Netra™ T2000 Server Service Manual

Sun Microsystems, Inc.
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Preface

The *Netra T2000 Server Service Manual* provides detailed procedures that describe the removal and replacement of replaceable parts in the Netra™ T2000 server. This manual also includes detailed and comprehensive diagnostics information and procedures. This document is written for technicians, system administrators, authorized service providers (ASPs), and users who have advanced experience troubleshooting and replacing hardware.

How This Document Is Organized

Chapter 1 describes the diagnostics that are available for monitoring and troubleshooting the server.

Chapter 2 describes safety considerations, and provides prerequisite procedures and information to replace components within the server.

Chapter 3 provides instructions for replacing nonvolatile data storage components.

Chapter 4 describes procedures to remove components from the server motherboard assembly and the motherboard assembly itself.

Chapter 5 provides instructions for replacing chassis components.

Chapter 6 describes tasks to perform after replacing components within the server.

Appendix A provides the server specifications.

Appendix B provides server signal pinouts.

Using UNIX Commands

This document might not contain information about basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices. Refer to the following for this information:

- Software documentation that you received with your system
- Solaris™ Operating System documentation, which is at:

  http://docs.sun.com

Shell Prompts

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

Typographic Conventions

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

* The settings on your browser might differ from these settings.

Related Documentation

The documents listed as online are available at:

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

Application	Title	Part Number	Format	Location
Administration	*Netra T2000 Server Administration Guide*	819-5837	PDF	Online
Installation	*Netra T2000 Server Installation Guide*	819-5838	PDF	Online
Updates	*Netra T2000 Server Product Notes*	819-5840	PDF	Online
Service	*Netra T2000 Server Service Manual*	819-5841	PDF	Online
Planning	*Netra T2000 Server Site Planning Notes*	819-5842	PDF	Online
Compliance	*Netra T2000 Server Safety and Compliance Guide*	819-5843	PDF	Online
Documentation	*Netra T2000 Server Getting Started Guide*	819-5844	Printed PDF	Shipping kit Online
Reference	*ALOM CMT 1.2 Guide*	819-3250	PDF	Online

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Netra T2000 Server Service Manual, part number 819-5841-10

CHAPTER 1

Server Diagnostics

This chapter describes the diagnostics that are available for monitoring and troubleshooting the server.

The following topics are covered:

- Section 1.1, "Fault on Initial Power Up" on page 1-1
- Section 1.2, "Server Diagnostics Overview" on page 1-2
- Section 1.3, "Using LEDs to Identify the State of Devices" on page 1-8
- Section 1.4, "Using ALOM for Diagnosis and Repair Verification" on page 1-13
- Section 1.5, "Running POST" on page 1-20
- Section 1.6, "Using the Solaris Predictive Self-Healing Feature" on page 1-31
- Section 1.7, "Collecting Information From Solaris OS Files and Commands" on page 1-35
- Section 1.8, "Managing Components With Automatic System Recovery Commands" on page 1-36
- Section 1.9, "Exercising the System With SunVTS" on page 1-39
- Section 1.10, "Obtaining the Chassis Serial Number" on page 1-44
- Section 1.11, "Additional Service Related Information" on page 1-45

1.1 Fault on Initial Power Up

If you have installed the server, and upon initial power up, errors which indicate fault with the DIMMs, the PCI cards, or other components is displayed, consider that the suspect component might have become loosened or ajar during shipment.

Conduct a visual inspection of the server internals and its components. Remove the top cover and physically reseat the cable connections, the PCI cards, and the DIMMs. See:

- Section 2.3, "Prerequisite Tasks for Component Replacement" on page 2-3
- Section 4.1.2, "Installing a PCI-X Card" on page 4-3
- Section 4.2.2, "Installing the PCI-E Card" on page 4-6
- Section 4.4.3, "Installing a DIMM" on page 4-14.

If performing these tasks is not successful, then continue to Section 1.2, "Server Diagnostics Overview" on page 1-2.

1.2 Server Diagnostics Overview

There are a variety of diagnostic tools, commands, and indicators you can use to monitor and troubleshoot a server:

- **LEDs** – These indicators provide a quick visual notification of the status of the server and of some of the FRUs.
- **Fault management architecture** – FMA provides simplified fault diagnostics through use of the `/var/adm/messages` file, the `fmdump` command, and a Sun Microsystems web site.
- **ALOM firmware** – This system firmware runs on the system controller. In addition to providing the interface between the hardware and OS, ALOM also tracks and reports the health of key server components. ALOM works closely with POST and Solaris Predictive Self-Healing technology to keep the system up and running even when there is a faulty component.
- **Power-on self-test (POST)** – POST performs diagnostics on system components upon system reset to ensure the integrity of those components. POST is configurable and works with ALOM to take faulty components offline if needed.
- **Solaris OS Predictive Self-Healing (PSH)** – This technology continuously monitors the health of the CPU and memory, and works with ALOM to take a faulty component offline if needed. The Predictive Self-Healing technology enables Sun systems to accurately predict component failures and mitigate many serious problems before they occur.
- **Log files and console messages** – Provide the standard Solaris OS log files and investigative commands that can be accessed and displayed on the device of your choice.
- **SunVTS™** – An application that exercises the system, provides hardware validation, and discloses possible faulty components with recommendations for repair.

The LEDs, ALOM, Solaris OS PSH, and many of the log files and console messages are integrated. For example, a fault detected by the Solaris software will display the fault, log it, pass information to ALOM where it is logged, and depending on the fault, might light one or more LEDs.

The diagnostic flowchart in FIGURE 1-1 and TABLE 1-1 describes an approach for using the server diagnostics to identify a faulty field-replaceable unit (FRU). The diagnostics you use, and the order in which you use them, depend on the nature of the problem you are troubleshooting, so you might perform some actions and not others.

The flowchart assumes that you have already performed some rudimentary troubleshooting such as verification of proper installation, visual inspection of cables and power, and possibly performed a reset of the server (refer to the server installation guide and server administration guide for details).

Use this flowchart to understand what diagnostics are available to troubleshoot faulty hardware, and use TABLE 1-1 to find more information about each diagnostic in this chapter.

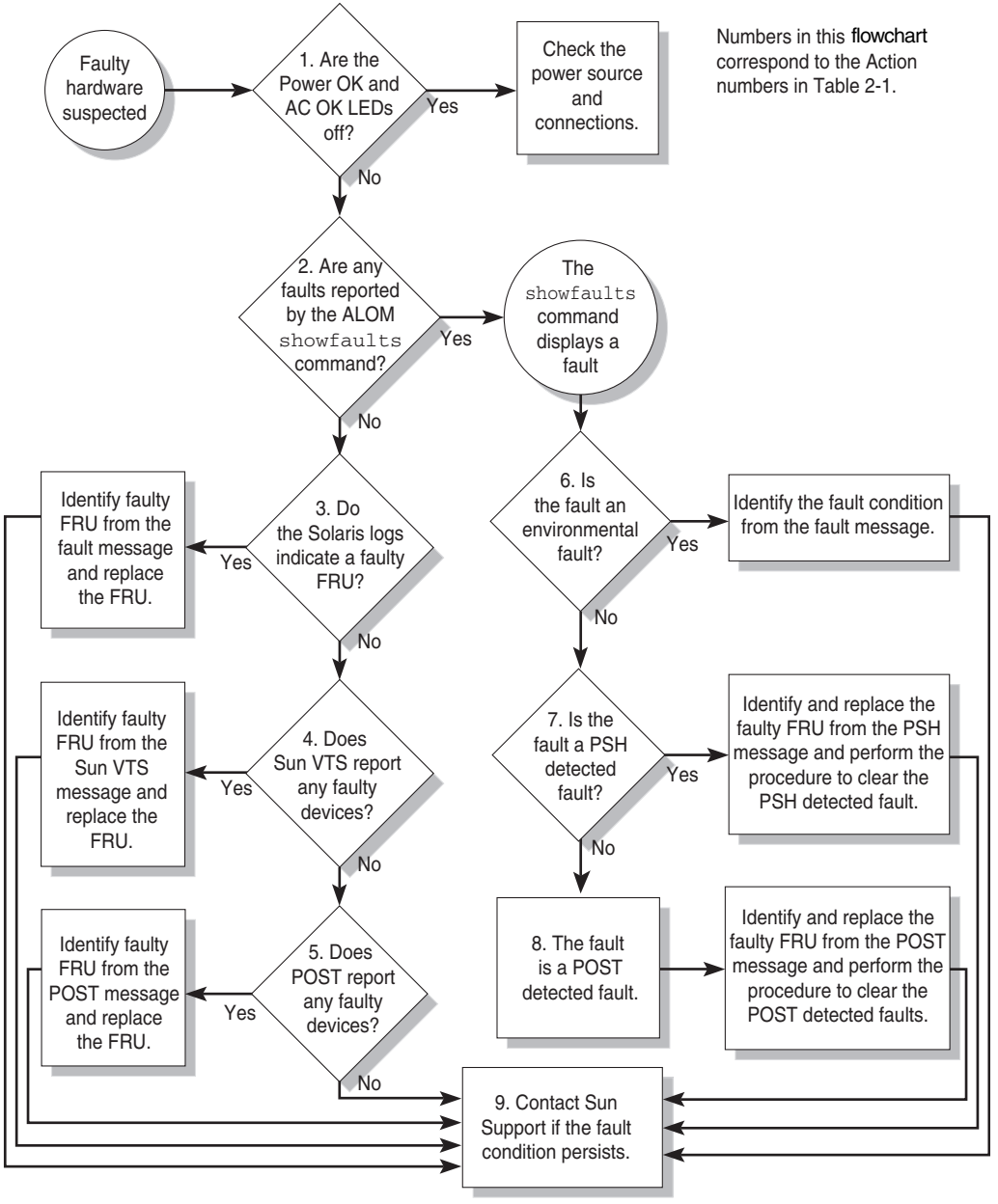

FIGURE 1-1 Diagnostic Flowchart

TABLE 1-1 Diagnostic Flowchart Actions

Action No.	Diagnostic Action	Resulting Action	Additional Information
1.	Check Power OK and Input OK LEDs on the server.	The Power OK LED is located on the front and rear of the chassis. The Input OK LED is located on the rear of the server on each power supply. If these LEDs are not on, check the power source and power connections to the server.	Section 1.3, "Using LEDs to Identify the State of Devices" on page 1-8
2.	Run the ALOM `showfaults` command to check for faults.	The `showfaults` command displays the following kinds of faults: • Environmental faults • Solaris Predictive Self-Healing (PSH) detected faults • POST detected faults Faulty FRUs are identified in fault messages using the FRU name. For a list of FRU names, see TABLE 2-1.	Section 1.4.1, "Displaying the Server's Faults" on page 1-15
3.	Check the Solaris log files for fault information.	The Solaris message buffer and log files record system events and provide information about faults. • If system messages indicate a faulty device, replace the FRU. • To obtain more diagnostic information, go to Action 4.	Section 1.7, "Collecting Information From Solaris OS Files and Commands" on page 1-35
4.	Run SunVTS.	SunVTS is an application you can run to exercise and diagnose FRUs. To run SunVTS, the server must be running the Solaris OS. • If SunVTS reports a faulty device replace the FRU. • If SunVTS does not report a faulty device, go to Action 5.	Section 1.9, "Exercising the System With SunVTS" on page 1-39
5.	Run POST.	POST performs basic tests of the server components and reports faulty FRUs. • If POST indicates a faulty FRU, replace the FRU. • If POST does not indicate a faulty FRU, go to Action 9.	Section 1.5, "Running POST" on page 1-20

TABLE 1-1 Diagnostic Flowchart Actions *(Continued)*

Action No.	Diagnostic Action	Resulting Action	Additional Information
6.	Determine if the fault is an environmental fault.	If the fault listed by the `showfaults` command displays a temperature or voltage fault, then the fault is an environmental fault. Environmental faults can be caused by faulty FRUs (power supply, fan, or blower), or by environmental conditions such as when computer room ambient temperature is too high, or the server airflow is blocked. When the environmental condition is corrected, the fault will automatically clear.	Section 1.4.1, "Displaying the Server's Faults" on page 1-15
		If the fault indicates that a fan, blower, or power supply is bad, you can perform a hot-swap of the FRU. You can also use the fault LEDs on the server to identify the faulty FRU (fans, blower, and power supplies).	Section 1.3, "Using LEDs to Identify the State of Devices" on page 1-8
7.	Determine if the fault was detected by PSH.	If the fault message displays the following text, the fault was detected by the Solaris Predictive Self-Healing software: `Host detected fault`	Section 1.6, "Using the Solaris Predictive Self-Healing Feature" on page 1-31
		If the fault is a PSH detected fault, identify the faulty FRU from the fault message and replace the faulty FRU.	Section 1.6.2, "Clearing PSH-Detected Faults" on page 1-33
		After replacing the FRU, perform the procedure to clear PSH detected faults.	Section 1.6.3, "Clearing the PSH Fault From the ALOM Logs" on page 1-34
8.	Determine if the fault was detected by POST.	POST performs basic tests of the server components and reports faulty FRUs. When POST detects a faulty FRU, it logs the fault and if possible, takes the FRU offline. POST detected FRUs display the following text in the fault message: *FRU_name* `deemed faulty and disabled`	Section 1.5, "Running POST" on page 1-20
		In this case, replace the FRU and run the procedure to clear POST detected faults.	Section 1.5.5, "Clearing POST-Detected Faults" on page 1-30
9.	Contact Sun for Support.	The majority of hardware faults are detected by the server's diagnostics. In rare cases, a problem might require additional troubleshooting. If you are unable to determine the cause of the problem, contact Sun for support.	Sun Support information: `http://www.sun.com/support` Section 1.10, "Obtaining the Chassis Serial Number" on page 1-44

1.2.1 Memory Configuration and Fault Handling

A variety of features play a role in how the memory subsystem is configured and how memory faults are handled. Understanding the underlying features helps you identify and repair memory problems. This section describes how the memory is configured and how the server deals with memory faults.

1.2.1.1 Memory Configuration

In the server memory there are 16 slots that hold DDR-2 memory DIMMs in the following DIMM sizes:

- 512 MB (maximum of 8 GB)
- 1 GB (maximum of 16 GB)
- 2 GB (maximum of 32 GB)

DIMMs are installed in groups of 8, called *ranks* (ranks 0 and 1). At minimum, rank 0 must be fully populated with eight DIMMS of the same capacity. A second rank of DIMMs of the same capacity can be added to fill rank 1.

See Section 4.4.3, "Installing a DIMM" on page 4-14 for instructions about adding memory to a server.

1.2.1.2 Memory Fault Handling

The server uses an advanced ECC technology, called *chipkill*, that corrects up to 4 bits in error on nibble boundaries, as long as all of the bits are in the same DRAM. If a DRAM fails, the DIMM continues to function.

The following server features independently manage memory faults:

- **POST** – Runs when the server is powered on (based on ALOM configuration variables) and thoroughly tests the memory subsystem.

  If a memory fault is detected, POST displays the fault with the FRU name of the faulty DIMMS, logs the fault, and disables the faulty DIMMs by placing them in the ASR blacklist. For a given memory fault, POST disables half of the physical memory in the system. When this occurs, you must replace the faulty DIMMs based on the fault message and enable the disabled DIMMs with the ALOM `enablecomponent` command.

- **Solaris Predictive Self-Healing (PSH) technology** – A feature of the Solaris OS, uses the fault manager daemon (`fmd`) to watch for various kinds of faults. When a fault occurs, the fault is assigned a unique fault ID (UUID), and logged. PSH reports the fault and provides a recommended proactive replacement for the DIMMs associated with the fault.

1.2.1.3 Troubleshooting Memory Faults

If you suspect that the server has a memory problem, follow the flowchart (see FIGURE 1-1). Run the ALOM `showfaults` command. The `showfaults` command lists memory faults and lists the specific DIMMS that are associated with the fault. Once you've identified which DIMMs to replace, see Section 4.4, "Replacing a DIMM" on page 4-10 for DIMM replacement instructions. It is important that you perform the instructions in that chapter to clear the faults and enable the replaced DIMMs.

1.3 Using LEDs to Identify the State of Devices

The server provides the following groups of LEDs:

- Section 1.3.1, "Front and Rear Panel LEDs" on page 1-8
- Section 1.3.2, "Hard Drive LEDs" on page 1-11
- Section 1.3.3, "Power Supply LEDs" on page 1-11
- Section 1.3.4, "Ethernet Port LEDs" on page 1-12

These LEDs provide a quick visual check of the state of the system.

1.3.1 Front and Rear Panel LEDs

The seven front panel LEDs (FIGURE 1-2) are located in the upper left corner of the server chassis. Three of these LEDs are also provided on the rear panel (FIGURE 1-3).

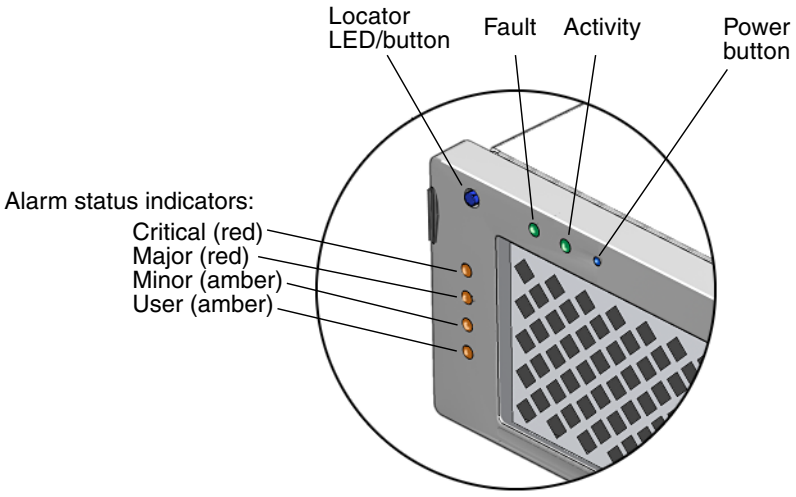

FIGURE 1-2 Front Panel LEDs

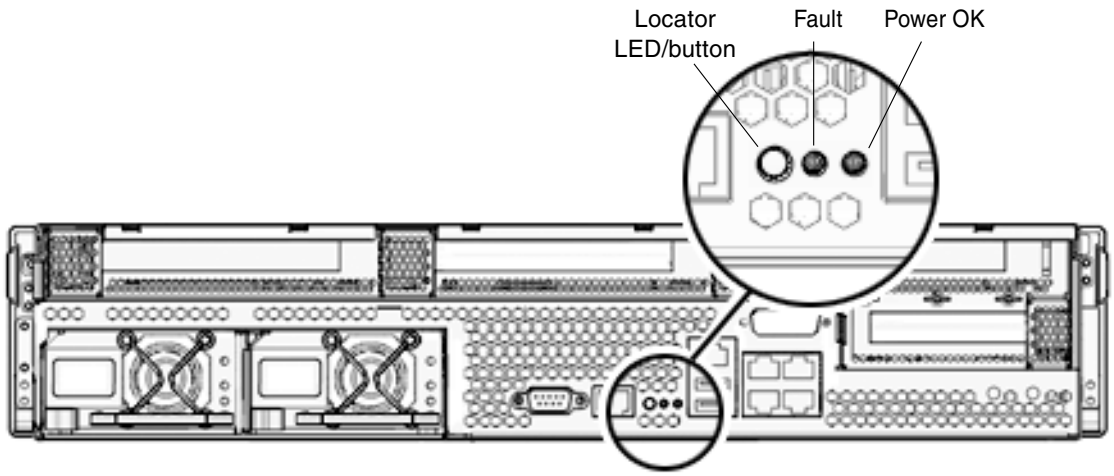

FIGURE 1-3 Rear Panel LEDs

TABLE 1-2 lists and describes the front and rear panel LEDs.

TABLE 1-2 Front and Rear Panel LEDs

LED	Location	Color	Description
Locator LED and button	front upper left and rear center	white	Enables you to identify a particular server. The LED is activated using one of the following methods: • Issuing the `setlocator on` or `off` command. • Pressing the button to toggle the indicator on or off. This LED provides the following indications: • Off – Normal operating state. • Fast blink – The server received a signal as a result of one of the preceding methods.
Fault LED	front upper left and rear center	amber	If on, indicates that service is required. The ALOM `showfaults` command provides details about any faults that cause this indicator to be lit.
Activity LED	front upper left	green	• On – Drives are receiving power. Solidly lit if drive is idle. • Flashing – Drives are processing a command. • Off – Power is off.
Power button	front upper left		Turns the host system on and off. This button is recessed to prevent accidental server power-off. Use the tip of a pen to operate this button.
Alarm:Critical LED	front left	red	Indicates a critical alarm. Refer to the server administration guide for a description of alarm states.
Alarm:Major LED	front left	red	Indicates a major alarm.
Alarm:Minor LED	front left	amber	Indicates a minor alarm.
Alarm :User LED	front left	amber	Indicates a user alarm.
Power OK LED	rear center	green	The LED provides the following indications: • Off – The system is unavailable. Either it has no power or ALOM is not running. • Steady on – Indicates that the system is powered on and is running it its normal operating state. • Standby blink – Indicates that the service processor is running while the system is running at a minimum level in Standby mode, and is ready to be returned to its normal operating state. • Slow blink – Indicates that a normal transitory activity is taking place. It might mean that the system diagnostics are running, or that the system is booting.

1.3.2 Hard Drive LEDs

The hard drive LEDs (FIGURE 1-4 and TABLE 1-3) are located on the front of each hard drive that is installed in the server chassis.

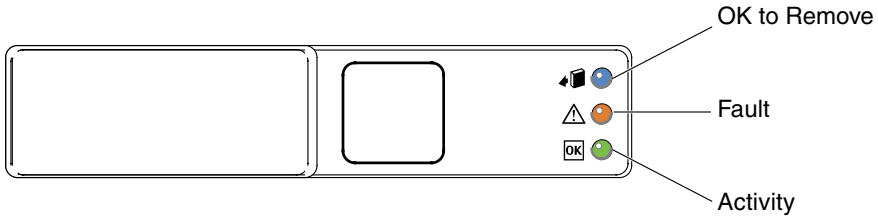

FIGURE 1-4 Hard Drive LEDs

TABLE 1-3 Hard Drive LEDs

LED	Color	Description
OK to Remove	blue	• On – The drive is ready for hot-plug removal. • Off – Normal operation.
Fault	amber	• On – The drive has a fault and requires attention. • Off – Normal operation.
Activity	green	• On – Drive is receiving power. Solidly lit if drive is idle. • Flashing – The drive is processing a command. • Off – Power is off.

1.3.3 Power Supply LEDs

The power supply LEDs (FIGURE 1-5 and TABLE 1-4) are located on the back of each power supply.

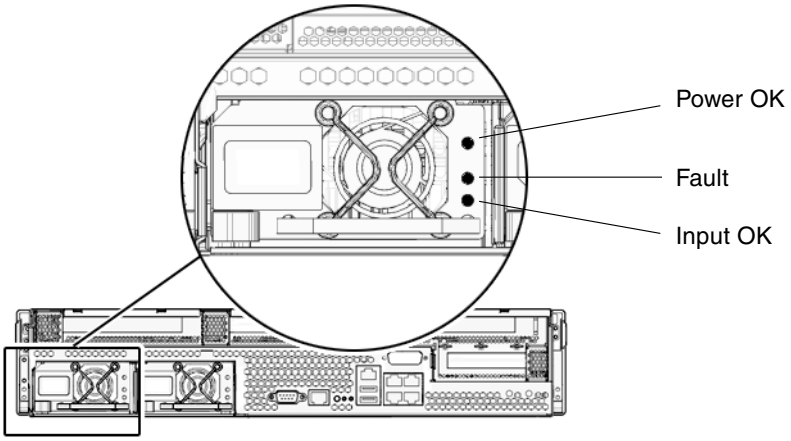

FIGURE 1-5 Power Supply LEDs

TABLE 1-4 Power Supply LEDs

LED	Color	Description
Power OK	Green	• On – Normal operation. DC output voltage is within normal limits. • Off – Power is off.
Fault	Amber	• On – Power supply has detected a failure. • Off – Normal operation.
Input OK	Green	• On – Normal operation. Input power is within normal limits. • Off – No input voltage, or input voltage is below limits.

1.3.4 Ethernet Port LEDs

The ALOM management Ethernet port and the four 10/100/1000 Mbps Ethernet ports each have two LEDs, as shown in FIGURE 1-6 and described in TABLE 1-5.

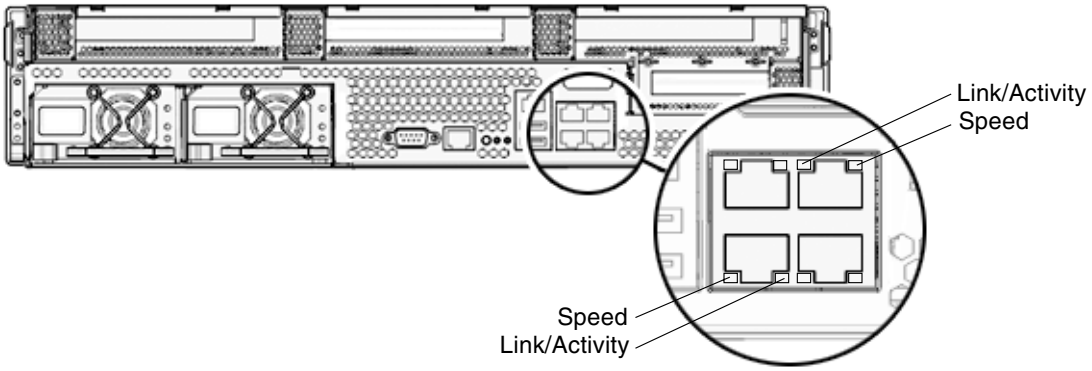

FIGURE 1-6 Ethernet Port LEDs

TABLE 1-5 Ethernet Port LEDs

LED	Color	Description
Left LED	Amber or Green	Speed indicator: • Amber On – The link is operating as a Gigabit connection (1000-Mbps) • Green On – The link is operating as a 100-Mbps connection. • Off – The link is operating as a 10/100-Mbps connection.
Right LED	Green	Link/Activity indicator: • Steady On – a link is established. • Blinking – there is activity on this port. • Off – No link is established.

Note – The NET MGT port only operates in 100-Mbps or 10-Mbps so the speed indicator LED can be green or off (never amber).

1.4 Using ALOM for Diagnosis and Repair Verification

The Sun Advanced Lights Out Manager (ALOM) CMT is a system controller in the server that enables you to remotely manage and administer your server.

ALOM enables you to remotely run diagnostics, such as power-on self-test (POST), that would otherwise require physical proximity to the server's serial port. You can also configure ALOM to send email alerts of hardware failures, hardware warnings, and other events related to the server or to ALOM.

The ALOM circuitry runs independently of the server, using the server's standby power. Therefore, ALOM firmware and software continue to function when the server operating system goes offline or when the server is powered off.

Note – Refer to the *Advanced Lights Out Manager (ALOM) CMT Guide* for comprehensive ALOM information.

Faults detected by ALOM, POST, and the Solaris Predictive Self-Healing (PSH) technology are forwarded to ALOM for fault handling (FIGURE 1-7).

In the event of a system fault, ALOM ensures that the fault LED is lit, FRU ID PROMs are updated, the fault is logged, and alerts are displayed (faulty FRUs are identified in fault messages using the FRU name). For a list of FRU names, see TABLE 2-1.

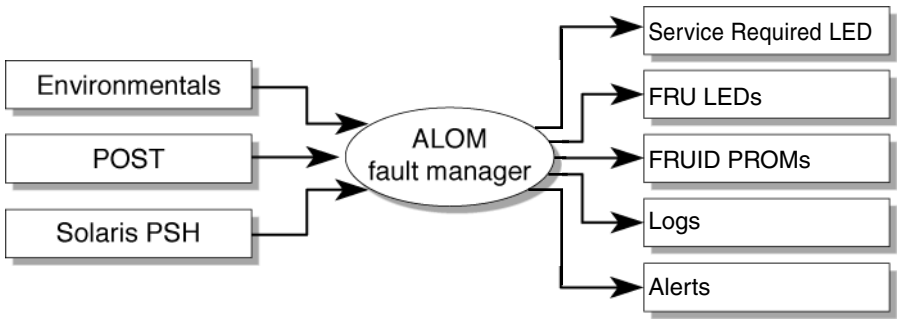

FIGURE 1-7 ALOM Fault Management

ALOM sends alerts to all ALOM users that are logged in, sending the alert through email to a configured email address, and writing the event to the ALOM event log.

ALOM can detect when a fault is no longer present and clears the fault in several ways:

- **Fault recovery** – The system automatically detects that the fault condition is no longer present. ALOM extinguishes the Service Required LED and updates the FRU's PROM, indicating that the fault is no longer present.
- **Fault repair** – The fault has been repaired by human intervention. In most cases, ALOM detects the repair and extinguishes the Service Required LED. If ALOM does not perform these actions, you must perform these tasks manually with `clearfault` or `enablecomponent` commands.

ALOM can detect the removal of a FRU, in many cases even if the FRU is removed while ALOM is powered off. This enables ALOM to know that a fault, diagnosed to a specific FRU, has been repaired. The ALOM `clearfault` command enables you to manually clear certain types of faults without a FRU replacement or if ALOM was unable to automatically detect the FRU replacement. ALOM does not automatically detect hard drive replacement.

Many environmental faults can automatically recover: a temperature that is exceeding a threshold might return to normal limits, unplugged power supplies can be plugged in, and so on. Recovery of environmental faults is automatically detected. Recovery events are reported using one of two forms:

- *fru* `at` *location* `is OK.`
- *sensor* `at` *location* `is within normal range.`

Environmental faults can be repaired through hot removal of the faulty FRU. FRU removal is automatically detected by the environmental monitoring and all faults associated with the removed FRU are cleared. The message for that case, and the alert sent for all FRU removals is:

fru `at` *location* `has been removed.`

There is no ALOM command to manually repair an environmental fault.

ALOM does not handle hard drive faults. Use the Solaris message files to view hard drive faults. See Section 1.7, "Collecting Information From Solaris OS Files and Commands" on page 1-35.

1.4.1 Displaying the Server's Faults

The ALOM `showfaults` command displays the following kinds of faults:

- **Environmental faults** – Temperature or voltage problems that might be caused by faulty FRUs (power supplies, fans, or blower), or by room temperature or blocked air flow to the server.
- **POST detected faults** – Faults on devices detected by the power-on self-test diagnostics.

- **PSH detected fault**s – Faults detected by the Solaris Predictive Self-Healing (PSH) technology.

Use the `showfaults` command for the following reasons:

- To see if any faults have been passed to, or detected by ALOM.
- To obtain the fault message ID (SUNW-MSG-ID) for PSH detected faults.
- To verify that the replacement of a FRU has cleared the fault and not generated any additional faults.

- **At the `sc>` prompt, type the `showfaults` command.**

The following `showfaults` command examples show the different kinds of output from the `showfaults` command:

- An example of the `showfaults` command when no faults are present:

```
sc> showfaults
Last POST run: THU MAR 09 16:52:44 2006
POST status: Passed all devices

No failures found in System
```

- An example of the `showfaults` command displaying an environmental fault:

```
sc> showfaults -v
Last POST run: TUE FEB 07 18:51:02 2006
POST status: Passed all devices
 ID FRU               Fault
  0 IOBD              VOLTAGE_SENSOR at IOBD/V_+1V has exceeded
low warning threshold.
```

- An example showing a fault that was detected by POST. These kinds of faults are identified by the message `deemed faulty and disabled` and by a FRU name.

```
sc> showfaults -v
   ID Time               FRU                Fault
    1 OCT 13 12:47:27   MB/CMP0/CH0/R0/D0 MB/CMP0/CH0/R0/D0 deemed
faulty and disabled
```

- An example showing a fault that was detected by the PSH technology. These kinds of faults are identified by the text `Host detected fault` and by a UUID.

```
sc> showfaults -v
ID Time              FRU               Fault
0 SEP 09 11:09:26   MB/CMP0/CH0/R0/D0 Host detected fault, MSGID:
SUN4U-8000-2S  UUID: 7ee0e46b-ea64-6565-e684-e996963f7b86
```

1.4.2 Displaying the Server's Environmental Status

The `showenvironment` command displays a snapshot of the server's environmental status. This command displays system temperatures, hard disk drive status, power supply and fan status, front panel LED status, voltage and current sensors. The output uses a format similar to the Solaris OS command `prtdiag` (1m).

- **At the `sc>` prompt, type the `showenvironment` command.**

  The output differs according to your system's model and configuration.

  For example:

```
sc> showenvironment
=============== Environmental Status ===============
------------------------------------------------------------------------------
--
System Temperatures (Temperatures in Celsius):
------------------------------------------------------------------------------
--
Sensor           Status  Temp LowHard LowSoft LowWarn HighWarn HighSoft
HighHard
------------------------------------------------------------------------------
--
PDB/T_AMB        OK        23    -10      -5       0      45
50       55
MB/T_AMB         OK        26    -10      -5       0      50
55       60
MB/CMP0/T_TCORE  OK        44    -10      -5       0      85
95      100
MB/CMP0/T_BCORE  OK        45    -10      -5       0      85
95      100
IOBD/IOB/TCORE   OK        41    -10      -5       0      95
100     105
IOBD/T_AMB       OK        30    -10      -5       0      45
50       55
------------------------------------------------------
System Indicator Status:
```

```
-------------------------------------------------------
SYS/LOCATE            SYS/SERVICE          SYS/ACT
OFF                   ON                   ON
-------------------------------------------------------
SYS/REAR_FAULT        SYS/TEMP_FAULT       SYS/TOP_FAN_FAULT
OFF                   OFF                  OFF
-------------------------------------------------------
-----------------------------------------
System Disks:
-----------------------------------------
Disk   Status             Service  OK2RM
-----------------------------------------
HDD0   OK                 OFF      OFF
HDD1   OK                 OFF      OFF
HDD2   OK                 OFF      OFF
HDD3   OK                 OFF      OFF
-------------------------------------------------
Fans Status:
-------------------------------------------------
Fans (Speeds Revolution Per Minute):
Sensor           Status           Speed   Warn    Low
-----------------------------------------------------------
FT0/FM0          OK                3618     --   1920
FT0/FM1          OK                3437     --   1920
FT0/FM2          OK                3556     --   1920
FT2              OK                2578     --   1900
-----------------------------------------------------------
-------------------------------------------------------------------------------
--
Voltage sensors (in Volts):
-------------------------------------------------------------------------------
--
Sensor          Status      Voltage LowSoft LowWarn HighWarn HighSoft
-------------------------------------------------------------------------------
--
MB/V_+1V5       OK            1.48    1.36    1.39    1.60     1.63
MB/V_VMEML      OK            1.78    1.69    1.72    1.87     1.90
MB/V_VMEMR      OK            1.78    1.69    1.72    1.87     1.90
MB/V_VTTL       OK            0.87    0.84    0.86    0.93     0.95
MB/V_VTTR       OK            0.87    0.84    0.86    0.93     0.95
MB/V_+3V3STBY   OK            3.33    3.13    3.16    3.53     3.59
MB/V_VCORE      OK            1.30    1.20    1.24    1.36     1.39
IOBD/V_+1V5     OK            1.48    1.27    1.35    1.65     1.72
IOBD/V_+1V8     OK            1.78    1.53    1.62    1.98     2.07
IOBD/V_+3V3MAIN OK            3.38    2.80    2.97    3.63     3.79
IOBD/V_+3V3STBY OK            3.33    2.80    2.97    3.63     3.79
IOBD/V_+1V      OK            1.11    0.93    0.99    1.21     1.26
IOBD/V_+1V2     OK            1.17    1.02    1.08    1.32     1.38
IOBD/V_+5V      OK            5.09    4.25    4.50    5.50     5.75
```

```
IOBD/V_-12V     OK          -12.11  -13.80  -13.20  -10.80   -10.20
IOBD/V_+12V     OK           12.18   10.20   10.80   13.20    13.80
SC/BAT/V_BAT    OK            3.03      --    2.69      --       --
-------------------------------------------------------------
System Load (in amps):
-------------------------------------------------------------
Sensor           Status              Load     Warn Shutdown
-------------------------------------------------------------
MB/I_VCORE       OK                25.280   80.000   88.000
MB/I_VMEML       OK                 4.680   60.000   66.000
MB/I_VMEMR       OK                 4.680   60.000   66.000
-------------------------------------------------------------
----------------------
Current sensors:
----------------------
Sensor          Status
----------------------
IOBD/I_USB0      OK
IOBD/I_USB1      OK
FIOBD/I_USB      OK
-------------------------------------------------------------------------------
Power Supplies:
-------------------------------------------------------------------------------
Supply  Status          Underspeed  Overtemp  Overvolt  Undervolt
Overcurrent
-------------------------------------------------------------------------------
PS0     OK              OFF         OFF       OFF       OFF        OFF
PS1     OK              OFF         OFF       OFF       OFF        OFF

sc>
```

Note – Some environmental information might not be available when the server is in Standby mode.

1.4.3 Displaying Information About the Server's FRUs

The `showfru` command displays information about the FRUs in the server. Use this command to see information about an individual FRU, or for all the FRUs.

Note – By default, the output of the `showfru` command for all FRUs is very long.

- **At the** `sc>` **prompt, enter the** `showfru` **command.**

  In the following example, the `showfru` command is used to get information about the motherboard (MB).

```
sc> showfru MB.SEEPROM
SEGMENT: SD
/ManR
/ManR/UNIX_Timestamp32:      WED OCT 12 18:24:28 2005
/ManR/Description:           ASSY,Sun-Fire-T2000,CPU Board
/ManR/Manufacture Location:  Sriracha,Chonburi,Thailand
/ManR/Sun Part No:           5016843
/ManR/Sun Serial No:         NC00OD
/ManR/Vendor:                Celestica
/ManR/Initial HW Dash Level: 06
/ManR/Initial HW Rev Level:  02
/ManR/Shortname:             T2000_MB
/SpecPartNo:                 885-0483-04
SEGMENT: FL
/Configured_LevelR
/Configured_LevelR/UNIX_Timestamp32:     WED OCT 12 18:24:28 2005
/Configured_LevelR/Sun_Part_No:          5410827
/Configured_LevelR/Configured_Serial_No: N4001A
/Configured_LevelR/HW_Dash_Level:        03
.
.
.
```

1.5 Running POST

Power-on self-test (POST) is a group of PROM-based tests that run when the server is powered on or reset. POST checks the basic integrity of the critical hardware components in the server (CPU, memory, and I/O buses).

If POST detects a faulty component, it is disabled automatically, preventing faulty hardware from potentially harming any software. If the system is capable of running without the disabled component, the system will boot when POST is complete. For example, if one of the processor cores is deemed faulty by POST, the core will be disabled, and the system will boot and run using the remaining cores.

Note – Devices can be manually enabled or disabled using ASR commands (see Section 1.8, "Managing Components With Automatic System Recovery Commands" on page 1-36).

1.5.1 Controlling How POST Runs

The server can be configured for normal, extensive, or no POST execution. You can also control the level of tests that run, the amount of POST output that is displayed, and which reset events trigger POST by using ALOM variables.

TABLE 1-6 lists the ALOM variables used to configure POST and FIGURE 1-8 shows how the variables work together. All of these parameters are set using the ALOM `setsc` command except for the `setkeyswitch` command.

TABLE 1-6 ALOM Parameters Used For POST Configuration

Parameter	Values	Description
`setkeyswitch`	`normal`	The system can power on and run POST (based on the other parameter settings). For details see FIGURE 1-8. This parameter overrides all other commands.
	`diag`	The system runs POST based on predetermined settings.
	`stby`	The system cannot power on.
	`locked`	The system can power on and run POST, but no flash updates can be made.
`diag_mode`	`off`	POST does not run.
	`normal`	Runs POST according to `diag_level` value.
	`service`	Runs POST with preset values for `diag_level` and `diag_verbosity`.
`diag_level`	`min`	If `diag_mode` = `normal`, runs minimum set of tests.
	`max`	If `diag_mode` = `normal`, runs all the minimum tests plus extensive CPU and memory tests.
`diag_trigger`	`none`	POST is not run on reset.
	`user_reset`	Runs POST upon user initiated resets.
	`power_on_reset`	Only runs POST for the first power on. This is the default.

TABLE 1-6 ALOM Parameters Used For POST Configuration

Parameter	Values	Description
	`error_reset`	Runs POST if fatal errors are detected.
	`all_reset`	Runs POST after any reset.
`diag_verbosity`	`none`	No POST output is displayed.
	`min`	POST output displays functional tests with a banner and pinwheel.
	`normal`	POST output displays all test and informational messages.
	`max`	POST displays all test, informational, and some debugging messages.

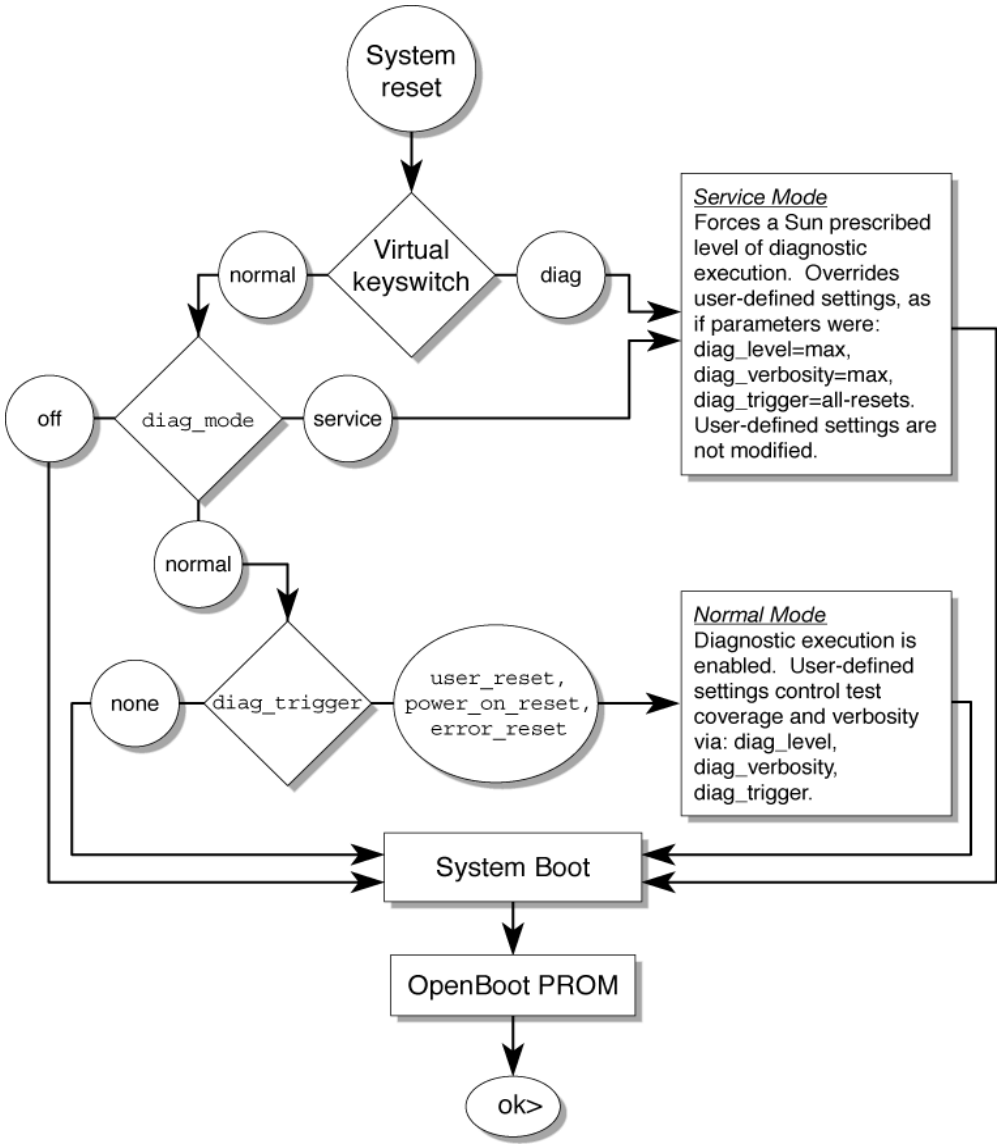

FIGURE 1-8 Flowchart of ALOM Variables for POST Configuration

TABLE 1-7 shows typical combinations of ALOM variables and associated POST modes.

TABLE 1-7 ALOM Parameters and POST Modes

Parameter	Normal Diagnostic Mode (default settings)	No POST Execution	Diagnostic Service Mode	Keyswitch Diagnostic preset values
`diag_mode`	`normal`	off	`service`	`normal`
`setkeyswitch`*	`normal`	normal	`normal`	`diag`
`diag_level`	`max`	n/a	`max`	`max`
`diag_trigger`	`power-on-reset error-reset`	none	`all-resets`	`all-resets`
`diag_verbosity`	`normal`	n/a	`max`	`max`
Description of POST execution	This is the default POST configuration. This configuration tests the system thoroughly, and suppresses some of the detailed POST output.	POST does not run, resulting in quick system initialization, but this is not a suggested configuration.	POST runs the full spectrum of tests with the maximum output displayed.	POST runs the full spectrum of tests with the maximum output displayed.

* The `setkeyswitch` parameter, when set to `diag`, overrides all the other ALOM POST variables.

1.5.2 Changing POST Parameters

1. **Access the ALOM `sc>` prompt:**

   At the console, issue the `#.` key sequence:

   ```
   #.
   ```

2. **At the ALOM `sc>` prompt, set the POST parameter:**

   - For the `setkeyswitch` parameters, use the following syntax:

     ```
     sc> setkeyswitch mode
     ```

   - For other parameters, use the following syntax:

     ```
     sc> setsc parameter mode
     ```

1.5.3 Reasons to Run POST

You can use POST to verify functionality of the server hardware and for troubleshooting as described in the following sections.

1.5.3.1 Verifying Functionality of the Hardware

POST tests critical hardware components to verify functionality before the system boots and accesses software. If POST detects an error, the faulty component is disabled automatically, preventing faulty hardware from potentially harming software.

Under normal operating conditions, the server is usually configured to run POST in maximum mode for all power-on or error-generated resets.

1.5.3.2 Diagnosing the System Hardware

You can use POST as an initial diagnostic tool for the system hardware. In this case, configure POST to run in diagnostic service mode for maximum test coverage and verbose output.

1.5.4 Running POST to Troubleshoot the Server

This procedure describes how to run POST when you want maximum testing, as in the case when you are troubleshooting a system.

1. **Switch from the system console prompt to the ALOM** `sc>` **prompt by issuing the** `#.` **escape sequence.**

```
ok #.
sc>
```

2. **Set the virtual keyswitch to** `diag` **so that POST will run in service mode.**

```
sc> setkeyswitch diag
```

3. **Reset the system so that POST runs.**

   There are several ways to initiate a reset. The following example uses the `powercycle` command. For other methods, refer to the server administration guide.

```
sc> powercycle
Are you sure you want to powercycle the system [y/n]? y
Powering host off at MON JAN 10 02:52:02 2000

Waiting for host to Power Off; hit any key to abort.

SC Alert: SC Request to Power Off Host.

SC Alert: Host system has shut down.
Powering host on at MON JAN 10 02:52:13 2000

SC Alert: SC Request to Power On Host.
```

4. **Switch to the system console to view the post output:**

```
sc> console
```

   An example of POST output. (Some output has been omitted for brevity):

```
SC Alert: Host System has Reset                Note: some output omitted.
 0:0>
 0:0>Copyright © 2005 Sun Microsystems, Inc. All rights reserved
 SUN PROPRIETARY/CONFIDENTIAL.
 Use is subject to license terms.
 0:0>VBSC selecting POST MAX Testing.
 0:0>VBSC enabling L2 Cache.
 0:0>VBSC enabling Full Memory Scrub.
 0:0>VBSC enabling threads: fffff00f
 0:0>Init CPU
 0:0>Start Selftest.....
 0:0>CPU =: 0
 0:0>DMMU Registers Access
 0:0>IMMU Registers Access
 0:0>Init mmu regs
 0:0>D-Cache RAM
 0:0>Init MMU.....
 0:0>DMMU TLB DATA RAM Access
 0:0>DMMU TLB TAGS Access
 0:0>DMMU CAM
 0:0>IMMU TLB DATA RAM Access
```

```
 0:0>IMMU TLB TAGS Access
 0:0>IMMU CAM
 0:0>Setup and Enable DMMU
 0:0>Setup DMMU Miss Handler
 0:0>Niagara, Version 2.0
 0:0>Serial Number 00000098.00000820 = fffff231.17422755
 0:0>Init JBUS Config Regs
 0:0>IO-Bridge unit 1 init test
0:0>sys 150 MHz, CPU 600 MHz, mem 150 MHz.
 0:0>Integrated POST Testing
 0:0>Setup L2 Cache
 0:0>L2 Cache Control = 00000000.00300000
 0:0>Scrub and Setup L2 Cache
 0:0>L2 Directory clear
 0:0>L2 Scrub VD & UA
 0:0>L2 Scrub Tags
 0:0>Test Memory.....
0:0>Scrub 00000000.00600000->00000001.00000000 on Memory Channel
[0 1 2 3 ] Rank 0 Stack 0
 0:0>Scrub 00000001.00000000->00000002.00000000 on Memory Channel
[0 1 2 3 ] Rank 1 Stack 0
 3:0>IMMU Functional
 7:0>IMMU Functional
 7:0>DMMU Functional
 0:0>IMMU Functional
 0:0>DMMU Functional
 0:0>Print Mem Config
 0:0>Caches : Icache is ON, Dcache is ON.
 0:0>Bank 0 4096MB : 00000000.00000000 -> 00000001.00000000.
 0:0>Bank 2 4096MB : 00000001.00000000 -> 00000002.00000000.
 0:0>Block Mem Test
 0:0>Test 4288675840 bytes at 00000000.00600000 Memory Channel [
0 1 2 3 ] Rank 0 Stack 0
 0:0>........
 0:0>Test 4294967296 bytes at 00000001.00000000 Memory Channel [
0 1 2 3 ] Rank 1 Stack 0
 0:0>........
 0:0>IO-Bridge Tests.....
 0:0>IO-Bridge Quick Read
 0:0>
 0:0>------------------------------------------------------------
--
 0:0>--------- IO-Bridge Quick Read Only of CSR and ID ----------
-----
```

```
 0:0>------------------------------------------------------------
--
 0:0>fire 1 JBUSID 00000080.0f000000 =
 0:0>IO-Bridge unit 1 Config MB bridges
 0:0>Config port A, bus 2 dev 0 func 0, tag IOBD/PCI-SWITCH0
 0:0>Config port A, bus 3 dev 1 func 0, tag IOBD/GBE0
 0:0>INFO:Master Abort for probe, device IOBD/PCIE1 looks like it
is not present!
 0:0>INFO:Master Abort for probe, device IOBD/PCIE2 looks like it
is not present!
 0:0>INFO:
 0:0>POST Passed all devices.
 0:0>
 0:0>DEMON: (Diagnostics Engineering MONitor)
 0:0>Select one of the following functions
 0:0>POST:Return to OBP.
 0:0>INFO:
 0:0>POST Passed all devices.
 0:0>Master set ACK for vbsc runpost command and spin...
```

5. **Perform further investigation if needed.**

   - If no faults were detected, the system will boot.
   - If POST detects a faulty device, the fault is displayed and the fault information is passed to ALOM for fault handling. Faulty FRUs are identified in fault messages using the FRU name. For a list of FRU names, see TABLE 2-1.

   a. Interpret the POST messages:

   POST error messages use the following syntax:

   c:*s* > `ERROR: TEST =` *failing-test*
   c:*s* > `H/W under test =` *FRU*
   c:*s* > `Repair Instructions: Replace items in order listed by H/W under test above`
   c:*s* > `MSG =` *test-error-message*
   c:*s* > `END_ERROR`

   In this syntax, *c* = the core number, *s* = the strand number.

   Warning and informational messages use the following syntax:

   `INFO` or `WARNING`: *message*

The following example shows a POST error message.

```
7:2>
7:2>ERROR: TEST = Data Bitwalk
7:2>H/W under test = MB/CMP0/CH2/R0/D0/S0 (MB/CMP0/CH2/R0/D0)
7:2>Repair Instructions: Replace items in order listed by 'H/W
under test' above.
7:2>MSG = Pin 149 failed on MB/CMP0/CH2/R0/D0 (J1601)
7:2>END_ERROR

7:2>Decode of Dram Error Log Reg Channel 2 bits
60000000.0000108c
7:2> 1 MEC 62 R/W1C Multiple corrected
errors, one or more CE not logged
7:2> 1 DAC 61 R/W1C Set to 1 if the error
was a DRAM access CE
7:2> 108c SYND 15:0 RW ECC syndrome.
7:2>
7:2> Dram Error AFAR channel 2 = 00000000.00000000
7:2> L2 AFAR channel 2 = 00000000.00000000
```

In this example, POST is reporting a memory error at DIMM location `MB/CMP0/CH2/R0/D0`. It was detected by POST running on core 7, strand 2.

b. Run the `showfaults` command to obtain additional fault information.

The fault is captured by ALOM, where the fault is logged, the Service Required LED is lit, and the faulty component is disabled.

For example:

```
ok .#
sc> showfaults -v
   ID   Time               FRU               Fault
    1 APR 24 12:47:27    MB/CMP0/CH2/R0/D0   MB/CMP0/CH2/R0/D0
deemed faulty and disabled
```

In this example, `MB/CMP0/CH2/R0/D0` is disabled. The system can boot using memory that was not disabled until the faulty component is replaced.

Note – You can use ASR commands to display and control disabled components. See Section 1.8, "Managing Components With Automatic System Recovery Commands" on page 1-36.

1.5.5 Clearing POST-Detected Faults

In most cases, when POST detects a faulty component, POST logs the fault and automatically takes the failed component out of operation by placing the component in the ASR blacklist (see Section 1.8, "Managing Components With Automatic System Recovery Commands" on page 1-36).

After the faulty FRU is replaced, you must clear the fault by removing the component from the ASR blacklist.

1. **After replacing a faulty FRU, at the ALOM prompt, use the `showfaults` command to identify POST-detected faults.**
   - If no fault is reported, you need not do anything else. Stop here.
   - If a POST detected fault is reported, you can distinguish it from other kinds of faults by the text `deemed faulty and disabled`, and no UUID number is reported. For example:

```
sc> showfaults -v
   ID   Time               FRU               Fault
    1 APR 24 12:47:27    MB/CMP0/CH2/R0/D0   MB/CMP0/CH2/R0/D0
deemed faulty and disabled
```

2. **Use the `enablecomponent` command to clear the fault and remove the component from the ASR blacklist.**

   Use the FRU name that was reported in the fault in the previous step.

   For example:

```
sc> enablecomponent MB/CMP0/CH0/R0/D0
```

   The fault is cleared and should not show up when you run the `showfaults` command. Additionally, the fault LED is no longer on.

3. **Reboot the server.**

   You must reboot the server for the `enablecomponent` command to take effect.

4. **At the ALOM prompt, use the `showfaults` command to verify that no faults are reported.**

```
sc> showfaults
Last POST run: THU MAR 09 16:52:44 2006
POST status: Passed all devices

No failures found in System
```

1.6 Using the Solaris Predictive Self-Healing Feature

The Solaris Predictive Self-Healing (PSH) technology enables the server to diagnose problems while the Solaris OS is running, and mitigate many problems before they negatively affect operations.

The Solaris OS uses the fault manager daemon, `fmd(1M)`, which starts at boot time and runs in the background to monitor the system. If a component generates an error, the daemon handles the error by correlating the error with data from previous errors and other related information to diagnose the problem. Once diagnosed, the fault manager daemon assigns the problem a Universal Unique Identifier (UUID) that distinguishes the problem across any set of systems. When possible, the fault manager daemon initiates steps to self-heal the failed component and take the component offline. The daemon also logs the fault to the `syslogd` daemon and provides a fault notification with a message ID (MSGID). You can use the message ID to get additional information about the problem from Sun's knowledge article database.

The Predictive Self-Healing technology covers the following server components:

- UltraSPARC® T1 multicore processor
- Memory
- I/O bus

The PSH console message provides the following information:

- Type
- Severity
- Description
- Automated response
- Impact
- Suggested action for system administrator

If the Solaris PSH facility detects a faulty component, use the `fmdump` command to identify the fault. Faulty FRUs are identified in fault messages using the FRU name. For a list of FRU names, see TABLE 2-1.

Note – Additional Predictive Self-Healing information is available at:
`http://www.sun.com/msg`

1.6.1 Using the `fmdump` Command to Identify Faults

The `fmdump` command displays the list of faults detected by the Solaris PSH facility. Use this command for the following reasons:

- To see if any faults have been detected by the Solaris PSH facility.
- If you need to obtain the fault message ID (SUNW-MSG-ID) for detected faults.
- To verify that the replacement of a FRU has cleared the fault and not generated any additional faults.

If you already have a fault message ID, go to Step 2 to obtain more information about the fault from Suns Predictive Self-Healing Knowledge Article web site.

Note – Faults detected by the Solaris PSH facility are also reported through ALOM alerts. In addition to the PSH `fmdump` command, the ALOM `showfaults` command also provides information about faults and displays fault UUIDs. See Section 1.4.1, "Displaying the Server's Faults" on page 1-15.

---

1. **Check the event log using the `fmdump` command with `-v` for verbose output.**

   For example:

```
# fmdump -v
TIME                 UUID                                 SUNW-MSG-
ID
Apr 24 06:54:08.2005 1ce22523-1c80-6062-e61d-f3b39290ae2c SUN4U-
8000-6H
100% fault.cpu.ultraSPARCT1l2cachedata
       FRU:hc:///component=MB
       rsrc: cpu:///cpuid=0/serial=22D1D6604A
```

   In this example, a fault is displayed, indicating the following details:

   - Date and time of the fault (`Apr 24 06:54:08.2005`)
   - Universal Unique Identifier (UUID) that is unique for every fault (`1ce22523-1c80-6062-e61d-f3b39290ae2c`)
   - Sun message identifier (`SUNW4V-8000-6H`) that can be used to obtain additional fault information
   - Faulted FRU (`FRU:hc:///component=MB`), that in this example is identified as `MB`, indicating that the motherboard requires replacement.

2. **Use the Sun message ID to obtain more information about this type of fault.**

   a. **In a browser, go to the Predictive Self-Healing Knowledge Article web site:** `http://www.sun.com/msg`

b. Enter the message ID in the SUNW-MSG-ID field, and press Lookup.

In this example, the message ID SUN4U-8000-6H returns the following information for corrective action:

```
CPU errors exceeded acceptable levels

Type
    Fault
Severity
    Major
Description
    The number of errors associated with this CPU has exceeded
acceptable levels.
Automated Response
   The fault manager will attempt to remove the affected CPU from
service.
Impact
    System performance may be affected.

Suggested Action for System Administrator
    Schedule a repair procedure to replace the affected CPU, the
identity of which can be determined using fmdump -v -u <EVENT_ID>.

Details
    The Message ID:   SUN4U-8000-6H indicates diagnosis has
determined that a CPU is faulty. The Solaris fault manager arranged
an automated attempt to disable this CPU. The recommended action
for the system administrator is to contact Sun support so a Sun
service technician can replace the affected component.
```

c. Follow the suggested actions to repair the fault.

1.6.2 Clearing PSH-Detected Faults

When the Solaris PSH facility detects faults, the faults are logged and displayed on the console. After the fault condition is corrected, for example by replacing a faulty FRU, you must clear the fault.

Note – If you are dealing with faulty DIMMs, perform the procedure in Section 4.4, "Replacing a DIMM" on page 4-10.

---

1. **After replacing a faulty FRU, boot the system.**

2. **At the ALOM prompt, use the `showfaults` command to identify PSH detected faults.**

   - If no fault is reported, you need not do anything else. Stop here.
   - If a PSH detected fault is reported, you can distinguish it from other kinds of faults by the text: `Host detected fault`.

     For example:

```
sc> showfaults -v
ID Time              FRU               Fault
0 SEP 09 11:09:26   MB/CMP0/CH0/R0/D0 Host detected fault, MSGID:
SUN4U-8000-2S  UUID: 7ee0e46b-ea64-6565-e684-e996963f7b86
```

3. **Clear the fault from all persistent fault records.**

   In some cases, even though the fault is cleared, some persistent fault information remains and results in erroneous fault messages at boot time. To ensure that these messages are not displayed, perform the following command:

   `fmadm repair` *UUID*

   For example:

```
# fmadm repair 7ee0e46b-ea64-6565-e684-e996963f7b86
```

1.6.3 Clearing the PSH Fault From the ALOM Logs

When the Solaris PSH facility detects faults, the faults are also logged by the ALOM system controller. After the fault condition is corrected, for example by replacing a faulty FRU, you must clear the fault from the ALOM logs.

Note – If you are dealing with faulty DIMMs, perform the procedure in Section 4.4, "Replacing a DIMM" on page 4-10.

---

1. **After replacing a faulty FRU, at the ALOM prompt, use the `showfaults` command to identify PSH detected faults.**

   - If no fault is reported, you need not do anything else. Stop here.

- If a PSH-detected fault is reported, you can distinguish it from other kinds of faults by the text: `Host detected fault`.

  For example:

```
sc> showfaults
ID FRU                  Fault
 0 MB                     Host detected fault, MSGID: SUNW-TEST07
UUID: 7ee0e46b-ea64-6565-e684-e996963f7b86
```

2. **Run the `clearfault` command with the UUID provided in the `showfaults` output:**

```
sc> clearfault 7ee0e46b-ea64-6565-e684-e996963f7b86
Clearing fault from all indicted FRUs...
Fault cleared.
```

1.7 Collecting Information From Solaris OS Files and Commands

With the Solaris OS running on the server, you have the full complement of Solaris OS files and commands available for collecting information and for troubleshooting.

If POST, ALOM, or the Solaris PSH features did not indicate the source of a fault, check the message buffer and log files for notifications for faults. Hard drive faults are usually captured by the Solaris message files.

Use the `dmesg` command to view the most recent system message. To view the system messages log file, view the contents of the `/var/adm/messages` file.

1.7.1 Checking the Message Buffer

1. **Log in as superuser.**
2. **Issue the `dmesg` command:**

```
# dmesg
```

The `dmesg` command displays the most recent messages generated by the system.

1.7.2 Viewing System Message Log Files

The error logging daemon, `syslogd`, automatically records various system warnings, errors, and faults in message files. These messages can alert you to system problems such as a device that is about to fail.

The `/var/adm` directory contains several message files. The most recent messages are in the `/var/adm/messages` file. After a period of time (usually every ten days), a new `messages` file is automatically created. The original contents of the `messages` file are rotated to a file named `messages.1`. Over a period of time, the messages are further rotated to `messages.2` and `messages.3`, and then deleted.

1. **Log in as superuser.**
2. **Issue the following command:**

```
# more /var/adm/messages
```

3. **If you want to view all logged messages, issue the following command:**

```
# more /var/adm/messages*
```

1.8 Managing Components With Automatic System Recovery Commands

The Automatic System Recovery (ASR) feature enables the server to automatically configure failed components out of operation until they can be replaced. The following server components are managed by the ASR feature:

- UltraSPARC T1 processor strands
- Memory DIMMS
- I/O bus

The database that contains the list of disabled components is called the ASR blacklist (`asr-db`).

In most cases, POST automatically disables a component when it is faulty. After the cause of the fault is repaired (FRU replacement, loose connector reseated, and so on), you must remove the component from the ASR blacklist.

There are three ALOM commands to assist you:

- `showcomponent`

- `disablecomponent` *asrkeys*
- `enablecomponent` *asrkeys*

where *asrkeys* vary from system to system, depending on how many cores and memory are present. The `showcomponent` command displays the `asrkeys` on a given system.

Note – A `reset` or `powercycle` is required after disabling or enabling a component. If the status of a component is changed with power on there is no effect to the system until the next reset or powercycle.

1.8.1 Displaying the Server's Components

The `showcomponent` command displays the server's components `asrkeys`) and reports their status.

1. **At the** `sc>` **prompt, enter the** `showcomponent` **command.**

An example with no disabled components:

```
sc> showcomponent

Keys:

MB/CMP0/P0      MB/CMP0/P1    MB/CMP0/P2       MB/CMP0/P3
MB/CMP0/P8      MB/CMP0/P9    MB/CMP0/P10      MB/CMP0/P11
MB/CMP0/P12    MB/CMP0/P13    MB/CMP0/P14      MB/CMP0/P15
MB/CMP0/P16    MB/CMP0/P17    MB/CMP0/P18      MB/CMP0/P19
MB/CMP0/P20    MB/CMP0/P21    MB/CMP0/P22      MB/CMP0/P23
MB/CMP0/P28    MB/CMP0/P29    MB/CMP0/P30      MB/CMP0/P31
MB/CMP0/CH0/R0/D0    MB/CMP0/CH0/R0/D1    MB/CMP0/CH0/R1/D0
MB/CMP0/CH0/R1/D1    MB/CMP0/CH1/R0/D0    MB/CMP0/CH1/R0/D1
MB/CMP0/CH1/R1/D0    MB/CMP0/CH1/R1/D1    MB/CMP0/CH2/R0/D0
MB/CMP0/CH2/R0/D1    MB/CMP0/CH2/R1/D0    MB/CMP0/CH2/R1/D1
MB/CMP0/CH3/R0/D0    MB/CMP0/CH3/R0/D1    MB/CMP0/CH3/R1/D0
MB/CMP0/CH3/R1/D1    IOBD/PCIEa    IOBD/PCIEb    PCIX1    PCIX0
PCIE2    PCIE1    PCIE0    TTYA

ASR state: clean
```

An example showing a disabled component:

```
sc> showcomponent
.
.
.
ASR state:  Disabled Devices
   MB/CMP0/CH3/R1/D1 : dimm15 deemed faulty
```

1.8.2 Disabling a Component

The `disablecomponent` command disables a component by adding it to the ASR blacklist.

1. **At the `sc>` prompt, enter the `disablecomponent` command.**

```
sc> disablecomponent MB/CMP0/CH3/R1/D1

SC Alert:MB/CMP0/CH3/R1/D1 disabled
```

2. **After receiving confirmation that the `disablecomponent` command is complete, reset the server so that the ASR command takes effect.**

```
sc> reset
```

1.8.3 Enabling a Component

The `enablecomponent` command enables a disabled component by removing it from the ASR blacklist.

1. **At the `sc>` prompt, enter the `enablecomponent` command.**

```
sc> enablecomponent MB/CMP0/CH3/R1/D1

SC Alert:MB/CMP0/CH3/R1/D1 reenabled
```

2. **After receiving confirmation that the `enablecomponent` command is complete, reset the server for so that the ASR command takes effect.**

```
sc> reset
```

1.9 Exercising the System With SunVTS

Sometimes a server exhibits a problem that cannot be isolated definitively to a particular hardware or software component. In such cases, it might be useful to run a diagnostic tool that stresses the system by continuously running a comprehensive battery of tests. Sun provides the SunVTS software for this purpose.

This chapter describes the tasks necessary to use SunVTS software to exercise your server:

- Section 1.9.1, "Checking Whether SunVTS Software Is Installed" on page 1-39
- Section 1.9.2, "Exercising the System Using SunVTS Software" on page 1-40

1.9.1 Checking Whether SunVTS Software Is Installed

This procedure assumes that the Solaris OS is running on the server, and that you have access to the Solaris command line.

1. **Check for the presence of SunVTS packages using the `pkginfo` command.**

```
% pkginfo -l SUNWvts SUNWvtsr SUNWvtsts SUNWvtsmn
```

- If SunVTS software is loaded, information about the packages is displayed.
- If SunVTS software is not loaded, you see an error message for each missing package.

```
ERROR: information for "SUNWvts" was not found
ERROR: information for "SUNWvtsr" was not found
...
```

The following table lists SunVTS packages:

Package	Description
SUNWvts	SunVTS framework
SUNWvtsr	SunVTS framework (root)
SUNWvtsts	SunVTS for tests
SUNWvtsmn	SunVTS man pages

If SunVTS is not installed, you can obtain the installation packages from the following:

- Solaris Operating System DVDs
- Sun Download Center: `http://www.sun.com/oem/products/vts`

The SunVTS 6.0 PS3 software, and future compatible versions, are supported on the server.

SunVTS installation instructions are described in the *SunVTS User's Guide*.

1.9.2 Exercising the System Using SunVTS Software

Before you begin, the Solaris OS must be running. You also must ensure that SunVTS validation test software is installed on your system. See Section 1.9.1, "Checking Whether SunVTS Software Is Installed" on page 1-39.

The SunVTS installation process requires that you specify one of two security schemes to use when running SunVTS. The security scheme you choose must be properly configured in the Solaris OS for you to run SunVTS. For details, refer to the *SunVTS User's Guide*.

SunVTS software features both character-based and graphics-based interfaces. This procedure assumes that you are using the graphical user interface (GUI) on a system running the Common Desktop Environment (CDE). For more information about the character-based SunVTS TTY interface, and specifically for instructions on accessing it by `TIP` or `telnet` commands, refer to the *SunVTS User's Guide.*

SunVTS software can be run in several modes. This procedure assumes that you are using the default mode.

This procedure also assumes that the server is *headless,* that is, it is not equipped with a monitor capable of displaying bit mapped graphics. In this case, you access the SunVTS GUI by logging in remotely from a machine that has a graphics display.

Finally, this procedure describes how to run SunVTS tests in general. Individual tests might presume the presence of specific hardware, or might require specific drivers, cables, or loopback connectors. For information about test options and prerequisites, refer to the following documentation:

- *SunVTS Test Reference Manual*
- *SunVTS 6.0 PS3 Doc Supplement (SPARC)*

1. **Log in as superuser to a system with a graphics display.**

   The display system should be one with a frame buffer and monitor capable of displaying bit-mapped graphics such as those produced by the SunVTS GUI.

2. **Enable the remote display.**

   On the display system, type:

```
# /usr/openwin/bin/xhost + test-system
```

   where *test-system* is the name of the server you plan to test.

3. **Remotely log in to the server as superuser.**

   Use a command such as `rlogin` or `telnet`.

4. **Start SunVTS software.**

   If you have installed SunVTS software in a location other than the default `/opt` directory, alter the path in the following command accordingly.

```
# /opt/SUNWvts/bin/sunvts -display display-system:0
```

   where *display-system* is the name of the machine through which you are remotely logged in to the server.

   The SunVTS GUI is displayed (FIGURE 1-9).

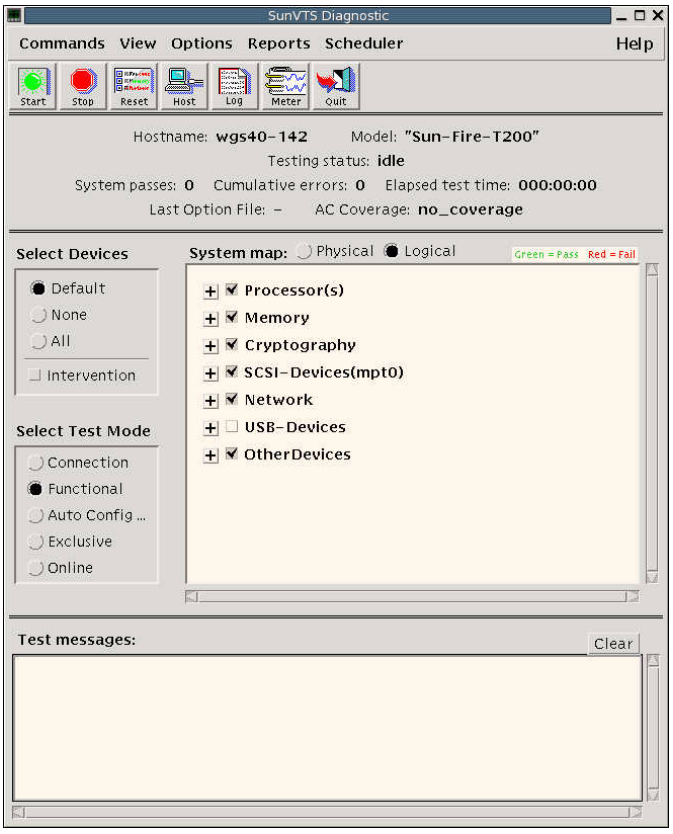

FIGURE 1-9 SunVTS GUI

5. **Expand the test lists to see the individual tests.**

   The test selection area lists tests in categories, such as *Network*, as shown in FIGURE 1-10. To expand a category, left-click the ⊞ icon (Expand Category icon) to the left of the category name.

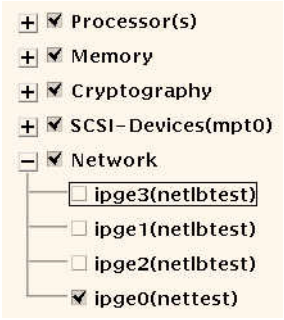

FIGURE 1-10 SunVTS Test Selection Panel

6. **(*Optional*) Select the tests you want to run.**

   Certain tests are enabled by default, and you can choose to accept these.

   Alternatively, you can enable and disable individual tests or blocks of tests by clicking the checkbox next to the test name or test category name. Tests are enabled when checked, and disabled when not checked.

   TABLE 1-8 lists tests that are especially useful to run on a server.

TABLE 1-8 Useful SunVTS Tests to Run on a Server

SunVTS Tests	FRUs Exercised by Tests
`cmttest`, `cputest`, `fputest`, `iutest`, `l1dcachetest`, `dtlbtest`, and `l2sramtest`—*indirectly*: `mptest`, and `systest`	Memory DIMMS, CPU motherboard
`disktest`	Disks, cables, disk backplane
`cddvdtest`	Optical media drive, cable, motherboard
`nettest`, `netlbtest`	Network interface, network cable, CPU motherboard
`pmemtest`, `vmemtest`, `ramtest`	Memory DIMMs, motherboard
`serialtest`	I/O (serial port interface)
`usbkbtest`, `disktest`	USB devices, cable, `CPU` motherboard (USB controller)
`hsclbtest`	Motherboard, system controller (Host to system controller interface)

7. **(*Optional*) Customize individual tests.**

   You can customize individual tests by right-clicking on the name of the test. For example, in FIGURE 1-10, right-clicking on the text string `ce0(nettest)` brings up a menu that enables you to configure this Ethernet test.

8. **Start testing.**

   Click the Start button that is located at the top left of the SunVTS window. Status and error messages appear in the test messages area located across the bottom of the window. You can stop testing at any time by clicking the Stop button.

   During testing, SunVTS software logs all status and error messages. To view these, click the Log button or select Log Files from the Reports menu. This opens a log window from which you can choose to view the following logs:

   - **Information** – Detailed versions of all the status and error messages that appear in the test messages area.
   - **Test error** – Detailed error messages from individual tests.
   - **VTS kernel error** – Error messages pertaining to SunVTS software itself. You should look here if SunVTS software appears to be acting strangely, especially when it starts up.
   - **Solaris OS message**s (`/var/adm/messages`) – A file containing messages generated by the operating system and various applications.
   - **Log files** (`/var/opt/SUNWvts/logs`) – A directory containing the log files.

1.10 Obtaining the Chassis Serial Number

To obtain support for your system, you need your chassis serial number. The chassis serial number is located on a sticker that is on the front of the server and another sticker on the side of the server. You can also run the ALOM `showplatform` command to obtain the chassis serial number.

For example:

```
sc> showplatform
SUNW,Sun-Fire-T2000
Chassis Serial Number: 0529AP000882
Domain Status
------ ------
S0 OS Standby
sc>
```

1.11 Additional Service Related Information

In addition to this service manual, the following resources are available to help you keep your server running optimally:

- **Product Notes** – The server product notes contain late-breaking information about the system including required software patches, updated hardware and compatibility information, and solutions to know issues. The product notes are available online at: http://www.sun.com/documentation
- **Release Notes** – The Solaris OS release notes contain important information about the Solaris OS. The release notes are available online at: http://www.sun.com/documentation
- **SunSolve™ Online** – Provides a collection of support resources. Depending on the level of your service contract, you have access to Sun patches, the Sun System Handbook, the SunSolve knowledge base, the Sun Support Forum, and additional documents, bulletins, and related links. Access this site at: http://sunsolve.sun.com
- **Predictive Self-Healing Knowledge Database** – You can access the knowledge article corresponding to a self-healing message by taking the Sun Message Identifier (SUNW-MSG-ID) and entering it into the field on this page: http://www.sun.com/msg

CHAPTER 2

Preparing for Service

This chapter describes safety considerations and provides prerequisite procedures and information to replace components within the server.

Topic include:

- Section 2.1, “Safety Information” on page 2-1
- Section 2.2, “Required Tools” on page 2-3
- Section 2.3, “Prerequisite Tasks for Component Replacement” on page 2-3
- Section 2.4, “Illustrated FRU Locations” on page 2-13

2.1 Safety Information

This section describes important safety information you need to know prior to removing or installing parts in the server.

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

- Follow all Sun standard cautions, warnings, and instructions marked on the equipment and described in *Important Safety Information for Sun Hardware Systems*, 816-7190.
- Ensure that the voltage and frequency of your power source match the voltage and frequency inscribed on the equipment s electrical rating label.
- Follow the electrostatic discharge safety practices as described in this section.

2.1.1 Safety Symbols

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

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

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

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

2.1.2 Electrostatic Discharge Safety

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

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

2.1.2.1 Use an Antistatic Wrist Strap

Wear an antistatic wrist strap and use an antistatic mat when handling components such as drive assemblies, boards, or cards. When servicing or removing server components, attach an antistatic strap to your wrist and then to a metal area on the chassis. Then disconnect the power cords from the server. Following this practice equalizes the electrical potentials between you and the server.

2.1.2.2 Use an Antistatic Mat

Place ESD-sensitive components such as the motherboard, memory, and other PCB cards on an antistatic mat.

2.2 Required Tools

The server can be serviced with the following tools:

- Antistatic wrist strap
- Antistatic mat
- No. 2 Phillips screwdriver

2.3 Prerequisite Tasks for Component Replacement

Before you can remove and install components that are inside the server, you must perform the following procedures:

- Section 2.3.1, "Powering Off the Server" on page 2-3
- Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4
- Section 2.3.3, "Removing the Server From the Rack" on page 2-5
- Section 2.3.4, "Performing Antistatic Measures" on page 2-7
- Section 2.3.5, "Removing the Top Cover" on page 2-8

Depending upon the component, you might also need to remove the PCI tray:

- Section 2.3.6, "Removing the PCI Tray" on page 2-8

Note – When replacing the hard drives or power supplies, not all of these tasks are necessary. The replacement procedures for those components address this fact.

2.3.1 Powering Off the Server

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

1. **Log in as superuser or equivalent.**

   Depending on the nature of the problem, you might want to view the system status, the log files, or run diagnostics before you shut down the system. Refer to the server administration guide for log file information.

2. **Notify affected users.**

   Refer to your Solaris system administration documentation for additional information.

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

   Refer to your application documentation for specific information on these processes.

4. **Shut down the Solaris OS.**

   Refer to the Solaris system administration documentation for additional information.

5. **Switch from the system console to the ALOM-CMT `sc>` prompt by typing the `#.` (Hash-Period) key sequence.**

6. **At the ALOM-CMT `sc>` prompt, issue the `poweroff` command.**

```
sc> poweroff -fy
SC Alert: SC Request to Power Off Host Immediately.
```

Note – You can also use the Power button on the front of the server to initiate a graceful system shutdown. This button is recessed to prevent accidental server power-off. Use the tip of a pen to operate this button.

Refer to the *Advanced Lights Out Management (ALOM) CMT Guide* for more information about the ALOM-CMT poweroff command.

7. **Disconnect the cables from the server.**

   See Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4.

2.3.2 Disconnecting Cables From the Server

Caution – The system supplies standby power to the circuit boards even when the system is powered off.

---

1. **Label all cables connected to the server.**

2. **Disconnect the following cables as appropriate:**

   - PCI-X 0
   - PCI-X 1
   - PCI-X 2
   - Alarm
   - PCI-E 0

- TTYA
- SER MGT
- NET MGT
- USB 1
- USB 0
- GBE 2
- GBE 3
- GBE 0
- GBE 1
- Power supply 0
- Power supply 1

3. **If you are going to remove the CMA, also remove the cables from it.**
4. **Remove the server from the rack.**

2.3.3 Removing the Server From the Rack

Removing the server from the rack is recommended for all cold-swappable FRU replacement procedures except the DIMMs, PCI cards, and the system controller.

Caution – The server weighs approximately 40 lb (18 kg). Two people are required to dismount and carry the chassis.

1. **Disconnect all the cables and power cords from the server.**
2. **From the front of the server, release the slide rail latches on each side.**

   Pinch the green latches as shown in FIGURE 2-1.

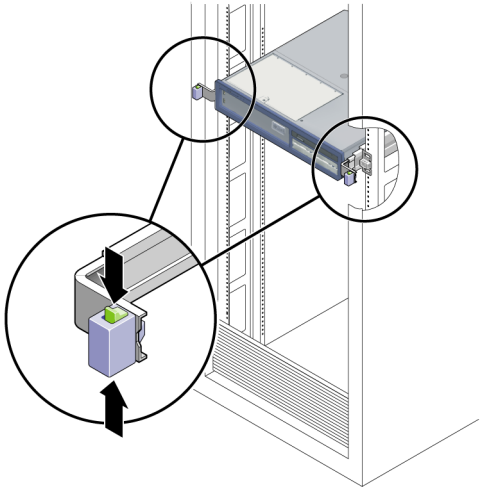

FIGURE 2-1 Slide Release Latches

3. **While pinching the release latches, slowly pull the server forward until the slide rails latch.**

4. **Press the metal lever (FIGURE 2-2) that is located on the inner side of the rail to disconnect the CMA from the rail assembly (on the right side from the rear of the rack).**

   The CMA is still attached to the cabinet, but the server chassis is now disconnected from the CMA.

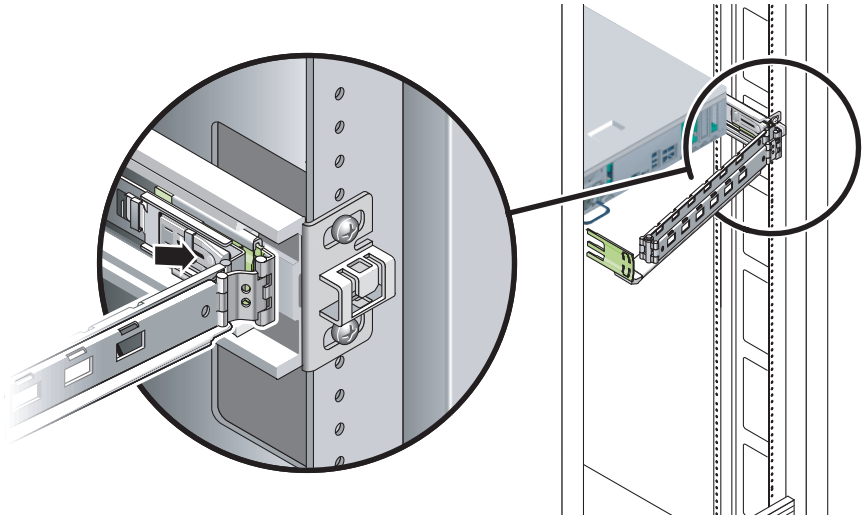

FIGURE 2-2 Locating the Metal Lever

Caution – The server weighs approximately 40 lb (18 kg). The next step requires two people to dismount and carry the chassis.

5. **From the front of the server, pull the release tabs forward and pull the server forward until it is free of the rack rails.**

   The release tabs are located on each rail, about midway on the server.

6. **Set the server on a sturdy work surface.**

7. **Perform antistatic measures.**

   See Section 2.3.4, "Performing Antistatic Measures" on page 2-7.

2.3.4 Performing Antistatic Measures

1. **Prepare an antistatic surface on which to set parts during removal and installation.**

   Place ESD-sensitive components such as the printed circuit boards on an antistatic mat. The following items can be used as an antistatic mat:

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

2. **Attach an antistatic wrist strap.**

   When servicing or removing server components, attach an antistatic strap to your wrist and then to a metal area on the chassis. Then disconnect the power cords from the server.

3. **Remove the top cover.**

   See Section 2.3.5, “Removing the Top Cover” on page 2-8.

2.3.5 Removing the Top Cover

All field-replaceable units (FRUs) that are not hot-swappable require the removal of the top cover.

1. **Use a No. 2 Philips screwdriver to press the top cover release button (**FIGURE 2-3**).**

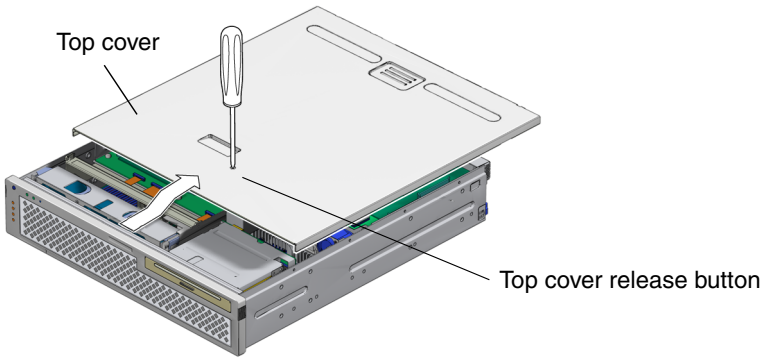

FIGURE 2-3 Top Cover and Release Button

2. **While pressing the top cover release button, slide the cover toward the rear of the server.**

3. **Lift the cover off the chassis and set it aside.**

4. **If necessary, remove the PCI tray.**

   See Section 2.3.6, “Removing the PCI Tray” on page 2-8.

2.3.6 Removing the PCI Tray

The PCI tray is a carrier for the PCI-X and PCI-E cards. You need to remove the PCI tray to replace the following components:

- PCI-E card
- LED board
- DIMM/CPU duct
- System controller board
- System controller battery
- NVRAM
- Alarm board
- DIMMs
- Motherboard assembly

It is not necessary to remove the PCI tray for other components, however, when the PCI tray is removed, additional working space is provided.

1. **Disconnect the cable at J2 and loosen the thumbscrew adjacent to it (**FIGURE 2-4**).**

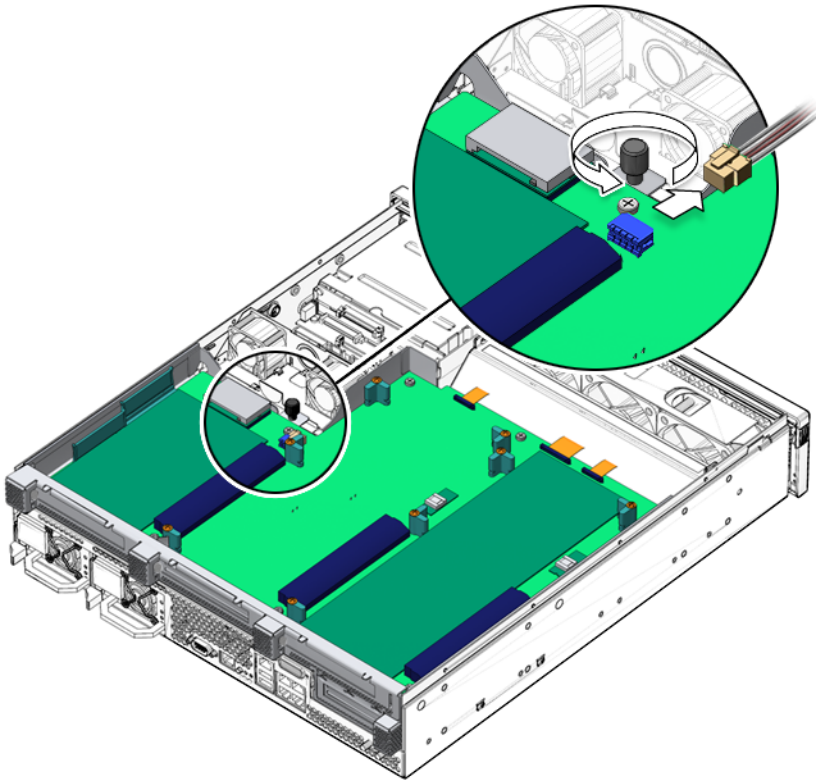

FIGURE 2-4 Disconnecting J2 and Loosening the Thumbscrew

Note – The thumbscrew is captive and cannot be fully removed from the PCI tray.

2. **Slide the PCI tray back about 1 inch and lift up on the back edge.(**FIGURE 2-5**).**

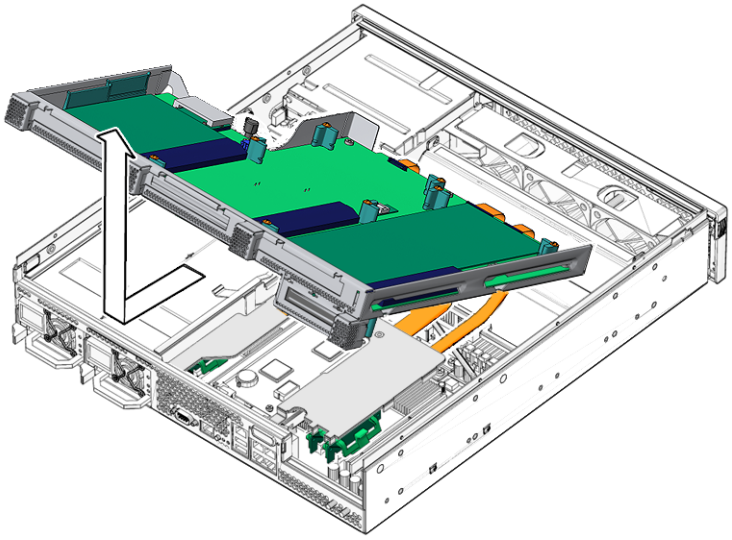

FIGURE 2-5 Lifting the PCI Tray

3. **If installed, remove the two screws that hold the U-plate in position, and lift the U-plate off (**FIGURE 2-6**).**

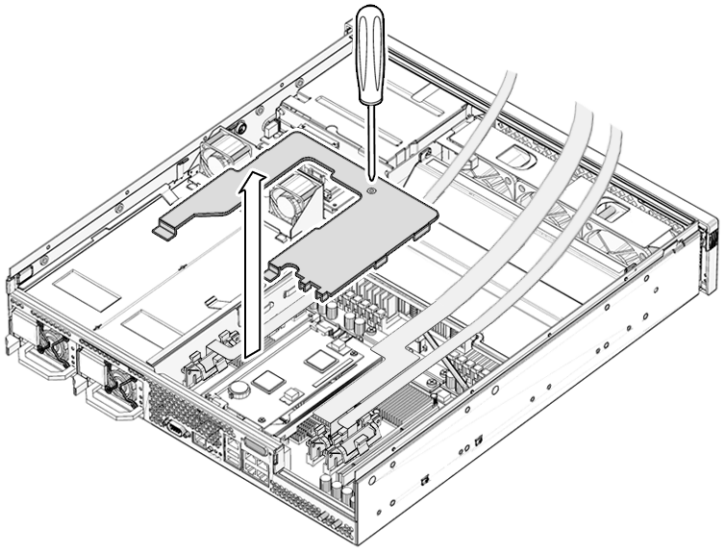

FIGURE 2-6 Removing the U-Plate

4. **Disconnect the PCI cables at connectors J2201, J2202, and J2100 on the motherboard assembly (**FIGURE 2-7**).**

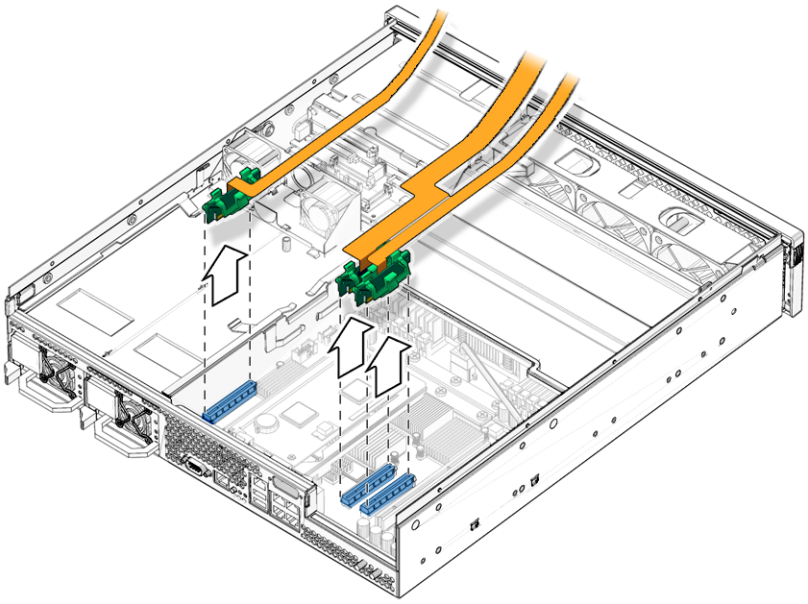

FIGURE 2-7 Disconnecting the PCI Cables

5. **Lift the PCI tray away from the chassis and set it aside on an antistatic mat.**
   You are now ready to replace components.

2.4 Illustrated FRU Locations

FIGURE 2-8 and TABLE 2-1 identifies, describes, and provides the locations of the field-replaceable units (FRUS) in the server.

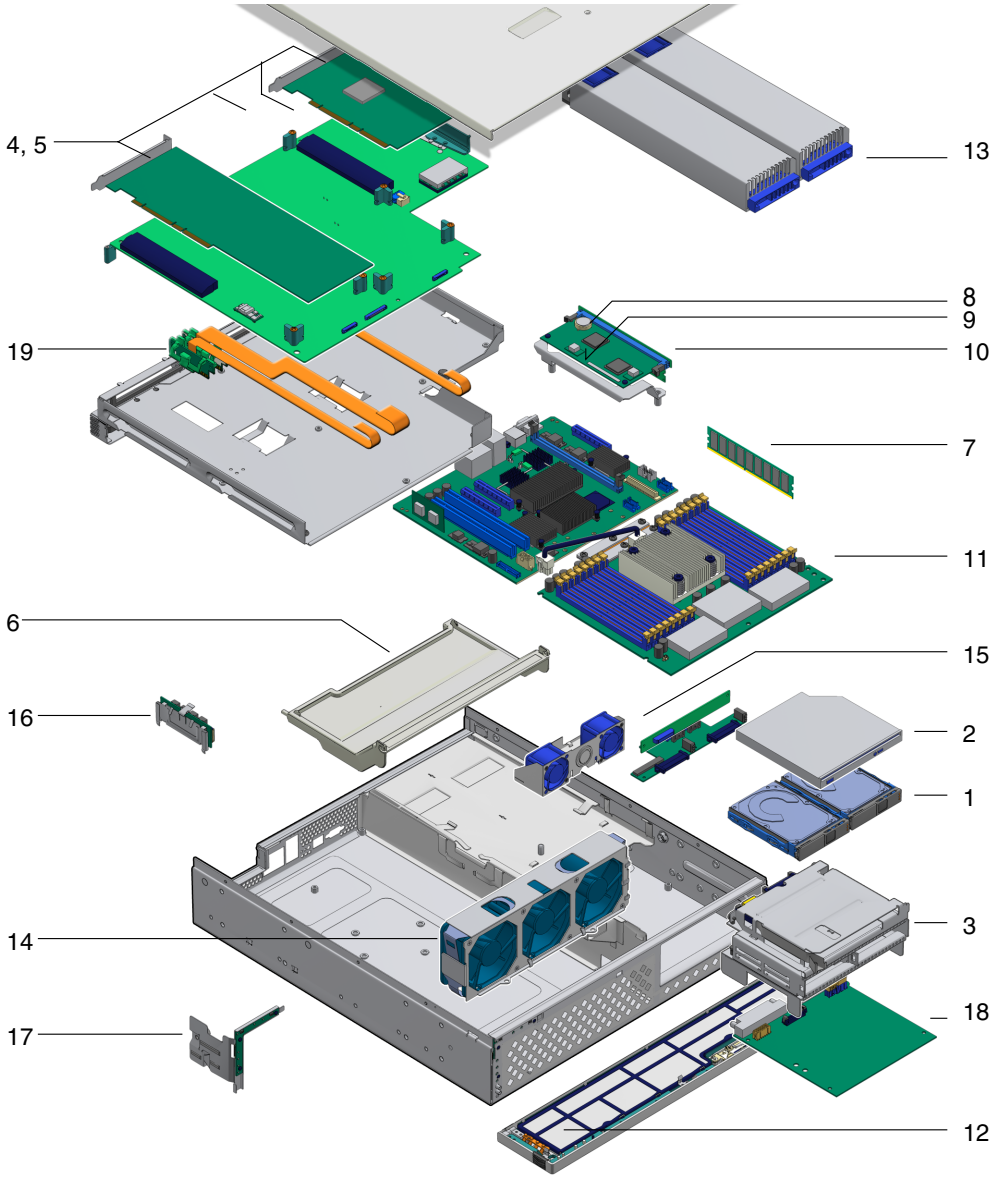

FIGURE 2-8 Field-Replaceable Units

TABLE 2-1 Server FRU List

Item No.	FRU	Replacement Instructions	Description	FRU Name*
1	Hard drives	Section 3.1, "Replacing a Hard Drive" on page 3-1	SFF SAS, 2.5-inch form-factor hard drives	HDD0 HDD1 HDD2 HDD3
2	Optical media drive	Section 3.2, "Replacing the Optical Media Drive" on page 3-6	Optical media drive	DVD
3	Mass storage assembly	Section 3.3, "Replacing the Mass Storage Assembly" on page 3-8	Bays that house hard drives and optical media drive.	
4	PCI-X cards	Section 4.1, "Replacing a PCI-X Card" on page 4-1	Optional add-on cards	PCIX0 PCIX1 PCIX2
5	PCI-E card	Section 4.2, "Replacing the PCI-E Card" on page 4-5	Optional add-on cards	PCIE0
6	DIMM/CPU duct	Section 4.3, "Replacing the DIMM/CPU Duct" on page 4-7	Duct aids cooling of DIMMS and CPU.	
7	DIMMs	Section 4.4, "Replacing a DIMM" on page 4-10	Can be ordered in the following sizes: • 512 MB • 1 GB • 2 GB	See FIGURE 4-10 and TABLE 4-1 I.
8	System controller battery	Section 4.5, "Replacing the Battery" on page 4-16	Battery	SC/BAT
9	NVRAM	Section 4.6, "Replacing the NVRAM" on page 4-17	SEEPROM containing system information.	

TABLE 2-1 Server FRU List *(Continued)*

Item No.	FRU	Replacement Instructions	Description	FRU Name*
10	System controller assembly (OSP board)	Section 4.7, "Replacing the System Controller Assembly" on page 4-19	This board implements the system controller subsystem. The SC board contains a PowerPC Extended Core and a communications processor that controls the host power and monitors host system events (power and environmental). The board holds a socketed EEPROM for storing the system configuration, all Ethernet MAC addresses, and the host ID. This board only draws power from the 3.3V standby supply rail, which is available whenever the system is receiving AC input power, even when the system is turned off.	SC
11	Motherboard assembly	Section 4.8, "Replacing the Motherboard Assembly" on page 4-23	The motherboard assembly is comprised of the following boards that must be replaced as a single FRU: • The CPU board – Comprises the central processing subsystem for the server, which includes the UltraSPARC T1 CPU processor, 16 DIMM connectors, the memory controllers, and supporting circuitry. • The I/O board – Provides the I/O logic, including the connectors for the PCI-X and PCI-E interfaces, Ethernet interfaces, all the power interconnections, and miscellaneous logic. Note: This assembly is provided in different configurations to accommodate the different processor models (4, 6, and 8 core).	MB IOBD
12	Air filter	Section 5.1, "Replacing the Air Filter" on page 5-1	Cleans air before entering system.	
13	Power supplies (PS)	Section 5.2, "Replacing a Power Supply" on page 5-4	The power supplies provide -3.3 Vdc standby power at 3 @ 3 Amps and 12 Vdc at 25 Amps. When facing the rear of the system, PS0 is on the left and PS1 is on the right.	PS0 PS1
14	Fan Assembly	Section 5.3, "Replacing the Fan Assembly" on page 5-7	Fans for the motherboard assembly.	FT0/FM0 FT0/FM1 FT0/FM2

TABLE 2-1 Server FRU List *(Continued)*

Item No.	FRU	Replacement Instructions	Description	FRU Name*
15	Hard drive fan assembly	Section 5.4, "Replacing the Hard Drive Fan Assembly" on page 5-10	Fans that provide supplemental cooling of the hard drives and optical media drive.	
16	Alarm board	Section 5.5, "Replacing the Alarm Board" on page 5-14	Provides dry-contact switching according to alarm conditions.	
17	LED board	Section 5.6, "Replacing the LED Board" on page 5-18	Contains the push-button circuitry and LEDs that are displayed on the bezel of the box.	LEDBD
18	Power board	Section 5.7, "Replacing the Power Board" on page 5-22	Provides the main 12V power interconnect between the power supplies and the other boards.	PDB
19	Cable kit	Cable replacement instructions are provided in the corresponding FRU procedures.	Includes the following: bus bars, hard drive cable, motherboard cables, power board cables, mass storage assembly cables, and other cables.	

* The FRU name is used in system messages.

CHAPTER 3

Replacing Storage Components

This chapter provides instructions for replacing nonvolatile data storage components. Topics include:

- Section 3.1, "Replacing a Hard Drive" on page 3-1
- Section 3.2, "Replacing the Optical Media Drive" on page 3-6
- Section 3.3, "Replacing the Mass Storage Assembly" on page 3-8

3.1 Replacing a Hard Drive

The hard disk drives in the server are hot-pluggable, but this capability depends on how the hard drives are configured. To hot plug a drive you must be able to take the drive offline (prevent any applications from accessing it, and remove the logical software links to it) before you can safely remove it.

The following situations inhibit the ability to perform hot-plugging of a drive:

- The hard drive provides the operating system, and the operating system is not mirrored on another drive.
- The hard drive cannot be logically isolated from the online operations of the server

If your drive falls into these conditions, you must shut the system down before you replace the hard drive. See Section 2.3.1, "Powering Off the Server" on page 2-3.

Note – Replacing a hard drive does not require removing the server from a rack.

3.1.1 Removing a Hard Drive

1. **Press the green tabs on either side of the bezel and pull forward and down (FIGURE 3-1).**

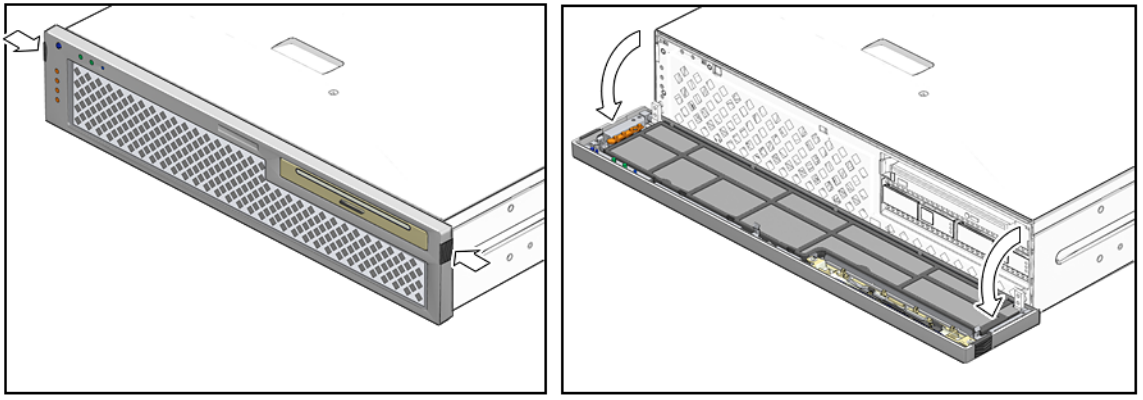

FIGURE 3-1 Opening the Bezel

2. **Identify the location of the hard drive that you want to remove (FIGURE 3-2).**

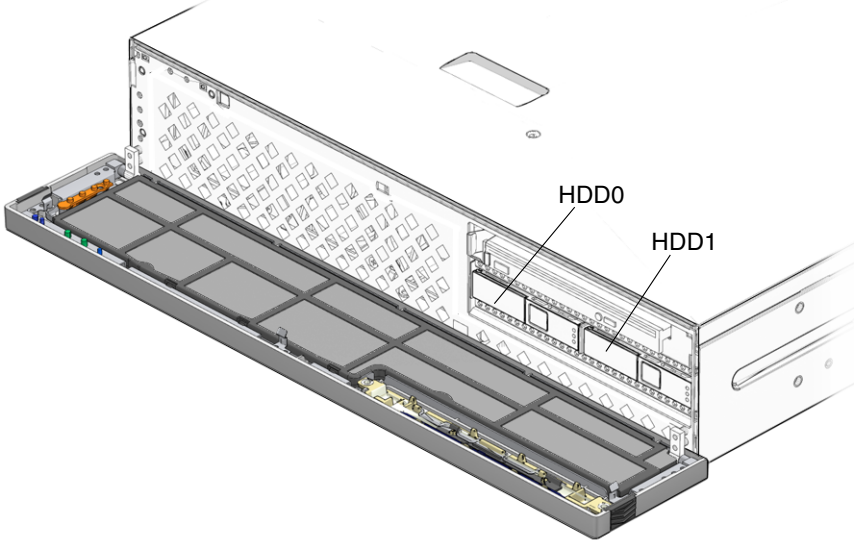

FIGURE 3-2 Locations of HDD0 and HDD1

3. **Issue the Solaris OS commands required to stop using the hard drive.**

   Exact commands required depend on the configuration of your hard drives. You might need to unmount file systems or perform RAID commands.

4. **On the drive you plan to remove, push the latch release button (**FIGURE 3-3**).**

   The latch opens.

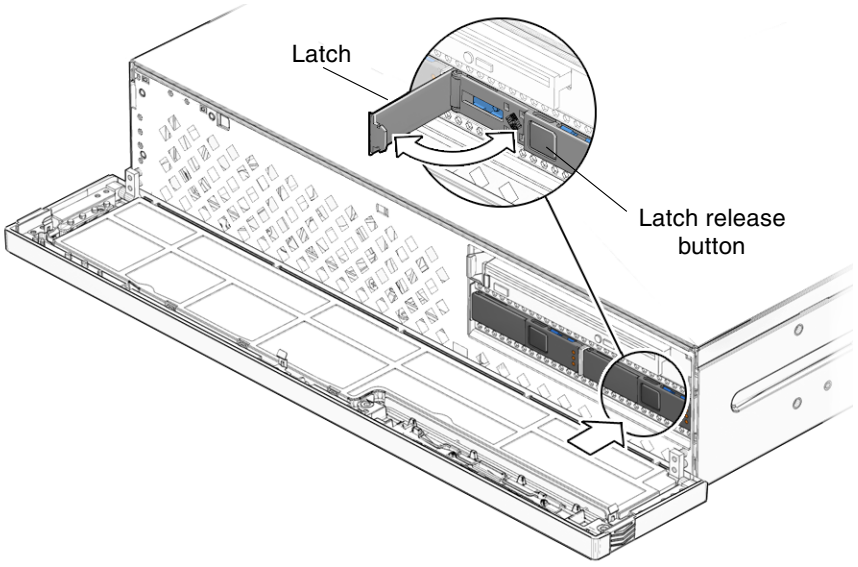

FIGURE 3-3 Opening Hard Drive Latch

Caution – The latch is not an ejector. Do not bend it too far to the left. Doing so can damage the latch.

5. **Grasp the latch and pull the drive out of the drive slot (**FIGURE 3-4**).**

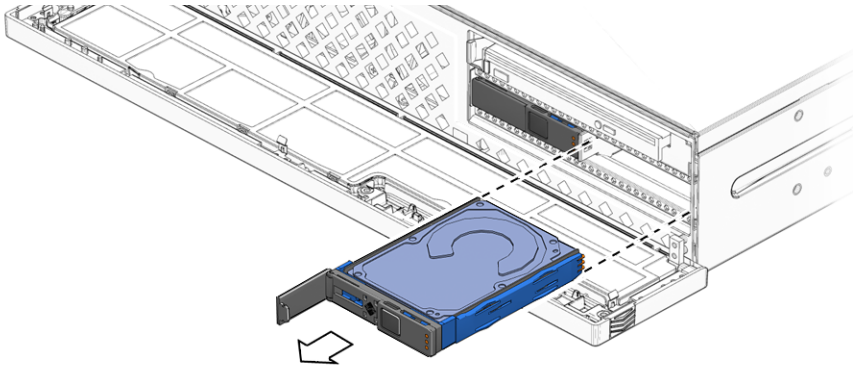

FIGURE 3-4 Removing Hard Drive

6. **Consider your next steps:**
   - If you are replacing the hard drive, continue to Section 3.1.2, "Installing a Hard Drive" on page 3-4.
   - If you are not replacing the hard drive, perform administrative tasks to configure the server to operate without the hard drive.

3.1.2 Installing a Hard Drive

1. **Remove the replacement hard drive from its packaging and place it on an antistatic mat.**
2. **Align the replacement drive to the drive slot.**

   The hard drive is physically addressed according to the slot in which it is installed. See FIGURE 3-2. It is important to install a replacement drive in the same slot as the drive that was removed.
3. **Slide the drive into the bay until it is fully seated (**FIGURE 3-5**).**

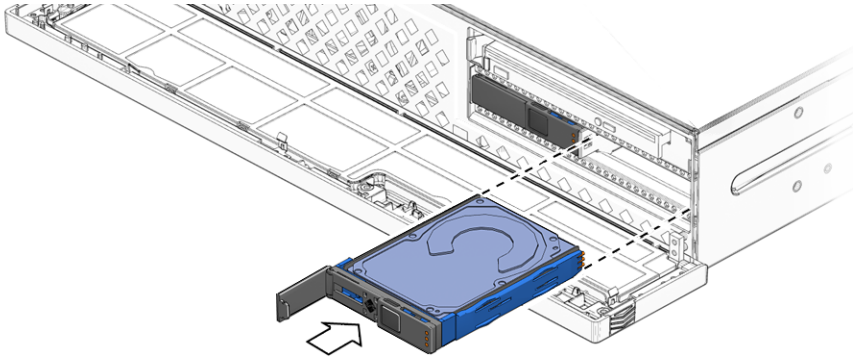

FIGURE 3-5 Installing the Hard Drive

4. **Close the latch to lock the drive in place.**
5. **Close the bezel (**FIGURE 3-6**).**

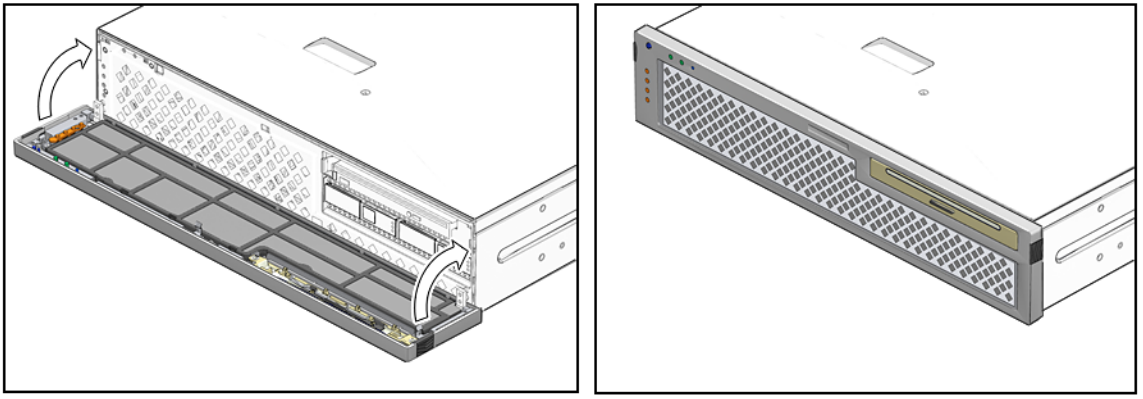

FIGURE 3-6 Closing the Bezel

6. **Perform administrative tasks to reconfigure the hard disk drive.**

   The procedures that you perform at this point depend on how your data is configured. You might need to partition the drive, create file systems, load data from backups, or have it updated from a RAID configuration.

3.2 Replacing the Optical Media Drive

3.2.1 Removing the Optical Media Drive

1. **Prepare the server for optical media drive removal. See:**
   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4
   - Section 2.3.3, "Removing the Server From the Rack" on page 2-5
   - Section 2.3.4, "Performing Antistatic Measures" on page 2-7
   - Section 2.3.5, "Removing the Top Cover" on page 2-8
2. **Open the bezel.**
3. Insert a small plastic probe into the opening at the back of the optical media drive **(**FIGURE 3-7**).**

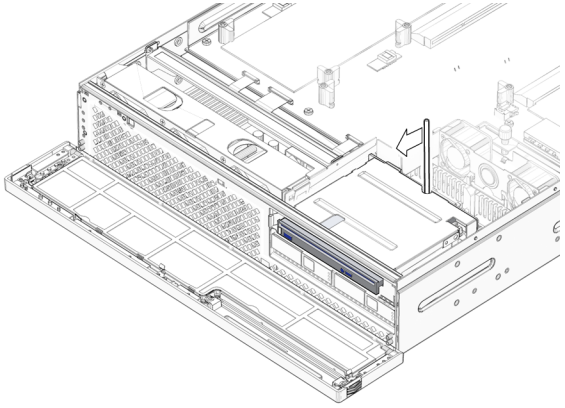

FIGURE 3-7 Inserting the Probe at the Back of the Optical Media Drive

4. Push the release tab to the left and pull the probe forward, freeing the optical media drive **(**FIGURE 3-8**).**

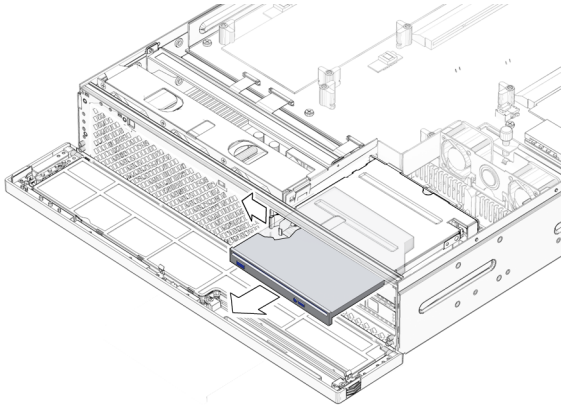

FIGURE 3-8 Releasing the Optical Media Drive

5. **Remove the optical media drive from the mass storage assembly and set it aside on an antistatic mat.**
6. **Consider your next step:**
   - If you removed the optical media drive as part of another procedure, return to that procedure.
   - Otherwise, continue to Section 3.2.2, "Installing the Optical Media Drive" on page 3-7.

3.2.2 Installing the Optical Media Drive

1. **Remove the replacement optical media drive from its packaging and place it on an antistatic mat.**
2. **Hold the tab to the left and insert the optical media drive into the mass storage assembly (**FIGURE 3-9**).**

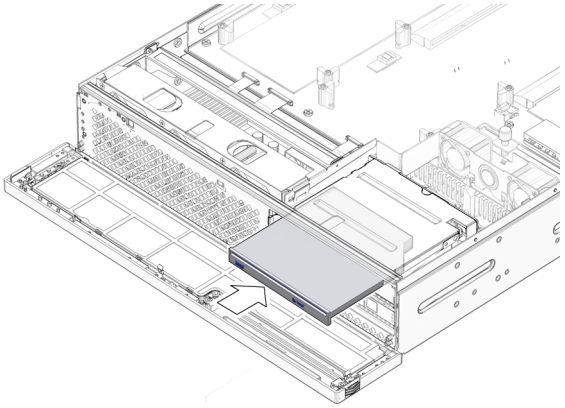

FIGURE 3-9 Inserting the Optical Media Drive

3. **Press optical media drive in until it seats and release the tab.**
4. **Close the bezel.**
5. **Consider your next step:**
   - If you installed the optical media drive as part of another procedure, return to that procedure.
   - Otherwise, perform the following tasks to bring the server back online:
     - Section 6.1.2, "Installing the Top Cover" on page 6-4
     - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
     - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
     - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
     - Section 6.1.6, "Powering On the Server" on page 6-9

3.3 Replacing the Mass Storage Assembly

Note – Referenced connectors on the mass storage assembly are identified in FIGURE B-8.

3.3.1 Removing the Mass Storage Assembly

1. **Prepare the server for mass storage assembly removal. See:**
   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4
   - Section 2.3.3, "Removing the Server From the Rack" on page 2-5
   - Section 2.3.4, "Performing Antistatic Measures" on page 2-7
   - Section 2.3.5, "Removing the Top Cover" on page 2-8
2. **Remove the optical media drive and the hard drives. See:**
   - Section 3.2.1, "Removing the Optical Media Drive" on page 3-6
   - Section 3.1.1, "Removing a Hard Drive" on page 3-2
3. **Disconnect the following cables from the mass storage assembly (**FIGURE 3-10**):**
   - J6
   - J4
   - J5
   - J2
   - J3

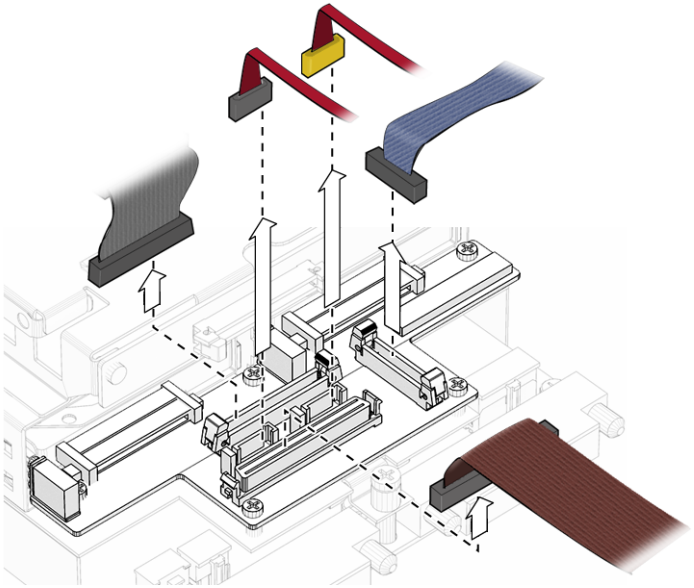

FIGURE 3-10 Disconnecting Cables From the Mass Storage Assembly

4. **Move the cables as far out of the way as possible.**

5. Loosen both the screw at the back of the mass storage assembly and at the front of the chassis (FIGURE 3-11).

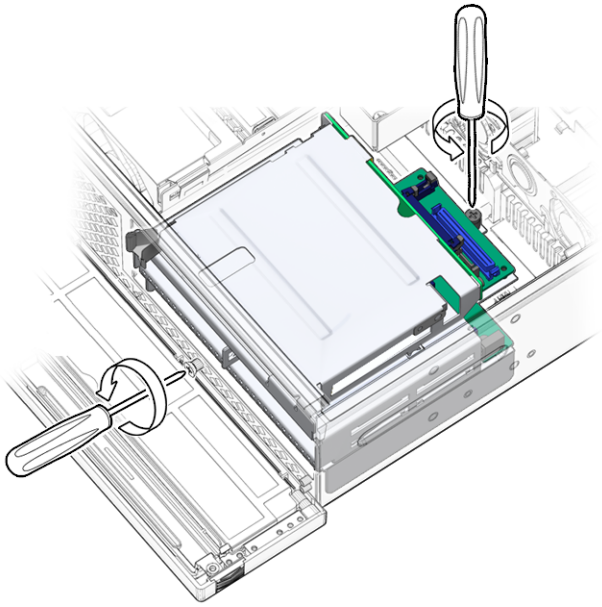

FIGURE 3-11 Loosening the Mass Storage Assembly Screws

Note – The screws are captive and cannot be completely removed.

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6. **Slide the mass storage assembly back, pivot the back end up, and lift the assembly out of the chassis (FIGURE 3-12).**

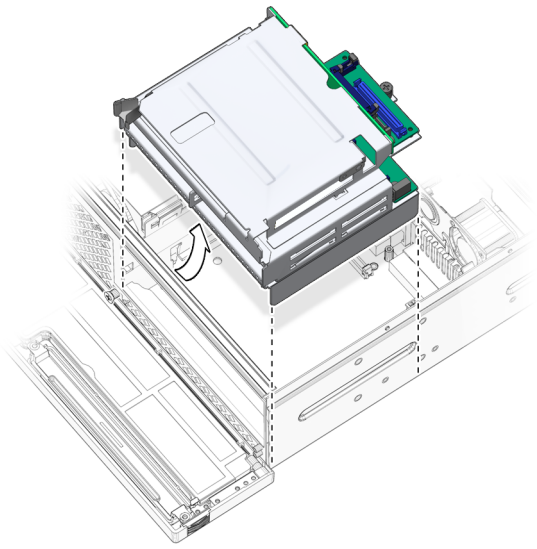

FIGURE 3-12 Lifting the Mass Storage Assembly Out of the Chassis

7. **Set the mass storage assembly aside on an antistatic mat.**
8. **Consider your next step:**
   - If you removed the mass storage assembly as part of another procedure, return to that procedure.
   - Otherwise, continue to Section 3.3.2, "Installing the Mass Storage Assembly" on page 3-11.

3.3.2 Installing the Mass Storage Assembly

1. **Remove the replacement mass storage assembly from its packaging and place it on an antistatic mat.**
2. **Move the cables as far out of the way as possible.**
3. **Pivot the front of the mass storage assembly down and lower it into the chassis, sliding it forward (FIGURE 3-13).**

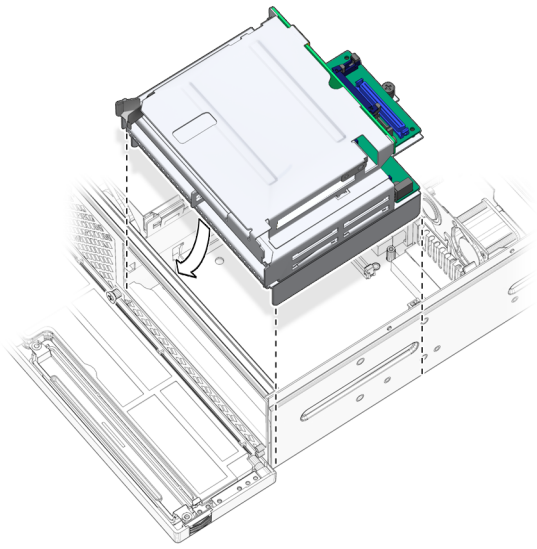

FIGURE 3-13 Setting the Mass Storage Assembly Into Place

4. **Tighten the screws at the front of the chassis and the back of the mass storage bracket (**FIGURE 3-14**).**

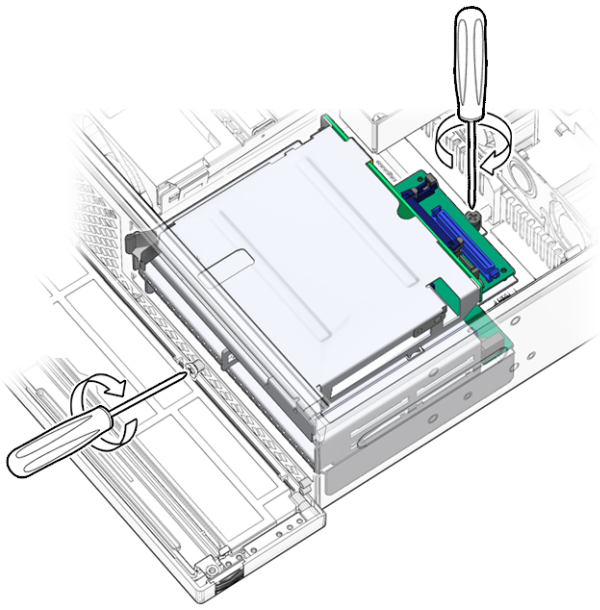

FIGURE 3-14 Tightening the Mass Storage Assembly Screws

5. **Connect the following cables to the mass storage assembly (**FIGURE 3-15**):**
   - J3
   - J2
   - J5
   - J6
   - J4

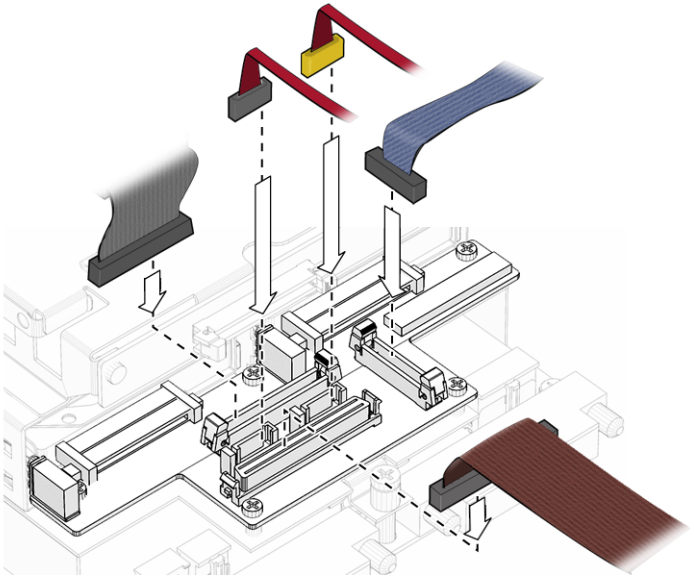

FIGURE 3-15 Connecting the Mass Storage Assembly Cables

6. **Install the optical media drive and the hard drives. See:**
   - Section 3.2.2, "Installing the Optical Media Drive" on page 3-7
   - Section 3.1.2, "Installing a Hard Drive" on page 3-4
7. **Close the bezel.**
8. **Consider your next step:**
   - If you installed the mass storage bracket as part of another procedure, return to that procedure.
   - Otherwise, perform the following tasks to bring the server back online:
     - Section 6.1.2, "Installing the Top Cover" on page 6-4
     - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
     - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
     - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
     - Section 6.1.6, "Powering On the Server" on page 6-9

CHAPTER 4

Replacing Motherboard Assembly Components

This chapter describes procedures to remove components from the server motherboard assembly and the motherboard assembly itself. Topic include:

- Section 4.1, “Replacing a PCI-X Card” on page 4-1
- Section 4.2, “Replacing the PCI-E Card” on page 4-5
- Section 4.3, “Replacing the DIMM/CPU Duct” on page 4-7
- Section 4.4, “Replacing a DIMM” on page 4-10
- Section 4.5, “Replacing the Battery” on page 4-16
- Section 4.6, “Replacing the NVRAM” on page 4-17
- Section 4.7, “Replacing the System Controller Assembly” on page 4-19
- Section 4.8, “Replacing the Motherboard Assembly” on page 4-23

4.1 Replacing a PCI-X Card

Caution – The total power consumption of all PCI cards combined is not to exceed 80 watts. The maximum power of any one PCI card is 25 watts.

4.1.1 Removing a PCI-X Card

1. **Prepare the server for PCI-X card removal. See:**

- Section 2.3.1, “Powering Off the Server” on page 2-3
- Section 2.3.2, “Disconnecting Cables From the Server” on page 2-4
- Section 2.3.3, “Removing the Server From the Rack” on page 2-5
- Section 2.3.4, “Performing Antistatic Measures” on page 2-7

- Section 2.3.5, “Removing the Top Cover” on page 2-8

2. **Identify which PCI-X card is to be removed and loosen the appropriate securing screw(**FIGURE 4-1**).**

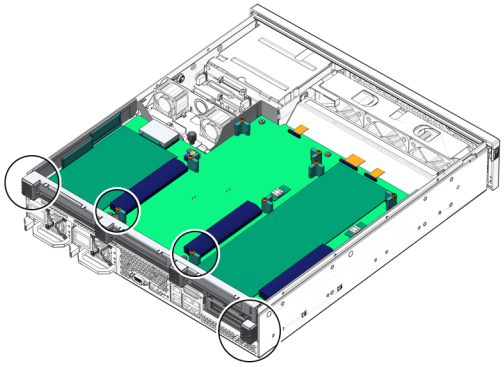

FIGURE 4-1 PCI Tray and PCI Card Securing Screws

Note – The screws are captive and cannot be completely removed from the PCI tray.

---

3. **Slide the PCI-X card to the left and lift it out of the PCI tray (**FIGURE 4-2**).**

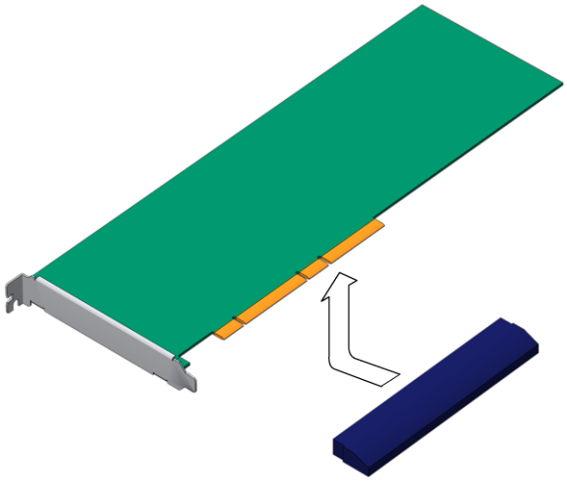

FIGURE 4-2 Lifting the PCI-X Card From the PCI Tray

Set the PCI-X card aside on an antistatic mat.

4. **Consider your next step:**
   - If you are replacing the PCI-X card, continue to Section 4.1.2, "Installing a PCI-X Card" on page 4-3.
   - If you will not replace the PCI-X card, install a filler panel.
5. **Tighten the PCI-X card securing screw.**
6. **Perform the following tasks to bring the server back online:**
   - Section 6.1.2, "Installing the Top Cover" on page 6-4
   - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
   - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
   - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
   - Section 6.1.6, "Powering On the Server" on page 6-9

4.1.2 Installing a PCI-X Card

1. **Prepare the server for PCI-X card installation. See:**
   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4
   - Section 2.3.3, "Removing the Server From the Rack" on page 2-5
   - Section 2.3.4, "Performing Antistatic Measures" on page 2-7
   - Section 2.3.5, "Removing the Top Cover" on page 2-8

2. **Determine where the PCI-X card will install and loosen the appropriate securing screw (**FIGURE 4-1**).**

Note – The screws are captive and cannot be completely removed from the PCI tray.

---

3. **Remove the replacement PCI-X card from its packaging and place it onto an antistatic mat.**
4. **If a filler panel is installed, remove it.**
5. **Lower the PCI-X card into position on the PCI tray, then slide it to the right to seat it into the connector (**FIGURE 4-3**).**

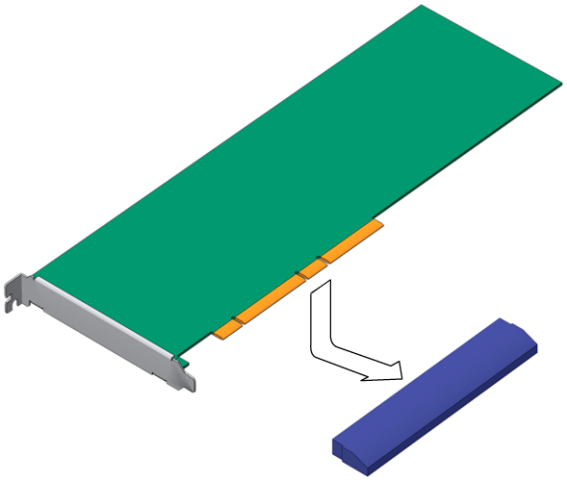

FIGURE 4-3 Installing the PCI-X Card Into the PCI Tray

6. **Tighten the PCI-X card securing screw.**
7. **Perform the following tasks to bring the server back online:**
   - Section 6.1.2, “Installing the Top Cover” on page 6-4
   - Section 6.1.3, “Removing Antistatic Measures” on page 6-5
   - Section 6.1.4, “Reinstalling the Server Chassis in the Rack” on page 6-5
   - Section 6.1.5, “Reconnecting Cables to the Server” on page 6-8
   - Section 6.1.6, “Powering On the Server” on page 6-9

4.2 Replacing the PCI-E Card

Caution – The total power consumption of all PCI cards combined is not to exceed 80 watts. The maximum power of any one PCI card is 25 watts.

4.2.1 Removing the PCI-E Card

1. **Prepare the server for PCI-E card removal. See:**
   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4
   - Section 2.3.3, "Removing the Server From the Rack" on page 2-5
   - Section 2.3.4, "Performing Antistatic Measures" on page 2-7
   - Section 2.3.5, "Removing the Top Cover" on page 2-8
   - Section 2.3.6, "Removing the PCI Tray" on page 2-8
2. **Flip the PCI tray over and loosen the PCI-E card securing screw (**FIGURE 4-4**).**

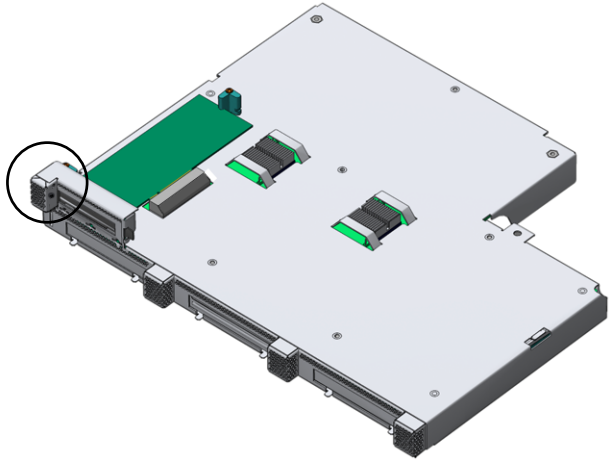

FIGURE 4-4 PCI Tray and PCI-E Card Securing Screw

Note – The screw is captive and cannot be completely removed from the PCI tray.

3. **Slide the PCI-E card to the left and lift it out of the PCI tray (**FIGURE 4-5**).**

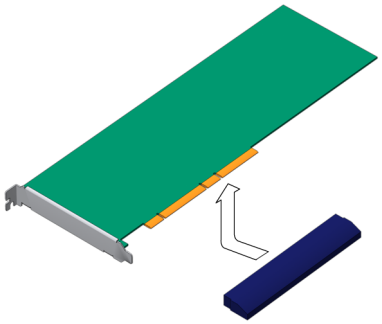

FIGURE 4-5 Lifting the PCI-E Card From the PCI Tray

4. **Set the PCI-E card aside on an antistatic mat.**

5. **Consider your next step:**
   - If you are replacing the PCI-E card, continue to Section 4.2.2, "Installing the PCI-E Card" on page 4-6.
   - If you will not replace the PCI-E card, install a filler panel.

6. **Tighten the PCI-E card securing screw.**

7. **Perform the following tasks to bring the server back online:**
   - Section 6.1.1, "Installing the PCI Tray" on page 6-1
   - Section 6.1.2, "Installing the Top Cover" on page 6-4
   - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
   - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
   - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
   - Section 6.1.6, "Powering On the Server" on page 6-9

4.2.2 Installing the PCI-E Card

1. **Prepare the server for PCI-E card installation. See:**
   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4
   - Section 2.3.3, "Removing the Server From the Rack" on page 2-5
   - Section 2.3.4, "Performing Antistatic Measures" on page 2-7
   - Section 2.3.5, "Removing the Top Cover" on page 2-8
   - Section 2.3.6, "Removing the PCI Tray" on page 2-8

2. **Flip the PCI tray over and loosen the PCI-E card securing screw (**FIGURE 4-4**).**

Note – The screw is captive and cannot be completely removed from the PCI tray.

3. **Remove the replacement PCI-E card from its packaging and place it onto an antistatic mat.**
4. **If a filler panel is installed, remove it.**
5. **Lower the PCI-E card into position on the PCI tray, then slide it to the right to seat it into the connector (**FIGURE 4-6**).**

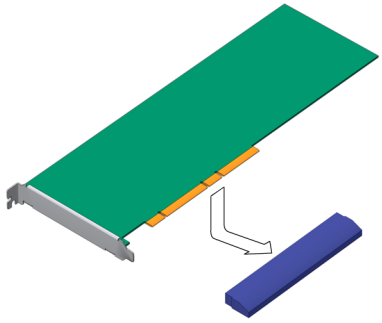

FIGURE 4-6 Installing the PCI-E Card Into the PCI Tray

6. **Tighten the PCI-E card securing screw.**
7. **Perform the following tasks to bring the server back online:**
   - Section 6.1.1, "Installing the PCI Tray" on page 6-1
   - Section 6.1.2, "Installing the Top Cover" on page 6-4
   - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
   - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
   - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
   - Section 6.1.6, "Powering On the Server" on page 6-9

4.3 Replacing the DIMM/CPU Duct

4.3.1 Removing the DIMM/CPU Duct

1. **Prepare the server for DIMM/CPU duct removal. See:**

- Section 2.3.1, “Powering Off the Server” on page 2-3
- Section 2.3.2, “Disconnecting Cables From the Server” on page 2-4
- Section 2.3.3, “Removing the Server From the Rack” on page 2-5
- Section 2.3.4, “Performing Antistatic Measures” on page 2-7
- Section 2.3.5, “Removing the Top Cover” on page 2-8
- Section 2.3.6, “Removing the PCI Tray” on page 2-8

2. **Raise the DIMM/CPU duct into the vertical position (**FIGURE 4-7**).**

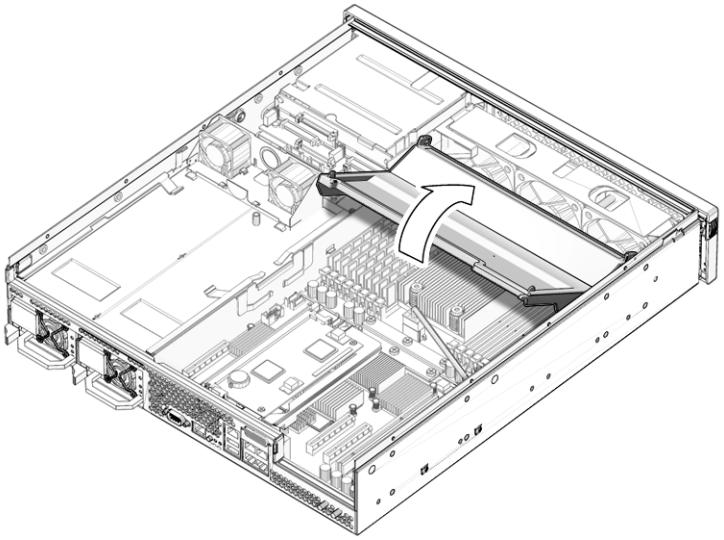

FIGURE 4-7 Raising the DIMM/CPU Duct

3. **Unhook the duct from the pins of the chassis (**FIGURE 4-8**).**

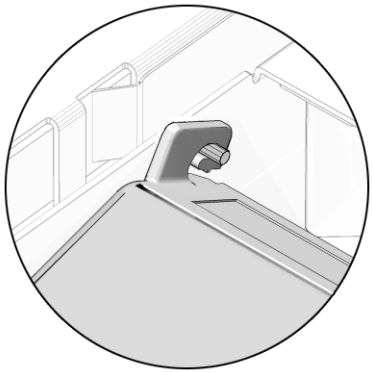

FIGURE 4-8 Unhooking the DIMM/CPU Duct From the Pins of the Chassis

4. **Lift the duct out of the chassis, and set it aside on an antistatic mat.**
5. **Consider your next step:**
   - If you removed the DIMM/CPU duct as part of another procedure, return to that procedure.
   - Otherwise, continue to Section 4.3.2, "Installing the DIMM/CPU Duct" on page 4-9.

4.3.2 Installing the DIMM/CPU Duct

1. **Remove the replacement DIMM/CPU duct from its packaging.**
2. **Position the duct vertically over the pins of the chassis and hook the duct to the pins of the chassis (**FIGURE 4-8**).**
3. **Lower the duct down to the horizontal position (**FIGURE 4-9**).**

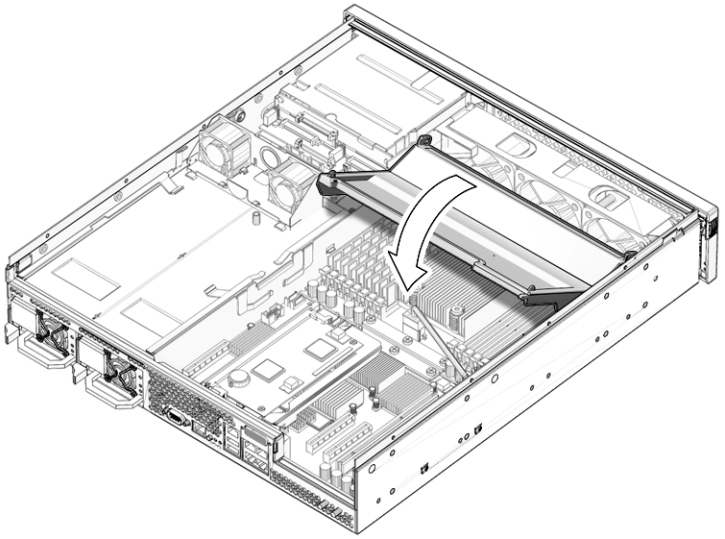

FIGURE 4-9 Lowering the DIMM/CPU Duct

4. **Consider your next step:**
   - If you installed the DIMM/CPU duct as part of another procedure, return to that procedure.
   - Otherwise, perform the following tasks to bring the server back online:
     - Section 6.1.1, "Installing the PCI Tray" on page 6-1
     - Section 6.1.2, "Installing the Top Cover" on page 6-4
     - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
     - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
     - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
     - Section 6.1.6, "Powering On the Server" on page 6-9

4.4 Replacing a DIMM

4.4.1 DIMM Guidelines

FIGURE 4-10 describes the server DIMM locations and the channel and rank configuration. Follow these guidelines when adding or removing DIMMs:

- The minimum configuration is one rank, Rank0 or Rank1. This requires configuring 8 identical DIMMs
- The DIMMs of Rank0 are independent of those in Rank1, and therefore can be of a different type.

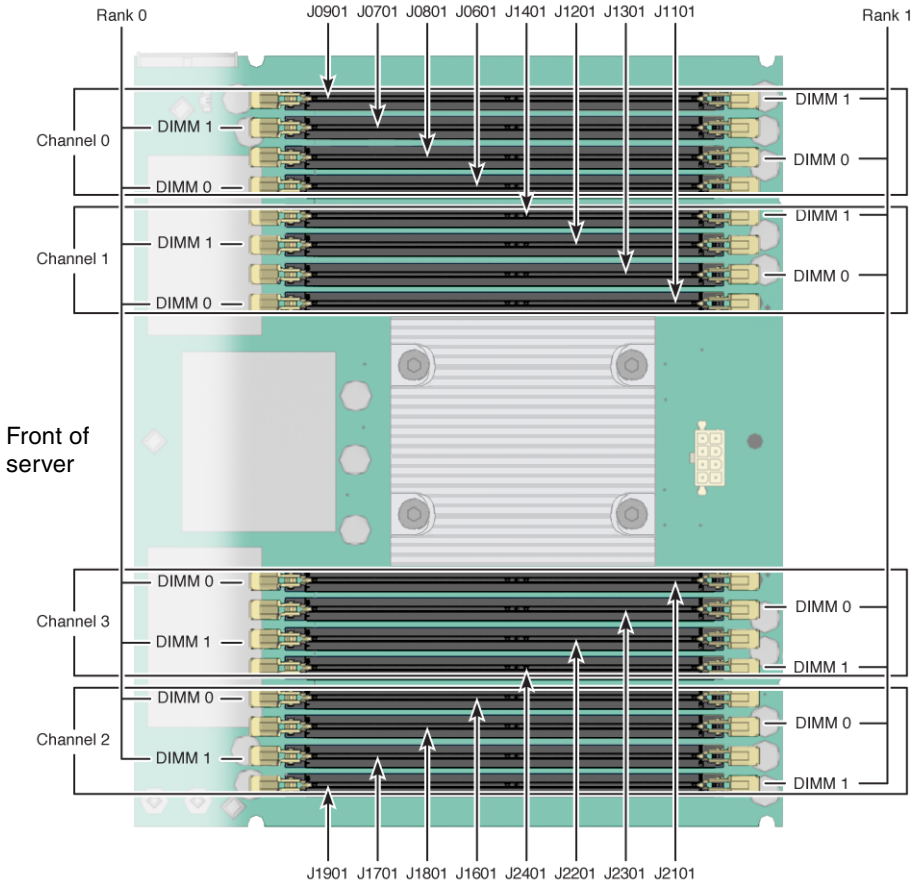

FIGURE 4-10 DIMM Locations

Use FIGURE 4-10 and TABLE 4-1 to map DIMM names that are displayed in faults to socket numbers that identify the location of the DIMM on the motherboard.

TABLE 4-1 DIMM Names and Socket Numbers

DIMM Name Used in Message	Socket No.
MB/CMP0/CH0/R1/D1	J0901
MB/CMP0/CH0/R0/D1	J0701
MB/CMP0/CH0/R1/D0	J0801
MB/CMP0/CH0/R0/D0	J0601
MB/CMP0/CH1/R0/D1	J1401
MB/CMP0/CH1/R1/D1	J1201
MB/CMP0/CH1/R1/D0	J1301
MB/CMP0/CH1/R0/D0	J1101
MB/CMP0/CH2/R1/D1	J1901
MB/CMP0/CH2/R0/D1	J1701
MB/CMP0/CH2/R1/D0	J1801
MB/CMP0/CH2/R0/D0	J1601
MB/CMP0/CH3/R1/D1	J2401
MB/CMP0/CH3/R0/D1	J2201
MB/CMP0/CH3/R1/D0	J2301
MB/CMP0/CH3/R0/D0	J2101

4.4.2 Removing a DIMM

1. **Prepare the server for DIMM removal. See:**
   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4
   - Section 2.3.3, "Removing the Server From the Rack" on page 2-5
   - Section 2.3.4, "Performing Antistatic Measures" on page 2-7
   - Section 2.3.5, "Removing the Top Cover" on page 2-8
   - Section 2.3.6, "Removing the PCI Tray" on page 2-8
2. **Remove the DIMM/CPU duct.**

   See Section 4.3.1, "Removing the DIMM/CPU Duct" on page 4-7.
3. **Locate which DIMM is to be removed and press the ejector levers open, removing the DIMM (FIGURE 4-11).**

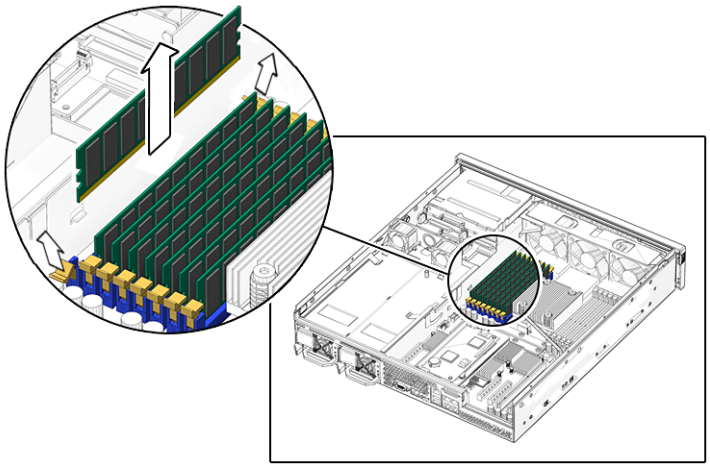

FIGURE 4-11 Ejecting the DIMM

4. **Set the DIMM aside on an antistatic mat.**
5. **Repeat from Step 3 for all DIMMs to be removed.**
6. **Consider your next step:**
   - If you removed the DIMMs as part of another procedure, return to that procedure.
   - If you are to install DIMMs, continue to Section 4.4.3, "Installing a DIMM" on page 4-14
   - If you are to only remove DIMMs:

   a. **Install the DIMM/CPU duct.**

      See Section 4.3.2, "Installing the DIMM/CPU Duct" on page 4-9.

   b. **Perform the following tasks to bring the server back online:**

      - Section 6.1.1, "Installing the PCI Tray" on page 6-1
      - Section 6.1.2, "Installing the Top Cover" on page 6-4
      - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
      - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
      - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
      - Section 6.1.6, "Powering On the Server" on page 6-9

4.4.3 Installing a DIMM

1. **Prepare the server for DIMM installation. See:**
   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4
   - Section 2.3.3, "Removing the Server From the Rack" on page 2-5
   - Section 2.3.4, "Performing Antistatic Measures" on page 2-7
   - Section 2.3.5, "Removing the Top Cover" on page 2-8
   - Section 2.3.6, "Removing the PCI Tray" on page 2-8
2. **Remove the DIMM/CPU duct.**

   See Section 4.3.1, "Removing the DIMM/CPU Duct" on page 4-7.
3. **Remove the replacement DIMM from its packaging and place it on an antistatic mat.**
4. **Locate where the DIMM is to install and align it with the slot (**FIGURE 4-12**).**

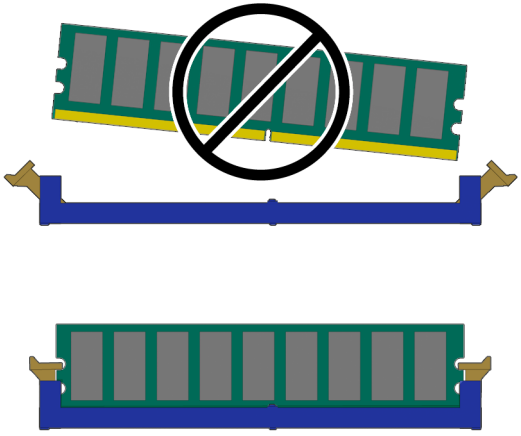

FIGURE 4-12 Aligning the DIMM With the Slot

5. **Push the DIMM into the slot until the ejector levers close with a click (**FIGURE 4-13**).**

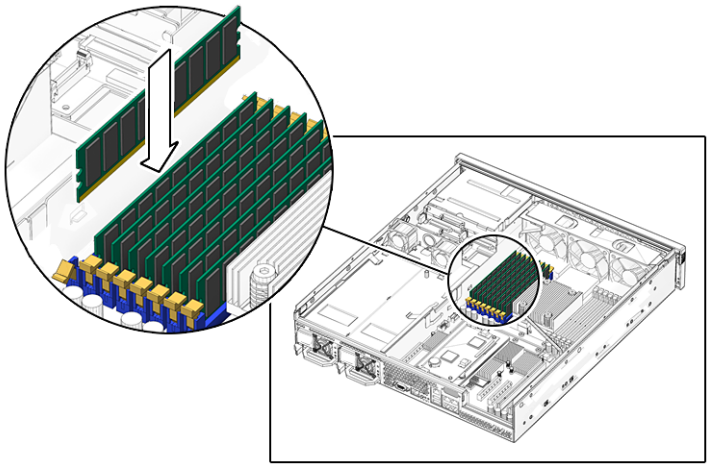

FIGURE 4-13 Inserting the DIMM Into the Slot

6. **Repeat from** Step 3 **for all DIMMs to be installed.**

7. **Consider your next step:**

   - If you installed DIMMs as part of another procedure, return to that procedure.
   - If you are to only install DIMMs:

   a. Install the DIMM/CPU duct.

   See Section 4.3.2, "Installing the DIMM/CPU Duct" on page 4-9.

   b. Perform the following tasks to bring the server back online:

   - Section 6.1.1, "Installing the PCI Tray" on page 6-1
   - Section 6.1.2, "Installing the Top Cover" on page 6-4
   - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
   - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
   - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
   - Section 6.1.6, "Powering On the Server" on page 6-9

4.5 Replacing the Battery

4.5.1 Removing the Battery

1. **Prepare the server for battery removal. See:**
   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4
   - Section 2.3.3, "Removing the Server From the Rack" on page 2-5
   - Section 2.3.4, "Performing Antistatic Measures" on page 2-7
   - Section 2.3.5, "Removing the Top Cover" on page 2-8
   - Section 2.3.6, "Removing the PCI Tray" on page 2-8
2. **Pry the battery out of the system controller board using a small flat-blade screwdriver (**FIGURE 4-14**).**

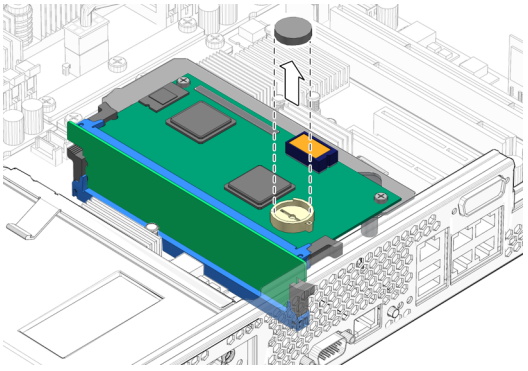

FIGURE 4-14 Prying the Battery From the System Controller Board

3. **Set the battery aside on an antistatic mat.**
4. **Continue to** Section 4.5.2, "Installing the Battery" on page 4-16**.**

4.5.2 Installing the Battery

Note – The battery is a CR-1225 or equivalent.

1. **Remove the replacement battery from its packaging.**
2. **Press the new battery in with the "+" side facing up (**FIGURE 4-15**).**

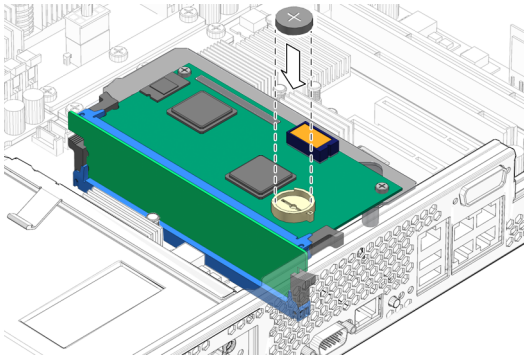

FIGURE 4-15 Inserting the Battery Into the System Controller Board

3. **Perform the following tasks to bring the server back online:**
   - Section 6.1.1, "Installing the PCI Tray" on page 6-1
   - Section 6.1.2, "Installing the Top Cover" on page 6-4
   - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
   - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
   - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
   - Section 6.1.6, "Powering On the Server" on page 6-9

4.6 Replacing the NVRAM

4.6.1 Removing the NVRAM

1. **Prepare the server for NVRAM removal. See:**
   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4
   - Section 2.3.3, "Removing the Server From the Rack" on page 2-5
   - Section 2.3.4, "Performing Antistatic Measures" on page 2-7
   - Section 2.3.5, "Removing the Top Cover" on page 2-8
   - Section 2.3.6, "Removing the PCI Tray" on page 2-8
2. **Carefully pull the NVRAM from the system controller board (**FIGURE 4-16**).**

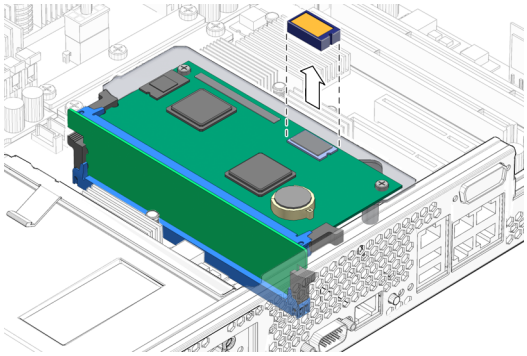

FIGURE 4-16 Pulling the NVRAM From the System Controller Board

3. **Set the NVRAM aside on an antistatic mat.**
4. **Consider your next step:**
   - If you removed the NVRAM as part of another procedure, return to that procedure.
   - Otherwise, continue to Section 4.6.2, "Installing the NVRAM" on page 4-18.

4.6.2 Installing the NVRAM

Note – The NVRAM contains the identifiers of the server, such as its MAC address, FRUID, and so on. If you install a new NVRAM, you must reconfigure your applications and services to recognize the new MAC address, FRUID, and so on.

---

1. **Remove the replacement NVRAM from its packaging and place it on an antistatic mat.**
2. **Align the notch in the NVRAM socket with the key on the underside of the NVRAM, and press it into place (**FIGURE 4-17**).**

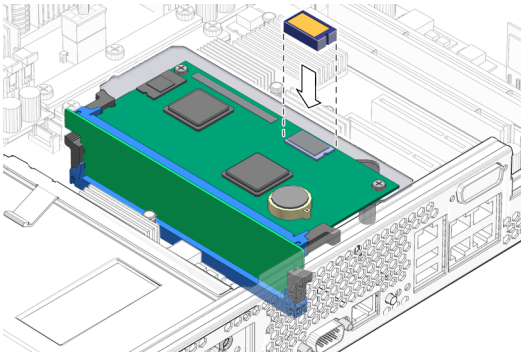

FIGURE 4-17 Pressing the NVRAM Into the Socket

3. **Consider your next step:**
   - If you installed the NVRAM as part of another procedure, return to that procedure.
   - Otherwise, perform the following tasks to bring the server back online:
     - Section 6.1.1, "Installing the PCI Tray" on page 6-1
     - Section 6.1.2, "Installing the Top Cover" on page 6-4
     - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
     - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
     - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
     - Section 6.1.6, "Powering On the Server" on page 6-9

4.7 Replacing the System Controller Assembly

Note – The system controller board and its riser card are replaced as one assembly.

4.7.1 Removing the System Controller Assembly

1. **Prepare the server for system controller assembly removal. See:**
   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4

- Section 2.3.3, “Removing the Server From the Rack” on page 2-5
- Section 2.3.4, “Performing Antistatic Measures” on page 2-7
- Section 2.3.5, “Removing the Top Cover” on page 2-8
- Section 2.3.6, “Removing the PCI Tray” on page 2-8

Note – For this procedure, it might be necessary to remove the NVRAM to gain access to the system controller assembly rear securing screw. See Section 4.6.1, “Removing the NVRAM” on page 4-17.

---

2. **Remove the two screws securing the system controller assembly to the system controller board bracket (**FIGURE 4-18**).**

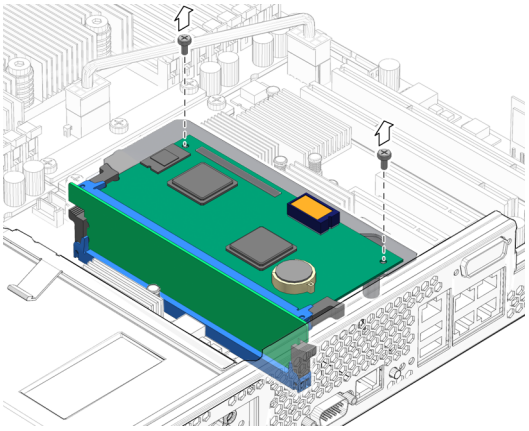

FIGURE 4-18 Removing the System Controller Assembly Screws

3. **Press the system controller board riser card ejector levers outward to release the riser card from the motherboard assembly (**FIGURE 4-19**).**

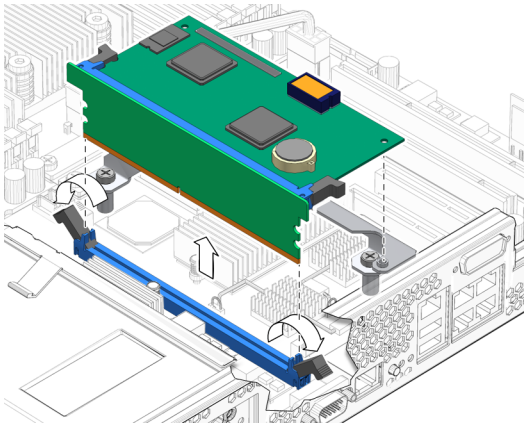

FIGURE 4-19 Ejecting the System Controller Board Riser Card

4. **Set the system controller assembly aside on an antistatic mat.**
5. **Consider your next step:**
   - If removed the system controller assembly as part of another procedure, return to that procedure.
   - Otherwise, continue to Section 4.7.2, "Installing the System Controller Assembly" on page 4-21.

4.7.2 Installing the System Controller Assembly

1. **Remove the replacement system controller assembly from its packaging and place it on an antistatic mat.**

Note – If necessary, remove the NVRAM from the system controller assembly. See Section 4.6.1, "Removing the NVRAM" on page 4-17

---

2. **Align the riser card over the slot in the motherboard assembly with the notch in the riser card matching to the key in the slot.**
3. **Press the riser card into the slot until it clicks into place (**FIGURE 4-20**).**

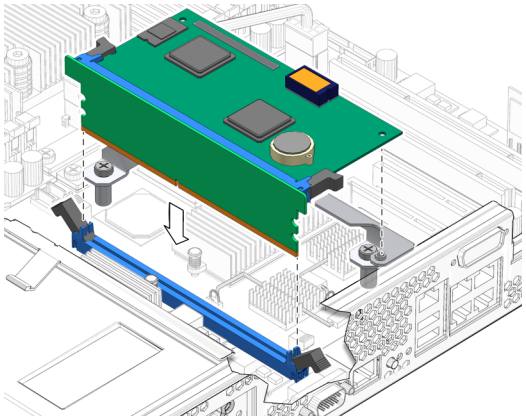

FIGURE 4-20 Inserting the System Controller Board Riser Card

4. **Install the two screws to secure the system controller assembly to the system controller board bracket (**FIGURE 4-21**).**

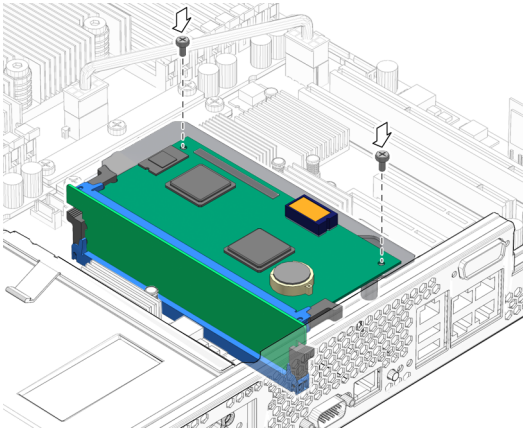

FIGURE 4-21 Securing the System Controller Assembly

5. **Consider your next step:**
   - If the NVRAM was removed to aid installation of the system controller assembly, install it now. See Section 4.6.2, “Installing the NVRAM” on page 4-18.
   - However, if you wish to retain the previous system MAC address, FRUID, and so on, replace the current NVRAM with the NVRAM on the removed system controller assembly. See Section 4.6, “Replacing the NVRAM” on page 4-17.

- If you installed the system controller assembly as part of another procedure, return to that procedure.
- Otherwise, perform the following tasks to bring the server back online:
  - Section 6.1.1, “Installing the PCI Tray” on page 6-1
  - Section 6.1.2, “Installing the Top Cover” on page 6-4
  - Section 6.1.3, “Removing Antistatic Measures” on page 6-5
  - Section 6.1.4, “Reinstalling the Server Chassis in the Rack” on page 6-5
  - Section 6.1.5, “Reconnecting Cables to the Server” on page 6-8
  - Section 6.1.6, “Powering On the Server” on page 6-9

4.8 Replacing the Motherboard Assembly

Note – Referenced connectors on the motherboard assembly are identified in FIGURE B-7.

4.8.1 Removing the Motherboard Assembly

1. **Prepare the server for motherboard assembly removal. See:**
   - Section 2.3.1, “Powering Off the Server” on page 2-3
   - Section 2.3.2, “Disconnecting Cables From the Server” on page 2-4
   - Section 2.3.3, “Removing the Server From the Rack” on page 2-5
   - Section 2.3.4, “Performing Antistatic Measures” on page 2-7
   - Section 2.3.5, “Removing the Top Cover” on page 2-8
   - Section 2.3.6, “Removing the PCI Tray” on page 2-8
2. **Remove the following components:**
   - DIMM/CPU duct – Section 4.3.1, “Removing the DIMM/CPU Duct” on page 4-7
   - Fan assembly – Section 5.3.1, “Removing the Fan Assembly” on page 5-7
   - DIMMs – Section 4.4.2, “Removing a DIMM” on page 4-12
   - Alarm board – Section 5.5.1, “Removing the Alarm Board” on page 5-14
   - System controller assembly – Section 4.7.1, “Removing the System Controller Assembly” on page 4-19
3. **Loose the two screws that secure the system controller bracket to the motherboard assembly (**FIGURE 4-22**).**

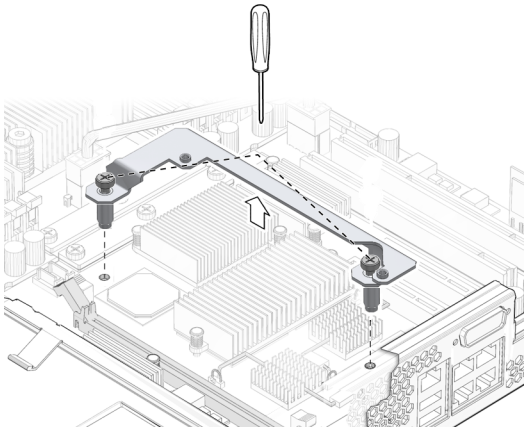

FIGURE 4-22 Removing the System Controller Bracket

Note – The screws are captive and cannot be removed from the system controller bracket.

---

4. **Disconnect the cables from the following connectors on the motherboard assembly (**FIGURE 4-23**):**

   - J5004
   - J5002
   - P8

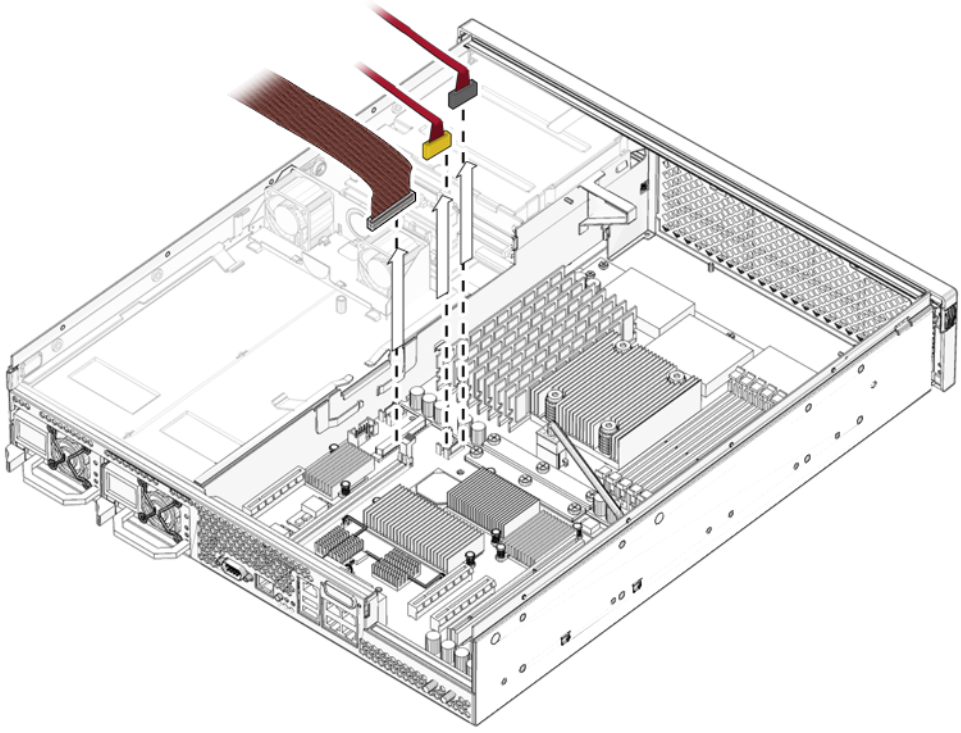

FIGURE 4-23 Disconnecting the Cables From the Motherboard Assembly

5. **Remove the two power screws and six other screws that secure the motherboard assembly to the chassis (**FIGURE 4-24**).**

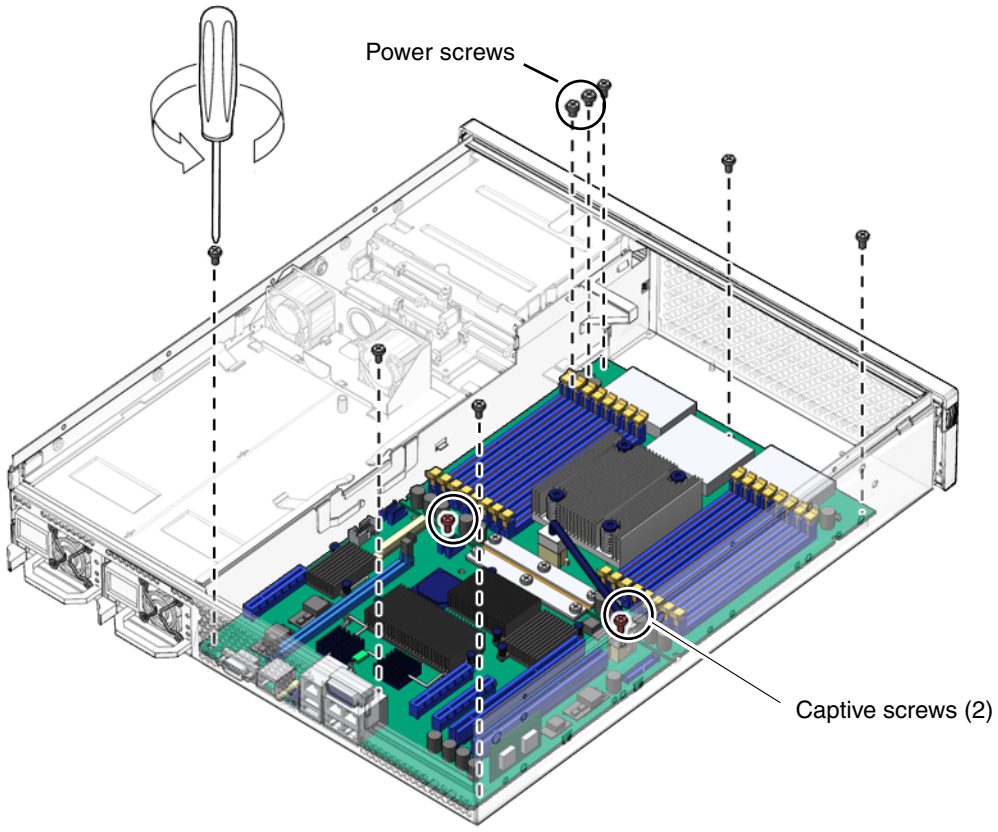

FIGURE 4-24 Removing the Motherboard Assembly Screws

6. **Loosen the two captive screws at the center of the motherboard assembly (FIGURE 4-24).**

7. **Lift up slighty and slide the motherboard assembly forward, lift up on the right edge, and remove the motherboard assembly from the chassis (FIGURE 4-25).**

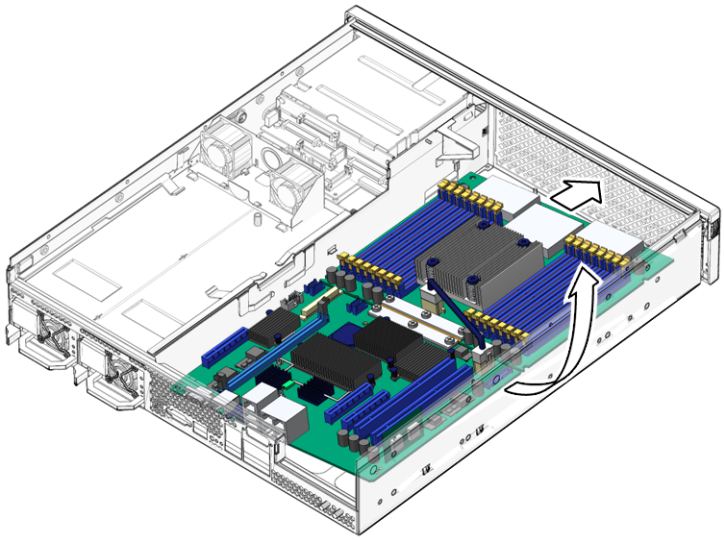

FIGURE 4-25 Removing the Motherboard Assembly From the Chassis

8. **Set the motherboard assembly aside on an antistatic mat.**
9. **Continue to** Section 4.8.2, "Installing the Motherboard Assembly" on page 4-27**.**

4.8.2 Installing the Motherboard Assembly

1. **Remove the replacement motherboard assembly from its packaging and place it on an antistatic mat.**
2. **Lower the left edge of the motherboard assembly into the chassis, then the entire board, and while slightly elevated, slide the motherboard assembly to the back of the chassis (**FIGURE 4-26**).**

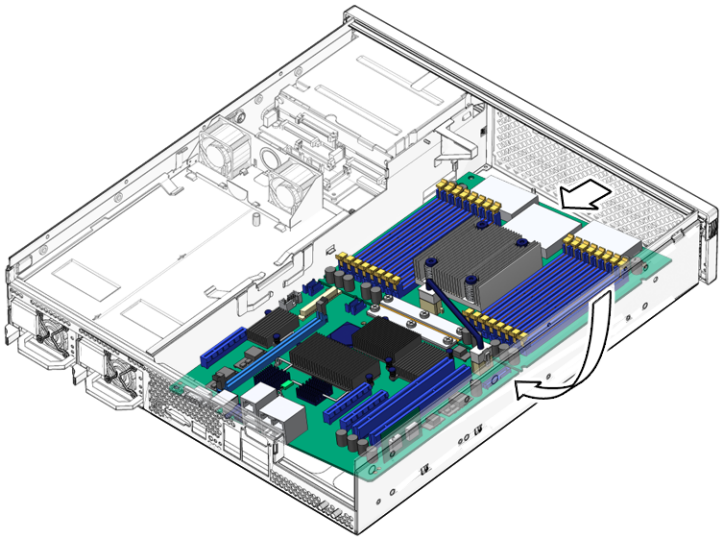

FIGURE 4-26 Installing the Motherboard Assembly Into the Chassis

3. **Align the motherboard assembly screw holes over the chassis standoffs.**
4. **Tighten the two captive screws at the center of the motherboard assembly (**FIGURE 4-27**).**

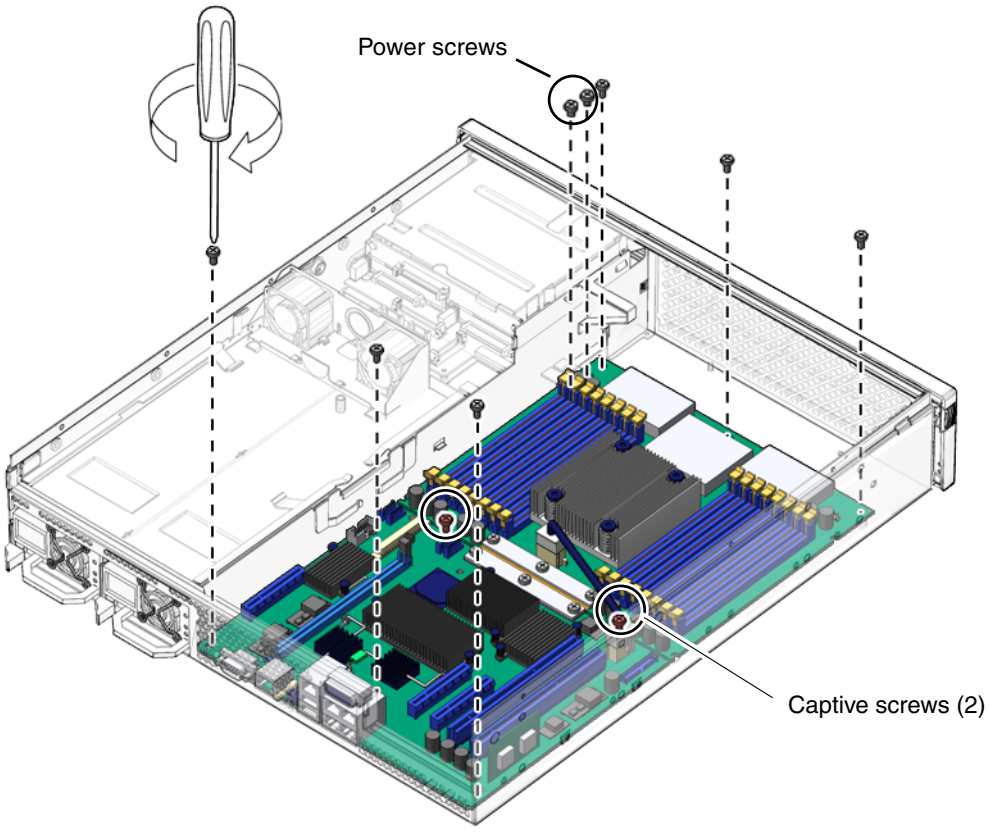

FIGURE 4-27 Installing the Motherboard Assembly Screws

Caution – You must tighten the center screws first. Failing to do so might damage the motherboard assembly.

5. **Install the two power screws and six other screws that secure the motherboard assembly to the chassis (**FIGURE 4-27**).**

6. **Reconnect the cables to the following connectors on the motherboard assembly (**FIGURE 4-28**):**

   - P8
   - J5002
   - J5004

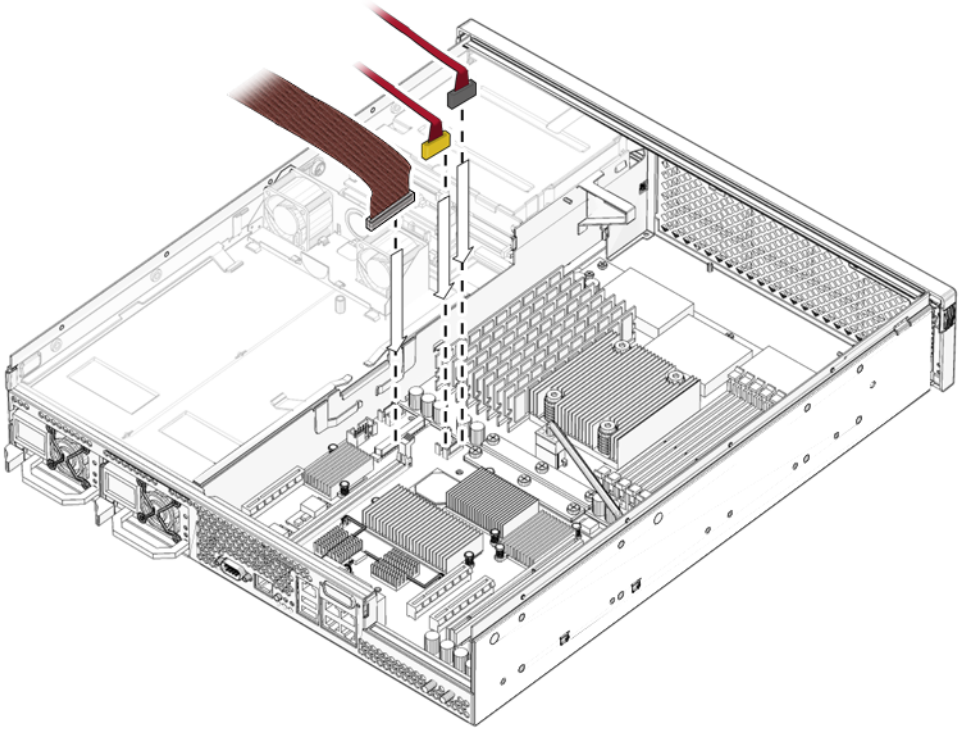

FIGURE 4-28 Reconnecting the Cables to the Motherboard Assembly

7. **Tighten the two screws that secure the system controller bracket to the motherboard assembly (**FIGURE 4-29**).**

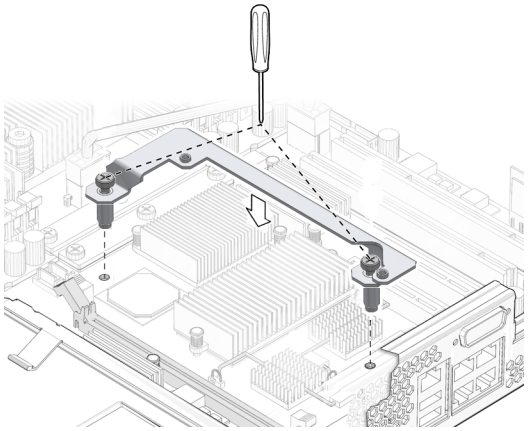

FIGURE 4-29 Installing the System Controller Bracket

8. **Install the following components:**
   - System controller assembly – Section 4.7.2, “Installing the System Controller Assembly” on page 4-21
   - Alarm board – Section 5.5.2, “Installing the Alarm Board” on page 5-16
   - DIMMs – Section 4.4.3, “Installing a DIMM” on page 4-14
   - Fan assembly – Section 5.3.2, “Installing the Fan Assembly” on page 5-8
   - DIMM/CPU duct – Section 4.3.2, “Installing the DIMM/CPU Duct” on page 4-9
9. **Perform the following tasks to bring the server back online:**
   - Section 6.1.1, “Installing the PCI Tray” on page 6-1
   - Section 6.1.2, “Installing the Top Cover” on page 6-4
   - Section 6.1.3, “Removing Antistatic Measures” on page 6-5
   - Section 6.1.4, “Reinstalling the Server Chassis in the Rack” on page 6-5
   - Section 6.1.5, “Reconnecting Cables to the Server” on page 6-8
   - Section 6.1.6, “Powering On the Server” on page 6-9

CHAPTER 5

Replacing Chassis Components

This chapter provides instructions for replacing chassis components. Topics include:

- Section 5.1, “Replacing the Air Filter” on page 5-1
- Section 5.2, “Replacing a Power Supply” on page 5-4
- Section 5.3, “Replacing the Fan Assembly” on page 5-7
- Section 5.4, “Replacing the Hard Drive Fan Assembly” on page 5-10
- Section 5.5, “Replacing the Alarm Board” on page 5-14
- Section 5.6, “Replacing the LED Board” on page 5-18
- Section 5.7, “Replacing the Power Board” on page 5-22

5.1 Replacing the Air Filter

5.1.1 Removing the Air Filter

1. **Press the green tabs on either side of the bezel and pull forward and down (**FIGURE 5-1**).**

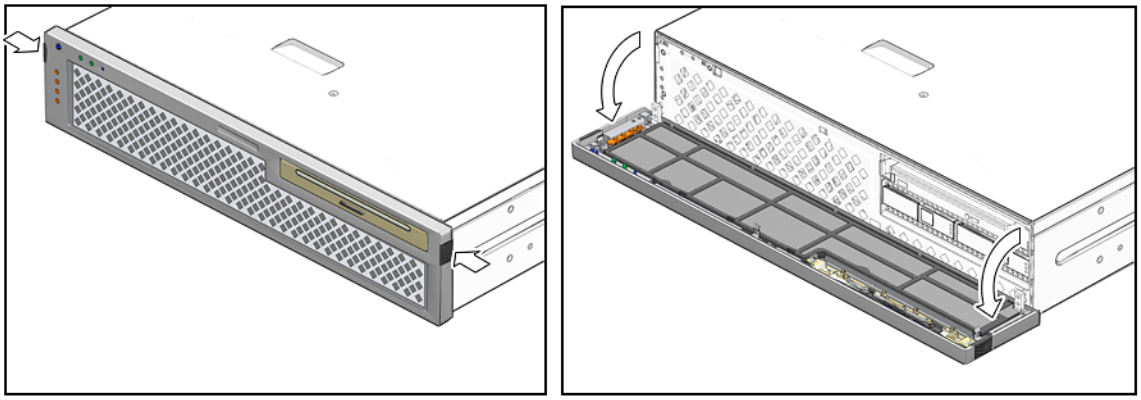

FIGURE 5-1 Opening the Bezel

2. **Grasp the tabs and lift the air filter from the bezel (**FIGURE 5-2**).**

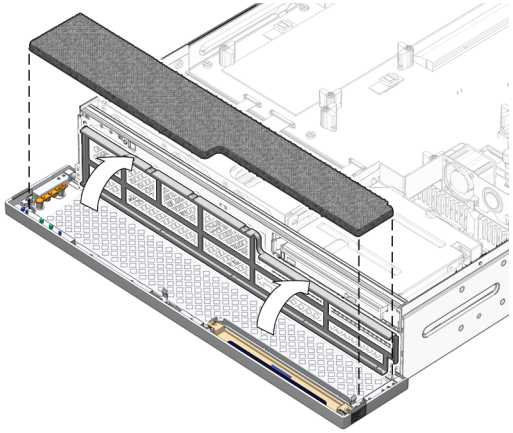

FIGURE 5-2 Removing the Air Filter

Note – Operating the server without an air filter installed is not advised.

---

3. **Continue to** Section 5.1.2, "Installing the Air Filter" on page 5-3**.**

5.1.2 Installing the Air Filter

1. **Remove the replacement air filter from its packaging.**
2. **Insert the air filter into the bezel (**FIGURE 5-3**).**

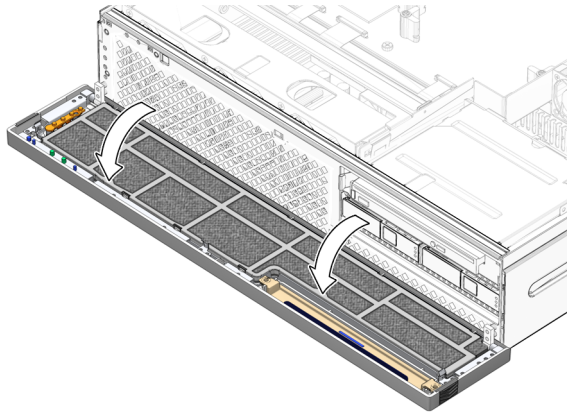

FIGURE 5-3 Installing the Air Filter

3. **Close the bezel (**FIGURE 5-4**).**

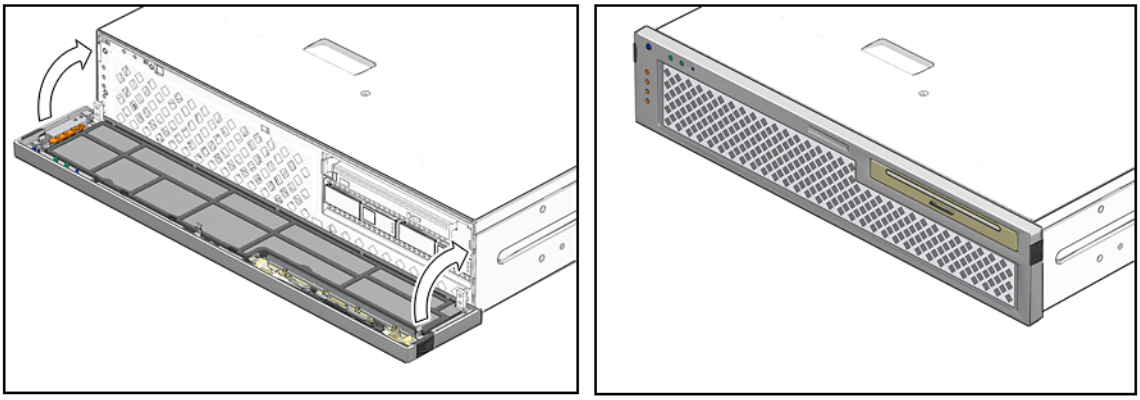

FIGURE 5-4 Closing the Bezel

5.2 Replacing a Power Supply

The server's redundant hot-swappable power supplies enable you to remove and replace a power supply without shutting the server down provided that the other power supply is online and working.

The following LEDs are lit when a power supply fault is detected:

- Front and rear Service Required LEDs.
- Amber Failure LED on the faulty power supply

If a power supply fails and you do not have a replacement available, leave the failed power supply installed to ensure proper air flow in the server.

5.2.1 Removing a Power Supply

1. **Identify which power supply requires replacement (**FIGURE 5-5**).**

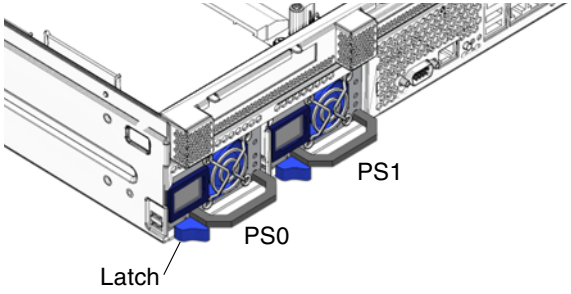

FIGURE 5-5 Locating the Power Supplies

A lighted amber LED on a power supply indicates that a failure was detected. You can also use the `showfaults` command at the `sc>` prompt.

2. **At the `sc>` prompt, issue the `removefru` command.**

   The `removefru` command indicates if it is OK to perform a hot-swap of a power supply. This command does not perform any action, but it provides a warning if the power supply should not be removed because the other power supply is not providing power to the server.

   For example:

```
sc> removefru PSn
Are you sure you want to remove PSn [y/n]? y
<PSn> is safe to remove.
```

   In this command, **`PS`***n* is the identifier for the power supply you plan to remove, either `PS0` or `PS1`.

3. **Disconnect the power cord from the faulty power supply.**

4. **Grasp the power supply handle and push the power supply latch to the right (FIGURE 5-5).**

5. **Pull the power supply out of the chassis (FIGURE 5-6).**

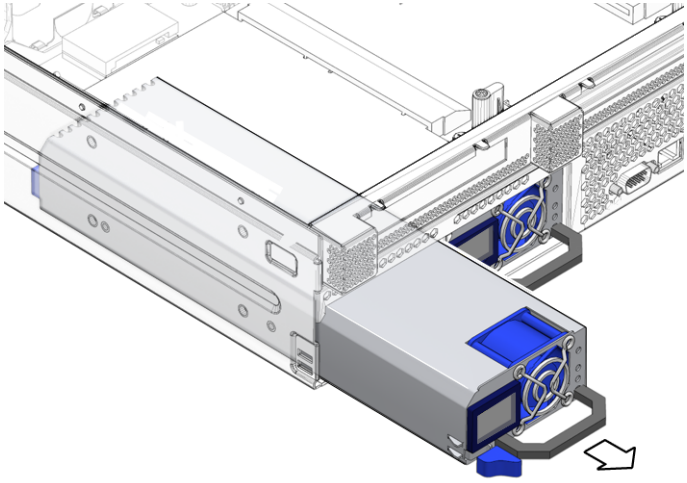

FIGURE 5-6 Removing a Power Supply

6. **Continue to** Section 5.2.2, "Installing a Power Supply" on page 5-6.

5.2.2 Installing a Power Supply

1. **Remove the replacement power supply from its packaging and place it on an antistatic mat.**
2. **Align the replacement power supply with the empty power supply bay.**
3. **Slide the power supply into bay until it is fully seated (**FIGURE 5-7**).**

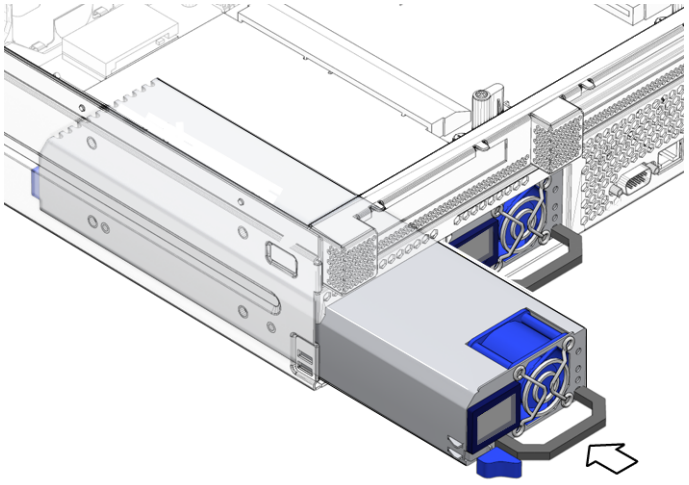

FIGURE 5-7 Installing a Power Supply

4. **Reconnect the power cord to the power supply.**
5. **Verify that the amber LED on the replaced power supply and the service required LEDs are not lit.**
6. **At the** `sc>` **prompt, issue the** `showenvironment` **command to verify the status of the power supplies.**

5.3 Replacing the Fan Assembly

5.3.1 Removing the Fan Assembly

1. **Prepare the server for fan assembly removal. See:**
   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4
   - Section 2.3.3, "Removing the Server From the Rack" on page 2-5
   - Section 2.3.4, "Performing Antistatic Measures" on page 2-7
   - Section 2.3.5, "Removing the Top Cover" on page 2-8
2. **Disconnect the fan assembly cable at J3 on the power board (**FIGURE 5-8**).**

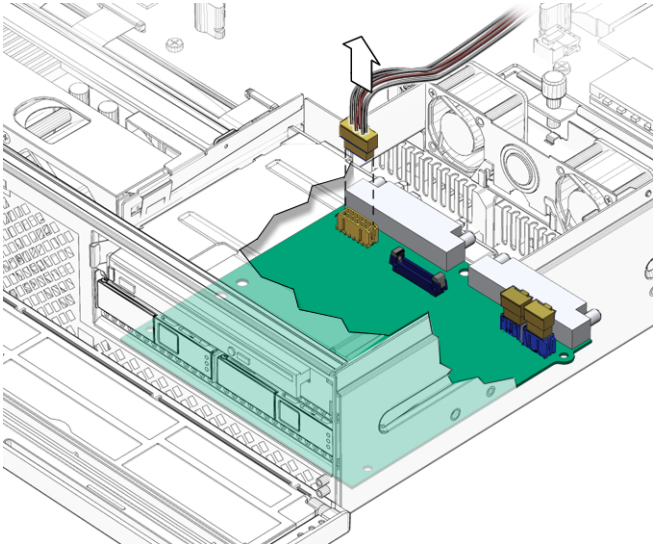

FIGURE 5-8 Disconnecting the Fan Assembly Cable

3. **Remove the fan assembly cable from the cable guides.**
4. **Insert your forefinger and thumb into the holes at the top of the fan assembly, squeeze them together, and lift the fan assembly from the chassis (**FIGURE 5-9**).**

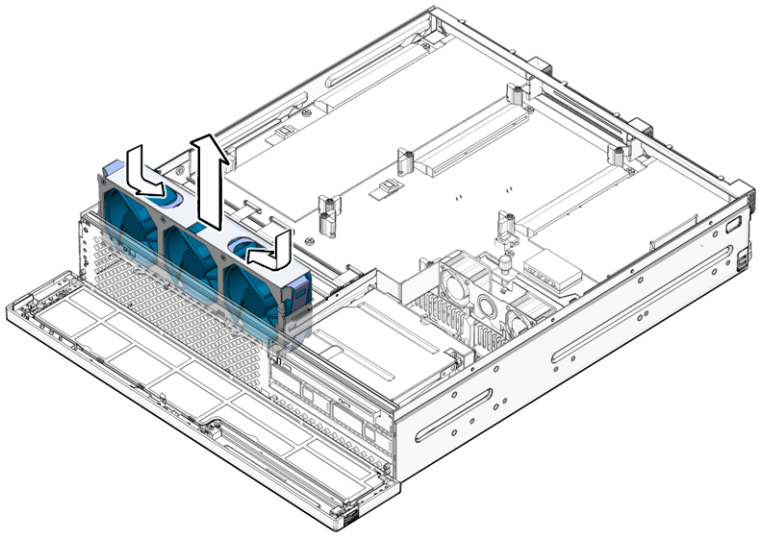

FIGURE 5-9 Lifting the Fan Assembly From the Chassis

5. **Set the fan assembly aside on an antistatic mat.**
6. **Consider your next step:**
   - If you removed the fan assembly as part of another procedure, return to that procedure.
   - Otherwise, continue to Section 5.3.2, "Installing the Fan Assembly" on page 5-8.

5.3.2 Installing the Fan Assembly

1. **Remove the replacement fan assembly from its packaging and place it on an antistatic mat.**
2. **Insert your forefinger and thumb into the holes at the top of the fan assembly, squeeze them together, and lower the fan assembly into the chassis (**FIGURE 5-10**).**

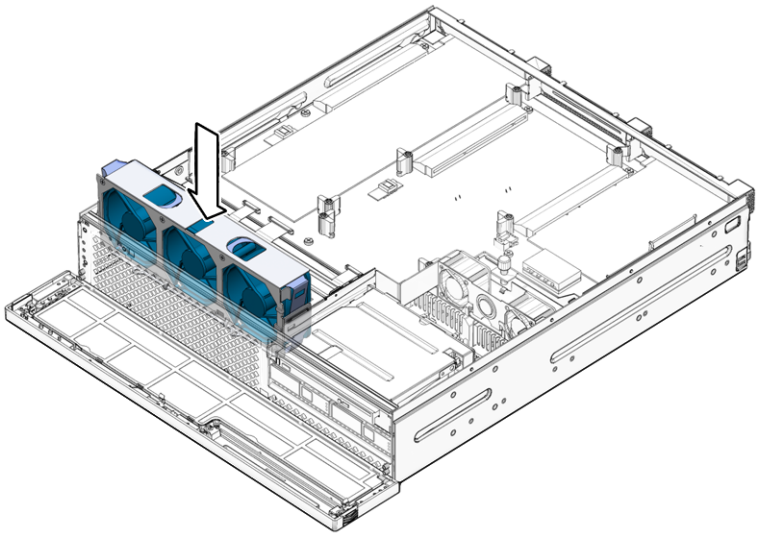

FIGURE 5-10 Lowering the Fan Assembly Into the Chassis

3. **Reconnect the fan assembly cable to connector J3 on the power board (**FIGURE 5-8**).**

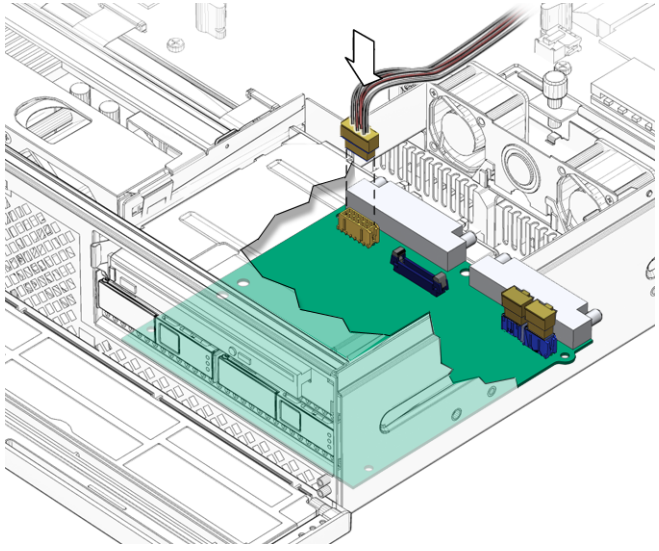

FIGURE 5-11 Connecting the Fan Assembly Cable

4. **Route the fan assembly cable back into the cable guides.**

5. **Consider your next step:**
   - If you installed the fan assembly as part of another procedure, return to that procedure.
   - Otherwise, perform the following tasks to bring the server back online:
     - Section 6.1.2, "Installing the Top Cover" on page 6-4
     - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
     - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
     - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
     - Section 6.1.6, "Powering On the Server" on page 6-9

5.4 Replacing the Hard Drive Fan Assembly

5.4.1 Removing the Hard Drive Fan Assembly

1. **Prepare the server for hard drive fan removal. See:**
   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4
   - Section 2.3.3, "Removing the Server From the Rack" on page 2-5
   - Section 2.3.4, "Performing Antistatic Measures" on page 2-7
   - Section 2.3.5, "Removing the Top Cover" on page 2-8

2. **Disconnect the hard drive fan assembly cable from the power board connector J5 (**FIGURE 5-12**).**

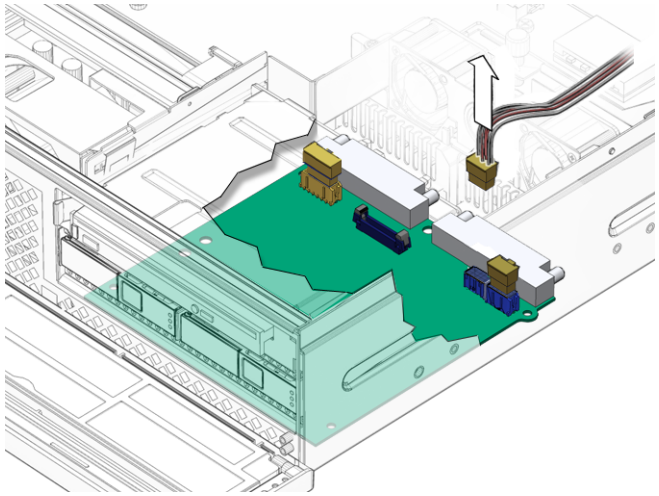

FIGURE 5-12 Disconnecting the Hard Drive Fan Assembly Cable

3. **Carefully lift the hard drive fan assembly cable from the cable guides.**
4. **Push the release button on the hard drive fan bracket, and pivot the bracket backwards (**FIGURE 5-13**).**

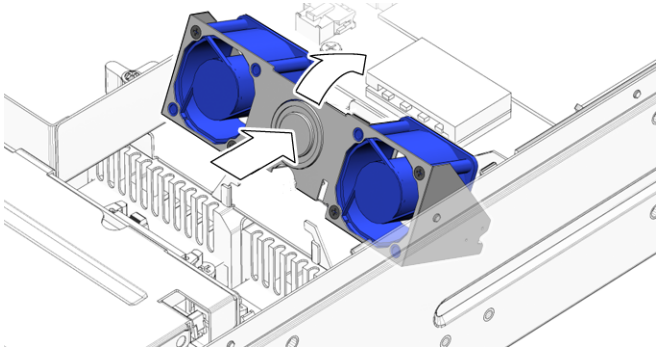

FIGURE 5-13 Releasing the Hard Drive Fan Bracket

5. **Slide the bracket forward and lift the hard drive fan assembly out (**FIGURE 5-14**).**

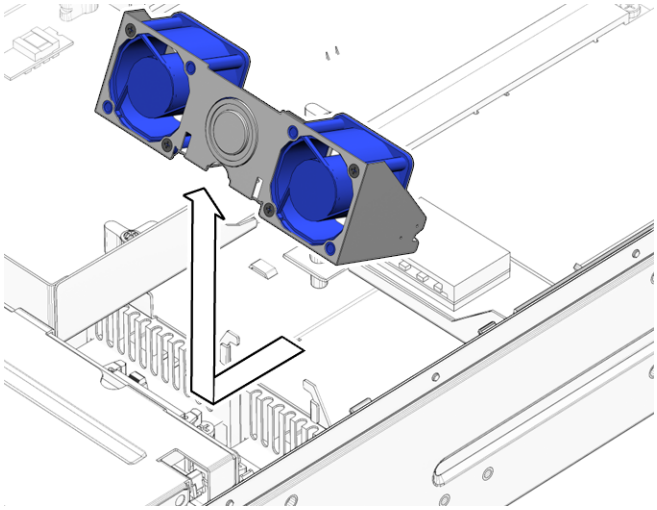

FIGURE 5-14 Lifting Out the Hard Drive Fan Assembly

6. **Set the hard drive fan assembly aside on an antistatic mat.**
7. **Continue to** Section 5.4.2, "Installing the Hard Drive Fan Assembly" on page 5-12**.**

5.4.2 Installing the Hard Drive Fan Assembly

1. **Remove the replacement hard drive fan assembly from its packaging and place it on an antistatic mat.**
2. **Lower the hard drive fan assembly down, and slide the hard drive fan bracket back so that the tabs enter the slots (**FIGURE 5-15**).**

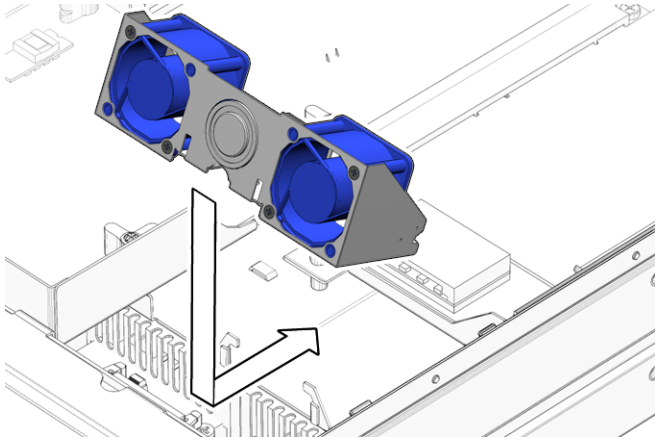

FIGURE 5-15 Lowering the Hard Drive Fan Assembly

3. **Pivot the hard drive fan bracket forward until it clicks (**FIGURE 5-16**).**

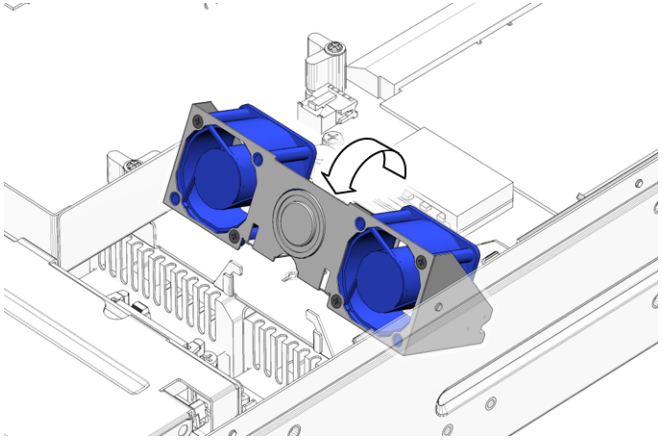

FIGURE 5-16 Securing the Hard Drive Fan Bracket

4. **Connect the hard drive fan assembly cable to the power board at J5 (**FIGURE 5-17**).**

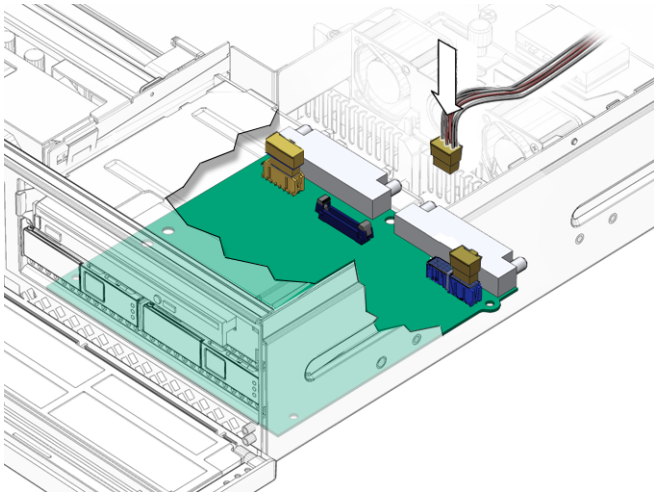

FIGURE 5-17 Connecting the Hard Drive Fan Assembly Cable

5. **Route the hard drive fan assembly cable back into the cable guides.**

6. **Perform the following tasks to bring the server back online:**

   - Section 6.1.2, "Installing the Top Cover" on page 6-4
   - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
   - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
   - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
   - Section 6.1.6, "Powering On the Server" on page 6-9

5.5 Replacing the Alarm Board

Note – Referenced connectors on the alarm board are identified in FIGURE B-10.

5.5.1 Removing the Alarm Board

1. **Prepare the server for alarm board removal. See:**

   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4

- Section 2.3.3, “Removing the Server From the Rack” on page 2-5
- Section 2.3.4, “Performing Antistatic Measures” on page 2-7
- Section 2.3.5, “Removing the Top Cover” on page 2-8
- Section 2.3.6, “Removing the PCI Tray” on page 2-8

2. **Disconnect the cables from the alarm board at the following connectors (FIGURE 5-18):**
   - J1
   - J2
   - J3

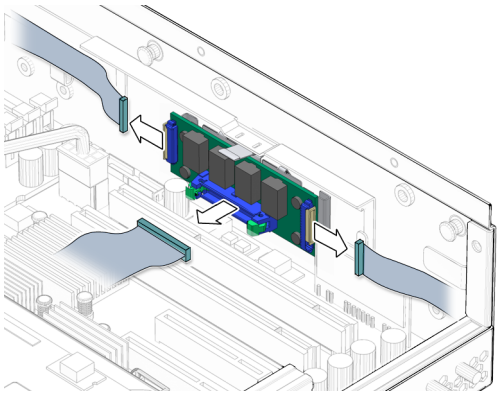

FIGURE 5-18 Disconnecting the Cables From the Alarm Board

3. **Push down on the tab, pivot the alarm board inward, and lift the alarm board out of the chassis (FIGURE 5-19).**

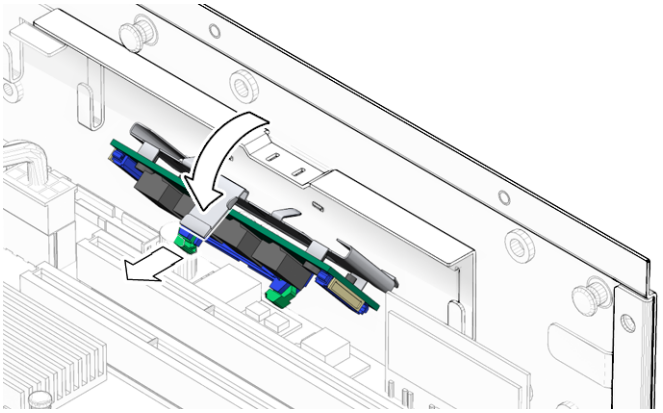

FIGURE 5-19 Lifting the Alarm Board Out of the Chassis

4. **Set the alarm board aside on an antistatic mat.**
5. **Consider your next step:**
   - If you removed the alarm board as part of another procedure, return to that procedure.
   - Otherwise, continue to Section 5.5.2, "Installing the Alarm Board" on page 5-16.

5.5.2 Installing the Alarm Board

1. **Remove the replacement alarm board from its packaging and place it on an antistatic mat.**
2. **Align the tabs of the alarm board with the slots in the chassis wall (**FIGURE 5-20**).**

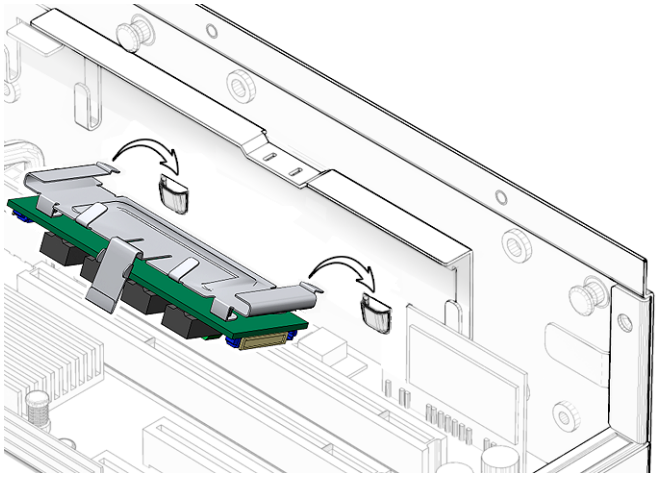

FIGURE 5-20 Aligning the Alarm Board With Chassis Wall

3. **Swing the alarm board up to the chassis wall until it clicks into place (**FIGURE 5-21**).**

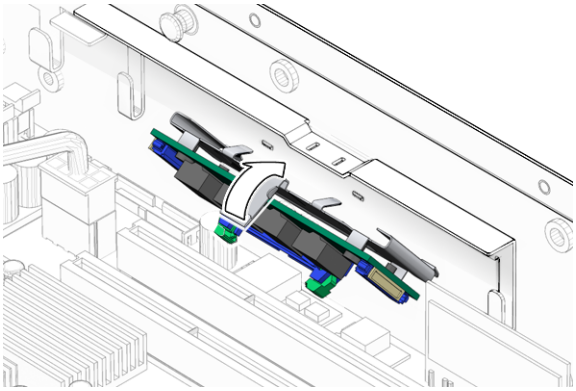

FIGURE 5-21 Swinging the Alarm Board Into Place

4. **Reconnect the cables to the alarm board at the following connectors (**FIGURE 5-22**):**
   - J3
   - J2
   - J1

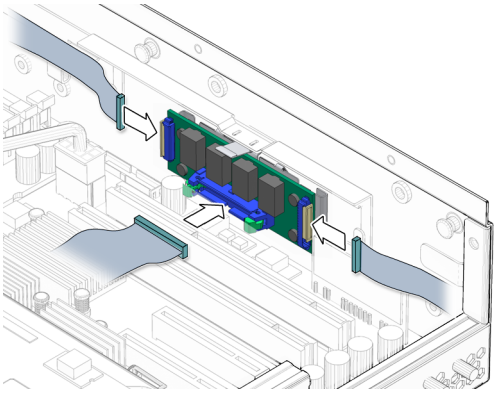

FIGURE 5-22 Connecting the Cables to the Alarm Board

5. **Route the cables into the cable guides.**

6. **Consider your next step:**
   - If you installed the alarm board as part of another procedure, return to that procedure.
   - Otherwise, perform the following tasks to bring the server back online:
     - Section 6.1.1, "Installing the PCI Tray" on page 6-1
     - Section 6.1.2, "Installing the Top Cover" on page 6-4
     - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
     - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
     - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
     - Section 6.1.6, "Powering On the Server" on page 6-9

5.6 Replacing the LED Board

5.6.1 Removing the LED Board

1. **Prepare the server for LED board removal. See:**
   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4
   - Section 2.3.3, "Removing the Server From the Rack" on page 2-5
   - Section 2.3.4, "Performing Antistatic Measures" on page 2-7
   - Section 2.3.5, "Removing the Top Cover" on page 2-8

- Section 2.3.6, “Removing the PCI Tray” on page 2-8

2. **Remove the DIMM/CPU duct.**

   See Section 4.3.1, “Removing the DIMM/CPU Duct” on page 4-7.

3. **Remove the fan assembly.**

   See Section 5.3.1, “Removing the Fan Assembly” on page 5-7.

4. **Loosen the thumbscrew of the LED board and swing the board out to the left (**FIGURE 5-23**).**

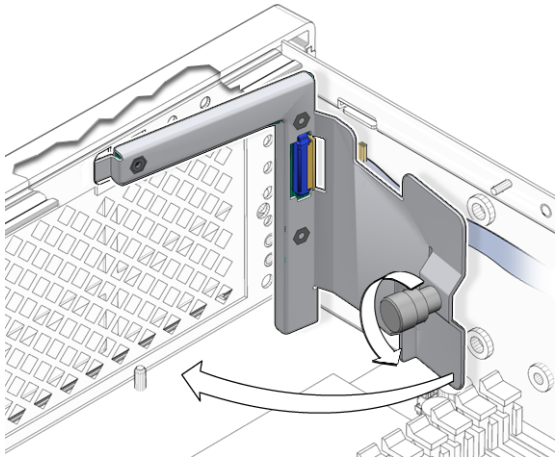

FIGURE 5-23 Removing the LED Board

5. **Carefully lift the LED board and cable from the cable clips.**

6. **Disconnect the cable from the LED board (**FIGURE 5-24**).**

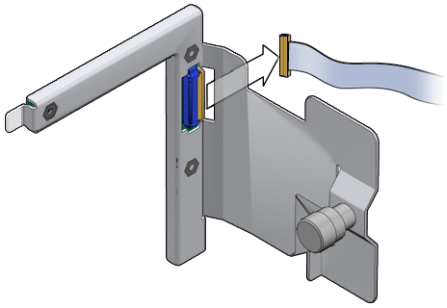

FIGURE 5-24 Disconnecting Cable From the LED Board

7. **Set the LED board aside on an antistatic mat.**
8. **Continue to** Section 5.6.2, "Installing the LED Board" on page 5-20**.**

5.6.2 Installing the LED Board

1. **Remove the replacement LED board from its packaging and place it on an antistatic mat.**
2. **Connect the cable to the LED board (**FIGURE 5-25**).**

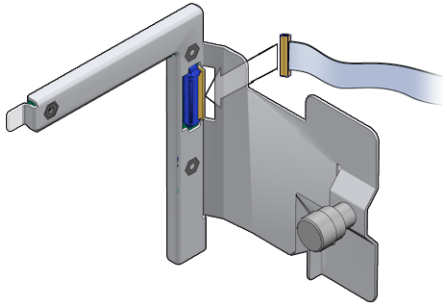

FIGURE 5-25 Connecting Cable to the LED Board

3. **Insert the tab on the LED board into the slot on the chassis (**FIGURE 5-26**).**

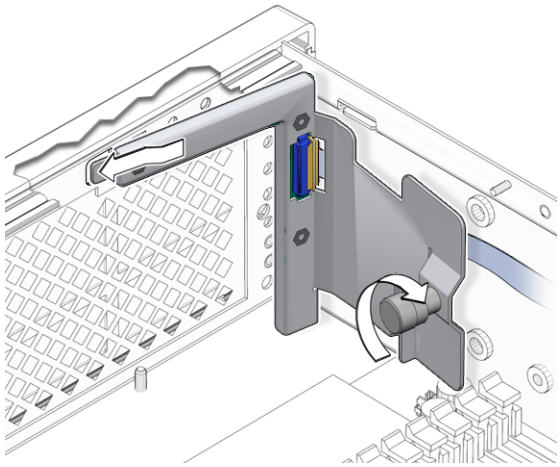

FIGURE 5-26 Inserting the LED Board Tab

4. Swing the LED board right to the chassis and tighten the thumbscrew **(**FIGURE 5-27**).**

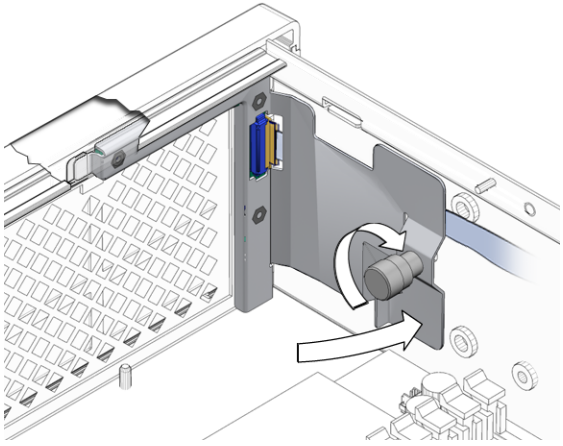

FIGURE 5-27 Swinging the LED Board Back Against the Chassis

5. **Route the LED board cable back into the cable guides.**
6. **Install the fan assembly.**

   See Section 5.3.2, “Installing the Fan Assembly” on page 5-8.

7. **Install the DIMM/CPU duct.**

   See Section 4.3.2, "Installing the DIMM/CPU Duct" on page 4-9.

8. **Perform the following tasks to bring the server back online:**

   - Section 6.1.1, "Installing the PCI Tray" on page 6-1
   - Section 6.1.2, "Installing the Top Cover" on page 6-4
   - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
   - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
   - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
   - Section 6.1.6, "Powering On the Server" on page 6-9

5.7 Replacing the Power Board

Note – Referenced connectors on the power board are identified in FIGURE B-9.

5.7.1 Removing the Power Board

1. **Prepare the server for power board removal. See:**

   - Section 2.3.1, "Powering Off the Server" on page 2-3
   - Section 2.3.2, "Disconnecting Cables From the Server" on page 2-4
   - Section 2.3.3, "Removing the Server From the Rack" on page 2-5
   - Section 2.3.4, "Performing Antistatic Measures" on page 2-7
   - Section 2.3.5, "Removing the Top Cover" on page 2-8

2. **Remove the power supplies, the optical media drive, the hard drives, and the mass storage assembly. See:**

   - Section 5.2.1, "Removing a Power Supply" on page 5-4
   - Section 3.2.1, "Removing the Optical Media Drive" on page 3-6
   - Section 3.1.1, "Removing a Hard Drive" on page 3-2
   - Section 3.3.1, "Removing the Mass Storage Assembly" on page 3-9

3. **Remove the five screws and two power screws that secure the power board to the chassis (FIGURE 5-28).**

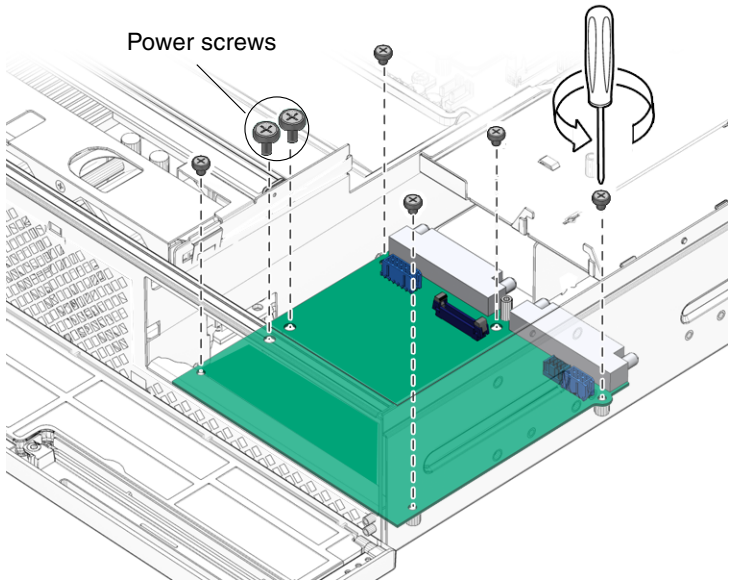

FIGURE 5-28 Removing the Power Board Screws

4. **Lift the power board out of the chassis and set it aside on an antistatic mat (**FIGURE 5-29**).**

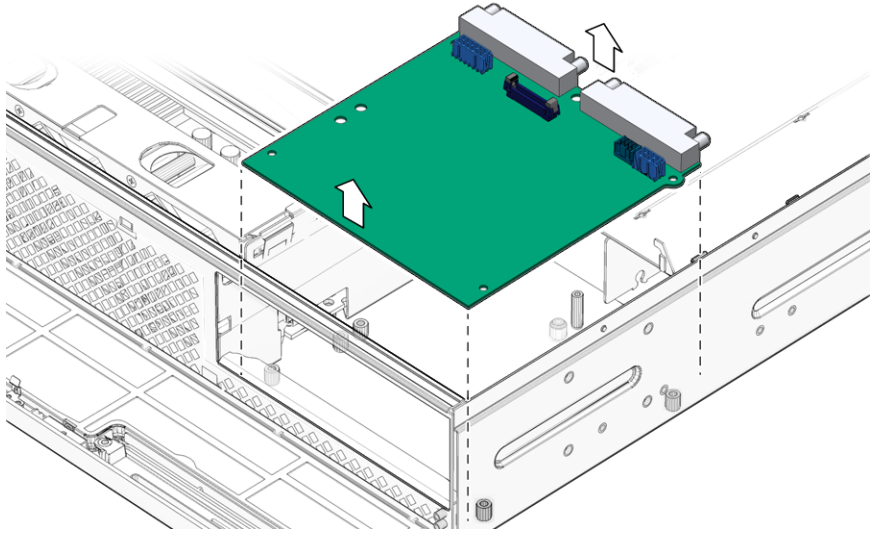

FIGURE 5-29 Lifting the Power Board From the Chassis

5. **Continue to** Section 5.7.2, "Installing the Power Board" on page 5-24**.**

5.7.2 Installing the Power Board

1. **Remove the replacement power board from its packaging and place it on an antistatic mat.**
2. **Lower the power board into the chassis, aligning the board's holes with the standoffs in the chassis (**FIGURE 5-29**).**

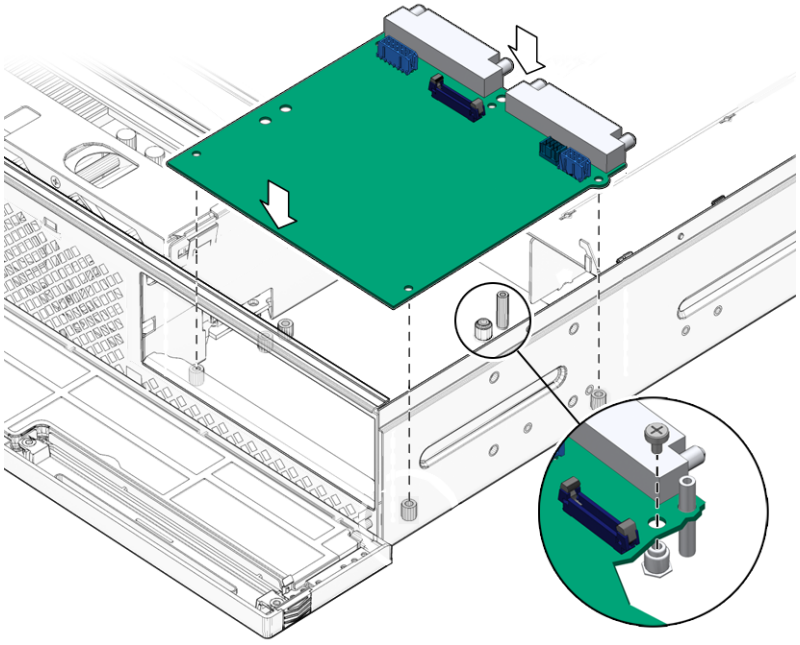

FIGURE 5-30 Lowering the Power Board Into the Chassis

3. **Install the five screws and two power screws to secure the power board to the chassis (**FIGURE 5-31**).**

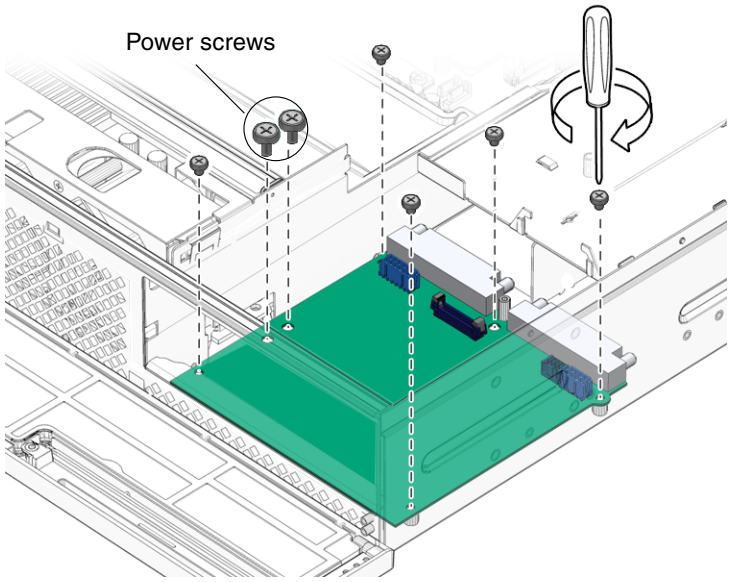

FIGURE 5-31 Securing the Power Board to the Chassis

Note – Tighten the two power screws firmly.

---

4. **Install the mass storage assembly, the hard drives, the optical media drive, and the power supplies. See:**
   - Section 3.3.2, "Installing the Mass Storage Assembly" on page 3-11
   - Section 3.1.2, "Installing a Hard Drive" on page 3-4
   - Section 3.2.2, "Installing the Optical Media Drive" on page 3-7
   - Section 5.2.2, "Installing a Power Supply" on page 5-6
5. **Perform the following tasks to bring the server back online:**
   - Section 6.1.2, "Installing the Top Cover" on page 6-4
   - Section 6.1.3, "Removing Antistatic Measures" on page 6-5
   - Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
   - Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
   - Section 6.1.6, "Powering On the Server" on page 6-9

CHAPTER 6

Finishing Up

This chapter describes tasks to perform after replacing components within the server. Topics include:

- Section 6.1, "Tasks for Finishing Up" on page 6-1

6.1 Tasks for Finishing Up

After replacing components inside of the server, perform the following tasks:

- Section 6.1.1, "Installing the PCI Tray" on page 6-1

  If it was removed for the component replacement procedure.
- Section 6.1.2, "Installing the Top Cover" on page 6-4
- Section 6.1.3, "Removing Antistatic Measures" on page 6-5
- Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5
- Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8
- Section 6.1.6, "Powering On the Server" on page 6-9

Note – When replacing the hard drives or power supplies, not all of these tasks are necessary. The replacement procedures for those components address this fact.

6.1.1 Installing the PCI Tray

1. **Set the PCI tray onto the chassis.**
2. **Reconnect the PCI cables at connectors J2201, J2202, and J2100 on the motherboard assembly (**FIGURE 6-1**).**

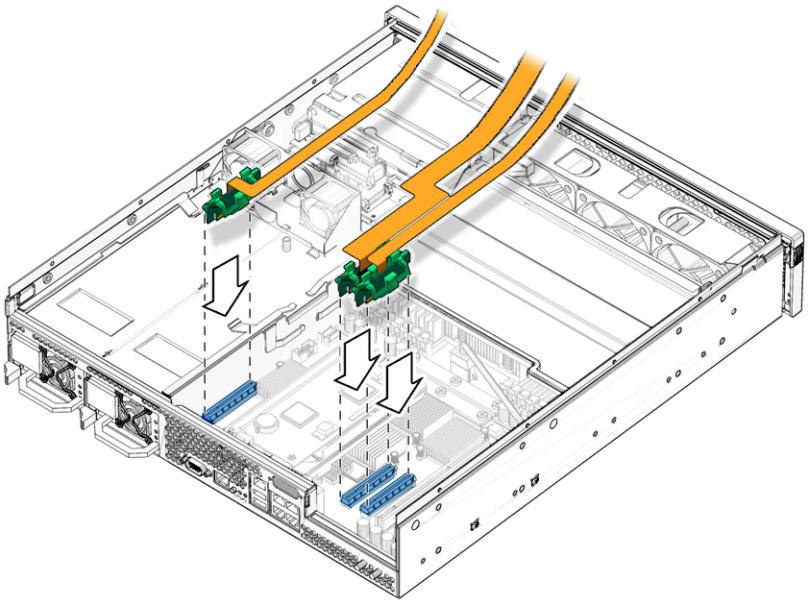

FIGURE 6-1 Reconnecting the PCI Cables

3. **If previously removed, set the U-plate over the system controller bracket and install the two screws that hold it in position (**FIGURE 6-2**).**

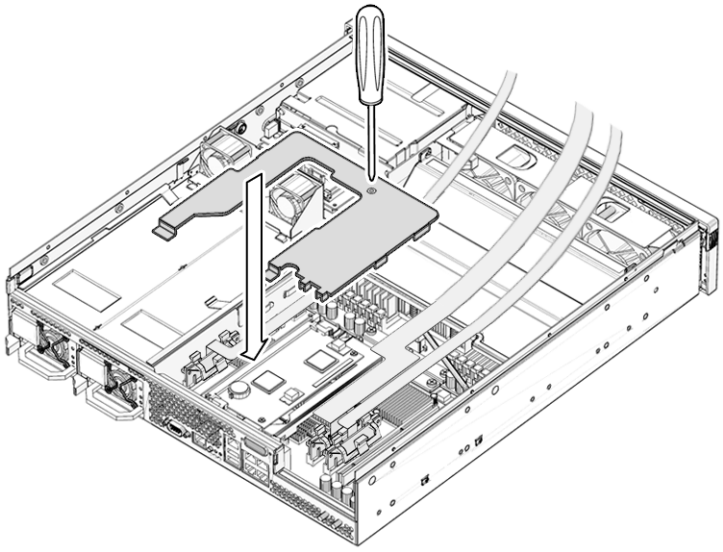

FIGURE 6-2 Installing the U-Plate

4. **Lower the PCI tray and slide it forward (**FIGURE 6-3**).**

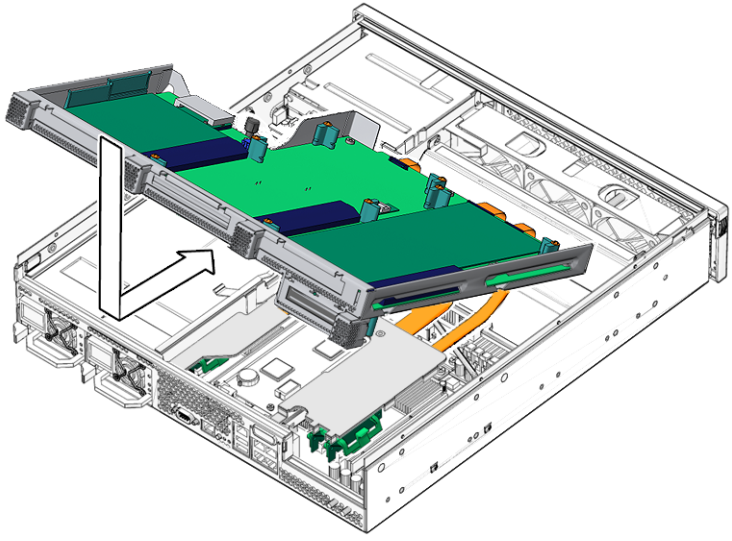

FIGURE 6-3 Lowering the PCI Tray

5. **Tighten the thumbscrew and reconnect the cable at J2 (**FIGURE 6-4**).**

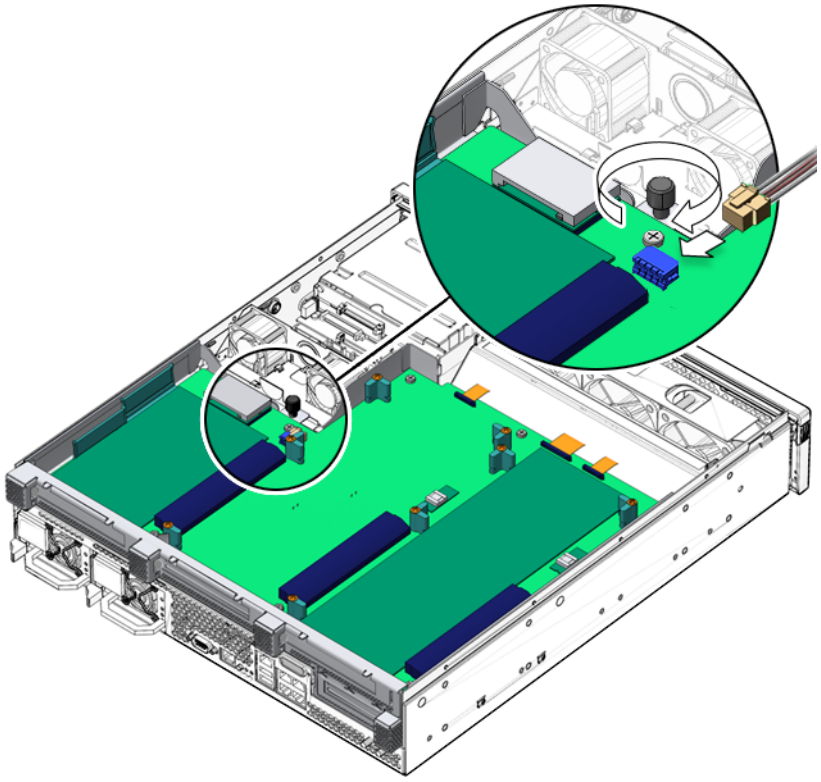

FIGURE 6-4 Reconnecting J2 and Tightening the Thumbscrew.

6. **Install the top cover.**

See Section 6.1.2, “Installing the Top Cover” on page 6-4.

6.1.2 Installing the Top Cover

1. **Place the top cover on the chassis.**

   Set the cover down so that it hangs over the rear of the server by about an inch (25 mm).

2. **Slide the cover forward until it latches into place (**FIGURE 6-5**).**

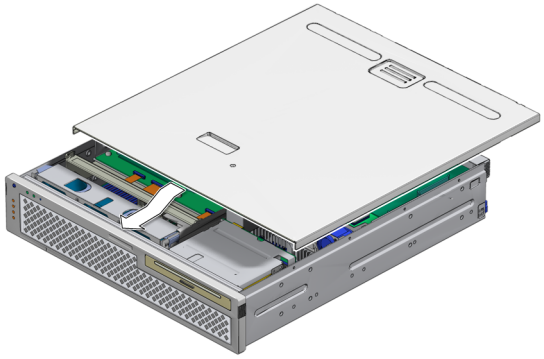

FIGURE 6-5 Installing Top Cover

3. **Remove the antistatic precautions.**

   See Section 6.1.3, "Removing Antistatic Measures" on page 6-5.

6.1.3 Removing Antistatic Measures

1. **Remove any antistatic straps or conductors from the server chassis.**
2. **Remove the antistatic wrist strap from yourself.**

Note – You will be handling the chassis, which is metal, so the wriststrap is no longer necessary. Additionally, this gives you more freedom of movement for installing the server into the rack.

---

3. **Lift the server from the antistatic mat and reinstall it into the rack.**

   See Section 6.1.4, "Reinstalling the Server Chassis in the Rack" on page 6-5.

Caution – The server weighs approximately 40 lb (18 kg). Two people are required to carry the chassis and install it in the rack.

6.1.4 Reinstalling the Server Chassis in the Rack

1. **On the rack, ensure that the rails are extended.**
2. **Place the ends of the chassis mounting brackets into the slide rails.**

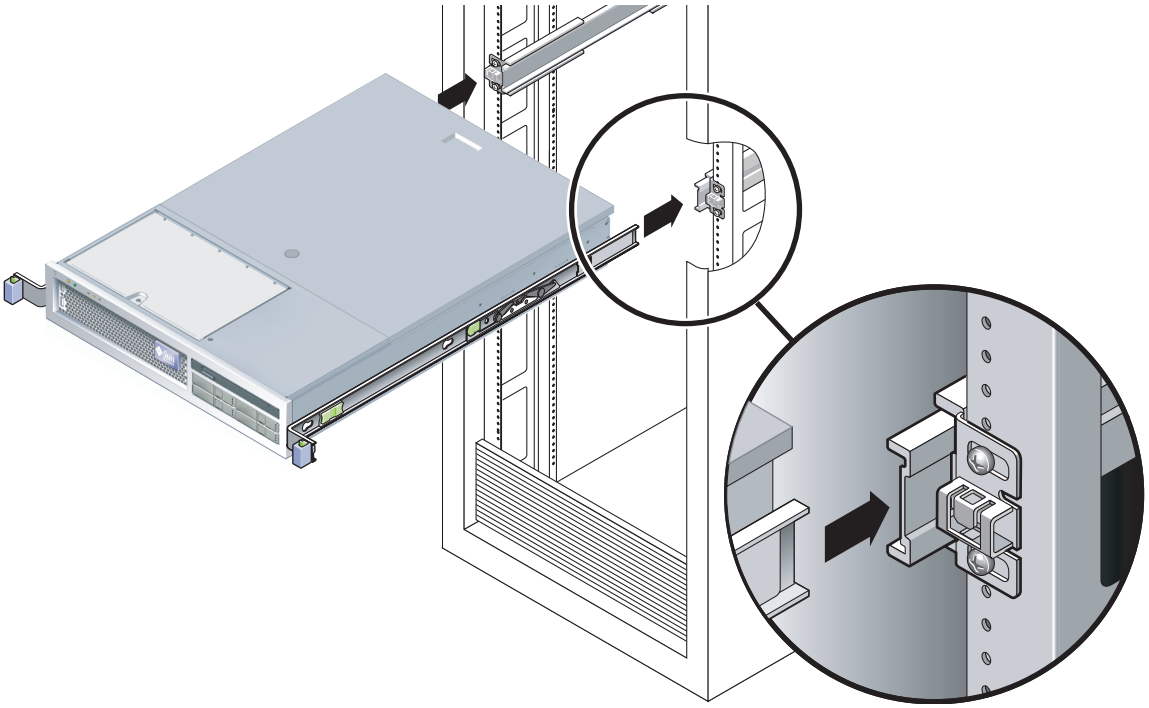

FIGURE 6-6 Returning the Server to the Rack

3. **Slide the server into the rack until the brackets lock into place.**
4. **Release the slide rails from the fully extended position by pushing the release levers on the side of each rail (**FIGURE 6-7**).**

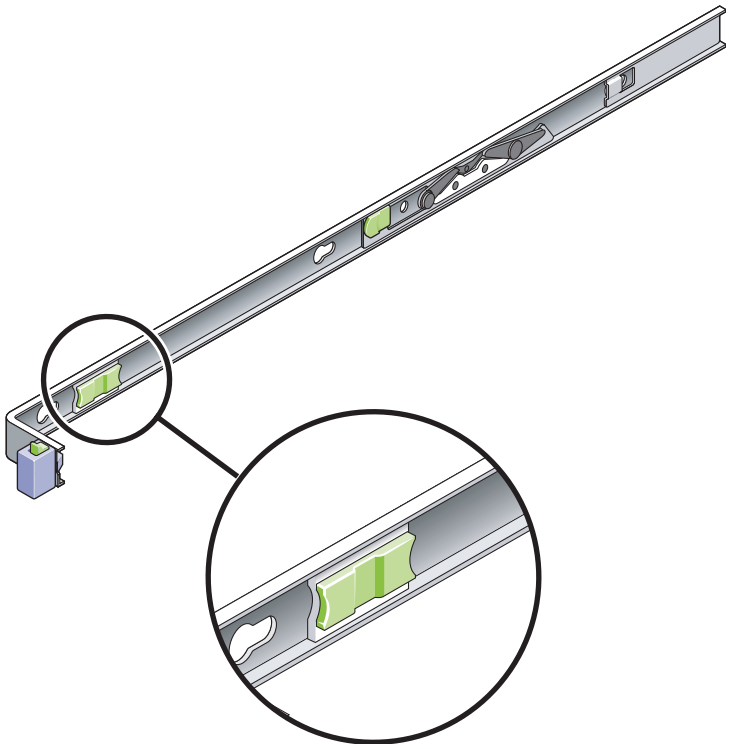

FIGURE 6-7 Release Levers

5. **While pushing on the release levers, slowly push the server into the rack.**

   Ensure that the cables are not in the way.

6. **Reconnect the CMA into the back of the rail assembly:**

Note – Refer to the server installation guide for detailed CMA installation instructions.

---

   a. **Insert the smaller extension into the clip located at the end of the mounting bracket (**FIGURE 6-8**).**

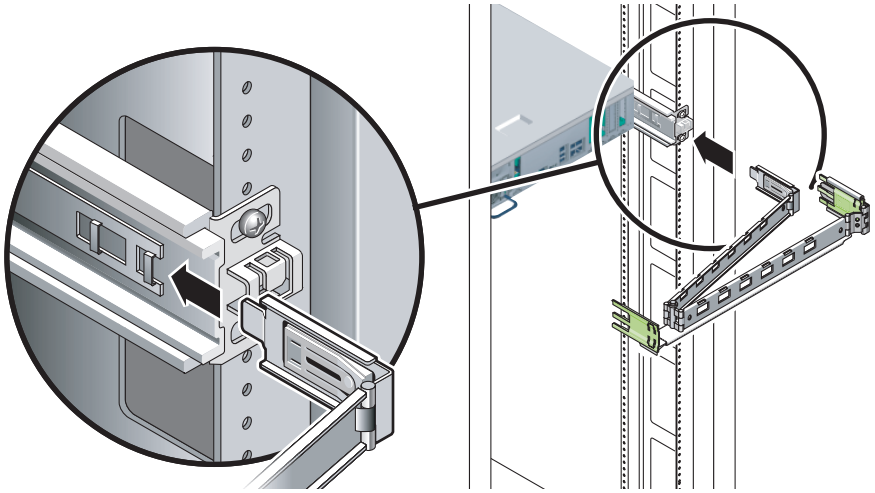

FIGURE 6-8 Installing the CMA

b. Plug the CMA rail extension into the end of the left sliding rail assembly.

The tab at the front of the rail extension clicks into place.

7. Reconnect the cables to the back of the server.

See Section 6.1.5, "Reconnecting Cables to the Server" on page 6-8.

Note – If the CMA is in the way, disconnect the left CMA release and swing the CMA open.

6.1.5 Reconnecting Cables to the Server

1. Reconnect the following cables as appropriate:

- GBE 1
- GBE 0
- GBE 3
- GBE 2
- USB 0
- USB 1
- NET MGT
- SER MGT
- TTYA
- PCI-E 0
- Alarm

- PCI-X 2
- PCI-X 1
- PCI-X 0
- Power supply 1
- Power supply 0

2. **If necessary, reinstall the appropriate cables into the CMA.**
3. **Power on the server.**

   See Section 6.1.6, "Powering On the Server" on page 6-9.

6.1.6 Powering On the Server

As soon as the power cords are connected, standby power is applied, and depending on the configuration of the firmware, the system might boot. If not, follow this procedure.

- **Use the tip of a pen to press the power button on the bezel (**FIGURE 6-9**).**

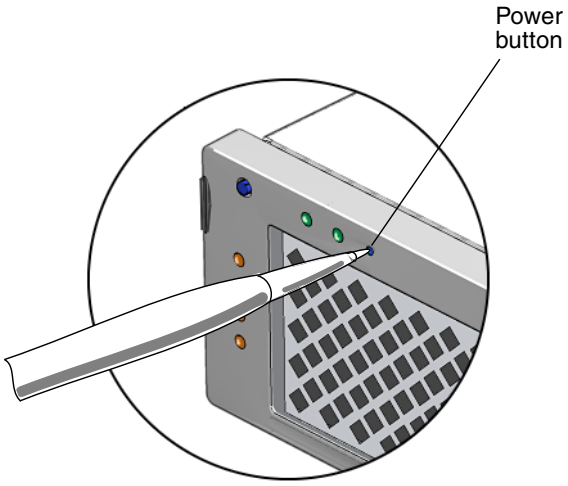

FIGURE 6-9 Powering On the Server

- **Alternatively, issue the** `poweron` **command to the system console.**

  For example:

```
sc> poweron
```

APPENDIX **A**

Server Specifications

This appendix provides the server specifications.

Topics include:

- Section A.1, “Physical Specifications” on page A-1
- Section A.2, “Environmental Requirements” on page A-2
- Section A.3, “Acoustic Noise Emissions” on page A-2
- Section A.4, “Electrical Specifications” on page A-3
- Section A.5, “NEBS Level 3 Compliance” on page A-3

A.1 Physical Specifications

TABLE A-1 Physical Specifications of the Server

Dimension	Server Dimensions	Measurements
Width	Bezel	17.4 in. (442.0 mm)
	System chassis	16.75 in. (425.5 mm)
Depth	To connector plane	19 in. (481.9 mm)
	Maximum overall	20.25 in. (514.4 mm)
Height	2 RU nominal	3.4 in. (87.1 mm)
Weight	Of system only	35.0 lbs (15.9 kg)

A.2 Environmental Requirements

You can operate and store the server safely in the conditions detailed in TABLE A-2.

TABLE A-2 Operating and Storage Specifications

Parameter	Operating	Storage
Ambient temperature*	41˚F to 104˚F (5˚C to 40˚C) up to 6000 feet (1829 meters)†	–40˚F to 158˚F (–40˚C to 70˚C)
Relative humidity	5% to 85% noncondensing, short term 25˚F to 113˚F (-5˚C to 55˚C) 5% to 90% noncondensing, but not to exceed 0.024 kg of water per kg of dry air (0.053 lbs. water/2.205 lbs. dry air)	Up to 93% noncondensing 100.4˚ (38˚C) maximum wet bulb
Elevation (Sun requirement)	Maximum 9840 feet (3000 meters) at 104˚F (40˚C)	Maximum 39370 feet (12000 meters)
Elevation (NEBS requirement)	-200 feet to 5900 feet (-60 meters to 1800 meters) at 104˚F (40˚C) 5900 feet to 13100 feet (1800 meters to 4000 meters) at 86˚F (30˚C)	

* Does not apply to removable media devices.

† Maximum ambient operating temperature is derated by 1 degree C per 500m elevation.

A.3 Acoustic Noise Emissions

The acoustic noise emissions for the server are as follows:

Parameter	Operating	Idling
Acoustic power LWAd (1B=10dB)	7.1 B	7.2 B
Acoustic pressure LpAm	58.9 dBA	59.0 dBA

Declared noise emissions are in accordance with ISO 9296 standards.

A.4 Electrical Specifications

TABLE A-3 Electrical Specifications

Parameter	DC Version Requirement	AC Version Requirement
Voltage	-48 VDC or -60 VDC nominal	100 VAC to 240 VAC single phase, 47-63 Hz
Current (per input)	10.2 A maximum per input at -48 VDC	5.4 A maximum per input at 100 VAC
Current (total)	10.4 A maximum total for all inputs at -48VDC	5.6 A maximum total for all inputs at 100 VAC
Power*	500 Watts	550 Watts

* Total input power is approximately equally divided among the operating power supplies.

A.5 NEBS Level 3 Compliance

The DC-powered version of the server meets NEBS Level 3 requirements per SR-3580, including the appropriate sections of GR-63-CORE (*Network Equipment-Building System Requirements: Physical Protection*) and GR-1089-CORE (*Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment*).

Caution – To maintain NEBS compliance, the network management (NET MGT) Ethernet port and the RJ45 serial management (SERIAL MGT) port must use shielded cables, and both ends of the shield must be grounded.

APPENDIX **B**

Signal Pinouts

This appendix gives the pinouts for the server rear ports and identifies connectors on various server boards. Topic include:

- Section B.1, “Gigabit Ethernet Ports” on page B-1
- Section B.2, “Network Management Port” on page B-2
- Section B.3, “Serial Ports” on page B-3
- Section B.4, “Alarm Port” on page B-6
- Section B.5, “USB Ports” on page B-7
- Section B.6, “Motherboard Assembly Connectors” on page B-8
- Section B.7, “Mass Storage Assembly Connectors” on page B-10
- Section B.8, “Power Board Connectors” on page B-11
- Section B.9, “Alarm Board Connectors” on page B-12

B.1 Gigabit Ethernet Ports

The server has four autonegotiating 10/100/1000BASE-T Gigabit Ethernet system domain ports. All four Ethernet ports use a standard RJ-45 connector, the transfer rates for which are given in TABLE B-1. FIGURE B-1 shows the pin numbering of the ports, and TABLE B-2 describes the pin signals.

TABLE B-1 Ethernet Connection Transfer Rates

Connection Type	IEEE Terminology	Transfer Rate
Ethernet	10BASE-T	10 Mbit/sec
Fast Ethernet	100BASE-TX	100 Mbits/sec
Gigabit Ethernet	1000BASE-T	1000 Mbit/sec

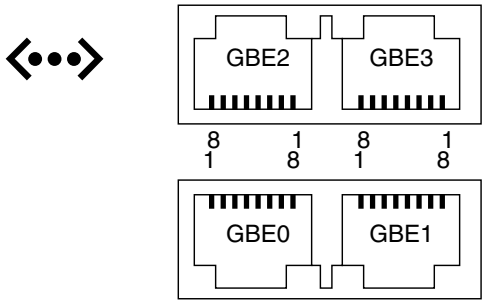

FIGURE B-1 Gigabit Ethernet Port Pin Numbering

TABLE B-2 Gigabit Ethernet Port Signals

Pin	Signal Description	Pin	Signal Description
1	Transmit/Receive Data 0 +	5	Transmit/Receive Data 2 –
2	Transmit/Receive Data 0 –	6	Transmit/Receive Data 1 –
3	Transmit/Receive Data 1 +	7	Transmit/Receive Data 3 +
4	Transmit/Receive Data 2 +	8	Transmit/Receive Data 3 –

B.2 Network Management Port

The server has one 10BASE-T Ethernet management domain interface, labelled NET MGT. For information on configuring this port for managing the server with ALOM, see the *Netra T2000 Server Administration Guide*, 819-5837.

Caution – If you are planning to use the network management (NET MGT) port, you must use a shielded Ethernet cable to maintain your server's NEBS compliance. The cable's shield must be grounded at both ends.

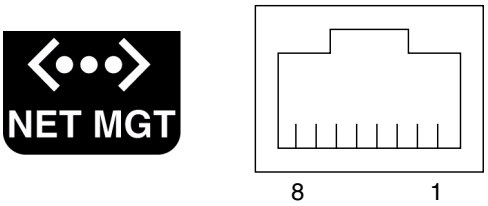

FIGURE B-2 Network Management Port Pin Numbering

TABLE B-3 Network Management Connector Signals

Pin	Signal Description	Pin	Signal Description
1	Transmit Data +	5	Common Mode Termination
2	Transmit Data –	6	Receive Data –
3	Receive Data +	7	Common Mode Termination
4	Common Mode Termination	8	Common Mode Termination

B.3 Serial Ports

The server has two serial ports, labeled SERIAL MGT and TTYA. TABLE B-4 lists the default serial connection settings for both serial ports.

TABLE B-4 Default Serial Connection Settings

Parameter	Setting
Connector	SERIAL MGT or IOIOI
Rate	9600 baud
Parity	None
Stop bits	1
Data bits	8

B.3.1 Serial Management Port

The serial management connector (labeled SERIAL MGT) is an RJ-45 connector that can be accessed from the rear panel. This port is the default connection to the server. Use this port *only* for server management.

Caution – You must use a shielded Ethernet cable to maintain your server's NEBS compliance. The cable's shield must be grounded at both ends.

FIGURE B-3 shows the pin numbering of the serial management port, and TABLE B-5 describes the pin signals.

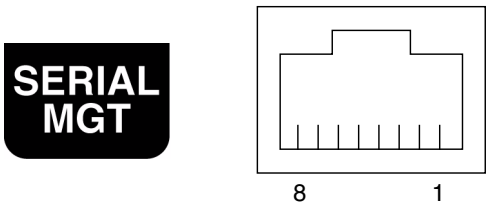

FIGURE B-3 Serial Management Port Pin Numbering

TABLE B-5 Serial Management RJ-45 Connector Signals

Pin	Signal Description	Pin	Signal Description
1	Request to Send	5	Ground
2	Data Terminal Ready	6	Receive Data
3	Transmit Data	7	Data Set Ready
4	Ground	8	Clear to Send

If you need to connect to the SERIAL MGT port using a cable with either a DB-9 or a DB-25 connector, use a supplied adapter to perform the crossovers given for each connector. The supplied RJ-45 to DB-9 and RJ-45 to DB-25 adapters are wired as described in TABLE B-6 and TABLE B-7.

B.3.1.1 RJ-45 to DB-9 Adapter Crossovers

TABLE B-6 RJ-45 to DB-9 Adapter Crossovers

Serial Port (RJ-45 Connector)		DB-9 Adapter	
Pin	**Signal Description**	**Pin**	**Signal Description**
1	RTS	8	CTS
2	DTR	6	DSR
3	TXD	2	RXD
4	Signal Ground	5	Signal Ground

TABLE B-6 RJ-45 to DB-9 Adapter Crossovers *(Continued)*

Serial Port (RJ-45 Connector)		DB-9 Adapter	
Pin	**Signal Description**	**Pin**	**Signal Description**
5	Signal Ground	5	Signal Ground
6	RXD	3	TXD
7	DSR	4	DTR
8	CTS	7	RTS

B.3.1.2 RJ-45 to DB-25 Adapter Crossovers

TABLE B-7 RJ-45 to DB-25 Adapter Crossovers

Serial Port (RJ-45 Connector)		DB-25 Adapter	
Pin	**Signal Description**	**Pin**	**Signal Description**
1	RTS	5	CTS
2	DTR	6	DSR
3	TXD	3	RXD
4	Signal Ground	7	Signal Ground
5	Signal Ground	7	Signal Ground
6	RXD	2	TXD
7	DSR	20	DTR
8	CTS	4	RTS

B.3.2 Serial Port TTYA

The port labeled TTYA accepts a DB-9 connector. Use this port for general purpose serial data transfers. FIGURE B-4 shows the pin numbering of the serial port, and TABLE B-8 describes the pin signals.

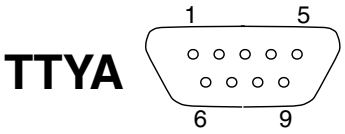

FIGURE B-4 Serial Port (TTYA) Pin Numbering

TABLE B-8 Serial Port (TTYA) Connector Signals

Pin	Signal Description	Pin	Signal Description
1	Data Carrier Detect	6	Data Set Ready
2	Receive Data	7	Request to Send
3	Transmit Data	8	Clear to Send
4	Data Terminal Ready	9	Ring Indicate
5	Ground		

B.4 Alarm Port

The alarm port on the alarm rear transition module uses a standard DB-15 connector. In a telecommunications environment, use this port to connect to the central office alarming system. FIGURE B-5 shows the pin numbering of the alarm port, and TABLE B-9 describes the pin signals.

Note – The alarm port relay contacts are rated for 100 V 0.2 A maximum.

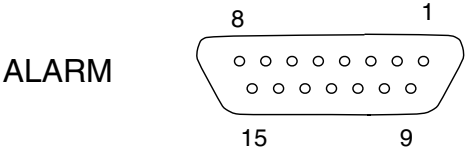

FIGURE B-5 Alarm Port Pin Numbering

TABLE B-9 Alarm Connector Signals

Pin	Service	Pin	Service
1	NC	9	ALARM1_NC
2	NC	10	ALARM1_COM
3	NC	11	ALARM2_NO
4	NC	12	ALARM2_NC
5	ALARM0_NO	13	ALARM2_COM
6	ALARM0_NC	14	ALARM3_NO
7	ALARM0_COM	15	ALARM3_COM
8	ALARM1_NO	CHASSIS	FRAME GND

B.5 USB Ports

The server has two USB ports for attaching supported USB 1.1 compliant devices. FIGURE B-6 shows the pin numbering of the USB ports, and TABLE B-10 describes the pin signals.

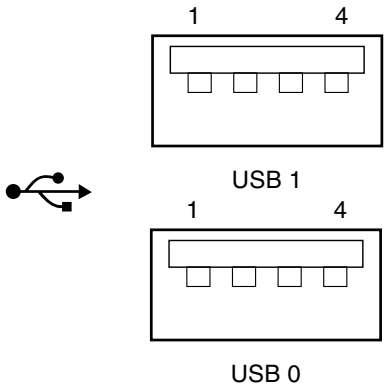

FIGURE B-6 USB Ports Pin Numbering

TABLE B-10 USB Connector Pin Signals

Pin	Signal Description
1	+5 V
2	DAT-
3	DAT+
4	Ground

B.6 Motherboard Assembly Connectors

FIGURE B-7 identifies the connectors on the motherboard assembly. TABLE B-11 lists the origin of the cables that connect to the motherboard assembly.

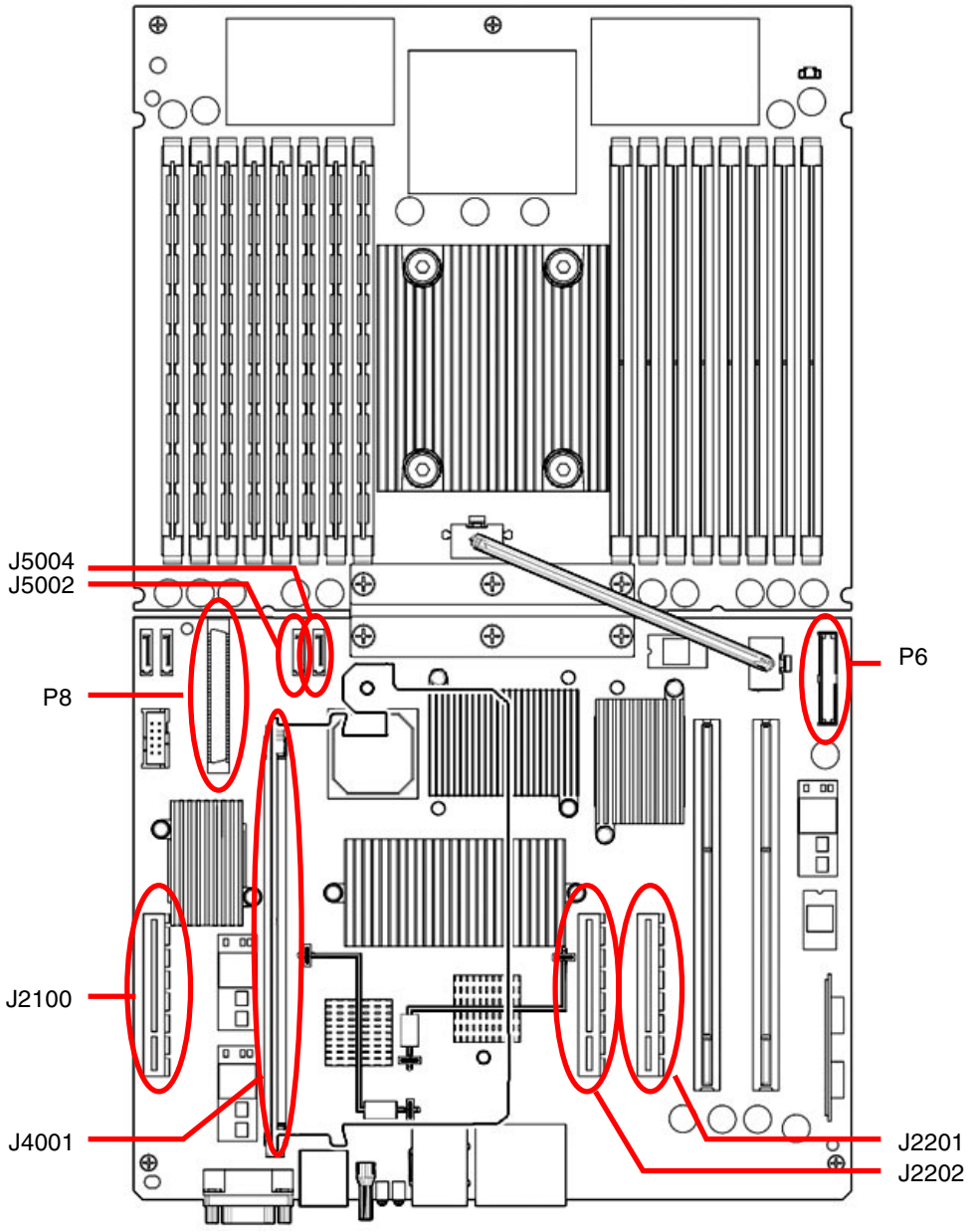

FIGURE B-7 Motherboard Assembly Connectors

TABLE B-11 Motherboard Assembly Connectors

Connector	Cable Origin
P6	Alarm board, J3
P8	Mass storage assembly, J3
J2100	PCI tray,
J2201	PCI tray,
J2202	PCI tray,
J5002	Mass storage assembly, J5
J5004	Mass storage assembly, J2
J4001	System controller riser card

B.7 Mass Storage Assembly Connectors

FIGURE B-8 identifies the connectors on the mass storage assembly. TABLE B-12 lists the origin of the cables that connect to the mass storage assembly.

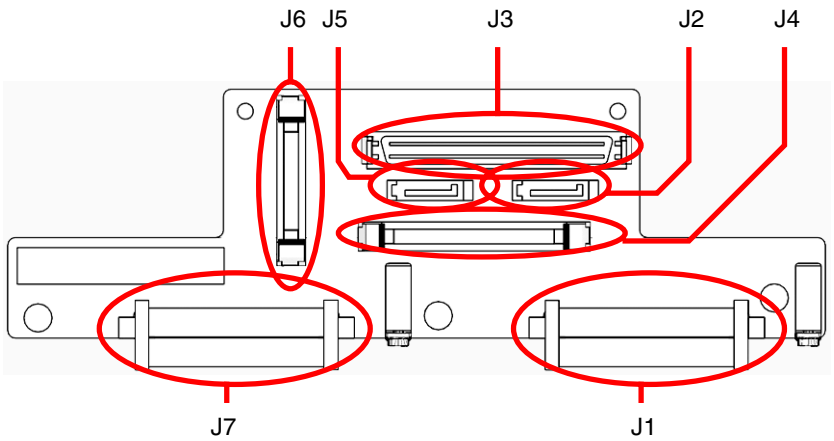

FIGURE B-8 Mass Storage Assembly Connectors

TABLE B-12 Mass Storage Assembly Connectors

Connector	Cable Origin
J1	Hard drive 1
J2	Motherboard assembly, J5004
J3	Motherboard assembly, P8
J4	Optical media drive, J1
J5	Motherboard assembly, J5002
J6	Power board, J4
J7	Hard drive 0

B.8 Power Board Connectors

FIGURE B-9 identifies the connectors on the power board. TABLE B-13 lists the origin of the cables that connect to the power board.

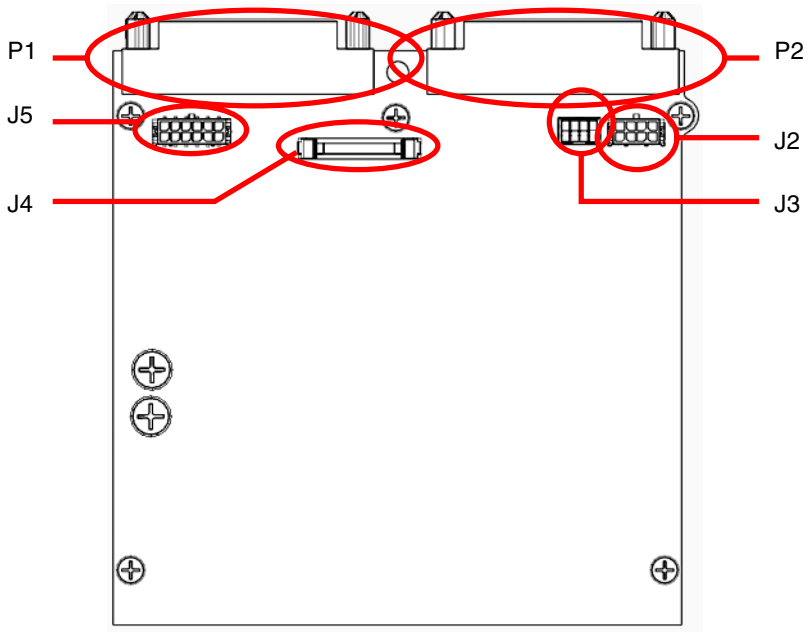

FIGURE B-9 Power Board Connectors

TABLE B-13 Power Board Connectors

Connector	Cable Origin
J2	PCI tray, J2
J3	Hard drive fans
J4	Mass storage assembly, J6
J5	System fans
P1	Power supply 1
P2	Power supply 0

B.9 Alarm Board Connectors

FIGURE B-10 identifies the connectors on the alarm board. TABLE B-14 lists the origin of the cables that connect to the alarm board.

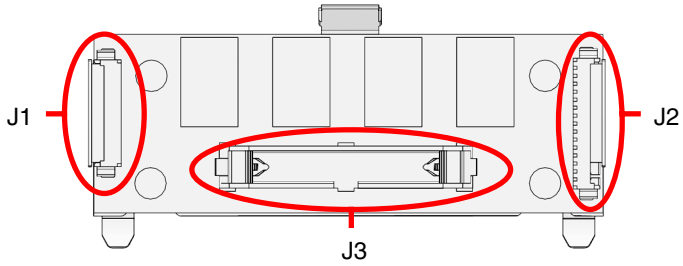

FIGURE B-10 Alarm Board Connectors

TABLE B-14 Alarm Board Connectors

Connector	Cable Origin
J1	LED board, J1
J2	Alarm connector
J3	Motherboard assembly, P6

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