256MB at Dimm Slot 0
                Start Addr: 0x00000000.00800000  Size: 248 MBytes
Write 0x33333333.33333333
.................................................................
Read
.................................................................
Write 0x55555555.55555555
.................................................................
Read
.................................................................
Write 0xcccccccc.cccccccc
.................................................................
Read
.................................................................
Write 0xaaaaaaaa.aaaaaaaa
.................................................................
Read
.................................................................

                Info : 256MB at Dimm Slot 1
                Start Addr: 0x00000000.40000000  Size: 256 MBytes
Write 0x33333333.33333333
.................................................................
Read
.................................................................
Write 0x55555555.55555555
.................................................................
Read
.................................................................
```

```
Write 0xcccccccc.cccccccc
...............................................................
Read
...............................................................
Write 0xaaaaaaaa.aaaaaaaa
...............................................................
Read
...............................................................

              Info : 256MB at Dimm Slot 2
              Start Addr: 0x00000000.80000000  Size: 256 MBytes
Write 0x33333333.33333333
...............................................................
Read
...............................................................
Write 0x55555555.55555555
...............................................................
Read
...............................................................
Write 0xcccccccc.cccccccc
...............................................................
Read
...............................................................
Write 0xaaaaaaaa.aaaaaaaa
...............................................................
Read
...............................................................

              Info : 256MB at Dimm Slot 3
              Start Addr: 0x00000000.c0000000  Size: 256 MBytes
Write 0x33333333.33333333
...............................................................
Read
...............................................................
Write 0x55555555.55555555
...............................................................
Read
...............................................................
Write 0xcccccccc.cccccccc
...............................................................
Read
...............................................................
Write 0xaaaaaaaa.aaaaaaaa
```

CODE EXAMPLE 3-1 `diag-level` Variable Set to `max` *(Continued)*

```
................................................................
Read
................................................................
        ECC Memory Addr Test
                Info : 256MB at Dimm Slot 0
                Start Addr: 0x00000000.00800000  Size: 248 MBytes
                Info : 256MB at Dimm Slot 1
                Start Addr: 0x00000000.40000000  Size: 256 MBytes
                Info : 256MB at Dimm Slot 2
                Start Addr: 0x00000000.80000000  Size: 256 MBytes
                Info : 256MB at Dimm Slot 3
                Start Addr: 0x00000000.c0000000  Size: 256 MBytes
        ECC Blk Memory Test
                Info : 256MB at Dimm Slot 0
                Start Addr: 0x00000000.00800000  Size: 248 MBytes
Write 0xa5a5a5a5.a5a5a5a5
................................................................
Read
................................................................
Write 0x96969696.96969696
................................................................
................
Read
................................................................
Write 0xbbbbbbbb.bbbbbbbb
................................................................
Read
................................................................
Write 0xdddddddd.dddddddd
................................................................
Read
................................................................
                Info : 256MB at Dimm Slot 1
                Start Addr: 0x00000000.40000000  Size: 256 MBytes
Write 0xa5a5a5a5.a5a5a5a5
................................................................
Read
................................................................
Write 0x96969696.96969696
................................................................
Read
................................................................
Write 0xbbbbbbbb.bbbbbbbb
```

```
.............................................................
Read
.............................................................
Write 0xdddddddd.dddddddd
.............................................................
Read
.............................................................
              Info : 256MB at Dimm Slot 2
              Start Addr: 0x00000000.80000000  Size: 256 MBytes
Write 0xa5a5a5a5.a5a5a5a5
.............................................................
Read
.............................................................
Write 0x96969696.96969696
.............................................................
Read
.............................................................
Write 0xbbbbbbbb.bbbbbbbb
.............................................................
Read
.............................................................
.............................................................
Write 0xdddddddd.dddddddd
.............................................................
Read
.............................................................
              Info : 256MB at Dimm Slot 3
              Start Addr: 0x00000000.c0000000  Size: 256 MBytes
Write 0xa5a5a5a5.a5a5a5a5
.............................................................
Read
.............................................................
Write 0x96969696.96969696
.............................................................
Read
.............................................................
Write 0xbbbbbbbb.bbbbbbbb
.............................................................
Read
.............................................................
Write 0xdddddddd.dddddddd
.............................................................
Read
```

CODE EXAMPLE 3-1 `diag-level` Variable Set to max *(Continued)*

```
..........................................................
Status of this POST run:         PASS
diag-script=none
Time Stamp [hour:min:sec] 15:20:37  [month/date year] 04/23 2002


Power On Selftest Completed
    Status  = 0000.0000.0000.0000  ffff.ffff.f00b.63f0
0002.3333.0200.001b


Speed Jumper is set to 0000.0000.0000.0008
Software Power ON


@(#)OBP 4.6.0 2002/04/03 12:28
CPU SPEED 0x0000.0000.26be.3680
Initializing Memory Controller
MCR0 0000.0000.76a0.cf04
MCR1 0000.0000.8000.8000
MCR2 0000.0000.cff0.eeee
MCR3 0000.0000.0060.0052


Clearing E$ Tags  Done
Clearing I/D TLBs Done
Probing Memory Done
Clearing Memory Done
MEM BASE = 0000.0000.c000.0000
MEM SIZE = 0000.0000.1000.0000
MMUs ON
Copy Done
PC = 0000.01ff.f000.297c
PC = 0000.0000.0000.29c0
Decompressing into Memory Done
Size = 0000.0000.0006.1780
ttya initialized
Reset Control: BXIR:0 BPOR:0 SXIR:0 SPOR:1 POR:0
Probing upa at 1f,0 pci
Probing upa at 0,0 SUNW,UltraSPARC-IIe (512 KB)
Loading Support Packages: kbd-translator
Loading onboard drivers: ebus flashprom eeprom idprom
Probing Memory Bank #0 256 Megabytes
Probing Memory Bank #1 256 Megabytes
Probing Memory Bank #2 256 Megabytes
Probing Memory Bank #3 256 Megabytes
```

CODE EXAMPLE 3-1   `diag-level` Variable Set to `max`   *(Continued)*

```
Probing /pci@1f,0 Device 7  isa dma floppy parallel power serial
serial
Probing /pci@1f,0 Device c  network firewire usb hub keyboard mouse
   storage
Probing /pci@1f,0 Device 3  pmu i2c temperature card-reader dimm
dimm
   dimm dimm ppm beep fan-control
Probing /pci@1f,0 Device 8  sound
Probing /pci@1f,0 Device d  ide disk cdrom
Probing /pci@1f,0 Device 13  SUNW,m64B
Probing /pci@1f,0 Device 5  pci
Probing /pci@1f,0/pci@5 Device 0  Nothing there
Probing /pci@1f,0/pci@5 Device 1  Nothing there
Probing /pci@1f,0/pci@5 Device 2  Nothing there

Sun Blade 150 (UltraSPARC-IIe 650MHz), Keyboard Present
Copyright 1998-2002 Sun Microsystems, Inc.  All rights reserved.
OpenBoot 4.6, 1024 MB memory installed, Serial #51602330.
Ethernet address 0:3:ba:13:63:9a, Host ID: 8313639a.

Skipping diagnostic script because diag-script = none

Resetting ...

Speed Jumper is set to 0000.0000.0000.0008
Software Power ON

@(#)OBP 4.6.0 2002/04/03 12:28
CPU SPEED 0x0000.0000.26be.3680
Initializing Memory Controller
MCR0 0000.0000.76a0.cf04
MCR1 0000.0000.8000.8000
MCR2 0000.0000.cff0.eeee
MCR3 0000.0000.0060.0052

Clearing E$ Tags  Done
Clearing I/D TLBs Done
Probing Memory Done
Clearing Memory Done
MEM BASE = 0000.0000.c000.0000
MEM SIZE = 0000.0000.1000.0000
MMUs ON
Copy Done
```

CODE EXAMPLE 3-1   `diag-level` Variable Set to `max`   *(Continued)*

```
PC = 0000.01ff.f000.297c
PC = 0000.0000.0000.29c0
Decompressing into Memory Done
Size = 0000.0000.0006.1780
ttya initialized
Reset Control: BXIR:0 BPOR:0 SXIR:0 SPOR:0 POR:1
Probing upa at 1f,0 pci
Probing upa at 0,0 SUNW,UltraSPARC-IIe (512 KB)
Loading Support Packages: kbd-translator
Loading onboard drivers: ebus flashprom eeprom idprom
Probing Memory Bank #0 256 Megabytes
Probing Memory Bank #1 256 Megabytes
Probing Memory Bank #2 256 Megabytes
Probing Memory Bank #3 256 Megabytes
Probing /pci@1f,0 Device 7  isa dma floppy parallel power serial
serial
Probing /pci@1f,0 Device c  network firewire usb hub keyboard mouse
   storage
Probing /pci@1f,0 Device 3  pmu i2c temperature card-reader dimm
dimm
   dimm dimm ppm beep fan-control
Probing /pci@1f,0 Device 8  sound
Probing /pci@1f,0 Device d  ide disk cdrom
Probing /pci@1f,0 Device 13  SUNW,m64B
Probing /pci@1f,0 Device 5  pci
Probing /pci@1f,0/pci@5 Device 0  Nothing there
Probing /pci@1f,0/pci@5 Device 1  Nothing there
Probing /pci@1f,0/pci@5 Device 2  Nothing there

Sun Blade 150 (UltraSPARC-IIe 650MHz), Keyboard Present
Copyright 1998-2002 Sun Microsystems, Inc.  All rights reserved.
OpenBoot 4.6, 1024 MB memory installed, Serial #51602330.
Ethernet address 0:3:ba:13:63:9a, Host ID: 8313639a.
```

3.6.2   `diag-level` Variable Set to `min`

When you set the `diag-level` variable to `min`, POST enables an abbreviated set of diagnostic-level tests. This mode requires approximately one minute to complete (with 128 Mbytes of DIMM installed). CODE EXAMPLE 3-2 shows a serial port POST output with `diag-level` set to `min` and a single 512 Mbyte DIMM installed.

Note – Both POST and OpenBoot PROM report the CPU as an UltraSPARC IIe processor. The CPU in your system is an UltraSPARC IIi processor.

Note – Video output is disabled while POST is initialized.

CODE EXAMPLE 3-2   `diag-level` Variable Set to `min`

```
Speed Jumper is set to 0000.0000.0000.0008
Hardware Power ON


@(#)OBP 4.6.0 2002/04/03 12:28


Executing Power On SelfTest


@(#) Sun Blade 150 POST 2.0.1 05:13 PM on 04/23/02


Processor Module Identification
        UltraSPARC-IIe Version 1.3
Init POST BSS
        Init System BSS
NVRAM Tests
        NVRAM Battery Detect Test
        NVRAM Scratch Addr Test
        NVRAM Scratch Data Test
DMMU TLB Tags
        DMMU TLB Tag Access Test
DMMU TLB RAM
        DMMU TLB RAM Access Test
Probe Ecache
        Probe Ecache
        Ecache Size = 0x00080000 bytes = 512 KBytes
Measure CPU Clock
        Initializing Southbridge
        Nominal CPU speed is 650 MHz
All CPU Basic Tests
        V9 Instruction Test
        CPU Soft Trap Test
        CPU Softint Reg and Int Test
All Basic MMU Tests
        DMMU Primary Context Reg Test
        DMMU Secondary Context Reg Test
```

CODE EXAMPLE 3-2   `diag-level` Variable Set to `min`   *(Continued)*

```
        DMMU TSB Reg Test
        DMMU Tag Access Reg Test
        IMMU TSB Reg Test
        IMMU Tag Access Reg Test
All Basic Cache Tests
        Dcache RAM Test
        Icache RAM Test
MCU Control & Status Regs Init
        Initializing Memory and MC registers
        DIMM 0: 256 MBytes = 0x10000000 bytes
        DIMM 1: 256 MBytes = 0x10000000 bytes
        DIMM 2: 256 MBytes = 0x10000000 bytes
        DIMM 3: 256 MBytes = 0x10000000 bytes
        Found 4 DIMMs in bank 0
        Bank 0: 1024 MBytes
        DIMM0 is a 32M x 8 device
        DIMM1 is a 32M x 8 device
        DIMM2 is a 32M x 8 device
        DIMM3 is a 32M x 8 device
        MC0 = 0x00000000.96a0cf06
        MC1 = 0x00000000.80008000
        MC2 = 0x00000000.cff0eeee
        MC3 = 0x00000000.00600b5f
        CPU MODULE upa_config is 0x0000003a.00000000
Ecache Tests
        Displacement Flush Ecache
        Ecache RAM Addr Test
        Ecache Tag Addr Test
Memory Init
        Malloc Post Memory
        Memory Addr Check w/o Ecache
        Load Post In Memory
        Run POST from MEM
        .........
        Map PROM/STACK/NVRAM in DMMU
        Update Master Stack/Frame Pointers
All FPU Basic Tests
        FPU Regs Test
        FPU Move Regs Test
All Basic IOMMU Tests
        CPU's IOMMU Regs Test
        CPU's IOMMU RAM Addr Test
        CPU's IOMMU CAM Address Test
```

```
        PBMA PCI Config Space Regs Test
        PBMA Control/Status Reg Test
        PBMA Diag Reg Test
        CPU's IO Regs Test
All Advanced CPU Tests
        IU ASI Access Test
        FPU ASI Access Test
All CPU Error Reporting Tests
        CPU Data Access Trap Test
        CPU Addr Align Trap Test
        DMMU Access Priv Page Test
        DMMU Write Protected Page Test
Audio Tests
Memory Tests
        Init Memory
                Info : 256MB at Dimm Slot 0
                Start Addr: 0x00000000.00800000  Size: 248 MBytes
Init with 0x00000000.00000000:
............................................................
................
                Info : 256MB at Dimm Slot 1
                Start Addr: 0x00000000.40000000  Size: 256 MBytes
Init with 0x00000000.00000000:
............................................................
                Info : 256MB at Dimm Slot 2
                Start Addr: 0x00000000.80000000  Size: 256 MBytes
Init with 0x00000000.00000000:
............................................................
Info : 256MB at Dimm Slot 3
                Start Addr: 0x00000000.c0000000  Size: 256 MBytes
Init with 0x00000000.00000000:
............................................................
Memory Addr Check with Ecache Test
                Info : 256MB at Dimm Slot 0
                Start Addr: 0x00000000.00800000  Size: 248 MBytes
Write 0xffffffff.ffffffff:
............................................................
Read:
............................................................
Write 0xaaaaaaaa.aaaaaaaa:
............................................................
Read:
............................................................
```

```
Write 0x55555555.55555555:
..............................................................
Read:
..............................................................
Write 0x00000000.00000000:
..............................................................
Read:
..............................................................
Info : 256MB at Dimm Slot 1
                Start Addr: 0x00000000.40000000  Size: 256 MBytes
Write 0xffffffff.ffffffff:
..............................................................
Read:
..............................................................
Write 0xaaaaaaaa.aaaaaaaa:
..............................................................
Read:
..............................................................
Write 0x55555555.55555555:
..............................................................
Read:
..............................................................
Write 0x00000000.00000000:
..............................................................
Read:
..............................................................
Info : 256MB at Dimm Slot 2
                Start Addr: 0x00000000.80000000  Size: 256 MBytes
Write 0xffffffff.ffffffff:
..............................................................
Read:
..............................................................
Write 0xaaaaaaaa.aaaaaaaa:
..............................................................
Read:
..............................................................
Write 0x55555555.55555555:
..............................................................
Read:
..............................................................
Write 0x00000000.00000000:
..............................................................
Read:
```

```
.............................................................
Info : 256MB at Dimm Slot 3
                Start Addr: 0x00000000.c0000000  Size: 256 MBytes
Write 0xffffffff.ffffffff:
.............................................................
Read:
.............................................................
Write 0xaaaaaaaa.aaaaaaaa:
.............................................................
Read:
.............................................................
Write 0x55555555.55555555:
.............................................................
Read:
.............................................................
Write 0x00000000.00000000:
.............................................................
Read:
.............................................................
ECC Memory Addr Test
                Info : 256MB at Dimm Slot 0
                Start Addr: 0x00000000.00800000  Size: 248 MBytes
                Info : 256MB at Dimm Slot 1
                Start Addr: 0x00000000.40000000  Size: 256 MBytes
                Info : 256MB at Dimm Slot 2
                Start Addr: 0x00000000.80000000  Size: 256 MBytes
                Info : 256MB at Dimm Slot 3
                Start Addr: 0x00000000.c0000000  Size: 256 MBytes

Status of this POST run:         PASS
diag-script=none
Time Stamp [hour:min:sec] 23:26:10  [month/date year] 04/15 2002

Power On Selftest Completed
    Status  = 0000.0000.0000.0000  ffff.ffff.f00b.63f0
0002.3333.0200.001b

Speed Jumper is set to 0000.0000.0000.0008
Software Power ON

@(#)OBP 4.6.0 2002/04/03 12:28
CPU SPEED 0x0000.0000.26be.3680
Initializing Memory Controller
```

```
MCR0 0000.0000.76a0.cf04
MCR1 0000.0000.8000.8000
MCR2 0000.0000.cff0.eeee
MCR3 0000.0000.0060.0052

Clearing E$ Tags  Done
Clearing I/D TLBs Done
Probing Memory Done
Clearing Memory Done
MEM BASE = 0000.0000.c000.0000
MEM SIZE = 0000.0000.1000.0000
MMUs ON
Copy Done
PC = 0000.01ff.f000.297c
PC = 0000.0000.0000.29c0
Decompressing into Memory Done
Size = 0000.0000.0006.1780
ttya initialized
Reset Control: BXIR:0 BPOR:0 SXIR:0 SPOR:1 POR:0
Probing upa at 1f,0 pci
Probing upa at 0,0 SUNW,UltraSPARC-IIe (512 KB)
Loading Support Packages: kbd-translator
Loading onboard drivers: ebus flashprom eeprom idprom
Probing Memory Bank #0 256 Megabytes
Probing Memory Bank #1 256 Megabytes
Probing Memory Bank #2 256 Megabytes
Probing Memory Bank #3 256 Megabytes
Probing /pci@1f,0 Device 7  isa dma floppy parallel power serial
serial
Probing /pci@1f,0 Device c  network firewire usb hub keyboard mouse
   storage
Probing /pci@1f,0 Device 3  pmu i2c temperature card-reader dimm
dimm
   dimm dimm ppm beep fan-control
Probing /pci@1f,0 Device 8  sound
Probing /pci@1f,0 Device d  ide disk cdrom
Probing /pci@1f,0 Device 13  SUNW,m64B
Probing /pci@1f,0 Device 5  pci
Probing /pci@1f,0/pci@5 Device 0  Nothing there
Probing /pci@1f,0/pci@5 Device 1  Nothing there
Probing /pci@1f,0/pci@5 Device 2  Nothing there

Sun Blade 150 (UltraSPARC-IIe 650MHz), Keyboard Present
```

```
Copyright 1998-2002 Sun Microsystems, Inc.  All rights reserved.
OpenBoot 4.6, 1024 MB memory installed, Serial #51602330.
Ethernet address 0:3:ba:13:63:9a, Host ID: 8313639a.
```

3.7   POST Progress and Error Reporting

POST progress indications are visible when a TTY-type terminal or a TIP line is connected between the serial port of the tested system and a second Sun workstation.

In most cases, POST also attempts to send a failure message to the POST monitoring system. CODE EXAMPLE 3-3 shows the typical appearance of an error message.

Note – The system does not automatically boot if a critical component fails the POST test. The system will halt at the `system` prompt to alert the user to a failure.

CODE EXAMPLE 3-3   Typical POST Error Message: DIMM Failure

```
Processor Module Identification
UltraSPARC-IIe Version 1.1
Init POST BSS
Init System BSS
NVRAM Tests
NVRAM Battery Detect Test
NVRAM Scratch Addr Test
NVRAM Scratch Data Test
DMMU TLB Tags
DMMU TLB Tag Access Test
DMMU TLB RAM
DMMU TLB RAM Access Test
Probe Ecache
Probe Ecache
Ecache Size = 0x00080000 bytes = 512 KBytes
Measure CPU Clock
Initializing Southbridge
Nominal CPU speed is 650 MHz
All CPU Basic Tests
```

```
V9 Instruction Test
CPU Tick and Tick Compare Reg Test
CPU Soft Trap Test
CPU Softint Reg and Int Test
All Basic MMU Tests
DMMU Primary Context Reg Test
DMMU Secondary Context Reg Test
DMMU TSB Reg Test
DMMU Tag Access Reg Test
DMMU VA Watchpoint Reg Test
DMMU PA Watchpoint Reg Test
IMMU TSB Reg Test
IMMU Tag Access Reg Test
All Basic Cache Tests
Dcache RAM Test
Dcache Tag Test
Icache RAM Test
Icache Tag Test
Icache Next Test
Icache Predecode Test
MCU Control & Status Regs Init
Initializing Memory and MC registers
DIMM 0: 128 MBytes = 0x08000000 bytes
DIMM 1: 0 MBytes = 0x00000000 bytes
DIMM 2: 0 MBytes = 0x00000000 bytes
DIMM 3: 0 MBytes = 0x00000000 bytes
Found 1 DIMMs in bank 0
Bank 0: 128 MBytes
DIMM0 is a 16M x 8 device
MC0 = 0x00000000.96a0cf06
MC1 = 0x00000000.80008000
MC2 = 0x00000000.c110000a
MC3 = 0x00000000.a0000804
CPU MODULE upa_config is 0x0000003a.00000000
Ecache Tests
Displacement Flush Ecache
Ecache RAM Addr Test
Ecache Tag Addr Test
Ecache RAM Test
Ecache Tag Test

Memory Init
Malloc Post Memory
```

CODE EXAMPLE 3-3   Typical POST Error Message: DIMM Failure *(Continued)*

```
Memory Addr Check w/o Ecache

**********************
STATUS =FAILED
TEST   =Memory Addr Check w/o Ecache
SUSPECT=DIMM1
MESSAGE=Mem Addr line compare error
addr 00000000.00000000
exp  00000000.00000000
obs  88880000.08000000
```

3.8   Bypassing POST

At the system prompt, type:

```
ok% setenv diag-level? off
ok% setenv diag-switch? false
```

3.9   Resetting Variables to Default Settings

The NVRAM permanently stores the default OpenBoot PROM settings for the latest OpenBoot PROM version on your system.

Caution – Before you reset to the default parameters, you should review the OpenBoot PROM settings to ensure that there are no changes that you need to save. Once the defaults are reset, all other OpenBoot PROM settings are permanently erased from the NVRAM. If you are unsure if you need your old settings, you may want to save your OpenBoot PROM settings to a file.

To set the system NVRAM parameters to the original default settings:

- **At the system prompt, type:**

```
ok% set-defaults
```

Note – The default POST setting is `max`.

3.10 Viewing the Default NVRAM Settings

You can view both the current NVRAM settings and the default settings simultaneously.

At the system prompt, type:

```
ok% printenv
```

3.11 Initializing Motherboard POST

Removing the *optional* system components and retesting the system isolates the possibility that those components are the cause of the failure.

1. **Power off the system.**

2. **Before replacing the motherboard, remove any optional components, such as PCI cards, then repeat the POST.**

Note – Nonoptional components such as DIMMs, the motherboard, the power supply, and the keyboard must be installed for POST to execute properly.

Troubleshooting Procedures

This chapter describes how to troubleshoot possible hardware problems and suggests corrective actions.

This chapter contains the following topics:

4.1 Power-On Failure

This section provides examples of power-on failure symptoms and suggested actions.

`Symptom`

The system does not power up when you press the power switch.

`Actions`

1. **Ensure that the AC power cord is properly connected to the system and to the wall receptacle. Verify that the wall receptacle is supplying AC power to the system.**

2. **If the wall receptacle AC power has been verified, but the system does not power on, the system power supply may be defective. See Section 4.4, "Power Supply Test" on page 4-4.**

4.2 Video Output Failure

This section provides video output failure symptoms and suggested actions. Perform the suggested actions until you isolate the problem.

`Symptom`

The video does not display on the system monitor.

`Actions`

1. **Check the monitor power cord to ensure that the cord is connected to the monitor and to the wall receptacle.**

2. **Verify that the wall receptacle is supplying power to the monitor.**

3. **Check the video cable connection between the monitor and the video output connector on the system back panel**

4. **Check that the CPU is properly seated.**

5. **If video still does not display on the monitor, the monitor, graphics card, or motherboard video chip may be defective.**

4.3 Hard Drive, CD-ROM, or DVD-ROM Drive Failure

This section provides hard drive, CD-ROM drive, or DVD-ROM drive failure symptoms and suggested actions. Perform the suggested actions until you isolate the problem.

`Symptoms`

■ A hard drive read, write, or parity error is reported by the operating system or a customer application.

■ A CD-ROM or DVD-ROM drive read error or parity error is reported by the operating system or a customer application.

```
Action
```

● **Replace the drive indicated by the failure message. The operating system identifies the internal drives as shown in** TABLE 4-1**.**

TABLE 4-1   Internal Drives Identification

Operating Environment Address	Drive Physical Location and Target	Cable Labels	Required Riser Board Connection
c0t0d0s#	Primary hard drive, target 0	Primary HDD	IDE1, J504*
c0t6d0s#	CD-ROM or DVD-ROM drive, target 1	CD/DVD	IDE1, J504*
c0t1d0s#	Secondary hard drive, target 2(optional)	Secondary HDD	IDE2, J503

* A three-way cable connects the Primary Hard Drive, and the CD-ROM or DVD-ROM to the riser board at connector IDE1, (J504). See the illustrations in Section 7.3, "Hard Drives" on page 7-6.

Note – The # symbol in the operating environment address examples can be a numeral between 0 and 7 and describes the slice or partition on the drive.

```
Symptom
```

Hard drive, CD-ROM, or DVD-ROM drive fails to respond to commands.

```
Action
```

Test the drive response to the probe-ide command as follows:

1. **To bypass POST, type** setenv diag-switch? false **at the system** ok **prompt.**

2. **At the system** ok **prompt, type:**

```
ok% reset-all
ok% probe-ide
```

   ■ If the hard drive responds correctly to the probe-ide command, the message shown in CODE EXAMPLE 4-4 on page 4-7 is displayed, which means that the system EIDE controller has successfully probed the device. This is an indication that the motherboard is operating correctly.

   ■ If an optional hard drive is installed and one drive does not respond to the EIDE controller probe but the other does, replace the unresponsive drive.

■ If the `probe-ide` test fails to show the device in the message, replace the drive (see Section 7.3, "Hard Drives" on page 7-6). If replacing the hard drive does not correct the problem, replace the motherboard.

4.4 Power Supply Test

This section describes how to test the power supply. Appendix B shows and describes the power supply connectors J501.

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5 "Preparing for Component Removal and Replacement."**

2. **Disconnect the IDE ribbon cables from the riser board so that you can access connector J501.**

3. **Power on the system.**

   See "Finishing Component Replacement" on page 9-1.

   Caution – With the system cover removed and the system powered on, there is unprotected access to voltage and energy levels that are potentially hazardous to equipment and personnel. If you are unsure how to safely proceed, please seek the assistance of qualified service personnel.

4. **Using a digital voltage meter (DVM), check the power supply output voltages as follows:**

   Note – Power supply connector J501 must remain connected to the riser board.

   a. **With the negative probe of the DVM placed on a connector ground (Gnd) pin, position the positive probe on each power pin.**

      See Section B.1, "Power Supply Connectors" on page B-2.

   b. **Verify voltage and signal availability as listed in Appendix B.**

5. **After you finish testing the power supply, remove the wrist strap, replace the system cover, and power on the system as described in Chapter 9 "Finishing Component Replacement."**

4.5 DIMM Failure

At times, the operating environment, diagnostic program, or POST might not display a DIMM location (U number) as part of a memory error message. In this situation, the only available information is a physical memory address and failing byte (or bit). The following table lists physical memory addresses that can be used to locate a defective DIMM. For more information on POST diagnostics, see Section 3.1, "POST Overview" on page 3-1.

TABLE 4-2 DIMM Physical Memory Address

DIMM Slot	Physical Address Range	DIMM Starting Address (Hex)
DIMM0 (U2)	0 to 512MB (0 to 0.5GB)	0X00000000
DIMM1 (U3)	512MB to 1024MB (0.5GB to 1GB)	0X40000000
DIMM2 (U4)	1024MB to 1536MB (1GB to 1.5GB)	0X80000000
DIMM3 (U5)	1536MB to 2048MB (1.5GB to 2GB)	0XC0000000

4.6 OpenBoot PROM On-Board Diagnostics

The following sections describe the OpenBoot PROM on-board diagnostics. To execute the OpenBoot PROM on-board diagnostics, the system must be at the ok prompt. The OpenBoot PROM on-board diagnostics are described as follows:

- Section 4.6.1, "Watch-Clock Diagnostic" on page 4-5
- Section 4.6.2, "Watch-Net and Watch-Net-All Diagnostics" on page 4-6
- Section 4.6.3, "Probe-IDE Diagnostic" on page 4-7

4.6.1 Watch-Clock Diagnostic

The watch-clock diagnostic reads a register in the NVRAM/TOD chip and displays the result as a seconds counter. During normal operation, the seconds counter repeatedly increments from 0 to 59 until interrupted by pressing any key on the Sun

keyboard. The watch-clock diagnostic is initialized by typing the
`watch-clock` command at the `ok` prompt. The following code example shows the
watch-clock diagnostic output message.

CODE EXAMPLE 4-1   `Watch-clock` Diagnostic

```
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.
49
ok
```

4.6.2   Watch-Net and Watch-Net-All Diagnostics

The watch-net and watch-net-all diagnostics monitor Ethernet packets on the
Ethernet interfaces connected to the system. Good packets received by the system
are indicated by a period (.). Errors such as the framing error and the cyclic
redundancy check (CRC) error are indicated with an "X" and an associated error
description. The watch-net diagnostic is initialized by typing the `watch-net`
command at the `ok` prompt and the watch-net-all diagnostic is initialized by typing
the `watch-net-all` command at the `ok` prompt. The following code example
shows the watch-net diagnostic output message. CODE EXAMPLE 4-2 shows the
watch-net-all diagnostic output message.

CODE EXAMPLE 4-2   Watch-Net Diagnostic Output Message

```
ok watch-net
Internal loopback test -- succeeded.
Link is -- up
Looking for Ethernet Packets.
'.' is a Good Packet. 'X' is a Bad Packet.
Type any key to stop.
.............................................................
ok
```

CODE EXAMPLE 4-3   Watch-Net-All Diagnostic Output Message

```
ok watch-net-all
/pci@1f,0/network@c,1
Internal loopback test -- succeeded.
Link is -- up
Looking for Ethernet Packets.
'.' is a Good Packet. 'X' is a Bad Packet.
Type any key to stop.
............................................................
ok
```

4.6.3   Probe-IDE Diagnostic

The probe-IDE diagnostic transmits an inquiry command to internal and external IDE devices connected to the system's on-board IDE interface. If the IDE device is connected and active, the target address, unit number, device type, and manufacturer name are displayed. Initialize the probe-IDE diagnostic by typing the probe-ide command at the ok prompt. The following code example shows the probe-IDE diagnostic output message.

CODE EXAMPLE 4-4   Probe-IDE Diagnostic Output Message

```
ok probe-ide
  Device 0  ( Primary Master )
         ATA Model: IC35L040AVER07-0

  Device 1  ( Primary Slave )
        Removable ATAPI Model: LTN486S

  Device 2  ( Secondary Master )
        Not Present

  Device 3  ( Secondary Slave )
        Not Present

ok
```

4.7 OpenBoot Diagnostics

OpenBoot Diagnostics is a menu-driven diagnostic tool that verifies:

- Internal I/O system
- Ethernet
- Keyboard
- Firewire 1394
- Diskette drive (floppy)
- Flash PROM
- Parallel port
- Serial ports
- NVRAM
- PMU
- USB
- EIDE
- Video

The OpenBoot Diagnostics program performs root-cause failure analysis on the referenced devices by testing internal registers, confirming subsystem integrity, and verifying device functionality.

Note – The OpenBoot Diagnostic test result data captured in the following code examples represent the test result data that is output when the system being tested is connected to a remote shell window through a TIP connection. When the system being tested is in a stand-alone configuration, the test result data may differ.

4.7.1 OpenBoot Diagnostics Menu Overview

Upon startup, the OpenBoot Diagnostics program performs a hierarchical census of all device nodes in the system device tree. The OpenBoot Diagnostics menu interface is dynamically generated. The menu will appear different depending on how your Sun Blade 150 system is configured (CODE EXAMPLE 4-5).

For example, if a keyboard is plugged into any of the four USB ports, the OpenBoot Diagnostics menu will display a test for that keyboard. If the system does not have a USB keyboard, no keyboard test will be available from the menu.

CODE EXAMPLE 4-5   OpenBoot Diagnostics Menu

```
 _____
|                              o b d i a g                             |
|_____|_____|_____|
|                              |                      |               |
|  1 SUNW,m64B@0               |  2 SUNW,m64B@13      |  3 ebus@c      |
|  4 firewire@c,2              |  5 flashprom@0,0     |  6 floppy@0,3f0|
|  7 ide@d                     |  8 keyboard@3        |  9 network@0   |
| 10 network@1                 | 11 network@c,1       | 12 parallel@0,378|
| 13 pmu@3                     | 14 serial@0,2e8      | 15 serial@0,3f8|
| 16 usb@c,3                   |                      |               |
|_____|_____|_____|
|        Commands: test test-all except help what setenv exit         |
|_____|
|              diag-passes=1 diag-level=max test-args=                |
|_____|
```

4.7.2   Starting the OpenBoot Diagnostics Menu

1. **At the** ok **prompt, type:**

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

2. **At the** ok **prompt, type:**

```
ok% reset-all
```

3. **Verify that the system resets, as shown in** CODE EXAMPLE 4-6**.**

Note – Both POST and OpenBoot PROM report the CPU as an UltraSPARC IIe processor. The CPU in your system is an UltraSPARC IIi processor.

CODE EXAMPLE 4-6   Reset Verification

```
ok reset-all
Resetting ...

Speed Jumper is set to 0000.0000.0000.0008
Software Power ON

@(#)OBP 4.6.0 2002/03/20 17:52  build_10
CPU SPEED 0x0000.0000.26be.3680
Initializing Memory Controller
MCR0 0000.0000.76a0.cf04
MCR1 0000.0000.8000.8000
MCR2 0000.0000.c333.00ee
MCR3 0000.0000.0060.04ce

Clearing E$ Tags  Done
Clearing I/D TLBs Done
Probing Memory Done
Clearing Memory Done
MEM BASE = 0000.0000.4000.0000
MEM SIZE = 0000.0000.2000.0000
MMUs ON
Copy Done
PC = 0000.01ff.f000.298c
PC = 0000.0000.0000.29d0
Decompressing into Memory Done
Size = 0000.0000.0006.1780
ttya initialized
Reset Control: BXIR:0 BPOR:0 SXIR:0 SPOR:0 POR:1
Probing upa at 1f,0 pci
Probing upa at 0,0 SUNW,UltraSPARC-IIe (512 KB)
Loading Support Packages: kbd-translator
Loading onboard drivers: ebus flashprom eeprom idprom
Probing Memory Bank #0 512 Megabytes
Probing Memory Bank #1 512 Megabytes
Probing Memory Bank #2   0 Megabytes
Probing Memory Bank #3   0 Megabytes
Probing /pci@1f,0 Device 7  isa dma floppy parallel power serial
serial
Probing /pci@1f,0 Device c  network firewire usb hub keyboard mouse
   storage storage
Probing /pci@1f,0 Device 3  pmu i2c temperature card-reader dimm
dimm
```

CODE EXAMPLE 4-6   Reset Verification *(Continued)*

```
   ppm beep fan-control
Probing /pci@1f,0 Device 8  sound
Probing /pci@1f,0 Device d  ide disk cdrom
Probing /pci@1f,0 Device 5  pci
Probing /pci@1f,0/pci@5 Device 0  SUNW,m64B
Probing /pci@1f,0/pci@5 Device 1  pci
Probing /pci@1f,0/pci@5/pci@1 Device 0  network
Probing /pci@1f,0/pci@5/pci@1 Device 1  network
Probing /pci@1f,0/pci@5/pci@1 Device 2  scsi disk tape scsi disk
tape
Probing /pci@1f,0/pci@5/pci@1 Device 3  Nothing there
Probing /pci@1f,0/pci@5/pci@1 Device 4  Nothing there
Probing /pci@1f,0/pci@5/pci@1 Device 5  Nothing there
Probing /pci@1f,0/pci@5/pci@1 Device 6  Nothing there
Probing /pci@1f,0/pci@5/pci@1 Device 7  Nothing there
Probing /pci@1f,0/pci@5/pci@1 Device 8  Nothing there
Probing /pci@1f,0/pci@5/pci@1 Device 9  Nothing there
Probing /pci@1f,0/pci@5/pci@1 Device a  Nothing there
Probing /pci@1f,0/pci@5/pci@1 Device b  Nothing there
Probing /pci@1f,0/pci@5/pci@1 Device c  Nothing there
Probing /pci@1f,0/pci@5/pci@1 Device d  Nothing there
Probing /pci@1f,0/pci@5/pci@1 Device e  Nothing there
Probing /pci@1f,0/pci@5/pci@1 Device f  Nothing there
Probing /pci@1f,0/pci@5 Device 2  Nothing there
Probing /pci@1f,0 Device 13  SUNW,m64B
Sun Blade 150 (UltraSPARC-IIe 650MHz), Keyboard Present
Copyright 1998-2002 Sun Microsystems, Inc.  All rights reserved.
OpenBoot 4.6 build_10, 1024 MB memory installed, Serial #51271539.
Ethernet address 0:3:ba:e:57:73, Host ID: 830e5773.
```

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

```
ok% obdiag
Searching for selftest methods: ebus flashprom floppy parallel
serial serial network firewire usb keyboard pmu ide SUNW,m64B
network network SUNW,m64B
```

The OpenBoot Diagnostics menu should appear on screen. See CODE EXAMPLE 4-7.

CODE EXAMPLE 4-7   OpenBoot Diagnostics Menu

```
 _____
|                                                                                |
|                               o b d i a g                                      |
|_____|
|                           |                          |                         |
|                           |                          |                         |
|  1 SUNW,m64B@0            |  2 SUNW,m64B@13          |  3 ebus@c               |
|  4 firewire@c,2          |  5 flashprom@0,0         |  6 floppy@0,3f0         |
|  7 ide@d                 |  8 keyboard@3            |  9 network@0            |
| 10 network@1             | 11 network@c,1           | 12 parallel@0,378       |
| 13 pmu@3                 | 14 serial@0,2e8          | 15 serial@0,3f8         |
| 16 usb@c,3               |                          |                         |
|_____|_____|_____|
|             Commands: test test-all except help what setenv exit               |
|_____|
|                  diag-passes=1 diag-level=max test-args=                        |
|_____|
```

4.7.3   OpenBoot Diagnostics Help

Various levels of help commands can assist you in determine how to perform diagnostics.

4.7.3.1   `Help` Command

The help screen provides brief descriptions of each OpenBoot Diagnostics menu tool command as well as a listing of all NVRAM Configuration Variables which relate to OpenBoot Diagnostics.

■ To view the help menu at the `ok` prompt, type:

```
obdiag> help
```

CODE EXAMPLE 4-8   OpenBoot Diagnostics Help Commands

```
obdiag> help

obdiag commands
exit            Exit obdiag tool
help            Print this help information
setenv          Set diagnostic configuration variable to new value
printenvs       Print values for diagnostic configuration variables
versions        Print selftests, library and obdiag tool versions
test-all        Test all devices displayed in the menu
test 1,2,5      Test devices 1, 2 and 5
except 2,5         Test all devices except devices 2 and 5
what 1,2,5         Print selected properties for devices 1, 2 and 5
Hit spacebar for diag control information, other key to return to
the main menu.
```

Note – If you press the spacebar, more information about Diagnostic Control variables is displayed.

4.7.4   Specific OpenBoot Diagnostics Tests

The following sections describe common OpenBoot Diagnostics Tests

4.7.4.1   Test Command

The test command allows the user to execute the selftests based on the corresponding numbers in the OpenBoot Diagnostics menu. Tests can be executed one at a time, or separated with a comma (CODE EXAMPLE 4-9).

CODE EXAMPLE 4-9   Test Command

```
obdiag> test 1,3,4
Hit the spacebar to interrupt testing
Testing /pci@1f,0/ebus@c ........................... passed
Testing /pci@1f,0/firewire@c,2 ..................... passed
```

```
Testing /pci@1f,0/isa@7/dma@0,0/floppy@0,3f0 ........ passed
Hit any key to return to the main menu
```

4.7.4.2 Test-all Command

The test-all command executes the selftest of every device in the OpenBoot
Diagnostics menu.

Note – The OpenBoot Diagnostics test-all command is different than the POST
test-all command (used at the ok prompt). In OpenBoot Diagnostics, you cannot
specify a particular device path name and test all the children of that device.

4.7.4.3 Except Command

The except command allows the user to execute all tests except those tests which
the user specifies. The user specifies the device number of the test to be excluded.
Use commas to exclude more than one test.

CODE EXAMPLE 4-10 Except Command

```
obdiag> except 1,4,5,6,8,10
Hit the spacebar to interrupt testing
Testing /pci@1f,0/ebus@c ..... ..................... passed
Testing /pci@1f,0/firewire@c,2 ..................... passed
Testing /pci@1f,0/network@c,1 ...................... passed
Testing /pci@1f,0/isa@7/serial@0,3f8 ............... passed
Hit any key to return to the main menu
```

4.7.4.4   Versions Command

The versions command displays the version of each selftest, the date it was most recently modified, and the manufacturer of the selftest. This information is also displayed for the OpenBoot Diagnostics menutool and library.

CODE EXAMPLE 4-11   Versions Command

```
obdiag> versions
1 SUNW,m64B@13 No version is specified.
2 ebus@c 1.9 xx/xx/xx Copyright (c) Sun Micro-systems, Inc.
3 firewire@c,2 1.23 xx/xx/xx Copyright (c) Sun Micro-systems, Inc.
4 flashprom@0,0 1.12 xx/xx/xx Copyright (c) Sun Micro-systems,
Inc.
5 floppy@0,3f0 1.10 xx/xx/xx Copyright (c) Sun Microsystems, Inc.
6 ide@d 1.0 xx/xx/xx Copyright (c) Sun Micro-systems, Inc.
7 network@c,1 1.12 xx/xx/xx Copyright (c) Sun Micro-systems, Inc.
8 serial@0,2e8 1.11 xx/xx/xx Copyright (c) Sun Micro-systems, Inc.
9 serial@0,3f8 1.11 xx/xx/xx Copyright (c) Sun Micro-systems, Inc.
10 usb@c,3 1.9 xx/xx/xx Copyright (c) Sun Micro-systems, Inc.
OBDIAG LIBRARY 1.3 xx/xx/xx Copyright (c) Sun Micro-systems, Inc.
OBDIAG MENUTOOL 1.2 00/01/19 Copyright (c) Sun Micro-systems, Inc.
Hit any key to return to the main menu
```

4.7.4.5   What Command

The what command prints more detailed information on any device. Type the number of the device shown in the OpenBoot Diagnostics menu. The information is derived from OpenBoot Diagnostics device node properties. If there are no properties in a given device node, OpenBoot Diagnostics will list no property instead.

CODE EXAMPLE 4-12   What Command

```
obdiag> what 3
Device 3 is /pci@1f,0/firewire@c,2
version : 1.23 xx/xx/xx Copyright (c) Sun Microsystems, Inc.
name : firewire
compatible : pci108e,1102.1001
Hit any key to return to the main menu
```

4.7.4.6 `Printenvs` Command

The `printenvs` command prints the current value of each OpenBoot Diagnostics configuration variable.

CODE EXAMPLE 4-13 `Printenvs` Command

```
obdiag> printenvs
test-args = null
diag-switch? = false
diag-passes = 1
diag-level = max
Hit any key to return to the main menu
```

4.7.4.7 `Setenv` Command

The `setenv` command allows the user to change the variable settings of OpenBoot Diagnostics. The OpenBoot Diagnostics then verifies that the new value is valid and echoes the new value to the user.

CODE EXAMPLE 4-14 `Setenv` Command

```
obdiag> setenv diag-switch? true
diag-switch? = true
Hit any key to return to the main menu
```

4.7.4.8 `Exit` Command

The `exit` command returns the user to the `ok` prompt and relinquishes control back to OpenBoot PROM.

CODE EXAMPLE 4-15 `Exit` Command

```
obdiag> exit
ok
```

4.7.5 Error Reporting in OpenBoot Diagnostics

When OpenBoot Diagnostics encounters an error, a set of standard information is displayed to the user:

- ERROR: error message detailing the cause of failure
- DEVICE: the device path name from the OpenBoot Diagnostics device tree
- SUBTEST: name of the subtest that caused the error
- MACHINE: name of the machine upon which the error occurred
- SERIAL#: serial number of the machine upon which the error occurred
- DATE: date and time when the error occurred.

CODE EXAMPLE 4-16   Example of Error Testing Output

```
Testing /pci@1f,0/ebus@c/flashprom@0,0
      ERROR : FLASHPROM CRC-32 is incorrect
      DEVICE : /pci@1f,0/ebus@c/flashprom@0,0
      SUBTEST: selftest
      MACHINE: Sun Blade 150 (UltraSPARC-IIe)
      SERIAL#: 11910854
      DATE : 04/10/2002 02:32:16 GMT
/pci@1f,0/ebus@c/flashprom@0,0 selftest failed, return code
= 1
ok
```

4.7.6 Exiting OpenBoot Diagnostics and Resetting the OpenBoot PROM settings

After you exit OpenBoot Diagnostics, you may want to reset the OpenBoot PROM parameters so that the system automatically boots at power-on.

1. **To exit OpenBoot Diagnostics, type** exit **at the** obdiag **prompt.**

```
obdiag exit
ok%
```

The system will return to the OpenBoot PROM ok prompt.

To set the system to automatically boot after POST, you must reset the auto-boot? parameter to true, and invoke reset-all.

Caution – Before you reset to the default parameters, you should review the OpenBoot PROM settings to ensure that there are no changes that you need to save. Once the defaults are reset, all other OpenBoot PROM settings are permanently erased from the NVRAM. If you are unsure if you need your old settings, you may want to save your OpenBoot PROM settings to a file.

Note – The default setting for OpenBoot Diagnostics is max.

2. **At the** ok **prompt, type:**

```
ok% setenv auto-boot? true
auto-boot? = true
```

You must always invoke the reset-all parameter to change any OpenBoot PROM parameters

3. **At the** ok **prompt, type:**

```
ok% reset-all
```

Note – If you do not need to save any custom changes to OpenBoot PROM, you could use the set-defaults parameter instead of the reset-all parameter. See Section 3.9, "Resetting Variables to Default Settings" on page 3-27.)

Preparing for Component Removal and Replacement

This chapter describes the activities you must do to prepare for removal and replacement of internal system components.

Note – It is very important that you review the safety requirements, symbols, and precautions in this chapter before you begin to remove or replace system components.

This chapter contains the following topics:

- Section 5.1, "Safety Requirements" on page 5-1
- Section 5.2, "Safety Symbols" on page 5-2
- Section 5.3, "Safety Precautions" on page 5-2
- Section 5.4, "Tools Required" on page 5-4
- Section 5.5, "Powering Off the System" on page 5-4
- Section 5.6, "Removing the System Cover" on page 5-6
- Section 5.7, "Attaching the Antistatic Wrist Strap" on page 5-6

5.1   Safety Requirements

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

- Follow all cautions, warnings, and instructions marked on the equipment.
- Ensure that the voltages and frequency rating of the power receptacle match the electrical rating label on the equipment.

- Never push objects of any kind through openings in equipment. Objects might touch dangerous voltage points or short components, resulting in fire or electric shock.
- Refer servicing of equipment to qualified personnel.

5.2 Safety Symbols

The following symbols mean:

Caution – Risk of personal injury and equipment damage. Follow the instructions.

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

Caution – Hot surfaces. Avoid contact. Surfaces are hot and may cause personal injury if touched.

5.3 Safety Precautions

Follow all safety precautions.

5.3.1 Modification to Equipment

Caution – Do not make mechanical or electrical modifications to the equipment. Sun Microsystems is not responsible for regulatory compliance of a modified Sun product.

5.3.2 Placement of a Sun Product

Caution – To ensure reliable operation of the Sun product and to protect it from overheating, ensure equipment openings are not blocked or covered. Never place a Sun product near a radiator or hot air register.

5.3.3 Power Cord Connection

Caution – Not all power cords have the same current ratings. Household extension cords do not have overload protection. Do not use household extension cords with a Sun product.

Caution – The power cord serves as the primary disconnect device for the system. Be sure to connect the power cord into a grounded electrical receptacle that is nearby the system and is readily accessible. Do not connect the power cord when the power supply has been removed from the system chassis.

5.3.4 Electrostatic Discharge

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 themselves or any metal parts.

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

5.3.5 Lithium Battery

⚠ **Caution –** This system contains a lithium battery. Lithium batteries may explode if mishandled. Do not dispose of a battery in fire. Do not disassemble a battery or attempt to recharge it.

5.4 Tools Required

The following tools are required to service the Sun Blade 150 system.

- No. 2 Phillips screwdriver (magnetized tip suggested)
- Needle-nose pliers
- Grounding wrist strap
- Digital voltage meter (DVM) (optional)
- Antistatic mat

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

- Bag used to wrap a Sun replacement part
- Shipping container used to package a Sun replacement part
- Inner side (metal part) of the system cover
- Sun antistatic mat, part no. 250-1088 (available through your Sun sales representative)
- Disposable antistatic mat; shipped with replacement parts or optional system features

5.5 Powering Off the System

⚠ **Caution –** Exit from the operating system before turning off system power. Failure to do so may result in data loss.

1. **Back up system files and data.**
   - If Solaris is running in a windowing environment:

Momentarily press and release the front panel power switch (FIGURE 5-1) to automatically shut down all programs, the operating system, and power off the system.

From the system shutdown menu displayed on the monitor, select "Shutdown."

■ If Solaris is not running in a windowing environment:

Press and hold the front panel power switch (FIGURE 5-1) for four seconds to power off the system.

> **Caution –** This action forces an immediate power off of the system and unsaved data is lost.

Power switch
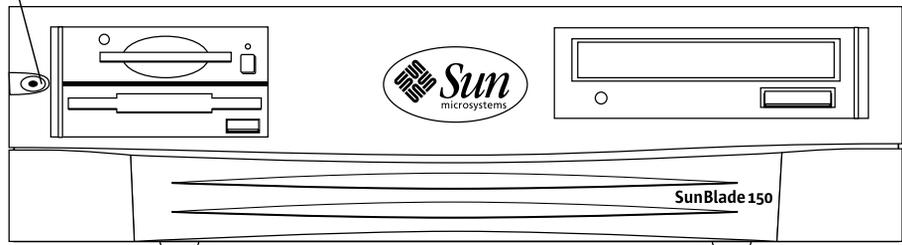
FIGURE 5-1   Front Panel Power Switch

2. **Verify the following:**

   a. **The front panel power-indicator LED is off.**

   b. **The system fans are not spinning.**

3. **Turn off the power to the monitor and any peripheral equipment.**

4. **Disconnect cables to any peripheral equipment.**

> **Caution –** Pressing the power switch does not remove all power from the system; a trickle current remains in the power supply. To remove all power from the system, disconnect the power cord.

5.6 Removing the System Cover

1. **Using a No. 2 Phillips screwdriver, remove the two screws securing the system cover to the chassis.** (FIGURE 5-2)

2. **Slide the system cover toward the rear of the system until the cover tabs release.**

3. **Lift the system cover straight up and set the cover aside in a safe place.**
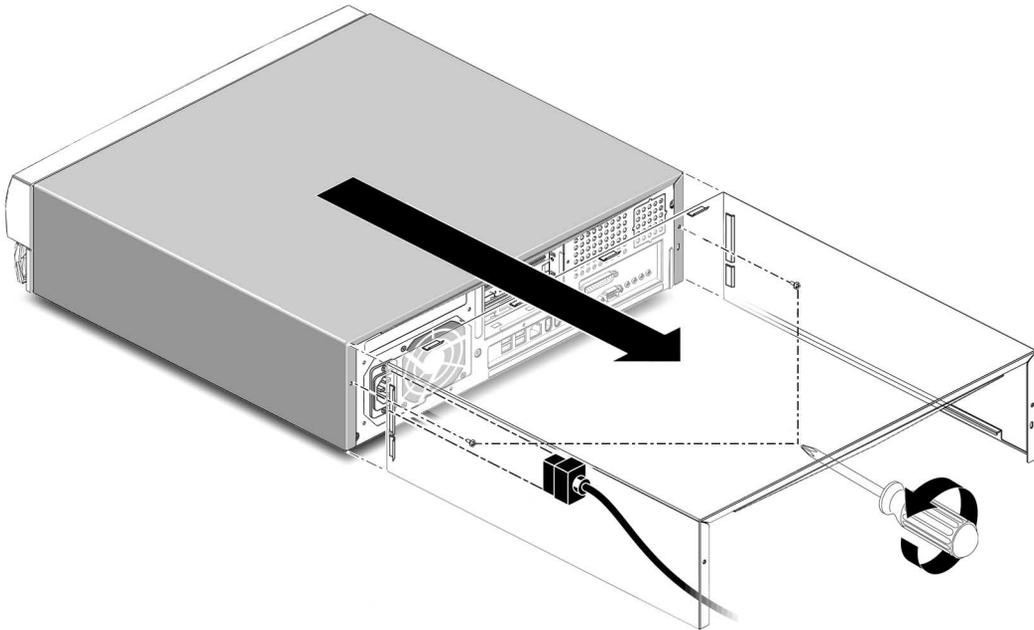
FIGURE 5-2   Removing the System Cover

5.7 Attaching the Antistatic Wrist Strap

1. **Unwrap the first two folds of the wrist strap; wrap the adhesive side firmly against your wrist.**

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

3. **Attach the copper end of the wrist strap to the chassis (**FIGURE 5-3**).**

4. Disconnect the AC power cord from the system.

Copper end
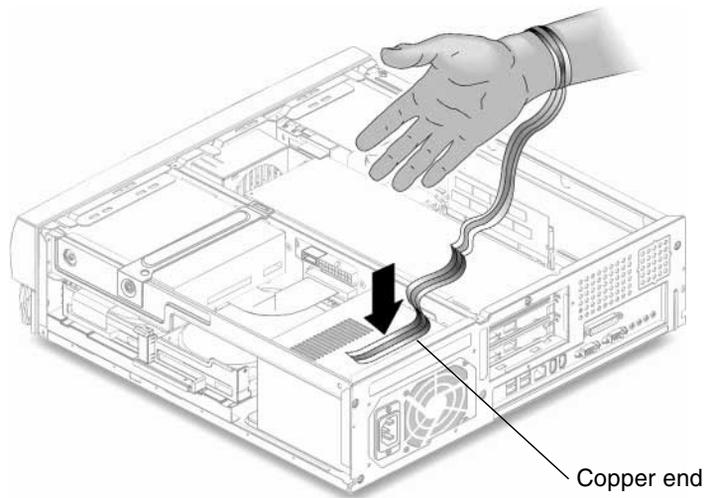
FIGURE 5-3   Attaching the Wrist Strap to the Chassis

Removing and Replacing Major Subassemblies

This chapter describes how to remove and replace the major subassemblies.

This chapter contains the following topics:

6.1 Power Supply

To remove and replace the power supply, proceed as follows.

6.1.1 Removing the Power Supply

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

⚠️ **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.

2. **Disconnect the power cable connector from riser board connector J501 (**FIGURE 6-1**).**

3. **Disconnect the power cable connector from riser board connector J505.**

4. **Using a No. 2 Phillips screwdriver, remove the three screws securing the power supply to the back panel.**

5. **Push the power supply toward the chassis front to disengage the power supply from the chassis mounting hooks on the bottom of the chassis.**

6. **Lift the power supply from the chassis.**
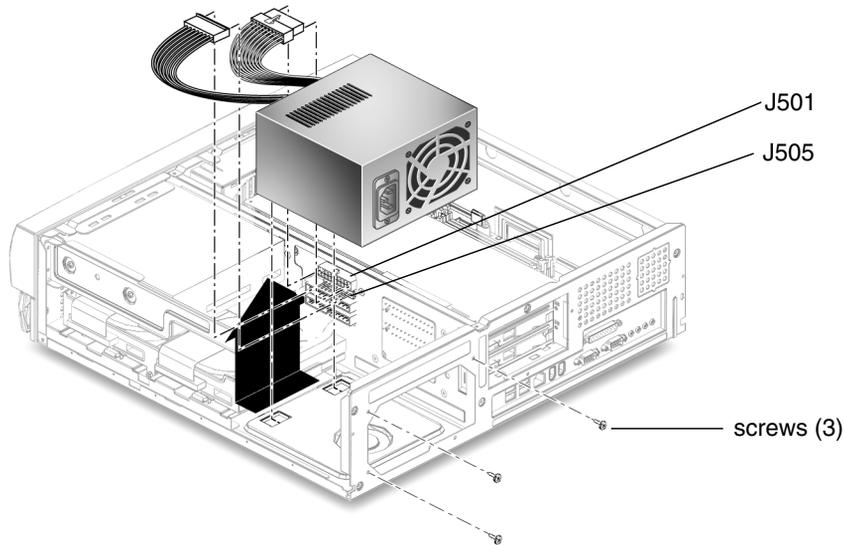
FIGURE 6-1   Removing and Replacing the Power Supply

6.1.2   Replacing the Power Supply

1. **Position the power supply into the chassis, tilting it slightly toward the back of the chassis (**FIGURE 6-1**).**

2. **Push the power supply toward the chassis rear to engage the mounting hooks.**

3. **Using a No. 2 Phillips screwdriver, replace the three screws securing the power supply to the back panel.**

4. **Connect the power cable connector to the riser board connector J501.**

5. **Connect the power cable connector from riser board connector J505.**

6. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

6.2 Cable Assemblies

The following cable assemblies can be removed and replaced:

- Diskette drive cable assembly
- Diskette drive power cable assembly
- Primary IDE cable assembly
- Secondary IDE cable assembly
- Smart card reader cable assembly
- Power switch/LED assembly

Note – All system cable assemblies are part of a cable kit; they cannot be ordered separately.

6.2.1 Removing the Diskette Drive Data Cable Assembly

1. Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.

⚠ **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.

---

2. Remove the diskette drive data cable assembly connectors from the following (FIGURE 6-2**):**

- Diskette drive
- Riser board (J9)

3. Open the two cable routing clips (FIGURE 6-2**).**

Note – You can move the fan assembly for easier access to the cables. See Section 6.4.1, "Removing the Fan Assembly" on page 6-15.

---

4. Remove the diskette drive data cable assembly from the chassis.

Cable routing clip

Diskette drive data cable

J9 connector

FIGURE 6-2   Removing and Replacing the Diskette Drive Data Cable Assembly

6.2.2   Replacing the Diskette Drive Data Cable Assembly

1. **Position the diskette drive data cable assembly into the chassis (**FIGURE 6-2**).**

2. **Close the two cable routing clips (**FIGURE 6-2**).**

3. **Connect the diskette drive data cable assembly connectors to the following:**
   - Riser board (J9)
   - Diskette drive

Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

---

4. **If you moved the fan assembly, replace it.**

   See "Replacing the Fan Assembly" on page 6-16.

5. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

6.2.3 Removing the Diskette Drive Power Cable Assembly

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

⚠️ **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.

2. **Remove the diskette drive power cable assembly connectors from the following (**FIGURE 6-3**):**
   - Diskette drive
   - Riser board (J10)

3. **Open the two cable routing clips (**FIGURE 6-3**).**

4. **Remove the diskette drive power cable assembly from the chassis.**

Note – You can move the fan assembly for easier access to the cables. See Section 6.4.1, "Removing the Fan Assembly" on page 6-15.

Diskette drive power cable
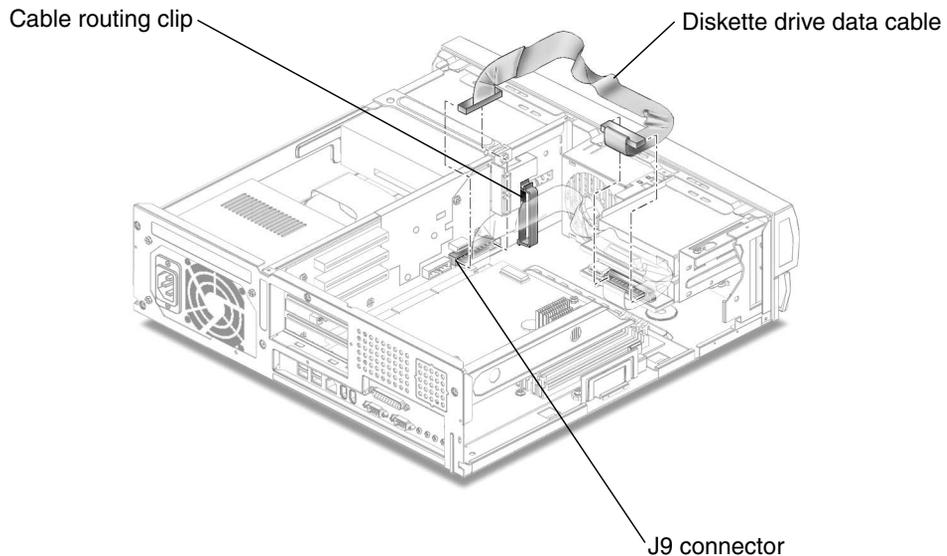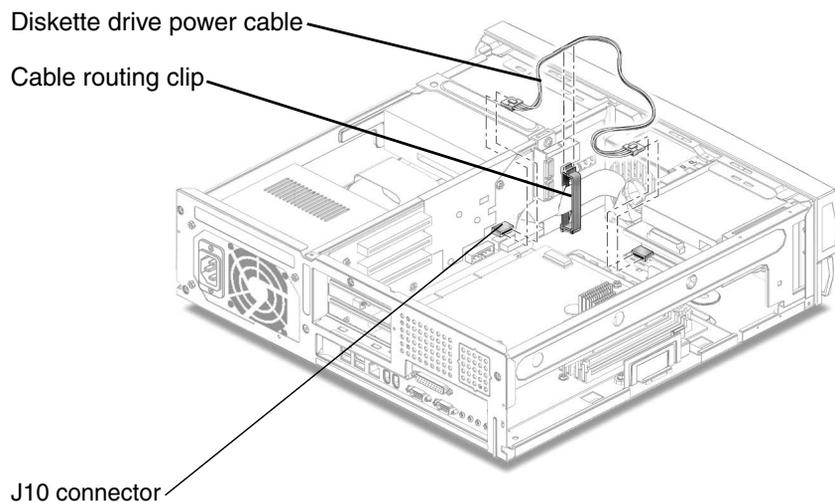
Cable routing clip

J10 connector

FIGURE 6-3 Removing and Replacing the Diskette Drive Power Cable Assembly

6.2.4 Replacing the Diskette Drive Power Cable Assembly

1. **Position the diskette drive power cable assembly into the chassis (**FIGURE 6-3**).**

2. **Close the two cable routing clips (**FIGURE 6-3**).**

3. **Connect the diskette drive power cable assembly connectors to the following:**
   - Riser board (J10)
   - Diskette drive

   Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

   ---

4. **If you moved the fan assembly, replace it.**

   See "Replacing the Fan Assembly" on page 6-16.

5. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

6.2.5 Removing the Primary IDE Cable Assembly

The primary IDE cable assembly connects the primary hard drive and the CD-ROM or DVD-ROM drive to the system.

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

   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.

   ---

2. **Disconnect the primary IDE cable assembly connectors from the following (**FIGURE 6-4**):**
   - CD-ROM or DVD-ROM drive
   - Primary hard drive
   - Riser board (J504 is also labeled IDE1)

3. **Remove the primary IDE cable assembly from the chassis.**

CD-DVD-ROM connector   IDE 1 (J504)
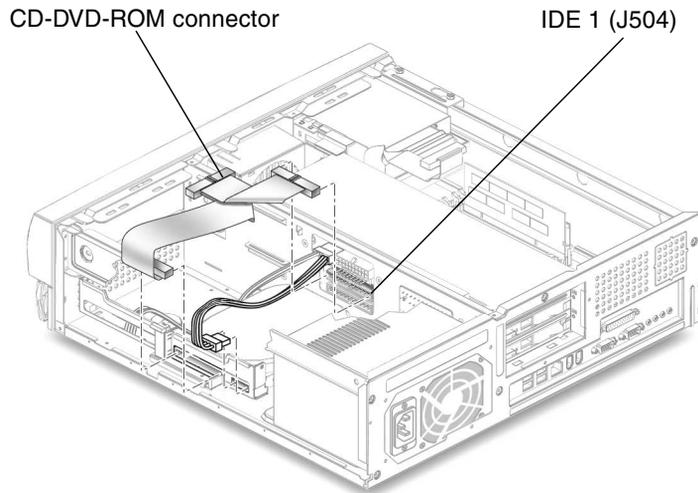
FIGURE 6-4   Removing and Replacing the Primary IDE Cable Assembly

6.2.6   Replacing the Primary IDE Cable Assembly

1. Position the primary IDE cable assembly into the chassis (FIGURE 6-4**).**

2. Connect the primary IDE cable assembly connectors to the following:

- Primary hard drive
- CD-ROM or DVD-ROM drive
- Riser board (J504 is also labeled IDE1)

Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

---

3. Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.

6.2.7   Removing the Secondary IDE Cable Assembly

The secondary IDE cable assembly connects the optional secondary hard drive to the system.

1. Power off the system, remove the system cover, and attach an antistatic wrist strap as described in "Preparing for Component Removal and Replacement" on page 5-1.

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.

2. **Disconnect the secondary IDE cable assembly connector from the following (**FIGURE 6-5**):**

   ■ Secondary hard drive
   ■ Riser board (J503 is also labeled IDE2)

3. **Remove the secondary IDE cable assembly from the chassis.**

IDE2 (J503)
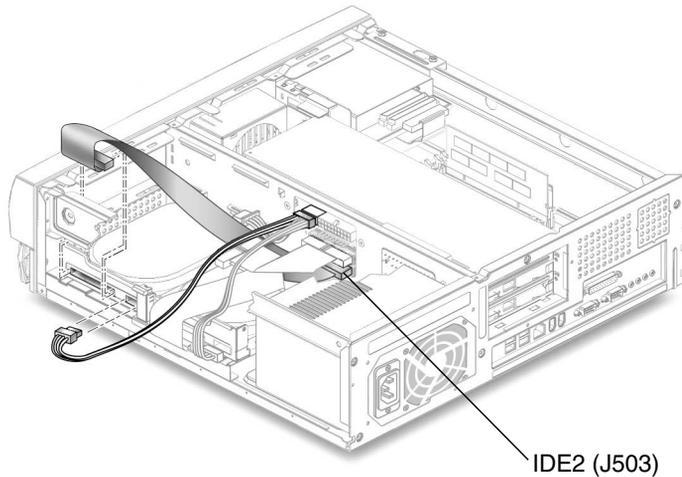
FIGURE 6-5 Removing and Replacing the Secondary IDE Cable Assembly

6.2.8   Replacing the Secondary IDE Cable Assembly

1. **Position the secondary IDE cable assembly into the chassis (**FIGURE 6-5**).**

2. **Connect the secondary IDE cable assembly connectors to the following:**

   ■ Secondary hard drive
   ■ Riser board (J503 is also labeled IDE2)

Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

3. Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.

6.2.9   Removing the Smart Card Reader Cable Assembly

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

⚠️ **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.

2. **Disconnect the smart card reader cable assembly connectors from the following (**FIGURE 6-6**):**
   - Smart card reader
   - Riser board (J8)

3. **Open the cable routing clip.**

4. **Remove the smart card reader cable assembly from the chassis.**

Note – You can move the fan assembly for easier access to the cables. See "Removing the Fan Assembly" on page 6-15.
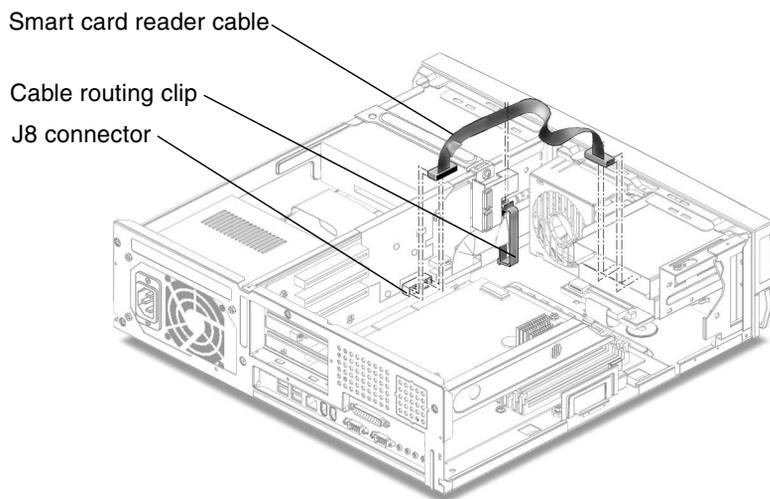

FIGURE 6-6   Removing and Replacing the Smart Card Reader Cable Assembly

6.2.10 Replacing the Smart Card Reader Cable Assembly

1. Replace the smart card reader cable assembly as follows (FIGURE 6-6**):**

a. Position the smart card reader cable assembly into the chassis.

b. Close the cable routing clip.

c. Connect the smart card reader cable assembly connectors to the following:

- Riser board (J8)
- Smart card reader

Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

---

2. If you moved the fan assembly, replace it.

See "Replacing the Fan Assembly" on page 6-16.

3. Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.

6.2.11 Removing the Power Switch/LED Assembly

1. Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.

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.

---

2. Remove the front panel bezel by lifting the three tabs and gently lifting the bezel from the system (FIGURE 6-7**).**
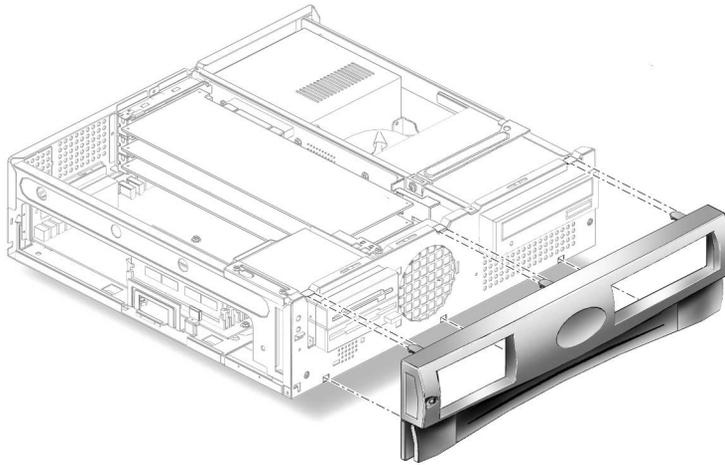
FIGURE 6-7 Removing the Front Bezel

3. **If any long PCI cards are installed, remove them.**

   See Section 8.4.1, "Removing a PCI Card" on page 8-10.

4. **Move the peripheral assembly aside to provide clearance:**

   a. **Open the cable routing clip below the peripheral assembly.**

      This will release the tension from the smart card and diskette drive cables. You do not have to disconnect the cables.

   b. **Using a No. 2 Phillips screwdriver, loosen (but do not remove) the three screws securing the peripheral assembly to the chassis (see** FIGURE 7-1**, in Section 7.1, "Diskette Drive" on page 7-1).**

   c. **Slide the peripheral assembly back and lift it from the chassis.**

      Do not remove any of the cables attached to the peripheral assembly.

   d. **Set the peripheral assembly on an antistatic mat.**

5. **Disconnect the power switch/LED cable from the riser board connector J2** (FIGURE 6-8**).**
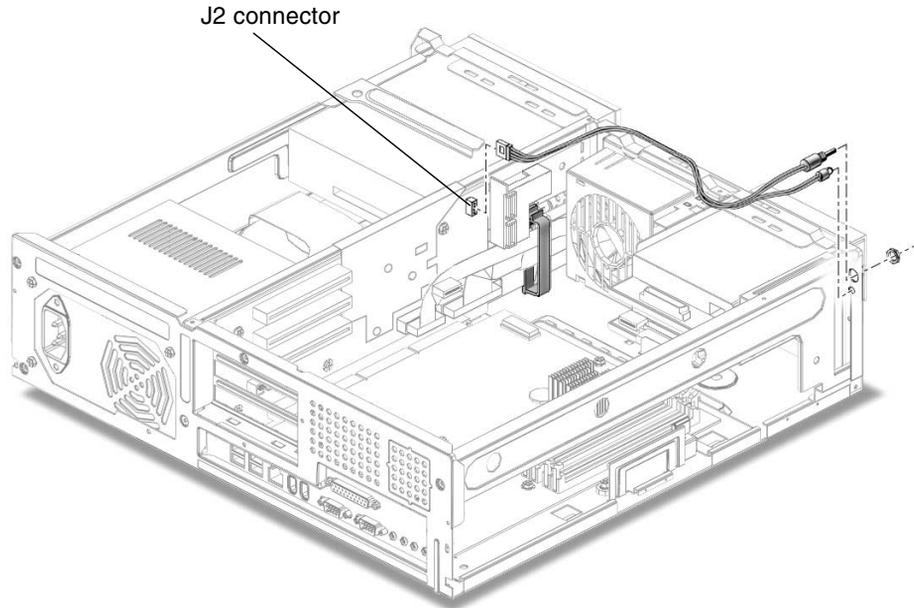
J2 connector

FIGURE 6-8   Removing and Replacing the Power Switch/LED Assembly

6. **Open the two cable routing clips on the chassis.**

Note – You can move the fan assembly for easier access to the cables. See Section 6.4.1, "Removing the Fan Assembly" on page 6-15.

---

7. **Remove the nut and washer retaining the power switch to the chassis.**

8. **Press the LED out of the chassis from the front panel side.**

9. **Remove the power switch/LED assembly from the chassis.**

6.2.12   Replacing the Power Switch/LED Assembly

1. **Position the power switch/LED assembly into the chassis (**FIGURE 6-8**).**

2. **Attach the power switch to the chassis with the washer and nut.**

3. **Press the LED into the chassis from the rear of the front panel.**

4. **Route the cable along the chassis.**

5. **Close the cable routing clips.**

6. **Connect the cable connector to riser board connector J2.**

7. **If you moved the fan assembly, replace it.**

   See Section 6.4.2, "Replacing the Fan Assembly" on page 6-16.

8. **Replace the peripheral assembly:**

   a. **Place the peripheral assembly back in position, aligning the three holes in the peripheral assembly with the three securing screws on the chassis (see** FIGURE 7-1**).**

   b. **Slide the peripheral assembly forward until it stops.**

   c. **Using a No. 2 Phillips screwdriver, tighten the three securing screws.**

   d. **Replace all of the cables into the cable retaining clip and secure the clip.**

9. **Replace the PCI cards.**

   See Section 8.4.2, "Replacing a PCI Card" on page 8-11.

10. **Replace the front bezel.**

11. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

6.3 Speaker Assembly

To remove and replace the speaker assembly, proceed as follows.

6.3.1 Removing the Speaker Assembly

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

> **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.

2. **Remove the front panel bezel by lifting the three tabs and gently lifting the bezel from the system (**FIGURE 6-7**).**

3. **If necessary to provide clearance, remove any long PCI cards from the riser board connectors.**

   See Section 8.4.1, "Removing a PCI Card" on page 8-10.

4. **Move the peripheral assembly aside to provide clearance:**

   a. **Open the cable routing clip below the peripheral assembly.**

      This will release the tension from the smart card and diskette drive cables. You do not have to disconnect the cables.

   b. **Using a No. 2 Phillips screwdriver, loosen (but do not remove) the three screws securing the peripheral assembly to the chassis (see** FIGURE 7-1**).**

   c. **Slide the peripheral assembly back and lift it from the chassis.**

      Do not remove any of the cables attached to the peripheral assembly.

   d. **Set the peripheral assembly on an antistatic mat.**

5. **Disconnect the speaker cable from connector J12 on the riser board.**

6. **Press the speaker retaining tab on the chassis front panel.**

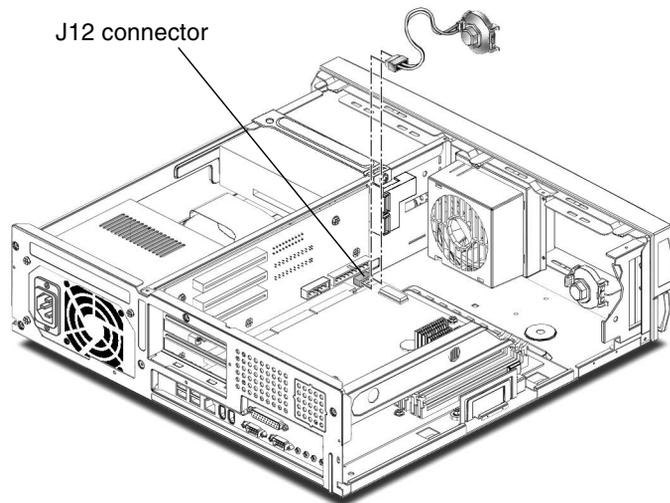7. **Remove the speaker assembly from the chassis.**

J12 connector

FIGURE 6-9   Removing and Replacing the Speaker Assembly

6.3.2 Replacing the Speaker Assembly

1. **Position the speaker assembly into the chassis (**FIGURE 6-9**).**

2. **Grasp the speaker and press the speaker into the three chassis speaker slots.**

3. **Route the speaker cable and any other loose cables through the cable retaining clip.**

4. **Connect the speaker cable to connector J12 on the riser board.**

5. **Replace the peripheral assembly:**

   a. **Place the peripheral assembly back in position, aligning the three holes in the peripheral assembly with the three securing screws on the chassis (see** FIGURE 7-1**).**

   b. **Slide the peripheral assembly forward until it stops.**

   c. **Using a No. 2 Phillips screwdriver, tighten the three securing screws.**

   d. **Replace all of the cables into the cable retaining clip and secure the clip.**

6. **If you removed any long PCI cards, replace them.**

   See Section 8.4.2, "Replacing a PCI Card" on page 8-11.

7. **Replace the front panel bezel.**

8. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

6.4 Fan Assembly

To remove and replace the fan assembly, proceed as follows.

6.4.1 Removing the Fan Assembly

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

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.

2. **If necessary to provide clearance, remove any long PCI cards from the riser board connectors.**

   See Section 8.4.1, "Removing a PCI Card" on page 8-10.

3. **Disconnect the fan assembly power cable connector from riser board connector J4 (**FIGURE 6-10**).**

4. **Open the cable retaining clip and remove the fan cable.**

5. **Press the fan assembly retaining tabs and remove the fan assembly from the chassis.**

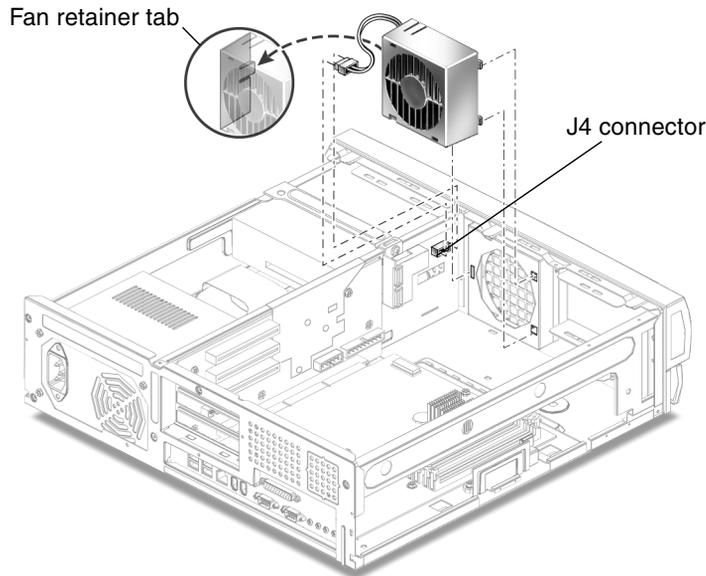Fan retainer tab

J4 connector

FIGURE 6-10 Removing and Replacing the Fan Assembly

6.4.2   Replacing the Fan Assembly

1. **Position the fan assembly, ensuring that the fan retaining tabs are aligned with the chassis retaining slots (**FIGURE 6-10**).**

2. **Press the fan assembly into the chassis slots.**

3. **Connect the fan assembly power cable connector to the riser board (J4).**

4. **Route the cables through the cable retaining clip and close the clip.**

5. **If you removed any long PCI cards, replace the PCI cards into the riser board.**

    See Section 8.4.2, "Replacing a PCI Card" on page 8-11.

6. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

CHAPTER **7**

Removing and Replacing Storage Devices

This chapter describes how to remove and replace the Sun Blade 150 storage devices.

This chapter contains the following topics:

- Section 7.1, "Diskette Drive" on page 7-1
- Section 7.2, "Smart Card Reader" on page 7-4
- Section 7.3, "Hard Drives" on page 7-6
- Section 7.4, "CD-ROM or DVD-ROM Drive" on page 7-11

7.1 Diskette Drive

To remove and replace the diskette drive, proceed as follows.

7.1.1 Removing the Diskette Drive

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

⚠ **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.

2. **If any long PCI cards are installed, remove them from the riser board connectors.**

   See Section 8.4.1, "Removing a PCI Card" on page 8-10.

3. **If required, remove a diskette from the drive.**

4. **Disconnect the following:**
   - Smart card reader power cable
   - Diskette drive power cable
   - Diskette drive data cable

5. **Using a No. 2 Phillips screwdriver, loosen (but do not remove) the three screws securing the peripheral assembly to the chassis (**FIGURE 7-1**).**

Note – Do not remove the three screws securing the peripheral assembly to the chassis.
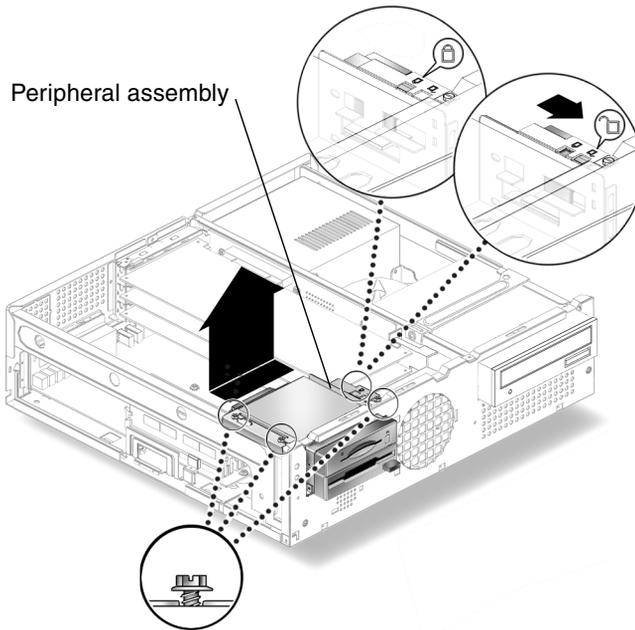

Peripheral assembly

FIGURE 7-1 Removing and Replacing the Peripheral Assembly

6. **Slide the peripheral assembly to the rear of the chassis and lift it from the chassis.**

7. **Using a No. 2 Phillips screwdriver, remove the three screws securing the diskette drive to the peripheral assembly.**

8. **Remove the diskette drive from the peripheral assembly (**FIGURE 7-2**).**
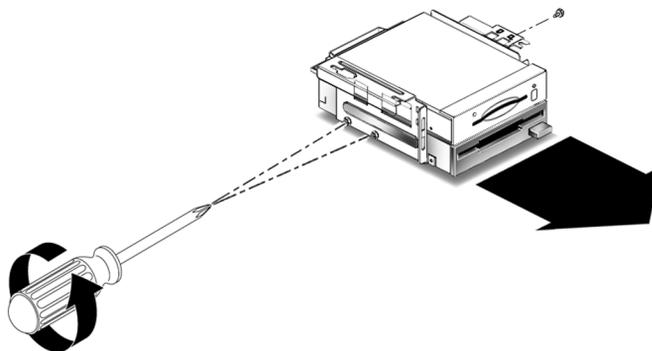
FIGURE 7-2   Removing the Diskette Drive

7.1.2   Replacing the Diskette Drive

1. **Position the diskette drive into the peripheral assembly (**FIGURE 7-2**).**

2. **Using a No. 2 Phillips screwdriver, replace the three screws securing the diskette drive to the peripheral assembly.**

3. **Position the peripheral assembly into the chassis, aligning the three holes on the assembly with the three screws on the chassis (**FIGURE 7-1**)**

4. **Slide the peripheral assembly forward until it stops.**

5. **Using a No. 2 Phillips screwdriver, tighten the three screws securing the peripheral assembly to the chassis.**

6. **Connect the following:**
   - Diskette drive data cable
   - Diskette drive power cable
   - Smart card reader power cable

   Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

   ---

7. **If you removed any PCI cards, reinstall them on the riser board.**

   See Section 8.4.2, "Replacing a PCI Card" on page 8-11.

8. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

7.2   Smart Card Reader

To remove and replace the smart card reader, proceed as follows.

7.2.1   Removing the Smart Card Reader

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

   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.

2. **If any long PCI cards are installed, remove them from the riser board connectors.**

   See Section 8.4.1, "Removing a PCI Card" on page 8-10.

3. **If there is a smart card in the reader, remove the smart card.**

4. **Disconnect the following:**
   - Smart card reader cable (FIGURE 6-6)
   - Diskette drive data cable (FIGURE 6-2)
   - Diskette drive power cable (FIGURE 6-3)

5. **Using a No. 2 Phillips screwdriver, loosen (but do not remove) the three screws securing the peripheral assembly to the chassis (**FIGURE 7-1**).**

   Note – Do not remove the three screws securing the peripheral assembly to the chassis.

6. **Slide the peripheral assembly to the rear of the chassis and lift it from the chassis.**

7. **Using a No. 2 Phillips screwdriver, remove the three screws securing the smart card reader to the peripheral assembly (**FIGURE 7-3**).**
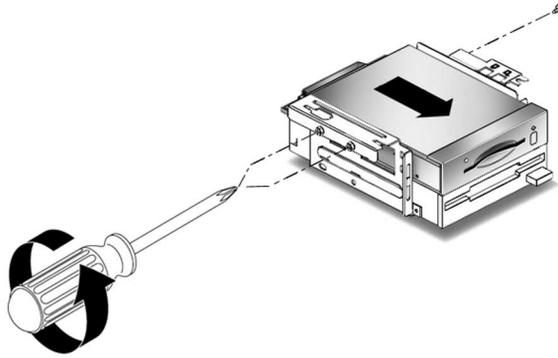
FIGURE 7-3   Removing and Replacing the Smart Card Reader

8. **Remove the smart card reader from the peripheral assembly.**

7.2.2   Replacing the Smart Card Reader

1. **Slide the smart card reader into the peripheral assembly.**

2. **Using a No. 2 Phillips screwdriver, replace the three screws securing the smart card reader to the peripheral assembly (**FIGURE 7-3**).**

3. **Position the peripheral assembly into the chassis, aligning the three holes on the assembly with the three screws on the chassis (**FIGURE 7-1**).**

4. **Slide the assembly forward until it stops.**

5. **Using a No. 2 Phillips screwdriver, tighten the three screws securing the peripheral assembly to the chassis.**

6. **Connect the following:**
   - Diskette drive data cable
   - Diskette drive power cable
   - Smart card reader cable

Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

---

7. **If you removed any PCI cards, reinstall them on the riser board.**

   See Section 8.4.2, "Replacing a PCI Card" on page 8-11.

8. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

7.3 Hard Drives

To remove and replace a primary (master) hard drive, proceed as follows.

7.3.1 Removing a Primary Hard Drive

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

⚠

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.

2. **Lift the spring-loaded latch upward to release the hard drive tray from the chassis (**FIGURE 7-4**).**

3. **Pull the hard drive tray ejection lever away from the chassis.**

4. **Disconnect the hard drive IDE cable and the power cable connectors from both hard drives (if two drives are installed).**

   Move the cables out of the way (FIGURE 7-4).

5. **Slide the hard drive tray out of the chassis.**

6. **Turn the hard drive tray over and place it on an antistatic mat.**

7. **Using a No. 2 Phillips screwdriver, remove the four screws securing the hard drive to the hard drive tray.**

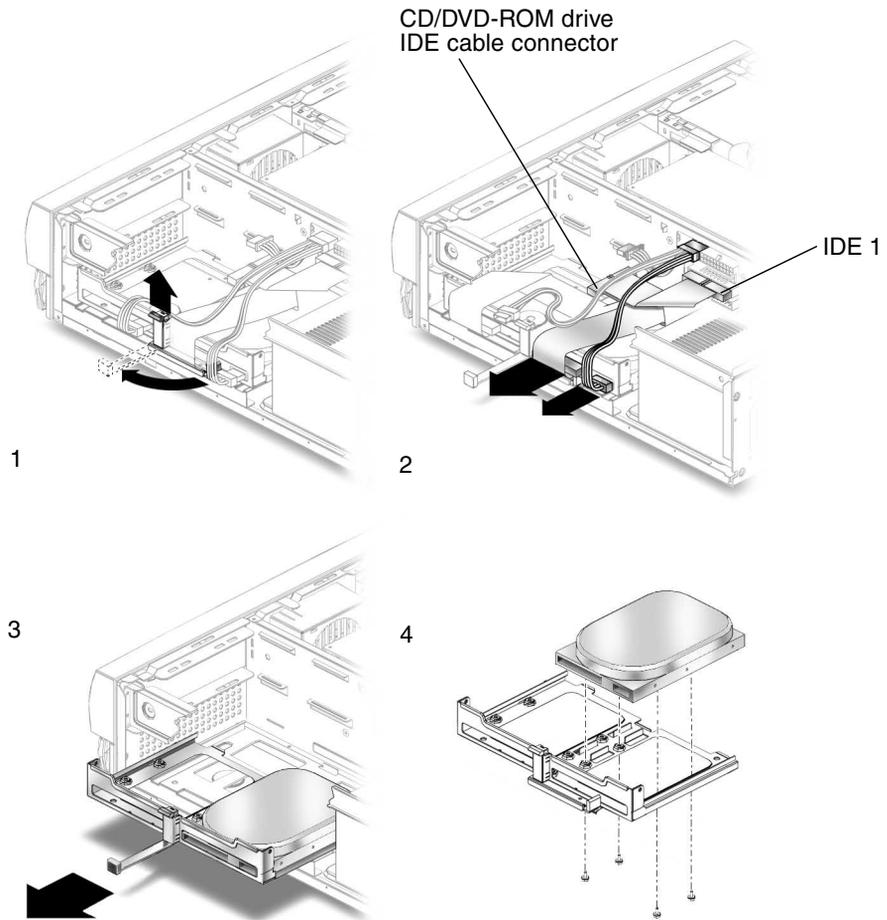8. **Lift the hard drive tray from the hard drive.**

**CD/DVD-ROM drive
IDE cable connector**

IDE 1

1

2

3

4

FIGURE 7-4 Removing and Replacing a Primary Hard Drive

7.3.2 Replacing a Primary Hard Drive

Note – Read the hard drive product guide for information about jumpers, switch settings, or other installation tasks.

Note – Before you replace any hard drive, verify that the hard drive mode-select jumper is set to "CS," "Enable Cable Select," or "Cable Select."

1. Position the hard drive into the hard drive tray (FIGURE 7-4**).**

2. **Turn the tray upside down on an antistatic mat.**

3. **Using a No. 2 Phillips screwdriver, replace the four screws securing the hard drive to the hard drive tray.**

4. **Position the hard drive tray into the chassis.**

5. **While ensuring that the cables are not damaged, slide the hard drive tray into the chassis until the spring-loaded latch clicks into place.**

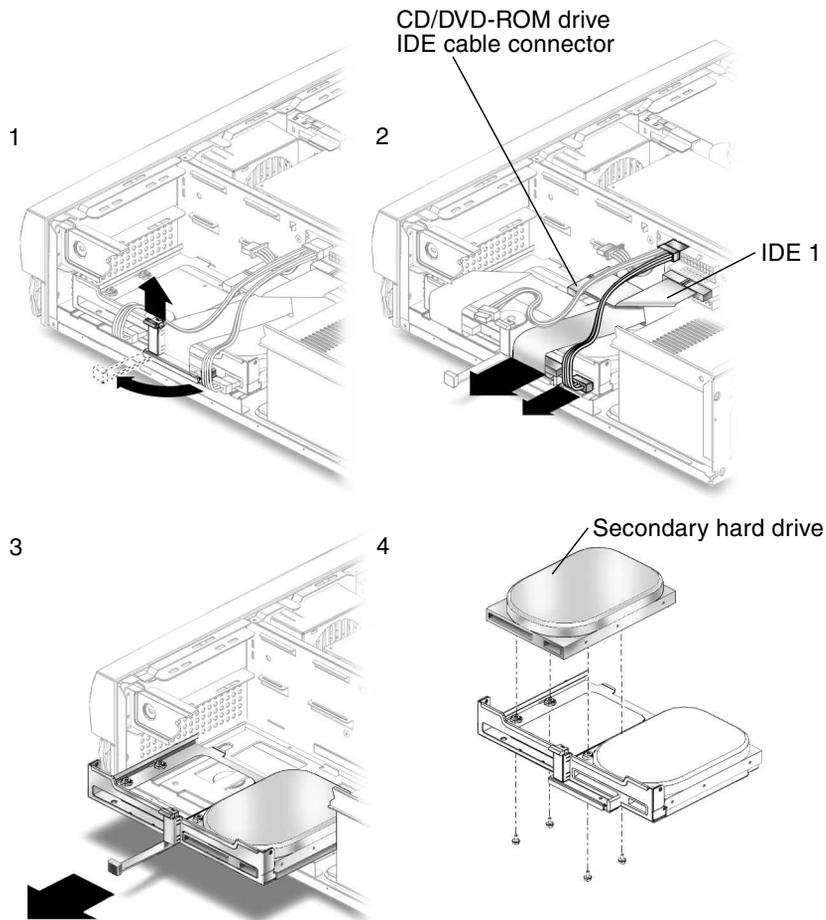6. **Connect the hard drive IDE cable connector labeled "Primary HDD" to the primary hard drive.**

Note – Ensure that the cables are properly oriented by aligning the connector keys.

7. **Connect the power cable to the hard drive.**

⚠ **Caution –** Ensure that the cables will not be damaged when you replace the system cover.

8. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

7.3.3 Installing a Secondary Hard Drive

The optional secondary hard drive mounts next to the primary hard drive on the hard drive tray (FIGURE 7-5). The secondary IDE cable assembly is used with the secondary hard drive. Use the following procedure to install the optional secondary hard drive.

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

⚠ **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.

2. **Lift the spring-loaded latch upward to release the hard drive tray from the chassis (**FIGURE 7-5**).**

3. **Pull the hard drive tray ejection lever away from the chassis.**

4. **Disconnect the existing hard drive IDE and power cables from the primary hard drive.**

5. **Slide the hard drive tray out of the chassis.**

6. **Place the new secondary hard drive onto the hard drive tray.**

7. **Turn the tray upside down on an antistatic mat.**

> **Note –** Before installing the hard drive into the system, verify that the drive's back-panel mode-select jumper is set to "CS," "Enable Cable Select," or "Cable Select."

8. **Using a No. 2 Phillips screwdriver, install the four screws that secure the drive to the hard drive tray.**

9. **While ensuring that the cables are not damaged, slide the hard drive tray into the chassis until the spring-loaded latch clicks into place.**

CD/DVD-ROM drive
IDE cable connector

IDE 1

Secondary hard drive

FIGURE 7-5   Installing a Secondary Hard Drive

10. **Verify that the secondary IDE cable connector is connected to riser board connector IDE2 (J503). See** FIGURE 7-6.

Note – Ensure that the cables are properly oriented by aligning the connector keys.

11. **Verify that the CD-ROM or DVD-ROM cable is connected to the primary (IDE1) cable connector labeled CD/DVD (**FIGURE 7-5**).**

12. **Connect the hard drive IDE cable connector labeled Primary HDD to the primary hard drive.**

13. **Connect the power cable to the secondary hard drive (**FIGURE 7-6**).**

14. **Connect the power cable to the primary hard drive.**

15. **Connect the secondary hard drive to the cable connector labeled Secondary HDD.**

    The following diagram shows the cabling for the secondary hard drive.
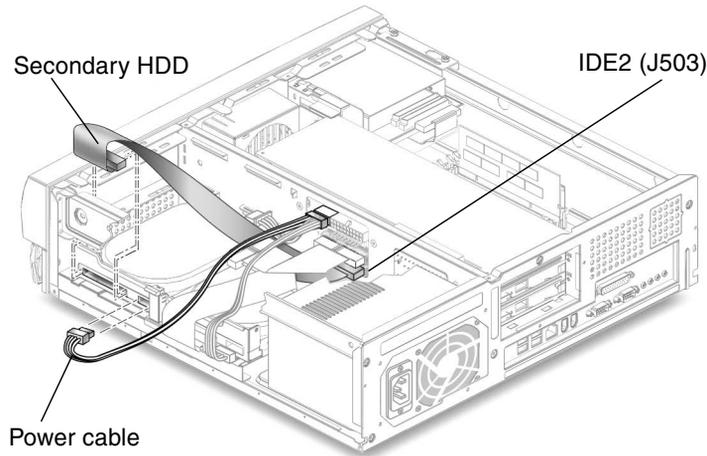
Secondary HDD

IDE2 (J503)

Power cable

FIGURE 7-6   Secondary Hard Drive Cabling Configuration

⚠️ **Caution –** Ensure that the cables will not be damaged when you replace the system cover.

16. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

7.4   CD-ROM or DVD-ROM Drive

To remove and replace a CD-ROM drive, proceed as follows.

7.4.1   Removing a CD-ROM or DVD-ROM Drive

1. **Remove any CD or DVD from the drive.**

2. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

<table>
<tr><td>

⚠️

</td><td>

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.

</td></tr>
</table>

3. **Remove the following from the back of the CD-ROM or DVD-ROM drive (**FIGURE 7-7**):**

   ■ CD-ROM or DVD-ROM drive IDE cable connector
   ■ Power cable connector

4. **Using a No. 2 Phillips screwdriver, remove the two screws securing the CD-ROM or DVD-ROM drive to the chassis.**

5. **Place your fingers on the back of the CD-ROM or DVD-ROM drive. Push the CD-ROM or DVD-ROM drive toward the chassis front and remove it.**

6. **Place the CD-ROM or DVD-ROM drive on an antistatic mat.**
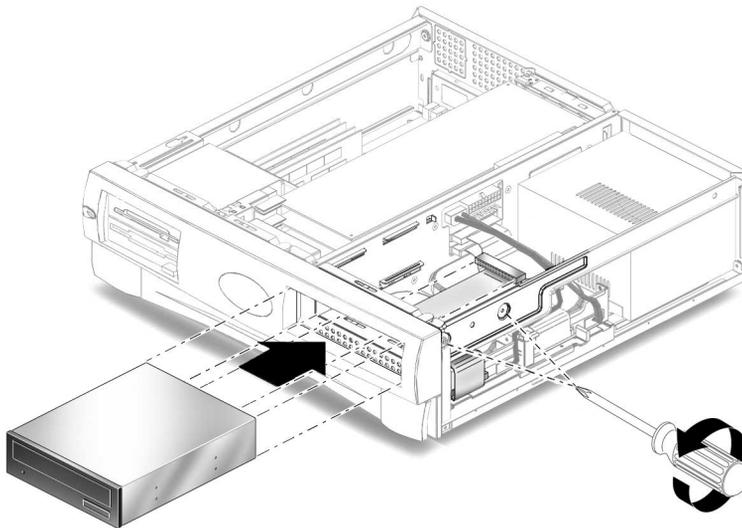
FIGURE 7-7   Removing and Replacing a CD-ROM or DVD-ROM Drive

7.4.2   Replacing a CD-ROM or DVD-ROM Drive

Note – Before you replace the CD-ROM or DVD-ROM drive, verify that the drive back panel mode-select jumper is set to "CS," "Enable Cable Select," or "Cable Select."

1. **Position the CD-ROM or DVD-ROM drive in the chassis (**<small>FIGURE 7-7</small>**).**

2. **Push the CD-ROM or DVD-ROM drive toward the chassis rear.**

3. **Connect the following to the rear of the CD-ROM or DVD-ROM drive:**
   - CD-ROM or DVD-ROM drive cable connector
   - Power cable connector

   Note – Ensure that the cable assembly connectors are properly oriented by aligning the connector keys.

   ---

4. **Using a No. 2 Phillips screwdriver, replace the two screws securing the CD-ROM or DVD-ROM drive to the chassis.**

5. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

Removing and Replacing the Motherboard and Related Components

This chapter describes how to remove and replace the Sun Blade 150 motherboard and motherboard components.

This chapter contains the following topics:

8.1 CPU

To remove and replace the CPU, proceed as follows.

8.1.1 Removing the CPU

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

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.

2. **If necessary, remove any installed PCI cards to provide space to work.**

   See Section 8.4.1, "Removing a PCI Card" on page 8-10.

Caution – The CPU will be damaged if you replace it incorrectly. Before you remove the CPU, look at the CPU and observe where the diagonally cut corner ("key") of the CPU fits onto the socket. Viewed from the front of the system chassis, the key is at the left rear corner of CPU (FIGURE 8-1)**.**

3. **Disconnect the fan power connector at J-22 on the motherboard (**FIGURE 8-1**).**

4. **Press the tab on the front of the heatsink retaining clip.**

5. **Release the tab on the back of the heatsink retaining clip.**

6. **Gently remove the heat sink and fan from the CPU.**

7. **Gently remove the EMI grounding ring.**

   The grounding ring connects to the motherboard with four inserts or "legs".

8. **Lift the CPU locking lever to free the CPU from the socket.**

Caution – Be sure that you lift the locking lever all the way back until it is vertical. The CPU could be damaged if the lever is not fully released.
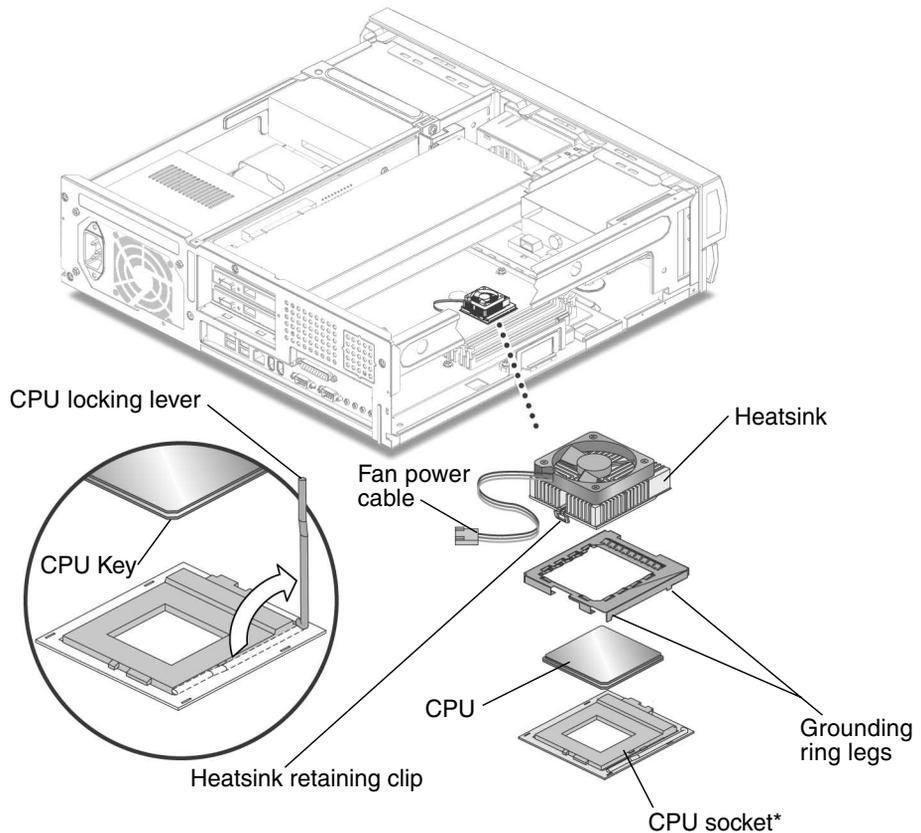
Caution – The CPU socket is permanently attached to the motherboard: do not attempt to lift the socket off the motherboard.

9. **Gently lift the CPU from the socket.**

   If the CPU does not lift off easily, ensure that the locking lever is fully released.

10. **Place the CPU on an antistatic mat with the pins facing up.**

*The CPU socket is permanently attached to the motherboard

FIGURE 8-1   Removing and Replacing the CPU

8.1.2   Replacing the CPU

1. Position the CPU over the motherboard CPU socket (FIGURE 8-1**).**

⚠ **Caution –** The CPU will be damaged if you replace it incorrectly. Ensure that the CPU key is correctly positioned before you attempt to press the CPU into the socket. Viewed from the front of the system chassis, the key is at the left rear corner of CPU. The key is the diagonal corner cut on the CPU (FIGURE 8-1)**.**

2. Ensure that the CPU locking lever is in the full upright position as shown in FIGURE 8-1**.**

3. **Gently place the CPU onto the socket and ensure that the pins are correctly aligned.**

4. **Push the CPU locking lever down to lock the CPU in place.**

⚠️ **Caution –** The grounding ring is precisely formed to fit the CPU. If you bend the grounding ring, it may not properly ground the EMI. Additionally, a bent grounding ring can interfere with CPU cooling. Be sure to position the grounding ring correctly. See FIGURE 8-1.

5. **Gently place the EMI grounding ring over the CPU.**

   Ensure that the grounding ring seats correctly on the CPU.

6. **Gently press the grounding ring legs into the motherboard**

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

8. **Attach the heatsink retaining clip:**

   a. **Press the back of the heatsink retaining clip over the plastic tabs on the back of the CPU socket.**

   b. **Press front of the clip over the front plastic tab on the CPU socket.**

9. **Reconnect the fan power connector at J-22 on the motherboard (**FIGURE 8-1**).**

Note – Read the documentation that is provided with the new CPU to determine the correct jumper settings.

10. **Verify that the motherboard CPU mode detect jumper, JP3, is set correctly.**

Note – A jumper switch is *closed* (sometimes referred to as shorted) with the plastic cap inserted over two pins of the jumper. A jumper is *open* with the plastic cap inserted over one, or none of the jumper pins.

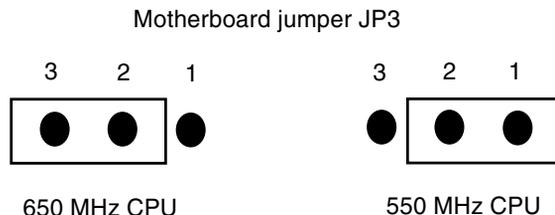FIGURE 8-2 shows the jumper settings for the 650 MHz and 550 MHz CPUs.

Motherboard jumper JP3

```
    3    2    1           3    2    1

   ●    ●   ●           ●   ●    ●

  650 MHz CPU           550 MHz CPU
```

FIGURE 8-2 JP3 OpenBoot PROM Jumper Settings for 650 MHz and 550 MHz CPUs

Caution – Be sure that you set the jumpers correctly before powering-on the system. A 550 MHz CPU can not operate if the jumpers are set for 650 MHz. A 650 MHz CPU will operate at 550 MHz if the jumpers are set for 550 MHz.

11. **If you removed any PCI cards, replace them.**

    See Section 8.4.2, "Replacing a PCI Card" on page 8-11.

12. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

8.2 NVRAM/TOD

To remove and replace the NVRAM/TOD, proceed as follows.

8.2.1 Removing the NVRAM/TOD

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

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.

2. **Remove any PCI cards installed in PCI slots 1 and 3.**

    See Section 8.4.1, "Removing a PCI Card" on page 8-10.

3. **Locate the NVRAM/TOD and carrier on the motherboard (**FIGURE 8-3**).**

Caution – Do not remove the NVRAM/TOD from the carrier.

4. **Grasp the NVRAM/TOD carrier at each end and pull it straight up, gently wiggling it as necessary.**

5. **Place the NVRAM/TOD and carrier on an antistatic mat.**
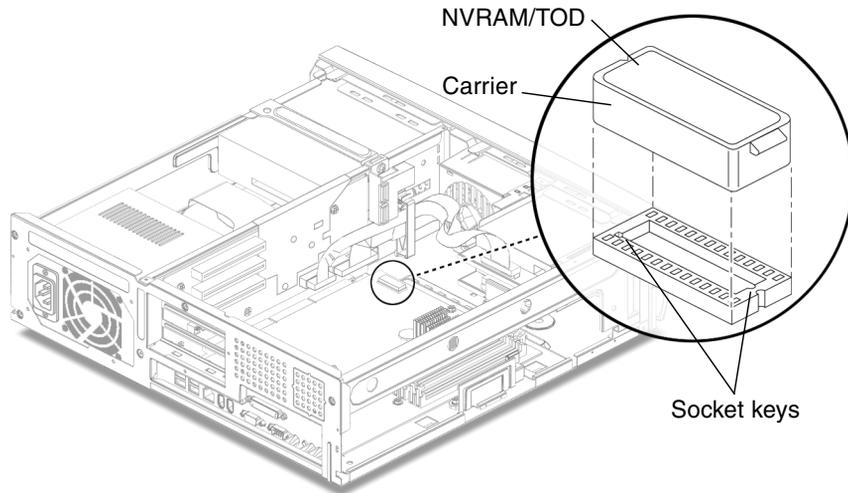
FIGURE 8-3   Removing and Replacing the NVRAM/TOD

8.2.2　Replacing the NVRAM/TOD

1. **Replace the NVRAM/TOD as follows (**FIGURE 8-3**):**

   a. **Position the NVRAM/TOD carrier on the motherboard.**

   For another view of the NVRAM/TOD, see FIGURE C-2 in Appendix C.

   b. **Carefully insert the NVRAM/TOD carrier into the motherboard socket.**

   Note – The carrier is keyed so that the NVRAM/TOD can be installed only one way.

   ---

   c. **Push the NVRAM/TOD carrier into the socket until it is properly seated.**

2. **Replace any PCI card(s) removed from slots 1 and 3.**

   See Section 8.4.2, "Replacing a PCI Card" on page 8-11.

3. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

8.3   DIMMs

⚠ **Caution –** For maximum performance, the DIMMs in this system have been specifically designed for it. Do not use DIMMs from a different system to upgrade or replace the DIMMs in this system. Verify with your Sun sales or service representative that the DIMMs you order have been Sun-certified for this system.

A failed DIMM can be identified by the address displayed in a memory failure error message, or in POST. To identify a failed DIMM, see TABLE 4-2.

⚠ **Caution –** DIMMs consist of electronic components that are extremely sensitive to static electricity. Ordinary amounts of static electricity from clothing or work environment can destroy the DIMM.

8.3.1   Removing a DIMM

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

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

⚠ **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.

Note – Always remove and replace DIMMs in order, beginning with the DIMM closest to the edge of the motherboard. See the *physical connectors* shown in (FIGURE 8-4).
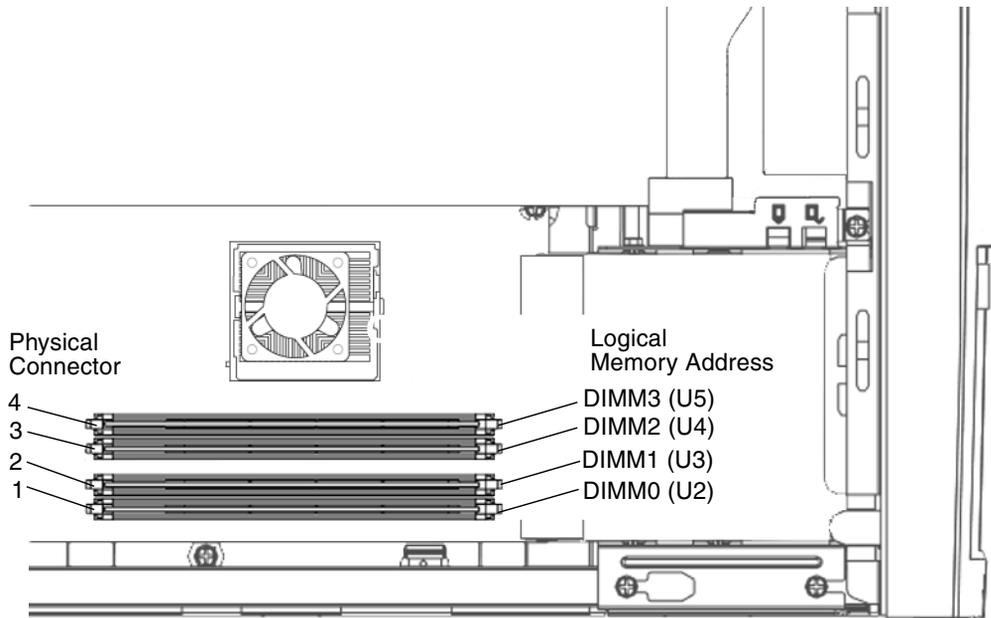
FIGURE 8-4 DIMM Installation Order

2. Locate the DIMM to be removed.

3. Push the ejection levers at each end of the DIMM connector away from the DIMM (FIGURE 8-5**).**

4. Lift the DIMM straight up from the motherboard connector.

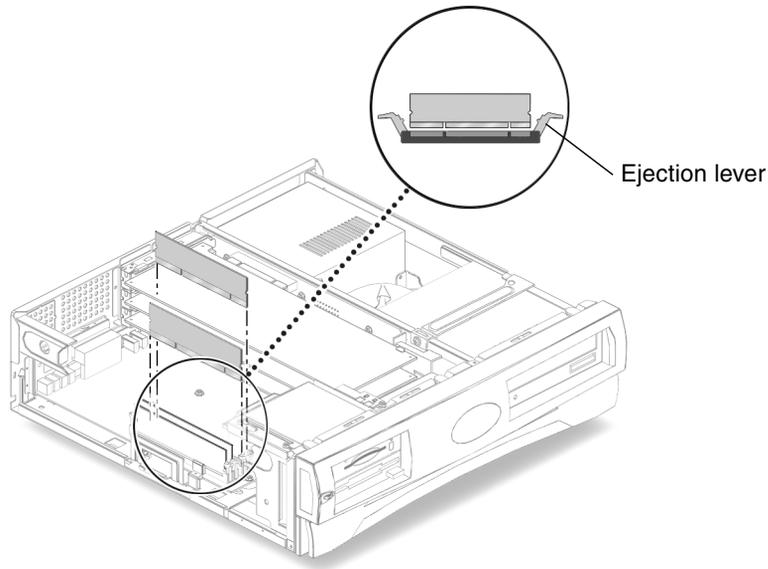**5. Place the DIMM on an antistatic mat.**

Ejection lever

FIGURE 8-5   Removing and Replacing a DIMM

8.3.2   Replacing a DIMM

⚠ **Caution –** Do not remove any DIMM from the antistatic container until you are ready to install it on the motherboard. Handle DIMMs only by their edges. Do not touch DIMM components or metal parts. Always wear an antistatic wrist strap when handling DIMMs.

Note – Always remove and replace DIMMs in order, beginning with the DIMM closest to the edge of the motherboard (FIGURE 8-4). The system will not function properly with only three installed DIMMS. You must install either one DIMM, two DIMMs, or four DIMMs.

1. **Remove the DIMM from the antistatic container.**

2. **Position the DIMM in the connector, ensuring that the notches on the bottom of the DIMM are aligned with the connector alignment keys (**FIGURE 8-5**).**

Note – DIMM alignment notches and connectors are keyed to ensure proper DIMM orientation.

Caution – If the DIMM is not seated into its slot evenly, it can cause electrical short circuits that will damage the system. Ensure that all contacts engage at the same time by pressing evenly on both ends of the DIMM—do not rock the DIMM into place. When the DIMM is properly seated, you should hear a click.

3. **Press firmly on the top ends of the DIMM at the same time until the DIMM is properly seated.**

4. **Verify that the ejection levers are closed toward the DIMM.**

5. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

8.4 PCI Card

To remove and replace a PCI card, proceed as follows.

8.4.1 Removing a PCI Card

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

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.

2. **Disconnect all external cables from the PCI card (**FIGURE 8-6**).**

3. **Using a No. 2 Phillips screwdriver, remove the screw securing the PCI card bracket retainer to the chassis.**

4. **Remove the PCI bracket retainer from the system.**

5. **If you are removing a long PCI card, slide back the retractable card guide to release the card.**

Caution – To avoid damaging the card's connector, do not apply force to only one end or one side of the card.

6. **Grasp the two corners of the PCI card and pull the card straight out from the riser board connector.**

7. **Place the PCI card on an antistatic mat.**
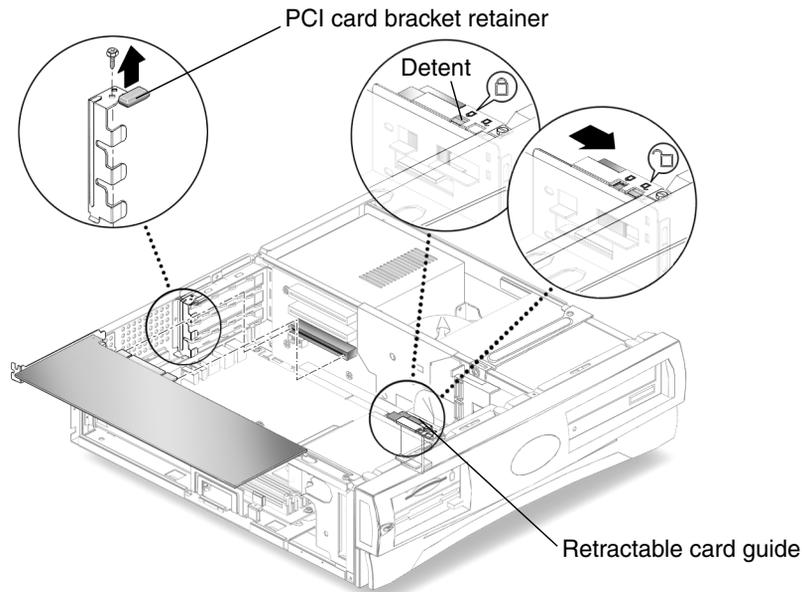
FIGURE 8-6   Removing and Replacing a PCI Card

8.4.2   Replacing a PCI Card

Note – Read the PCI card product guide for information about jumper or switch settings, slot requirements, and required tools.

Note – Maximum power consumption for all three PCI connectors is 50 watts. Do not install a combination of PCI cards and/or graphic accelerators that exceed a power consumption of 50 watts.

1. **Ensure that there is no back plate in the PCI slot that you intend to use.**

2. **Position the PCI card into the chassis (**FIGURE 8-6**).**

3. **Insert the PCI card connector so that it touches the associated riser board connector.**

4. **Guide the PCI card bracket tab into the back panel slot of the chassis: ensure that the card bracket tab fits under the retaining tab on the back of the chassis.**

5. **At the two corners of the card, push the card into the riser board connector until the card is fully seated.**

6. **If you are installing a long PCI card, depress the detent and slide the retractable card guide forward to secure the rear of the PCI card.**

7. **Position the PCI card bracket retainer onto the chassis.**

8. **Using a No. 2 Phillips screwdriver, replace the screw securing the PCI card bracket retainer to the system chassis.**

9. **Connect all external cables to the PCI card.**

10. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

8.5   Motherboard

To remove and replace a motherboard, proceed as follows.

⚠ **Caution –** Use an antistatic mat when working with the motherboard. An antistatic mat contains the cushioning needed to protect the underside components, to prevent motherboard flexing, and to provide antistatic protection.

8.5.1   Removing the Motherboard

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

⚠ **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.

2. **Pull the motherboard ejection lever away from the chassis to release the motherboard from the riser board connector (**FIGURE 8-7**).**

3. **Slide the motherboard out of the chassis.**

4. **Place the motherboard on an antistatic mat.**

5. **Remove the following from the motherboard:**

   ■ CPU module

   See Section 8.1.1, "Removing the CPU" on page 8-1.

   ■ NVRAM/TOD with carrier

   See Section 8.2.1, "Removing the NVRAM/TOD" on page 8-5.

   ■ DIMMs

   See Section 8.3.1, "Removing a DIMM" on page 8-7.

Note – The NVRAM/TOD contains the system host identification (ID) and Ethernet address. If the same ID and Ethernet address will be used on the replacement motherboard, remove the NVRAM/TOD carrier from the motherboard and install it on the new motherboard. See Section 8.2.2, "Replacing the NVRAM/TOD" on page 8-6.
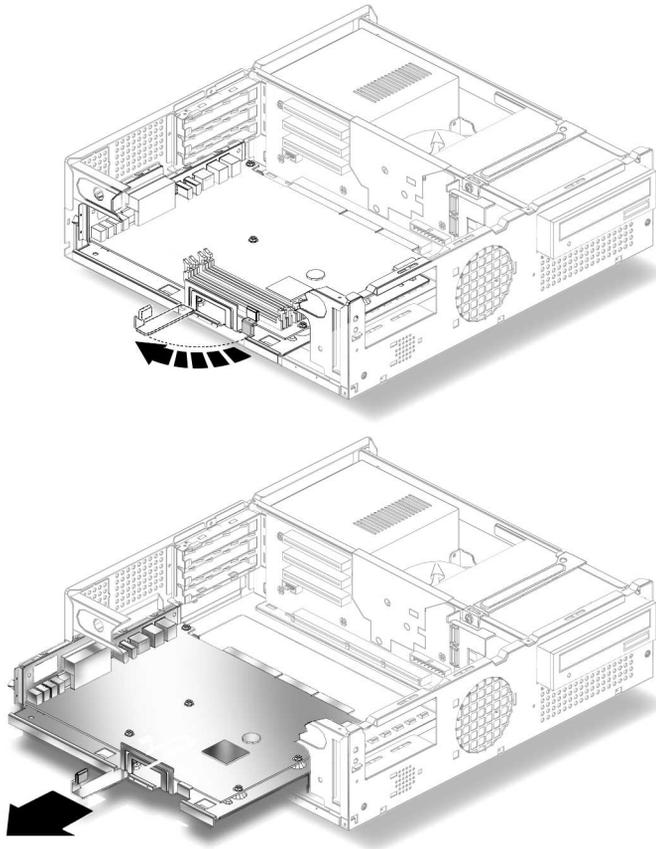
FIGURE 8-7   Removing and Replacing the Motherboard

8.5.2   Replacing the Motherboard

Replace the motherboard as follows (FIGURE 8-7).

> **Caution –** Handle the motherboard by the back panel or the edges only.

> **Note –** If you will re-install the same motherboard you do not need to change the CPU speed setting jumpers or the Flash PROM jumpers.

1. **Using needle-nosed pliers, set the Flash PROM Jumpers, JP1 and JP2.**

   Flash PROM jumpers JP1 and JP2 are used for reprogramming specific code blocks and remote programming of the flash PROM. FIGURE 8-8 illustrates the default JP1/JP2 jumper settings for the flash PROM. TABLE 8-1 identifies the flash PROM jumper settings. The default shunt settings of jumpers JP1 and JP2 are 1-2. Placing the shunt on pins 2 and 3 enables the flash PROM for reprogramming.
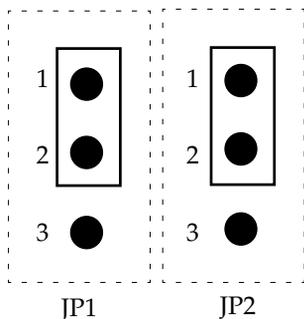
FIGURE 8-8   JP1/JP2 Jumper Settings for the Flash PROM

TABLE 8-1   Flash PROM Jumper Settings

Jumper	Pins 1-2 Select	Pins 2-3 Select	Default Jumper on Pins
JP1	To onboard PROM (default)	To ROMBO	1-2
JP2	Disable	Enable	1-2

2. **Replace the DIMMs.**

   See Section 8.3.2, "Replacing a DIMM" on page 8-9.

3. **Replace the NVRAM/TOD with carrier.**

   See Section 8.2.2, "Replacing the NVRAM/TOD" on page 8-6.

4. **If you removed the CPU or will install a new CPU, see Section 8.1.2, "Replacing the CPU" on page 8-3.**

5. **Carefully slide the motherboard tray into the chassis.**

6. **Position the motherboard connector against the riser board connector and ensure that the connector keys are properly aligned.**

   a. **Push the motherboard ejection lever toward the chassis to lock the motherboard into the riser board connector.**

b. Verify that the motherboard is firmly locked into the riser board by gently pressing the motherboard tray into the riser board connector.

7. **Replace the PCI card(s).**

   See Section 8.4.2, "Replacing a PCI Card" on page 8-11.

8. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

8.6 Riser Board

To remove and replace the riser board, proceed as follows.

8.6.1 Removing the Riser Board

1. **Power off the system, remove the system cover, and attach an antistatic wrist strap as described in Chapter 5.**

   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.

2. **Remove the PCI card(s) from the riser board.**

   See Section 8.4.1, "Removing a PCI Card" on page 8-10.

3. **Remove all the cables connected to both sides of the riser board.**

4. **Remove the motherboard.**

   See Section 8.5.1, "Removing the Motherboard" on page 8-12.

5. **Using a No. 2 Phillips screwdriver, remove the three screws securing the riser board to the system chassis (**FIGURE 8-9**).**

6. **Remove the riser board from the chassis.**

Screws (3)
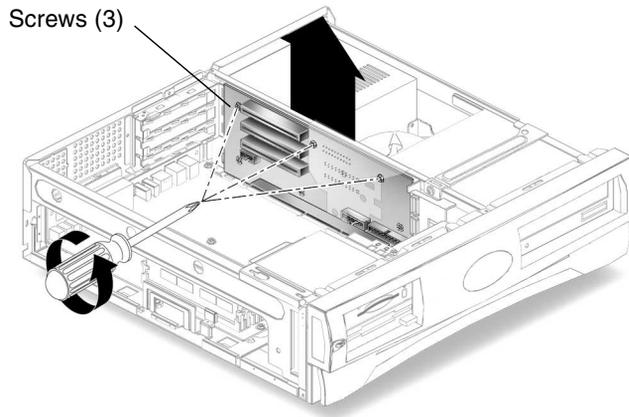
FIGURE 8-9   Removing and Replacing the Riser Board

8.6.2   Replacing the Riser Board

1. **Position the riser board into the chassis (**FIGURE 8-9**).**

   The riser board fits between the staggered tabs on the chassis.

2. **Using a No. 2 Phillips screwdriver, replace the three screws securing the riser board to the system chassis.**

3. **Replace the motherboard.**

   See Section 8.5.2, "Replacing the Motherboard" on page 8-14.

4. **Reconnect all the cables to both sides of the riser board.**

5. **Replace the PCI card(s) into the riser board.**

   See Section 8.4.2, "Replacing a PCI Card" on page 8-11.

6. **Detach the wrist strap, replace the system cover, and power on the system as described in Chapter 9.**

Finishing Component Replacement

This chapter contains the following topics:

- Section 9.1, "Replacing the System Cover" on page 9-1
- Section 9.2, "Powering On the System" on page 9-2

9.1 Replacing the System Cover

1. **Remove the wrist strap from the system chassis and from your wrist.**

2. **Position the system cover onto the system chassis.**

Caution – Ensure that the hard drive cables will not be damaged when you replace the system cover.

3. **Slide the system cover toward the front of the system until the cover tabs lock (**FIGURE 9-1**).**

4. **Using a No. 2 Phillips screwdriver, replace the two screws securing the system cover to the chassis.**
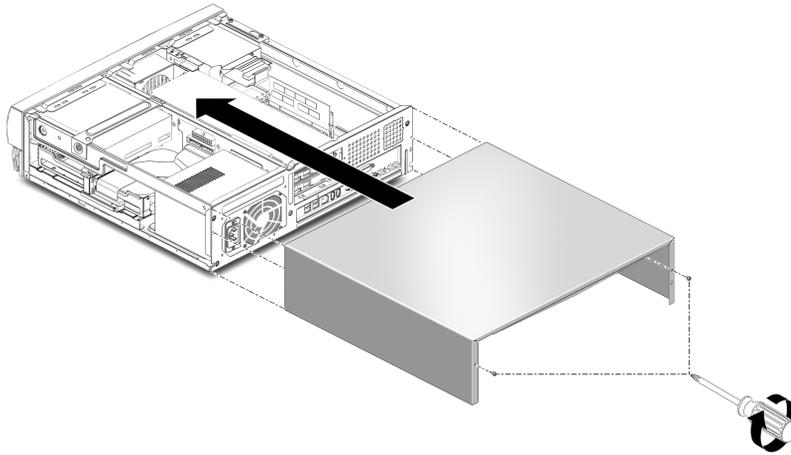
FIGURE 9-1   Replacing the System Cover

9.2 Powering On the System

To power on the system:

1. **Connect the system power cord to the system and to an AC power outlet.**

2. **Reconnect and turn on power to any peripherals (so that the system can recognize the peripherals when it is powered on).**

3. **Press the front panel power switch (**FIGURE 9-2**).**
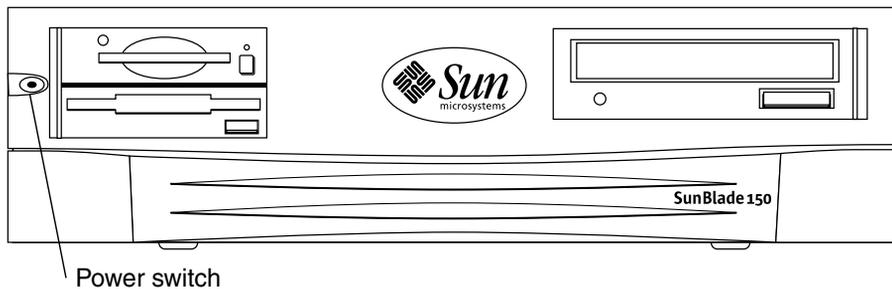
Power switch

FIGURE 9-2   System Power Switch

4. **Verify the following:**

    a. The front panel power indicator LED is on.

    b. The system fans are spinning.

5. If the system does not power on, see the Troubleshooting section in the *Getting Started Guide.*

OpenBoot Emergency Procedures

The introduction of USB keyboards has made it necessary to change the Stop-N, Stop-D, and Stop-F commands. The following sections describe the OpenBoot emergency procedures for systems with standard keyboards and for newer systems with USB keyboards.

10.1 OpenBoot Emergency Procedures for Systems With Standard (Non-USB) Keyboards

When issuing any of these commands, hold down the keys immediately after turning on the power to your system, and keep them pressed for a few seconds until the keyboard LEDs flash.

Command	Description
Stop	Bypass POST. This command does not depend on security-mode. (Note: Some systems bypass POST as a default; in such cases, use Stop-D to start POST).
Stop-A	Abort.
Stop-D	Enter the diagnostic mode (set `diag-switch?` to `true`).
Stop-F	Enter Forth on TTYA instead of probing. Use `fexit` to continue with the initialization sequence. Useful if hardware is broken.
Stop-N	Reset NVRAM contents to default values.

10.2 OpenBoot Emergency Procedures for Systems With USB Keyboards

The following sections describe how to perform the functions of the Stop-commands on systems that have USB keyboards.

10.2.1 Stop-A Functionality

Stop-A (Abort) works the same as it does on systems with standard keyboards, except that it does not work during the first few seconds after the machine is reset.

10.2.2 Stop-N Equivalent Functionality

1. **After turning on the power to your system, wait until the front panel power-indicator LED begins to blink and you hear an audible beep.**

2. **Quickly press the front panel power switch twice (similar to the way you would double-click a mouse).**

   A screen similar to the following is displayed to indicate that you have successfully reset the NVRAM contents to the default values. If a screen similar to the following is not displayed, repeat Steps 1 and 2.

Note – Both POST and OpenBOOT PROM on Sun Blade 150 systems report the CPU as an UltraSPARC IIe processor. The CPU in your system is an UltraSPARC IIi processor.

CODE EXAMPLE 10-1 Resetting Default NVRAM Variables

```
Sun Blade 150 (UltraSPARC-IIe 650MHz), Keyboard Present
Copyright 1998-2002 Sun Microsystems, Inc.  All rights reserved.
OpenBoot 4.6 build_10, 1024 MB memory installed, Serial #51271539.
Ethernet address 0:3:ba:e:57:73, Host ID: 830e5773.

Safe NVRAM mode, the following nvram configuration variables have
been overridden:
        'diag-switch?' is true
```

CODE EXAMPLE 10-1 Resetting Default NVRAM Variables *(Continued)*

```
'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
```

Some NVRAM configuration parameters are reset to their defaults. The defaults include parameters that are more likely to cause problems, such as TTYA settings.

- These NVRAM settings are only reset to their defaults for this power cycle. If you do nothing other than reset the system at this point, the values are not permanently changed.
- Only settings that you change manually at this point become permanent. All other customized NVRAM settings are retained.
- Typing set-defaults discards any customized NVRAM values and permanently restores the default settings for *all* NVRAM configuration parameters.

Note – After the power-indicator LED stops blinking and stays lit, you can press the power switch to power off the system.

For more information, see Section 3.9, "Resetting Variables to Default Settings" on page 3-27.

10.2.3 Stop-F Functionality

The Stop-F functionality is not available in systems with USB keyboards.

10.2.4 Stop-D Functionality

The Stop-D (diags) key sequence is not supported on systems with USB keyboards. However, the Stop-D functionality can be closely emulated by using the power button double-tap (see Section 10.2.2, "Stop-N Equivalent Functionality" on page 10-2), since this temporarily sets `diag-switch?` to `true`. If you want to turn on the diagnostic mode permanently, type:

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

Product Specifications and Reference Information

This appendix provides product specifications for the Sun Blade 150 system.

- Section A.1, "Physical Specifications" on page A-1
- Section A.2, "Electrical Specifications" on page A-2
- Section A.6, "Modem Setup Specifications" on page A-6
- Section A.4, "Environmental Requirements" on page A-3
- Section A.5, "Reference Information" on page A-4

A.1 Physical Specifications

The following table lists the Sun Blade 150 physical specifications.

TABLE A-1   Sun Blade 150 Physical Specifications

Specification	U.S.A.	Metric
Height	4.6 in.	11.8 cm
Width	18.0 in.	44.70 cm
Depth	17.6 in.	44.6 cm
Weight (approximate)	34.2 lb	15.5 kg

A.2 Electrical Specifications

TABLE A-2 lists the electrical specifications for the Sun Blade 150 system.

TABLE A-2   Sun Blade 150 System Electrical Specifications

Input/Output	Regulation	Minimum Current	Maximum Current
AC Input	-	47 to 63 Hz, 90 to 132 VAC or 180 to 264 VAC (5.0 Amps (rms) Maximum)	
DC Output	-	250 Watts (maximum)	
+12 VDC	±5%	0.2	7.7
+5 VDC	+5%, -3%	1.0	16.5
+3.3 VDC	+5%, -3%	0.0	20.7
-12 VDC	±10%	0.0	0.6
+5 VSB	±5%	0.0	0.1

+5 VSB is a standby voltage that is always present when AC line voltage is present.

A.3 Acoustic Specifications

Table lists the acoustic specifications for the Sun Blade 150 system.

TABLE A-3   Acoustic Specifications

System Status	Acoustic Range
Operating	<42 dba to 55 dba
Idle	<37 dba to 48 dba

A.4 Environmental Requirements

The following table lists environmental requirements for the Sun Blade 150 system.

TABLE A-4   Sun Blade 150 System Environmental Requirements

Environmental	Operating	Nonoperating
Temperature	41 to 95 degrees F (5 to 35 degrees C)	-4 to 140 degrees F (-20 to 60 degrees C)
Humidity	40% to 80% noncondensing at 95 degrees F (35 degrees C)	30% to 90% noncondensing at 140 degrees F (60 degrees C)
Altitude	10,000 ft (3 km)	40,000 ft (12 km)

A.4.1 Clearance Requirements for Proper Cooling

FIGURE A-1 lists clearance requirements for proper cooling of the Sun Blade 150 system.
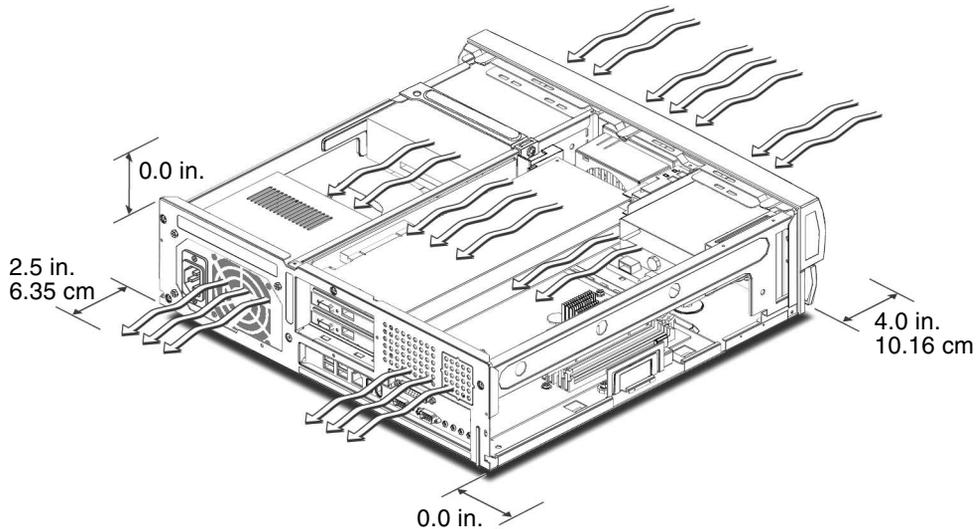
FIGURE A-1   Minimum Clearance for System Cooling

A.5   Reference Information

This section contains the following reference information:

- Section A.5.1, "IDE Cabling Configuration" on page A-4
- Section A.5.2, "CD-ROM and DVD-ROM Jumper Settings" on page A-5
- Section A.5.3, "CD Handling and Use" on page A-5

A.5.1   IDE Cabling Configuration

FIGURE A-2 shows the IDE cabling. The Sun Blade 150 system can support an optional secondary hard drive. An optional cable with two connectors is shipped with the secondary drive and is connected as shown in FIGURE A-2.

```
┌─────────────────────────┐       ┌─────────────────────────────┐
│   Riser board (J503)    │───────│  Optional second hard drive │
│        IDE 2            │       │       (Secondary HDD)       │
└─────────────────────────┘       └─────────────────────────────┘

┌─────────────────────────┐  ┌───────────────────────────┐  ┌─────────────────────────┐
│   Riser board (J504)    │──│ CD-ROM or DVD-ROM drive  │──│   Primary hard drive    │
│        IDE 1            │  │        (CD/DVD)           │  │      (Primary HDD)      │
└─────────────────────────┘  └───────────────────────────┘  └─────────────────────────┘
```
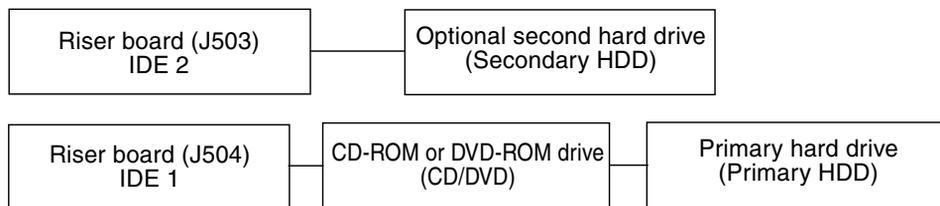
FIGURE A-2   IDE Cabling Configuration

FIGURE 1-4 in Chapter 1 shows the cables separate from the system.

Section 7.3, "Hard Drives" on page 7-6 contains illustrations that illustrates the cables connected to the hard drives.

A.5.2   CD-ROM and DVD-ROM Jumper Settings

Before you install a CD-ROM or DVD-ROM drive or a hard drive in a Sun Blade 150 system, verify that the drive's back panel mode-select jumper is set as follows:

Set the CD-ROM drive jumper (located on the CD-ROM drive back panel) to either "CS," "Enable Cable Select," or "Cable Select."

A.5.3   CD Handling and Use

The following topics are discussed in this section:
- "Inserting a CD Into the CD-ROM or DVD-ROM Drive" on page A-5
- "Ejecting a CD From the CD-ROM or DVD-ROM Drive" on page A-6
- "Cleaning the CD-ROM or DVD-ROM Drive" on page A-6
- "Handling and Storing CDs" on page A-6

A.5.3.1   Inserting a CD Into the CD-ROM or DVD-ROM Drive

1. **After the system is powered on, push the eject button on the CD-ROM or DVD-ROM drive to open the drive tray.**

2. **Place the CD (label side up) into the drive tray.**

   Ensure that the CD is properly set into the recessed area of the drive tray.

A.5.3.2 Ejecting a CD From the CD-ROM or DVD-ROM Drive

To eject a CD, press the eject button on the front of the drive.

It may be necessary to unmount the CD before manually ejecting it. You can also eject the CD by using software commands. Refer to the peripherals handbook that corresponds with your operating environment.

If the motorized eject mechanism does not operate, insert a thin, stiff wire (such as a paper clip) into the hole next to the eject button to manually eject the CD.

A.5.3.3 Cleaning the CD-ROM or DVD-ROM Drive

If the CD-ROM or DVD-ROM drive cannot read a CD, the cause might be a dirty CD. Follow these guidelines to clean a CD:

Caution – Do not use solvents such as benzine, paint thinner, antistatic aerosol spray, or abrasive cleaners to clean CDs.

- Use a professional CD cleaning kit.
- Use a soft, clean, lint-free, dry cloth.
- Clean the unlabeled side of the CD.
- Wipe the CD radially from the center to the outside.

A.5.3.4 Handling and Storing CDs

Follow these guidelines when handling and storing CDs:

- Handle CDs only by their edges; avoid touching CD surfaces.
- Do not write on CDs with permanent marking pens.
- Do not use CDs in high-dust environments.
- Keep CDs out of direct sunlight, away from extreme sources of heat or cold, and away from dust and moisture.
- Make sure CDs are at room temperature before using them.
- Store CDs in storage boxes so that they remain clean and free of dust.

A.6 Modem Setup Specifications

A.6.1 Setting Up the Modem

Any modem that is compatible with CCITT V.24 can be connected to one of the system serial ports.
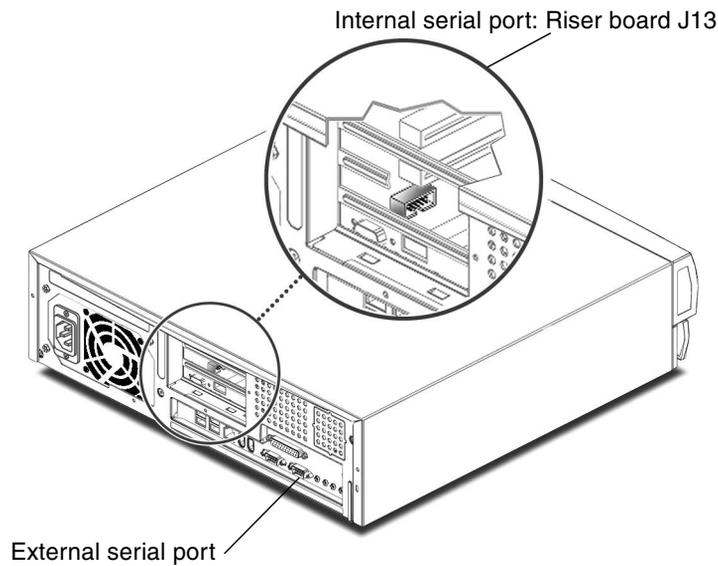
FIGURE A-3 External and Internal Serial Ports

Modems can be set up to function in one of three ways:

- Dial-out only
- Dial-in only
- Bidirectional

To set up a modem:

1. Become superuser and type `admintool`**.**

```
% su
Password:
# admintool
```

2. **In the Admintool window, select Serial Port Manager.**

3. **Choose Edit.**

   The Serial Port Manager Modify Service window is displayed.

4. **Choose the Expert level of detail.**

5. **From the Use Template menu, choose one of the following:**
   - Modem - Dial-out only
   - Modem - Dial-in only
   - Modem - Bidirectional

6. **Choose Apply.**

7. **Set your modem auto-answer switch to one of the following:**
   - Off – Dial-out only
   - On – Dial-in only
   - On – Bidirectional

A.6.2 Changing the Serial Port Speed

To change the speed of a serial port, edit the `/etc/remote` file as follows:

1. **Become superuser and type** `cd /etc`**.**

   ```
   % su
   Password:
   # cd /etc
   ```

2. **Type** `vi remote to open the remote file in a vi text editor`**.**

3. **Type** `tip` *speed device-name***.**

   Typical speeds are 9600, 19200 to 38400 bps.

   The device name is the serial port name—for example, `/dev/tty[a,b]` or
   `/dev/term/[a,b]`.

4. **Press Esc and Shift-colon, then type** `wq` **to save your file change(s) and to exit from
   the** `vi` **text editor.**

A.6.3 Modem Recommendations

A.6.3.1 Cable

For a modem-to-host (system) connection, use an RS-423/RS-232 straight-through cable with DB-25 male connectors at both ends.

A.6.3.2 Modem Switch Settings (AT Commands)

Note – These settings are guidelines only. These guidelines might change depending on site requirements and the chosen modem.

- Enable transmit flow control (AT&H1) [suggested setting]

  Required for sending binary/8-bit data.
- Set link rate to fixed

  Will not track modem data rate, AT&B*n*; *n* = menu choice in modem manual
- Set display result codes (ATQ0)
- Set verbal result codes (ATV1)
- Set result code subset (ATX*n*; *n* = option choice)
- Save settings in NVRAM (AT&W)

For additional information about modem switch settings, see the documentation that came with the modem.

Signal Descriptions

This appendix describes the Sun Blade 150 motherboard connector signals and pin assignments.

B.1 Power Supply Connectors

There are two power supply connectors on the riser board. The Sun Blade 150 riser board uses a standard ATX style connector at (J501) and a connector at J505.
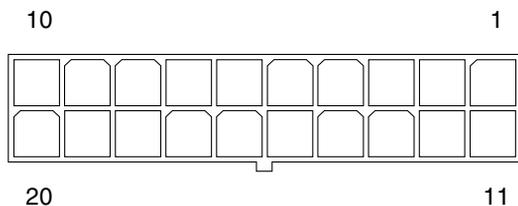
FIGURE B-1   Power Supply Connector J501 Pin Configuration

TABLE B-1   Power Supply Connector J501 Pin Assignments

Pin	Signal	Description
1	+3.3V	+3.3 VDC
2	+3.3V	+3.3 VDC
3	Gnd	Chassis ground
4	+5V	+5 VDC
5	Gnd	Chassis ground
6	+5V	+5 VDC
7	Gnd	Chassis ground
8	PWR_OK	Power okay
9	5VSB	
10	+12V	+12 VDC
11	+3.3V	+3.3 VDC
12	-12V	-12 VDC
13	Gnd	Chassis ground
14	PS_ON	Power supply on
15	Gnd	Chassis ground
16	Gnd	Chassis ground
17	Gnd	Chassis ground

TABLE B-1   Power Supply Connector J501 Pin Assignments *(Continued)*

Pin	Signal	Description
18		Open
19	+5V	+5 VDC
20	+5V	+5 VDC / sense
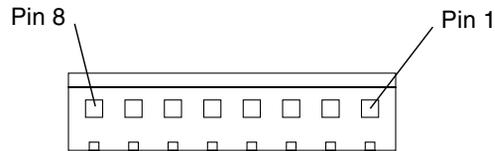
FIGURE B-2   Secondary Power Supply Connector J505 Pin Configuration

TABLE B-2   Power Supply Connector J505 Pin Assignments

Pin	Signal	Description
1	+3.3V	+3.3 VDC
2	+3.3V	+3.3 VDC
3	+3.3V	+3.3 VDC
4	+3.3V	+3.3 VDC
5	Gnd	Chassis ground
6	Gnd	Chassis ground
7	Gnd	Chassis ground
8	+12V	+12 VDC

B.2 Universal Serial Bus Connector

Four universal serial bus (USB) connectors are located on the back panel. Two are used for the Sun USB Type-6 keyboard and the USB mouse.
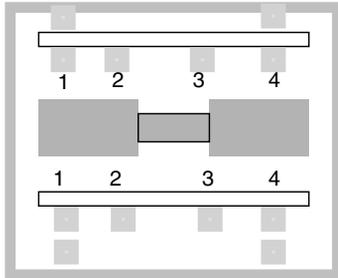
FIGURE B-3   USB Connector J17, J18 Pin Configuration

TABLE B-3   USB Connector J17, J18 Pin Assignments

Pin	Signal Name
A1	USB0_VCC
A2	CM_USB_D0_N
A3	CM_USB_D0_P
A4	Gnd
B1	USB1_VCC
B2	CM_USB_D1_N
B3	CM_USB_D1_P
B4	Gnd

B.3 IEEE 1394 Connector

Two IEEE 1394 connectors are located on the back panel.
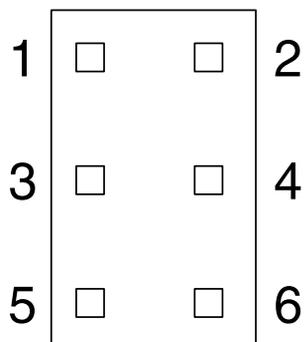
FIGURE B-4   IEEE 1394 Connector J20, J30 Pin Configuration

TABLE B-4   IEEE 1394 Connector J20, J30 Pin Assignments

Pin	Signal Name	Description
1	P1394_EX_BUSPOWER	Bus power
2	Gnd	Ground
3	CM_P1394_TPB1_OUT_N	
4	CM_P1394_TPB1_OUT_P	
5	CM_P1394_TPA1_OUT_N	
6	CM_P1394_TPA1_OUT_P	

B.4 Twisted-Pair Ethernet Connector

The twisted-pair Ethernet (TPE) connector is an RJ-45 type connector located on the back panel.

Caution – Connect only TPE-type cables into the TPE connector.
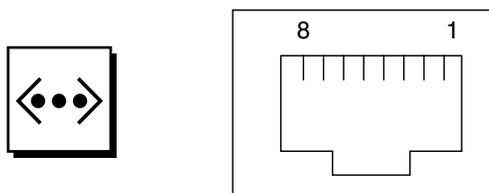
FIGURE B-5 TPE Connector J19 Pin Configuration

TABLE B-5 TPE Connector J19 Pin Assignments

Pin	Signal	Description
1	tpe0	Transmit data +
2	tpe1	Transmit data -
3	tpe2	Receive data +
4	Common mode termination	Termination
5	Common mode termination	Termination
6	tpe3	Receive data -
7	Common mode termination	Termination
8	Common mode termination	Termination

B.4.1 TPE Cable-Type Connectivity

The following types of TPE cables can be connected to the TPE connector:

- For 10BASE-T applications, unshielded twisted-pair (UTP) cable:
  - Category 3 (UTP-3, "voice grade")
  - Category 4 (UTP-4)
  - Category 5 (UTP-5, "data grade")
- For 100BASE-T applications, UTP cable, UTP-5, "data grade"

B.4.2 External UTP-5 Cable Lengths

TABLE B-6   TPE UTP-5 Cables

Cable Type	Application	Maximum Length (Metric)	Maximum Length (US)
UTP-5, "data grade"	10BASE-T or 100BASE-T	100 meters	109 yards

B.5 Serial Port Connector

The serial port connector is a DB-9 type connector located on the back panel. The serial port connector provides asynchronous serial communications.
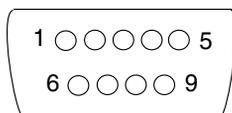
FIGURE B-6 Serial Port Connector J36 Pin Configuration

TABLE B-7 Serial Port Connector J36 Pin Assignments

Pin	Signal	Description
1	CD	Carrier detect
2	RD	Receive data
3	TD	Transmit data
4	DTR	Data terminal ready
5	GND	Ground
6	DSR	Data set ready
7	RTS	Request to send
8	CTS	Clear to send
9	RI	Ring indicator

There is also a second serial port connector at J13 on the riser card (FIGURE B-7). A cable adapter is required. You also need to use a PCI card slot to access the serial port connector on the riser board. FIGURE B-8 shows how you can access the riser card serial port through a PCI card slot.
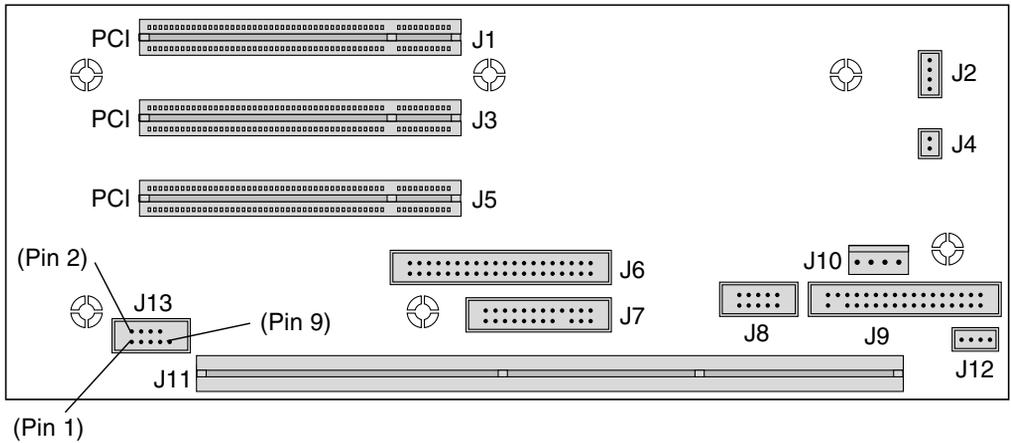
FIGURE B-7   Riser Board Serial Port Pinouts (J13)

TABLE B-8   Riser Board Serial Port Connector J13 Pin Assignments

Pin	Signal	Description
1	DCD	Carrier detect
2	DSR	Data set ready
3	RXD	Receive Data
4	RTS	Request to send
5	TXD	Transmit data
6	CTS	Clear to send
7	DTR	Data terminal ready
8	RI	Ring indicator
9	Gnd	Ground
(10)	-	No Connection

Internal serial port: Riser board J13

External serial port
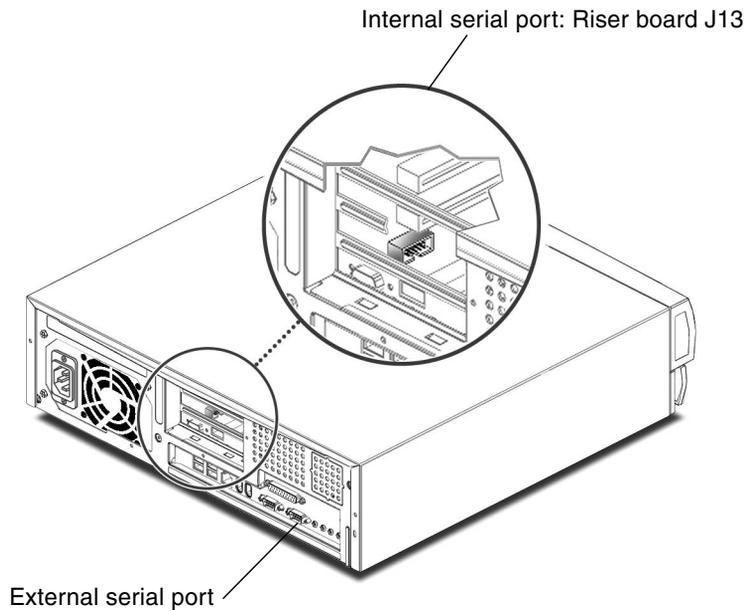
FIGURE B-8   Accessing the Second Serial Port Through a PCI Card Slot

Some third-party cables are too bulky to fit the Sun Blade 150 serial port and video port. The Sun Blade 150 system was shipped with connector extensions to allow for better connections with bulky third-party cables (FIGURE B-9).
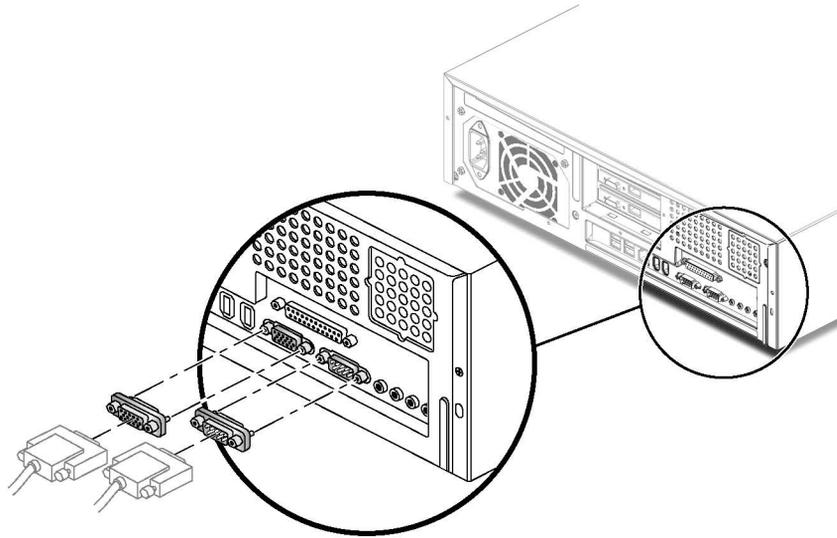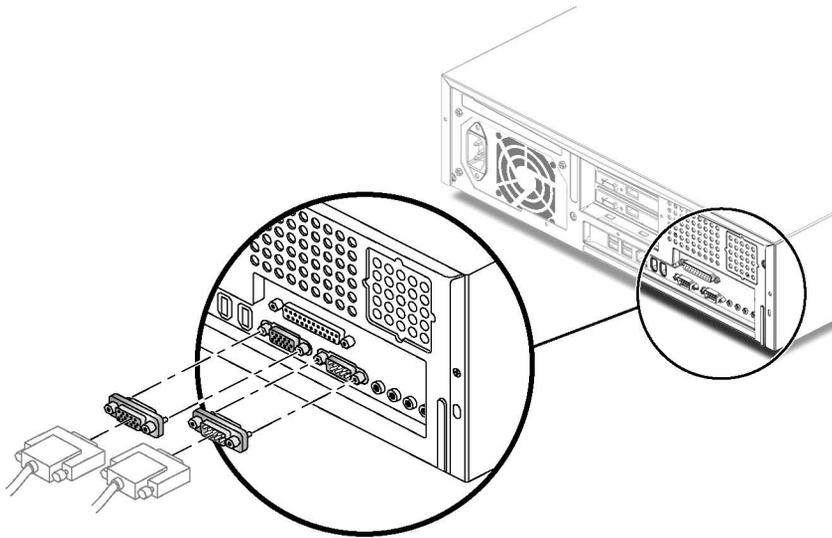
FIGURE B-9 Serial and Video Port Connector Extensions

B.6 Parallel Port Connector

The parallel port connector is a DB-25 type connector located on the back panel.
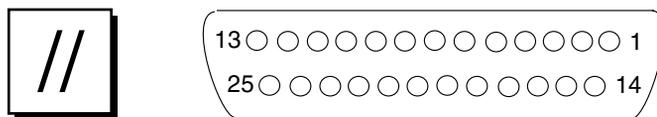
FIGURE B-10 Parallel Port Connector J9 Pin Configuration

TABLE B-9 Parallel Port Connector J9 Pin Assignments

Pin	Signal	Description
1	Data_Strobe_L	Set low during forward channel transfers to latch data into peripheral device. Set high during reverse channel transfers.
2 to 9	Data[0.7]	The main data bus for the parallel port. Data0 is the least-significant bit (LSB). Not used during reverse channel transfers.
10	ACK_L	Driven low by the peripheral device to acknowledge data byte transfer from host during forward channel transfer. Qualifies data being transferred to host in reverse channel transfer.
11	BUSY	Driven high to indicate the peripheral device is not ready to receive data during forward channel transfer. Used to send Data3 and Data7 during reverse channel transfer.
12	PERROR	Driven high by peripheral device to indicate an error in the paper path during forward channel transfer. Used to send Data2 and Data6 during reverse channel transfer.
13	SELECT_L	Indicates the peripheral device is on-line during forward channel transfer. Used to send Data1 and Data5 during reverse channel transfer.
14	AFXN_L	Set low by the host to drive the peripheral into auto-line feed mode during forward channel transfer. During reverse channel transfer, set low to indicate host can receive peripheral device data and then set high to acknowledge receipt of peripheral data.
15	ERROR_L	Set low by the peripheral device to indicate an error during forward channel transfer. In reverse channel transfer, set low to indicate peripheral device has data ready to send to the host. Used to send Data0 and Data4.

TABLE B-9   Parallel Port Connector J9 Pin Assignments *(Continued)*

Pin	Signal	Description
16	INIT_L	Driven low by the host to reset peripheral.
17	PAR_IN_L	Set low by the host to select peripheral device for forward channel transfer. Set high to indicate bus direction is from peripheral to host.
18	Signal ground	Signal ground
19	Signal ground	Signal ground
20	Signal ground	Signal ground
21	Signal ground	Signal ground
22	Signal ground	Signal ground
23	Signal ground	Signal ground
24	Signal ground	Signal ground
25	Signal ground	Signal ground

B.7 Audio Connectors

The audio connectors are located on the back panel. These connectors use EIA standard 0.125-inch (3.5-mm) jacks.

Headphones   Line-out   Line-in   Microphone
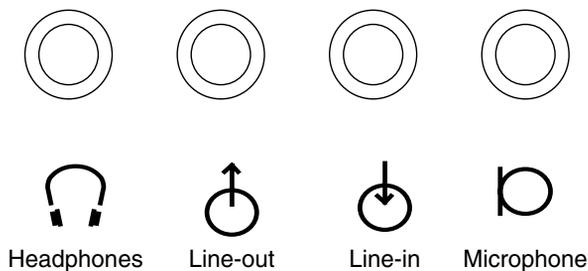
FIGURE B-11 Audio Connector Configuration

TABLE B-10 Audio Connector Line Assignment

Component	Headphones	Line-Out	Line-In	Microphone
Tip	Left channel	Left channel	Left channel	Left channel
Ring (center)	Right channel	Right channel	Right channel	Right channel
Shield	Ground	Ground	Ground	Ground

B.8 Video Connector

The video connector is a 15-pin mini D-sub connector located on the back panel.
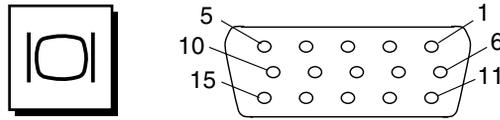
FIGURE B-12 Video Connector J37 Pin Configuration

TABLE B-11 Video Connector J37 Pin Assignments

Pin	Signal	Description
1	Red	Red video signal
2	Green	Green video signal
3	Blue	Blue video signal
4	Gnd	Ground
5	NC	Not connected
6	Gnd	Ground for red video signal
7	Gnd	Ground for green video signal
8	Gnd	Ground for green video signal
9	NC	Not connected
10	Gnd	Ground
11	Gnd	Ground
12	SDA	Bidirectional data
13	Horizontal sync	Horizontal synchronizing signal
14	Vertical sync	Vertical sync clock
15	SCL	Data clock

Some third-party cables are too bulky to fit the Sun Blade 150 serial port and video port. The Sun Blade 150 system was shipped with connector extensions to allow for better connections with bulky third-party cables. See FIGURE B-13.

FIGURE B-13 Serial and Video Port Connector Extensions

Functional Description

This appendix provides a functional description of the Sun Blade 150 system.

C.1   System

The Sun Blade 150 system is an UltraSPARC port architecture-based uniprocessor machine that uses the peripheral component interconnect (PCI) as the I/O bus. The CPU and ATI graphics ASIC communicate with each other using the PCI protocol.

The following figure shows a functional block diagram of the system.
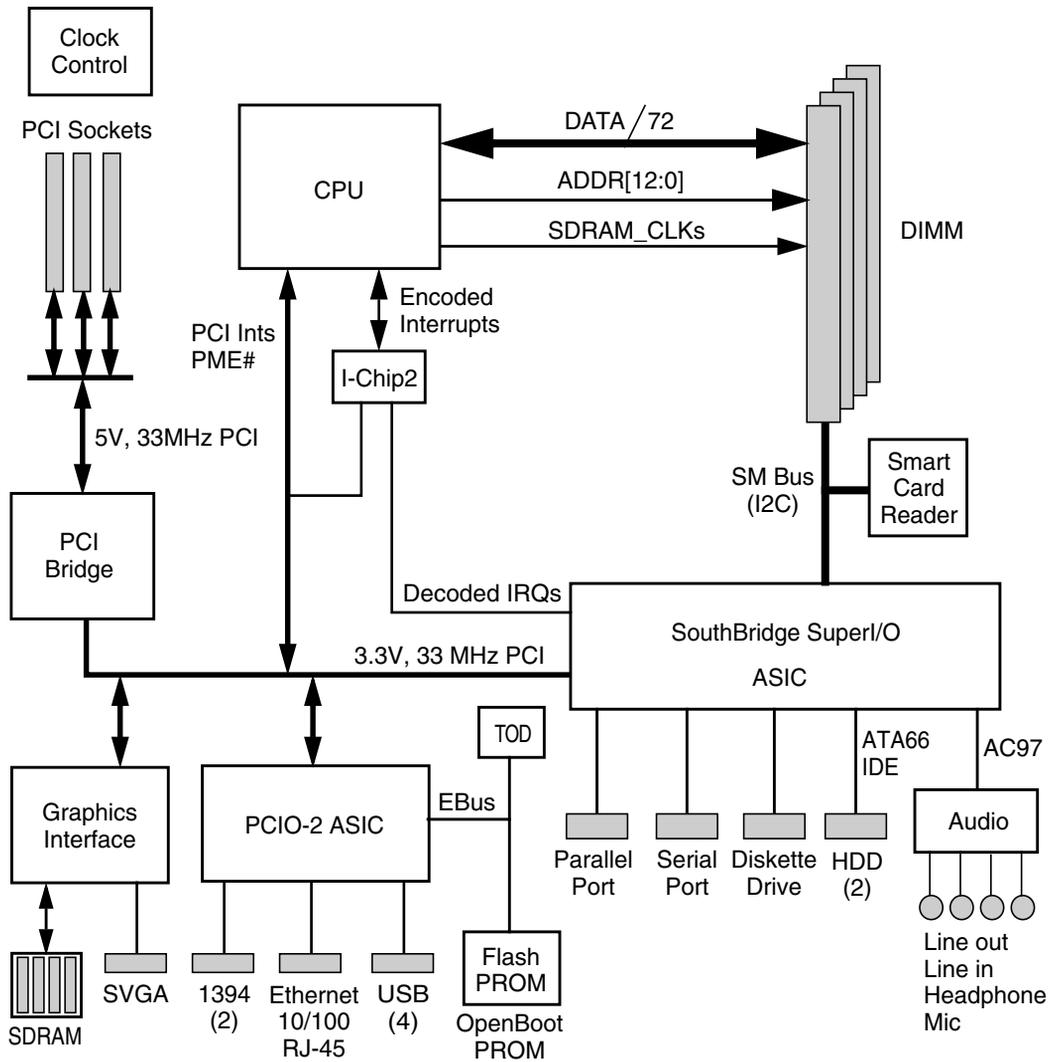
FIGURE C-1 Sun Blade 150 System Functional Block Diagram

C.2 Motherboard

The following figure illustrates a layout diagram of the system motherboard.
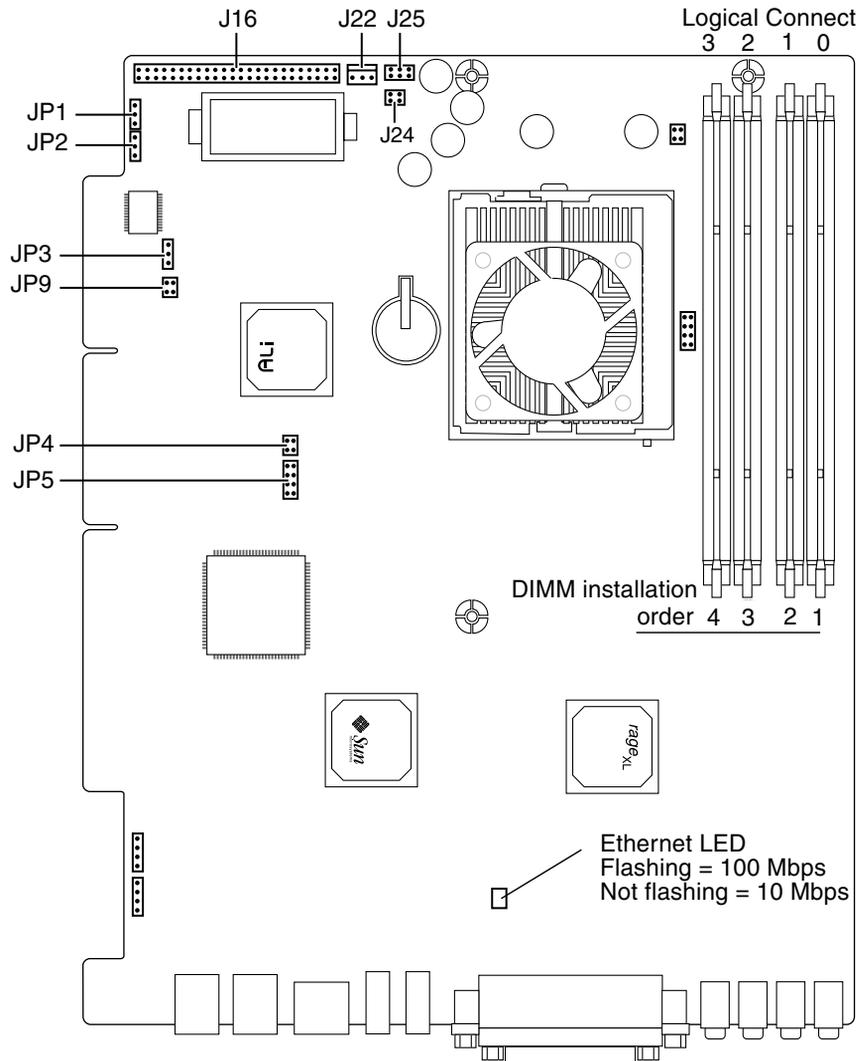
FIGURE C-2 Motherboard Layout Diagram

C.3 Riser Board

The following figures illustrate the layout diagram of the riser board.
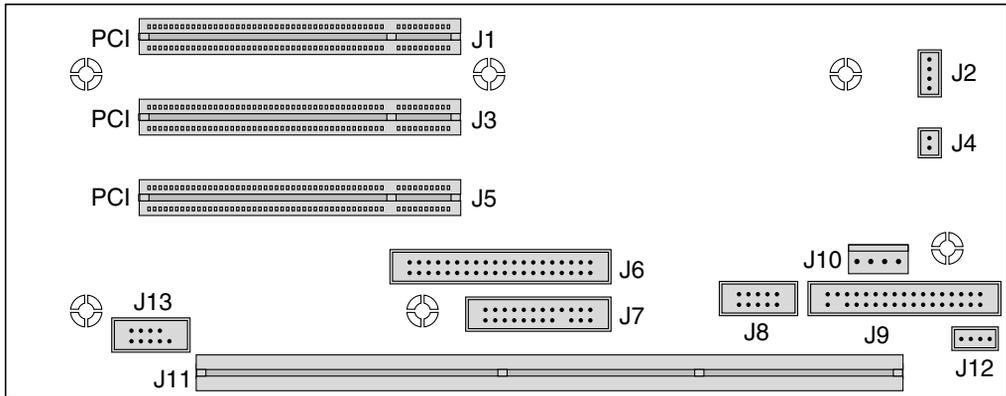
FIGURE C-3 Riser Board Layout Diagram, Side 1

TABLE C-1 Riser Board Connectors, Side 1

Connector	Description
J1	PCI connector
J2	Power/LED connector
J3	PCI connector
J4	Fan connector
J5	PCI connector
J6	Debug connector
J7	Debug connector
J8	Smart card connector
J9	Diskette drive data connector
J10	Diskette drive power connector
J12	Speaker connector
13	(Second) Serial Port Connector
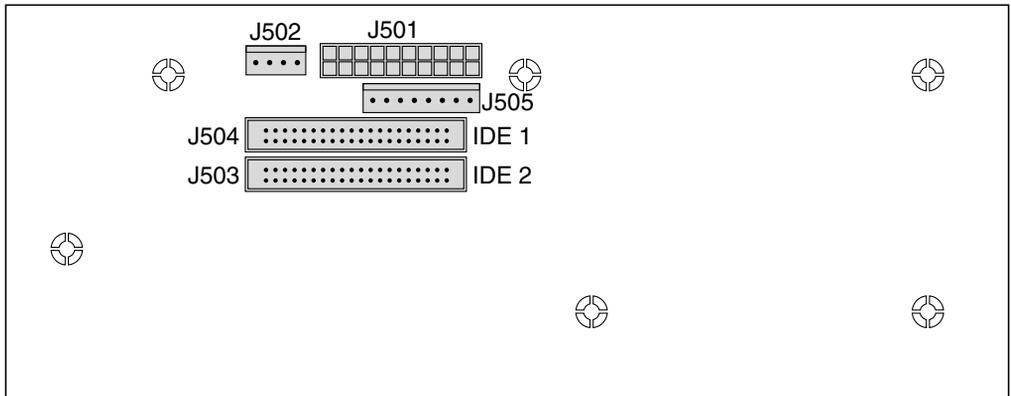
FIGURE C-4 Riser Board Layout Diagram, Side 2

TABLE C-2 Riser Board Connectors, Side 2

Connector	Description
J501	Power supply connector
J502	IDE drive power connector
J503	Secondary IDE channel connector
J504	Primary IDE channel connector

C.4   Jumper Descriptions

There are two jumpers that can be configured, the CPU speed jumper J3, and the PROM jumper J2. See "OpenBoot PROM Jumpers   CPU Speed Selection" on page C-14, or Section 8.5.2, "Replacing the Motherboard" on page 8-14.

Jumper configurations can be changed by setting jumper switches on the motherboard. The motherboard jumpers are preset at the factory. For more information on CPU jumper settings, see Section 8.1.2, "Replacing the CPU" on page 8-3.

A jumper switch is *closed* (sometimes referred to as *shorted*) with the plastic cap inserted over two pins of the jumper. A jumper is *open* with the plastic cap inserted over one or no pin(s) of the jumper.

C.5 Motherboard Components

This section describes all the Sun Blade 150 system components. Most of the devices are connected through the PCI interface that is supported by the CPU. The CPU has one 32-bit 33 MHz PCI bus. The PCI bus from the CPU is 3.3V. All the PCI devices on the motherboard are 3.3V devices. The 5 V and 3.3 VPCI cards are supported through plug-in slots on the secondary bus of the PCI to PCI bridge. The PCI bus runs at 33 Mhz.

This section discusses the following topics:

- Section C.5.1, "CPU" on page C-6
- Section C.5.2, "IChip2 ASIC" on page C-7
- Section C.5.3, "SouthBridge ASIC" on page C-7
- Section C.5.4, "PCI Graphics" on page C-10
- Section C.5.5, "PCIO-2.x ASIC" on page C-10
- Section C.5.6, "PCI to PCI Bridge ASIC" on page C-11
- Section C.5.7, "Flash PROM" on page C-11
- Section C.5.8, "Smart Card Interface" on page C-12
- Section C.5.9, "NVRAM/TOD" on page C-13

C.5.1 CPU

The system CPU is the UltraSPARC IIi processor. The CPU is a high-performance, highly-integrated superscalar processor implementing the SPARC-V9 64-bit RISC V9 architecture. A PCI bus controller (rev. 2.1 compatible) and a memory management unit that supports synchronous DRAM are integrated into the unit. The CPU integrates the L2 cache megacell, which contains a total of 512 Kbytes of L2 cache. The CPU uses a pipelined L2 cache which requires the L2 cache to sustain the bandwidth of two-cycle throughput.

The CPU characteristics and associated features include:

- SPARC-V9 architecture compliant
- Binary compatibility with all SPARC application code
- 16 Kbyte nonblocking data cache
- 16 Kbyte instruction cache with single cycle branch following
- Power management
- PCI interface
- Memory management unit (MMU) 4 Gigabyte addressable

Note – Both POST and OpenBoot PROM report the CPU as an UltraSPARC IIe processor. The CPU in your system is an UltraSPARC IIi processor.

C.5.2 IChip2 ASIC

IChip2 is a 128-pin thin quad flat package (TQFP) ASIC that functions as an interrupt concentrator. The interrupt concentrator is capable of processing 11 major groups of interrupts comprising a total of 48 different interrupt signals at the same time. The result is a 6-bit encoding, which designates the source of the interrupt. The IChip2 can prioritize the interrupts based on the round-robin scheduling scheme. The ASIC also supports three types of interrupts: level high, level low, and pulse low.

C.5.3 SouthBridge ASIC

The Sun Blade 150 system uses the SouthBridge ASIC, which is a highly integrated system I/O chip set in a 328-pin, ball grid array (BGA) package. It has the following integrations:

- PCI-to-ISA bridge
- SuperI/O interface
- PCI IDE controller (UltraDMA 66)
- AC97-compliant audio interface
- SMBus (I2C) interface

C.5.3.1 Super I/O Functions

Serial Ports

The serial ports are 16450/16550-compatible UAR with 16-byte FIFOs. The serial ports have a programmable baud rate generator. See Section A.6, "Modem Setup Specifications" on page A-6. There is a serial port on the system backpanel. The second serial port is on the riser card and requires an open PCI card slot for connection and a custom connector. See FIGURE C-5.
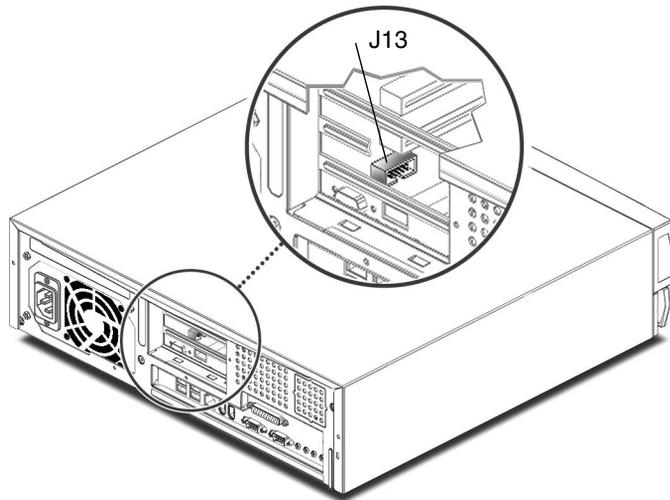
FIGURE C-5   External and Internal Serial Ports

Parallel Port

The parallel port supports ECP/EPP/PS/2/SPP and IEEE 1284 compliance.

Floppy Drive Controller

The floppy drive controller (FDC) is software compatible with 82077 and supports 16-byte data FIFOs. The interface supports standard 1 Mbit/sec, 500 Kbit/sec, 300 Kbit/sec, 250 Kbit/sec data transfer rates.

C.5.3.2 PCI IDE Controller

There are two IDE channels within the IDE controller to support up to four devices. Each channel can operate at DMA mode 4 speed independently. The target devices are one or two UltraDMA/66 capable hard drives and a DVD-ROM or CD-ROM drive. The PCI IDE controller:

- Supports PCI bus mastering at 132 Mbyte/sec transfer rate
- Includes two separate IDE channels that support ultra 66 high performance ATA bus for 66-Mbyte transfer rate and concurrent operation
- Includes dedicated ATA bus pins and buffers for each channel

C.5.3.3 AC97 Compliant Audio Interface

The system audio consists of a single-chip CODEC, integrated amplifier, and supporting analog circuitry.

The CODEC is a single-chip stereo, analog-to-digital and digital-to-analog converter based on delta-sigma conversion technique. The microphone input specifications are designed for the SunMicrophone II or equivalent. The following figure shows a functional block diagram of the system audio circuit.
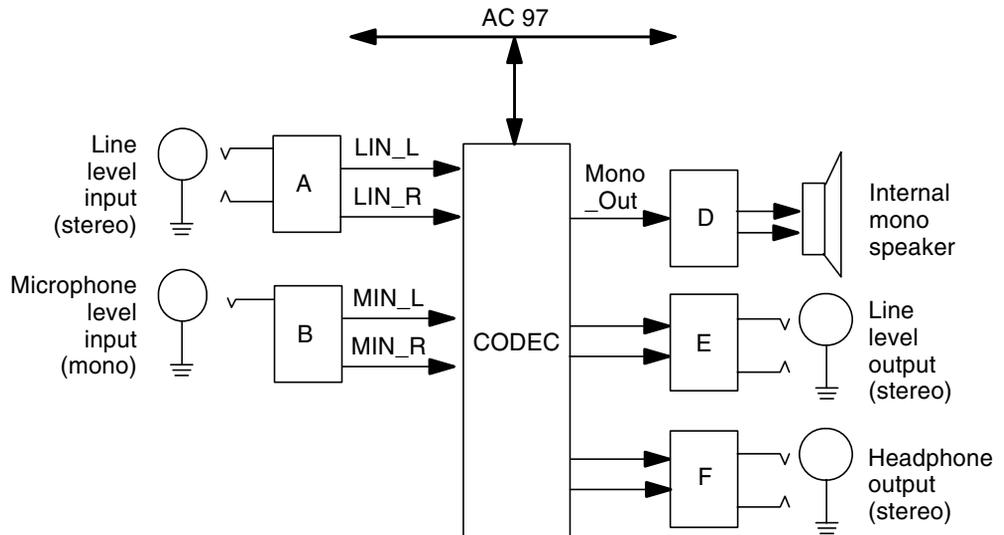
FIGURE C-6 Audio Circuit Functional Block Diagram

An internal speaker is connected to the motherboard through the riser card and used by SW to make "beep" sounds as well as audio sound output.

C.5.3.4 SMBus Interface

The SMBus host controller provides the communication channel with other serial devices through SMBus protocol. In the Sun Blade 150 system, this SMBus is connected to the four SDRAM DIMM modules, so that on system power-up OpenBoot PROM can access the information regarding each DIMM type and configuration stored inside the serial EEPROM on each DIMM module.

C.5.4 PCI Graphics

C.5.4.1 ATI Rage XL ASIC

ATI Rage XL is the graphics controller in a 256-pin Ball grid array (BGA) package. The controller provides PCI based graphics with a 64 bit memory path supporting SGRAM.

C.5.4.2 Graphics Memory

The ATI Rage Pro memory interface supports a 64-bit memory path. The system has 8 Mbytes of SGRAM on the motherboard. The system uses two chips, based on a 32 Mbit SDRAM (512k x 32 x 4 banks).

C.5.5 PCIO-2.x ASIC

The PCIO-2.x ASIC is a 256-pin BGA package. This ASIC contains the following interfaces:

- EBus Channel Engine, which can interface standard off-the-shelf ISA devices
- Full-duplex Ethernet Engine with Media Access Control function, providing a 10/100 Mbps network interface
- IEEE-1394 standard interface capable of 100, 200, 400 Mbit/sec transfers
- Open HCI compliant USB host controller capable of supporting 1.5, 12 Mbit/sec transfer rate

C.5.5.1 Ethernet

The PCIO-2.x ASIC includes a 10/100Mbps ethernet MAC. The Sun Blade 150 system uses the Lucent LU3X31T PHY chip attached to the PCIO-2.x MII interface.

The motherboard has an LED which shows the ethernet mode (FIGURE C-2). If the LED is flashing, the ethernet is operating at 100 Mbps. If the LED is not flashing, the ethernet is operating at 10 Mbps.

C.5.5.2 USB

The PCIO-2.x USB interface is an industry standard low-cost serial bus intended for slower peripheral devices such as 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

The Sun Blade 150 uses two USB ports for the keyboard and mouse. See Appendix E for details.

C.5.5.3 IEEE 1394

The Sun Blade 150 provides a dual IEEE-1394 interface for faster asynchronous peripheral devices of transfer rate up to 400Mb/s.

Note – Only one Sun Visual Collaboration Kit (1394 camera) is supported at one time due to system bandwidth limitations. The minimum DIMM configuration for using the Sun Visual Collaboration Kit is 256 Megabytes.

C.5.6 PCI to PCI Bridge ASIC

This ASIC provides the PCI bus extension for plug-in PCI devices and is compliant with PCI Specification 2.1 and PCI Power Management Specification 1.0.

C.5.7 Flash PROM

The Sun Blade 150 motherboard contains 1 Mbyte of flash memory, which is connected to the EBus of the PCIO-2.x ASIC. The flash PROM is an 8 Mbit, 5.0 volt flash memory with faster than 120ns access time.

The 1 Mbyte of the PROM is divided into two halves, the OpenBoot PROM and the Power-On Self-Test (POST). The OpenBoot PROM and POST image reside in a separate address space off of the EBus space. There is a ROMBO connector for

OpenBoot PROM and POST software development during initial bringup phase and two jumpers, one for enabling the use of connector ROMBO, the other for flash PROM write-protect.
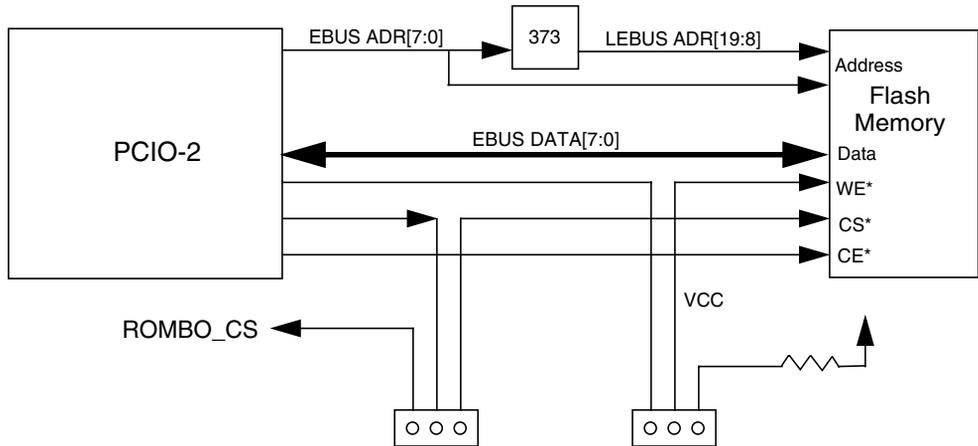
FIGURE C-7   PROM Interface

C.5.8   Smart Card Interface

The smart card reader interface conforms to ISO 7816.3. The smart card reader is mounted to the peripheral assembly at the front of the system chassis. A 10-pin ribbon cable connects the smart card PCB to the connector of the riser board. The smart card connects to the on-board I2C (SMBus) interface on the SouthBridge ASIC.
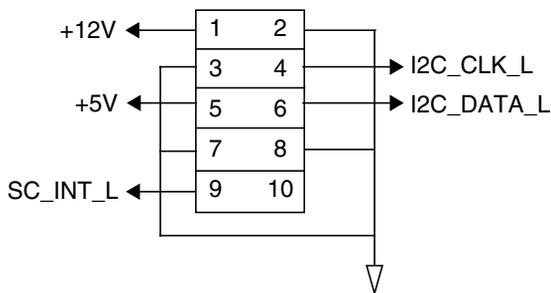
FIGURE C-8   Smart Card Interface Header

C.5.9   NVRAM/TOD

The system requires at least 8 Kbytes of nonvolatile static RAM to store the variables for the operating system and a real time clock to do timekeeping. The device also has both functions integrated plus the self-contained battery. It also has a programmable alarm interrupt output that can be used by the software to enable auto-shutdown (auto suspend/resume) as a power management choice.

C.6   Reset Types

The CPU has several types of resets. The resets affect different levels of the system devices and the processor. As an example, a Power-on Reset (POR) resets all devices on the motherboard as well as any PCI card that is plugged in. A soft reset is under software control and is used to reset particular registers that reside in the devices on the motherboard.

C.7   Clocking

C.7.1   Clock Generation

The four clock domains in the Sun Blade 150 system. The domains are the CPU, SDRAM, PCI, and miscellaneous clocks.

All the clocks in those four domains are generated from clock synthesizers or dedicated crystals on the motherboard except SDRAM clocks, which are generated by the CPU.

TABLE C-3 lists all the clocks present on the system. Each of the clocks listed is generated by the clock generator or a dedicated crystal.

TABLE C-3 Clock Frequencies

Component	Clock	Frequency (MHz)	Source	Description
CPU	CLKA	125 ~ 350	Clock generator	LVPECL
CPU	CLKB	125 ~ 350	Clock generator	LVPECL
CPU	PCI_REF_CLK	66.66	Clock generator	Core PCI clock
CPU	PCI_CLK	33.33	Clock generator	PCI clock
SouthBridge	PCI_CLK	33.33	Clock generator	PCI clock
SouthBridge	OSC32KI/	32.768KHz	Dedicated crystal	Real-time clock
SouthBridge	USB_CLK	48.00	Clock generator	USB clock
SouthBridge	OSC14M	14.3182	Clock generator	Reference clock
Graphics chip	Clk	29.499	Dedicated crystal	Video clock
Graphics chip	PCICLK	33.33	Clock generator	PCI clock
PCIO-2.x	PCICLK	33.33	Clock generator	PCI clock
PCIO-2.x	USBCLK	48.00	Clock generator	USB clock
IChip2	PCICLK	33.33	Clock generator	PCI clock
PCI bridge	PCICLK	33.33	Clock generator	PCI clock
AC97	XIN	24.576	Dedicated crystal	CS4297 clock
1394 PHY	XIN	24.576	Dedicated crystal	FW802 clock

C.7.2 OpenBoot PROM Jumpers   CPU Speed Selection

When the system is powered on, the CPU clock speed is determined by the default hardware settings (200MHz) of the MC12429. The OpenBoot PROM firmware then needs to know the exact CPU speed so that the OpenBoot PROM can reprogram the MC12429 accordingly through the OpenBoot PROM serial programming interface. The CPU speeds and jumper settings are provided in the CPU release notes.

FIGURE C-9 shows the jumper settings for the 550 MHz and 650 MHz CPUs.

Caution – Be sure that you set the jumpers correctly before powering-on the system. A 550 MHz CPU can not operate if the jumpers are set for 650 MHz. A 650 MHz CPU will operate at 550 MHz if the jumpers are set for 550 MHz.

Motherboard jumper JP3
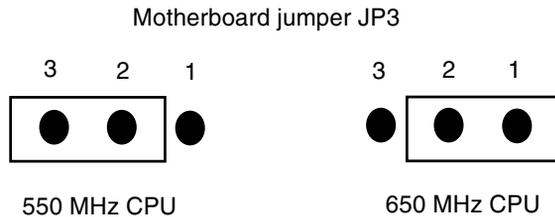
FIGURE C-9 JP3 OpenBoot PROM Jumper Settings for 550 MHz and 650 MHz CPUs

C.8   Power Control

C.8.1   Power Switch

The Sun Blade 150 system power on/off switch is on the front panel.

For more information see the sections below and Chapter 10, "OpenBoot Emergency Procedures" on page 10-1.

C.8.1.1   Powering on the System

When the system is off, you can power on the system by pushing the power switch.

C.8.1.2   Interrupting the system

When the system is already powered on, you can press the power switch to send an interrupt to the system software. The software gracefully shuts the system down (The system confirms shut down with the user, syncs the hard drives, and turns off power supply).

C.8.1.3 Forcing the System to Power-Off During Software Hang

If the software is hung, the switch has a second mode. If the switch is held down for 4 seconds, the switch will turn the power supply off directly (independent of software).

C.8.2 Power-On and Power-Off Circuitry

C.8.2.1 Power-On

Two conditions turn the system power on through the power on/off control circuitry on the Sun Blade 150 motherboard:

- The system was originally turned off and the front panel power on/off button is pushed.
- The system was gracefully shutdown, and the alarm inside TOD M48T59 went off.

C.8.2.2 Power-Off

Two conditions turn off the system power through the power on/off control circuitry on the Sun Blade 150 motherboard:

- The system shuts down through the operating system: one general purpose output pin of the SouthBridge is activated to shut down the power supply.
- When the system power was on, and front panel power on/off button is pressed for more than 4 seconds.

C.8.3 On-Board VRM

The CPU requires two different voltage sources, 3.3V with 5% tolerance and 1.7V with 3% tolerance. The total estimated power consumption is around 19 Watts at 650 MHz speed. The 3.3V source for the processor is provided by the power supply and the 1.7V source of the processor comes from an on-board voltage regulator. The Raytheon RC5057 is the switcher control chip.

VRM ID codes from the CPU are not used. The 1.7 V code required for the processor is hard set. Voltage changes are possible but require installation of special header/jumper connections.

C.8.3.1 On-Board VRM requirements

The overall solution for the system on-board VRM should be based on the following requirements:

- Programmable output from 1.3V to 3.5V
- 5V input source
- At least 12.5 amps driving capability

C.8.3.2 Power-On Beep

The M1535D SouthBridge provides a speaker output to the audio codec for output to an internal speaker. This speaker output has two different beep functions, one is write-beep function that beeps one to three beeps depending on the number of writes to the register and the other is a periodic four-beep function. This is all controlled by the software. The OpenBoot PROM must program the M1535D to send a "beep" sound at power on.

C.8.3.3 Power-On LED Control

The M1535D provides a software-controllable LED output to turn on or turn off the LED and causes the LED to blink at the rate of 1Hz or 2Hz.

C.8.4 Optional Secondary Hard Drive

The Sun Blade 150 system has a provision for a second hard drive on the hard drive tray (FIGURE C-10).
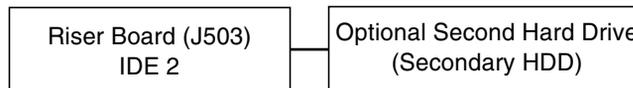
FIGURE C-10 Secondary Hard Drive Cabling Configuration

C.9　Memory Architecture

The Sun Blade 150 system uses a 168-pin, JEDEC standard, dual-in-line, 3.3V, unbuffered, synchronous DRAM module. The memory control unit (MCU) is embedded within the CPU. All address signals, control signals, and clocks are driven off of the processor and directly drive the memory subsystem on the motherboard.

The CPU L2 cache megacell reserves a 4 Gbyte region for cacheable main memory. The memory controller only supports 4 Gbytes of space.

Note – Although the cache and memory controller support up to 4 Gbytes, only 512 MB DIMMS are supported on the Sun Blade 150 system. This limits the maximum DIMM configuration to 2 Gbytes.

The system has four DIMM slots on the motherboard. Because the memory data bus width is equal to the DIMMs (64-bit data, plus 8-bit ECC) they can be installed one at a time and with mixed sizes. The interface between processor and memory sub-system on the motherboard consists of:

- Two sets of multiplexed row-column address bank select address.
- Two sets of bank address
- Four RAS
- Four CAS
- Four WE
- Eight clocks
- Eight CS

FIGURE C-11 describes the system memory interface.
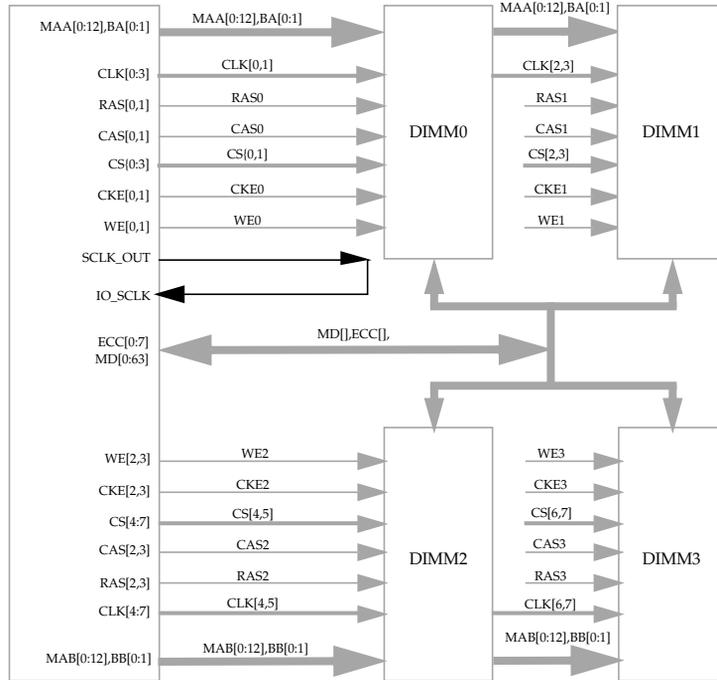
FIGURE C-11 Sun Blade 150 Memory Block Diagram

C.9.1 SDRAM Address Multiplexing

	16 Mbit				64 Mbit				128 Mbit				256 Mbit			
		x16	x8	x4		x16	x8	x4		x16	x8	x4		x16	x8	x4
	Row	Col	Col	Col	Row	Col	Col	Col	Row	Col	Col	Col	Row	Col	Col	Col
BA1						A24	A25	A26		A25	A26	A27		A26	A27	A28
BA0		A22	A23	A24		A23	A24	A25		A24	A25	A26		A25	A26	A27
MA12									A23				A23			
MA11					A22				A22				A22			A26
MA10	A21	0	0	0	A21	0	0	0	A21	0	0	0	A21	0	0	0
MA9	A20			A23	A20			A24	A20			A25	A20		A25	A25
MA8	A19		A22	A22	A19		A23	A23	A19		A24	A24	A19	A24	A24	A24
MA7	A18	A10	A10	A10	A18	A10	A10	A10	A18	A10	A10	A10	A18	A10	A10	A10
MA6	A17	A9	A9	A9	A17	A9	A9	A9	A17	A9	A9	A9	A17	A9	A9	A9
MA5	A16	A8	A8	A8	A16	A8	A8	A8	A16	A8	A8	A8	A16	A8	A8	A8
MA4	A15	A7	A7	A7	A15	A7	A7	A7	A15	A7	A7	A7	A15	A7	A7	A7
MA3	A14	A6	A6	A6	A14	A6	A6	A6	A14	A6	A6	A6	A14	A6	A6	A6
MA2	A13	A5	A5	A5	A13	A5	A5	A5	A13	A5	A5	A5	A13	A5	A5	A5
MA1	A12	A4	A4	A4	A12	A4	A4	A4	A12	A4	A4	A4	A12	A4	A4	A4
MA0	A11	A3	A3	A3	A11	A3	A3	A3	A11	A3	A3	A3	A11	A3	A3	A3

FIGURE C-12 SDRAM Address Multiplexing

C.9.2 DIMMs

C.9.2.1 Speed and Timing

The Sun Blade 150 system uses PC100 compliant SDRAM DIMMs. The motherboard can support up to 4 Gbytes with four DIMM slots. The CPU can address 4 Gbytes of memory.

Note – Always remove and replace DIMMs in order, beginning with the DIMM closest to the edge of the motherboard (FIGURE C-2). The system will not function properly with only three installed DIMMS. You must install either one DIMM, two DIMMs, or four DIMMs.

Note – The maximum main memory is 512 Mbyte per slot.

The DIMMs comply with the following parameters:

TABLE C-4 DIMMs Performance Range

Frequency	tRC	tRAS	tRP	tclk
133 Mhz (10ns)	67.5 ns	45 ns	20ns	7.5ns

C.9.3 SDRAM DIMM Configuration

The table below shows the different SDRAM DIMMs that can be used in the Sun Blade 150 system.

TABLE C-5 SDRAM size options (DIMMs only)

DIMM Mem Size	Configuration	Technology	No. of chips on DIMM	2-DIMM Mem Size	4-DIMM Mem Size
128 Mbyte	16Mx72	128 Mbit	9	256 Mbyte	512 Mbyte
256 Mbyte	2 * 16Mx72	128 Mbit	18	512 Mbyte	1 Gbyte
512 Mbyte	2 * 32Mx72	256 Mbit	18	1 Gbyte	2 Gbyte

SDRAM DIMM modules implement the serial presence detect (SPD) mechanism. A serial EEPROM on the DIMM module contains data programmed by the DIMM manufacturers that identifies the module type and various SDRAM organization and timing parameters. This information can be accessed through the system management bus (I2C bus).

C.9.3.1 DIMM Memory Addressing

TABLE C-6 shows the DIMM Addressing.

For troublehooting information see Section 4.5, "DIMM Failure" on page 4-5.

TABLE C-6 DIMM Physical Memory Address

DIMM Slot	Physical Address Range	DIMM Starting Address (Hex)
DIMM0 (U2)	0 to 512MB (0 to 0.5GB)	0X00000000
DIMM1 (U3)	512MB to 1024MB (0.5GB to 1GB)	0X40000000
DIMM2 (U4)	1024MB to 1536MB (1GB to 1.5GB)	0X80000000
DIMM3 (U5)	1536MB to 2048MB (1.5GB to 2GB)	0X**C**0000000

C.10 Address Mapping

This section provides the overview of address partitioning and software-visible registers and their respective functionality. The physical address associated with each of these registers is listed, along with a brief description of the register. For further details on the description and functionality of the registers and chips, refer to the respective chip specification.

- Section C.10.1, "Port Allocations" on page C-22
- Section C.10.2, "PCI Address Assignments" on page C-23

C.10.1 Port Allocations

The following table lists the system port allocations. The CPU divides the physical address space among:

- Main memory (DRAM)

- PCI (which is further subdivided into the primary PCI bus (PCI-A) and the secondary PCI bus (PCI-B bus) when the APB ASIC is used

TABLE C-7   Port Allocations

Address Range in PA<40:0>	Size	Port Access	Access Type
0x000.0000.0000 - FFFF.FFFF	4 Gbyte	Main memory	Cacheable
0x001.0000.000 - 0x1FF.FFFF.FFFF	Do not use	Undefined	Cacheable
0x1FC.0000.0000 - 0x1FD.FFFF.FFFF	8 Gbytes	UPA graphics	Noncacheable
0x1FE.0000.0000 - 0x1FF.FFFF.FFFF	8 Gbytes	CPU IO	Noncacheable

C.10.2   PCI Address Assignments

The following table lists the PCI address assignments.

TABLE C-8   PCI Address Assignments

Address Range in PCI Address	Size	PCI Space Addressed	Notes
0x8000.0000 - 0xBFFF.FFFF	1 Gbyte	Primary PCI DVMA space	CPU DVMA register (equals 0x30)
0x4000.0000 - 0x7FFF.FFFF	1 Gbyte	PCI bus A memory space	PCI slots APB ASIC register (equals 0xc)
0x40.0000 - 0x7f.ffff	4 Mbytes	PCI bus A I/O space	PCI slots
0x0000.0000 - 0x3FFF.FFFF 0xC000.0000 - 0xFFFF.FFFF	2 Gbytes	PCI bus B memory space	On-board PCI bus APB ASIC B register (equals 0xc3)
0x00.0000 - 0x3f.FFFF 0xC0.0000 - 0xFF.FFF	8 Mbytes	PCI bus B I/O space	

C.10.2.1   PCI Bus A Address Assignments

PCI bus A has all the PCI slots and the address is programmable by the OpenBoot PROM.

C.10.2.2 PCI Bus B Address Assignments

The PCI bus B address assignments are as follows:

- PCIO ASIC registers
- OpenBoot PROM

PCIO ASIC Registers

The PCIO ASIC is a PCI client. The address can be reprogrammed by software during boot only. Therefore, instead of providing absolute addresses for each of the registers, only offset addresses that are relative to a base address are given.

The PCIO ASIC is a multifunction PCI device and its configuration space has three base address pointers:

- Openboot PROM
- EBus2 (function 0)
- Ethernet (function 1)

Boot PROM

The PCIO ASIC is strapped so that the red mode trap address is:

- UPA: 0x1FF.F000.0000
- PCI: 0xF000.0000
- EBus2: 0x00.0000

The following table lists the Openboot and flash PROM address assignments.

TABLE C-9 Openboot PROM/Flash PROM Address Assignments

Offset	Register Description	Type	Size
0x00.0000 - 0xFF.FFFF	Flash PROM/EPROM	R	1 or 4 bytes

C.11　Interrupts

C.11.1　Interrupt Interface

The CPU uses a 6-bit encoded interrupt vector mechanism. An IChip2 is used as an interrupt concentrator, which receives all the system interrupts and encodes the interrupts into a 6-bit interrupt vector. The interrupt vector is then registered and synchronized externally with PCI clock before sending to the processor. The difference between the IChip and IChip2 is the package. IChip is a 120p-pin MQFP and IChip2 is a 128-pin TQFP.

C.12　Power

The Sun Blade 150 system is Energy Star compliant.

The Sun Blade 150 uses the Tier2, Guideline B of the EPA 3.0 MOU. This means that when Sun Blade 150 is in a power managed state the maximum power consumption is 37.5 Watts or less.

When put into Energy Star mode, the UltraSPARC IIi processor reduces the core clock speed by dividing the input clock by a factor of six internally. The PCI clocks to the PCI slots are stopped. The peripheral compliance I/O-2 (PCIO-2.x) keeps running at full PCI speed to support "network awareness." The SDRAM is put into the self-refresh mode and will only come out to complete a transaction. If the SDRAM is in self-refresh mode and there is a pending transaction, the CPU takes the SDRAM out of self-refresh mode. Upon completion of the transaction and if the software has not changed the SDRAM self-refresh bit, the CPU (hardware) puts the SDRAM back into self refresh.

C.12.1　Energy Star

The Sun Blade 150 motherboard follows the guidelines set up by the U.S. EPA's Energy Star program. The current MOU is revision 3.0. Refer to:
http://www.epa.gov/appdstar/esoe/moureq.html

The current Energy Star requirement for computers with power supplies that are from 0 to 250W is 37.5W when in power-saving mode.

C.12.1.1 Energy Star Power Consumption Tier 1

The table below lists the Energy Star *low-power/sleep mode* power requirements.

TABLE C-10   Maximum Sleep Mode Power

Max Continuous Power rating of PS	Watts allowed in Low Power mode
≤ 200W	≤ 30W
> 200W	15% of max power

C.12.1.2 Energy Star Tier 2, Guideline B

Since the system uses a 250 W power supply, the power budget for the system in sleep mode is 37.5 W. The following are the requirements of Guideline B:

- The computer shall enter a sleep mode after a period of inactivity.
- If the computer is shipped with the capability to be on a network, it shall have the ability to enter a sleep mode irrespective of the network technology.
- The computer shall retain in sleep mode its ability to respond to all types of network requests. There shall be no loss in network functionality available to the user (e.g., the network functionality available to the user during the sleep mode shall be the same as that was available before the computer entered the sleep mode.)
- The computer shall consume in the sleep mode, no more than 15% of the maximum continuous power rating of its power supply.

C.12.2 USB

USB framework power manages all USB devices. If a USB device is inactive for a period of time, USB framework puts the device into low power mode. The device is again brought into full power mode by the USB framework when a user attempts to use a device or when an application on the host starts an input or output to or from the device.

All HID (Human Interface Device) hub and storage devices (for example: keyboard or mouse) are power managed by default if they support wake up. Printers are power managed only between job outputs.

Note – Activity on the USB keyboard or mouse indicates user intervention, causing USB framework power to remove the system from low power mode.

Special Procedures

This appendix provides a functional description of the Sun Blade 150 system.

- Section D.1, "Disabling Power Management" on page D-1
- Section D.2, "Setting the Default Console Display" on page D-2

D.1 Disabling Power Management

This section describes how to disable hard drive power management and system power management.

D.1.1 Disabling Hard Drive Power Management

When the system is in low-power mode, the hard drive eventually stops rotating to conserve power. Later, when you perform a task that accesses the hard drive, the hard drive spins up again. You might have to wait a few seconds for the hard drive to spin up to full speed.

If you find that the delay is inconvenient, you can turn off Energy Star hard drive power management to prevent the hard drive from entering the low-power mode.

1. **Become superuser.**

   a. **Using any file editor, type the following line in your** `/etc/power.conf` **file:**

   ```
   device-thresholds  /dev/dsk/c0t0d0s0  always-on
   ```

   b. **Save the** `/etc/power.conf` **file.**

2. **Run the command:**

   `/usr/sbin/pmconfig`

These commands tell the power management framework to keep the hard drive powered up all the time, regardless of drive usage. You can completely turn off all power-saving features of the workstation using the following procedure.

D.1.2   Disabling all System Power Management

You can disable the power management feature by using the Dtpower graphical user interface.

1. **At the system prompt type:**

   /usr/dt/bin/dtpower

   The Dtpower window appears on your screen.

2. **Under the Current power saving scheme menu, select Disabled.**

3. **Press the OK button.**

D.2   Setting the Default Console Display

If a PCI graphics card, such as the Sun Expert 3D-Lite graphics accelerator, is installed, the default monitor console switches to the installed PCI card. You can set the on-board M64 graphics device as the default monitor console.

1. **At the** ok **prompt, type the following to display a list of the installed graphics devices:**

```
ok show-displays
a) /pci@1f,0/SUNW,m64B@13
b) /pci@1f,0/pci@5/SUNW,Expert3D-Lite@1
q) NO SELECTION
Enter Selection, q to quit:
```

2. **Type a letter at the prompt to select the graphics card you want to be the default console display.**

   In this example, type a to select the on-board M64 graphics device.

   ```
   Enter Selection, q to quit: a
   /pci@1f,0/SUNW,m64B@13 has been selected.
   Type ^Y ( Control-Y ) to insert it in the command line.
   e.g. ok nvalias mydev ^Y
   ```

3. **Set the selected device as the console device by typing:**

   ```
   ok setenv output-device
   ```

4. **Press "Control-Y".**

5. **Power off the system.**

   See Section 5.5, "Powering Off the System" on page 5-4.

6. **Connect your monitor cable to the on-board VGA connector on your system back panel.**

   See FIGURE 1-3, in Section 1.3, "System Description" on page 1-4.

7. **Power on the system.**

   See Section 9.2, "Powering On the System" on page 9-2.

Using USB Devices

This appendix contains information on the following topics:

- Section E.1, "USB Keyboard and Mouse" on page E-1.
- Section E.2, "USB Power Management" on page E-2.

For more information on USB products, see this web site:

```
http://www.sun.com/io/usb.html
```

E.1   USB Keyboard and Mouse

The following USB keyboard and mouse information is provided for your Type-6 USB keyboard and USB mouse:

E.1.0.1   Keyboards

- The Sleep key on the USB keyboard behaves differently than the power key on Type-5 or Type-6 keyboards. On a USB keyboard, you can suspend or shutdown the system using the sleep key, but you cannot power-on the system.

- If you are using a USB keyboard that is not from Sun, the functionality that you get with a left-side keypad is unavailable.

Note – The keys that are standard on the left side of other keyboards are not present on the USB keyboard.

- Multiple keyboards are not supported. The keyboards enumerate and are usable but do not operate as a console keyboard.

- The first keyboard that gets probed at boot time becomes the console keyboard. If multiple keyboards plugged in when the system is booted, it can be difficult to determine which keyboard is the console keyboard.

- On a system with multiple USB keyboards, if you unplug the console keyboard, the next available USB keyboard does not become the console keyboard. The next hot plugged keyboard will become the console keyboard.

E.1.0.2 Mouse Devices

- Only a 2- or 3-button mouse is supported. A wheel-on-wheel mouse acts like a plain button mouse. A mouse with more than 3 button functions like a 3-button mouse.

- Multiple mice are not supported. Additional mouse devices enumerate and are usable, but do not operate as a console mouse.

- The first mouse probed at boot time becomes the console mouse. This can potentially cause confusion if there are multiple mouse devices plugged in at boot time.

- If you have a third-party composite keyboard with PS/2 mouse, and it is the first one to be probed, it will become the console keyboard/mouse even if the PS/2 mouse is not plugged in.

Note – If another USB mouse is plugged into the system, it will not work because the second mouse is not configured as the console mouse.

- On a system with more than one USB mouse, if you unplug the console mouse, the next available USB mouse doesn't become the console mouse. The next hot plugged mouse will become the console mouse.

E.2 USB Power Management

USB power management is leaf first and then bottoms-up. This means that all leaf devices go into low-power mode first. Following that, the lowest hub goes into low-power mode first, followed by hubs in the next upper level. This follows all the way to the top root hub.

Note – As a rule of thumb, the deeper the USB device tree, the poorer USB power management becomes.

E.2.1 Storage Devices

- Use pcfs(7fs) and udfs(7fs) with USB mass storage devices. These file systems are platform neutral and data can be easily shared between platforms. UFS is also supported, but requires syncing on panic. The driver currently supports syncing.

- Each mass storage device has a device node called disk. Each node receives a unique controller number. A device with multiple LUNs will get the same controller number but different d number (/dev/[r]dsk/cXtYdZsN)

- On hot remove mass storage drives, /dev/[r]dsk links remain persistent. Type **devfsadm -C** to remove stale links.

- System Checkpoint/Resume will fail if a file system is mounted.

E.2.2 Printer Devices

- After plugging in the printer, type lpadmin or printmgr to configure printer.

- To find out which of /dev/printers/N is a USB printer, type ls -l on /dev/printers and find out which symbolic links point to the usbprn device.

- For Lexmark™ printers choose HP as the printer type in printmgr.

E.2.3 Audio Devices

- Plug in a USB audio device such as a speaker or microphone. The link should appear as /dev/sound/<n>

- Use the appropriate link through the AUDIODEV variable or /dev/audio link from the application.

- Sometimes the speaker may not produce any sound. If this occurs, you should shut your applications down safely and power-cycle the system.

E.2.4 Hot Plugging

- OpenBoot PROM at present doesn't support hot plugging of USB devices. If a user removes the USB keyboard when the system is at the ok prompt, the system will become wedged. If the USB keyboard is plugged into the system again, OpenBoot PROM will not recognize the keyboard. You will have to power cycle the system.

- As a general rule, no USB device should be hotplugged when the system is at the OK prompt in OpenBoot PROM and during booting of the system until a UNIX login prompt is displayed.

- Unplugging open or busy device will not remove the entries in the `prtconf` file. The system prompts to plug in the original device. To clear the `prtconf` entries, the original device needs to be plugged into the same port, the application terminated, and then the device removed. Until then, the port remains unusable.

- After plugging in a device, check `prtconf` or `/dev/usb` before hot removing.

E.2.5   Cabling

- Never use USB cable extenders that are available on the market. Always use a hub with longer cables to connect devices.

- Always use fully rated (12 Mbps) 20/28 AWG cables for connecting devices.

E.2.6   Devices Supported

For current information on supported USB devices, see this web site:

`http://www.sun.com/io/usb.html`

E.2.7   Man Pages Available

- `ohci`(7D),
- `uhci`(7D),
- `hubd`(7D),
- `usb_mid`(7D),
- `hid`(7D),
- `scsa2usb`(7D),
- `usbprn`(7D),
- `usbkb`(7M),
- `usbms`(7M)
- `usb_ah` (7M)
- `usb_ac`(7D)
- `usb_as`(7D

Glossary

address   A unique location within a computer or peripheral memory. Reference made to an address is usually for retrieving or storing data.

APB   Advanced PCI bridge. A PCI-to-PCI bridge ASIC that features a connection path between a 32-bit bus operating at speeds up to 66 MHz on the primary interface and two 32-bit, 5 VDC or 3.3 VDC, PCI buses (each operating at 33 MHz), on the secondary interface.

ASIC   Application-specific integrated circuit.

ASP   Authorized service provider.

AUXIO   Auxiliary I/O. General purpose lines used to control miscellaneous system functions.

BGA   Ball grid array

boot   A term used to identify the process of reading initial software into the computer.

boot PROM   In Sun workstations, contains the PROM monitor program, a command interpreter used for booting, resetting, low-level configuration, and simple test procedures.

CAS   Column address select.

CDE   Common Desktop Environment.

CD-ROM   Compact disc read-only memory.

DBZ   Double buffer with Z.

DCE   Data communication equipment. An external modem.

default   A preset value that is assumed to be correct unless changed by the user.

DIMM   Dual in-line memory module. A small printed circuit card that contains dynamic random access memory chips.

DMA	Direct memory address.
DOC	Department of Communications.
dpi	Dots per inch.
DRAM	Dynamic random-access memory. A read/write dynamic memory in which the data can be read or written in approximately the same amount of time for any memory location.
DTAG	Dual tag or data tag.
DTE	Data terminal equipment.
DVD-ROM	Digital versatile disc
EBus	Extension bus.
ECC	Error checking code.
EDO	Extended data out.
EIDE	Enhanced integrated drive electronics.
EMI	Electrostatic magnetic interference. Electrical phenomena that directly or indirectly contribute to a degradation in performance of an electronic system.
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.
FBC	Frame buffer controller. An ASIC responsible for the interface between the UPA and the 3DRAM. Also controls graphic draw acceleration.
FCC	Federal Communications Commission.
FIFO	First-in-first-out.
flash PROM	Flash programmable read-only memory.
Gbyte	Gigabyte.
GUI	Graphical user interface.
IDC	Insulation displacement connector.
IDE	Integrated drive electronics.
I/O	Input/output.
JTAG	IEEE standard 1149.1.
Kbyte	Kilobyte.

LAN	Local area network.
LED	Light-emitting diode.
MAC	Media access controller.
Mbyte	Megabyte.
MBps	Megabytes per second.
Mbps	Megabits per second.
MCU	Memory controller unit.
MHz	Megahertz.
MII	Media independent interface.
MQFP	Metric quad flat package
ns	Nanosecond.
NVRAM	Nonvolatile random access memory. Stores system variables used by the boot PROM. Contains the system host ID number and Ethernet address.
OpenBoot PROM	A routine that tests the network controller, diskette drive system, memory, cache, system clock, network monitoring, and control registers.
PCI	Peripheral component interconnect. A high-performance 32- or 64-bit-wide bus with multiplexed address and data lines.
PCIO	PCI-to-EBus/Ethernet controller. An ASIC that bridges the PCI bus to the EBus, enabling communication between the PCI bus and all miscellaneous I/O functions, as well as the connection to slower on-board functions.
PCMCIA	Personal Computer Memory Card International Association.
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.
RAMDAC	RAM digital-to-analog converter. An ASIC responsible for direct interface to 3DRAM. Also provides on-board phase-lock loop (PLL) and clock generator circuitry for the pixel clock.
RAS	Row address select.
RC	Resistive-capacitive.
RISC	Reset, interrupt, scan, and clock. An ASIC responsible for reset, interrupt, scan, and clock.

SB	Single buffer.
SDRAM	Synchronous DRAM.
SGRAM	Synchronous graphics RAM.
Smart card	A card used for user authentication or storing individual user preferences.
SRAM	Static random access memory.
Standby switch	Controls the standby state of the system.
STP	Shielded twisted-pair.
SunVTS	A diagnostic application designed to test hardware.
TIP connection	A connection that enables a remote shell window to be used as a terminal to display test data from a system.
TPE	Twisted-pair Ethernet.
TOD	Time of day. A timekeeping integrated circuit.
TQFP	Thin quad flat package.
TTL	Transistor-transistor logic.
UPA	UltraSPARC port architecture. Provides processor-to-memory interconnection.
UTP	Unshielded twisted-pair.
VCCI	Voluntary Control Council for Interference.
VIS	Visual instruction set.
Vrms	Volts root-mean-square.

Index