

Sun Netra T5440 Server

Service Manual

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Using This Documentation

This manual provides detailed procedures that describe the removal and replacement of parts in the Sun Netra T5440 server from Oracle. This manual also includes detailed and comprehensive diagnostics information and procedures. This manual is written for technicians, system administrators, authorized service providers, and users who have advanced experience troubleshooting and replacing hardware.

Product Documentation Library

Documentation and resources for this product and related products are available at <http://docs.oracle.com/cd/E19874-01/index.html>.

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Server Diagnostics

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

The following topics are covered:

- [“1.1 Fault on Initial Power Up” on page 11](#)
- [“1.2 Server Diagnostics Overview” on page 12](#)
- [“1.3 Using LEDs to Identify the State of Devices” on page 16](#)
- [“1.4 Using the Service Processor Firmware for Diagnosis and Repair Verification” on page 22](#)
- [“1.5 Running POST” on page 32](#)
- [“1.6 Using the Solaris Predictive Self-Healing Feature” on page 40](#)
- [“1.7 Collecting Information From Solaris OS Files and Commands” on page 45](#)
- [“1.8 Managing Components With Automatic System Recovery Commands” on page 46](#)
- [“1.9 Exercising the System With SunVTS Software” on page 48](#)
- [“1.10 Obtaining the Chassis Serial Number” on page 54](#)
- [“1.11 Additional Service Related Information” on page 54](#)

1.1 Fault on Initial Power Up

If you have installed the server, and upon initial power up, you see errors indicating faults with the Fully Buffered DIMMs (FB-DIMMs), PCI cards, or other components, 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 reseal the cable connections, the PCI cards, and the FB-DIMMs. See:

- [“2.3 Prerequisite Tasks for Component Replacement” on page 58](#)
- [“4.2 Replacing PCI-X 0-1 and PCIe 2-3 Cards” on page 73](#)
- [“4.9 Servicing FB-DIMMs” on page 100.](#)

If performing these tasks is not successful, then continue to [“1.2 Server Diagnostics Overview” on page 12.](#)

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 `fmddump` command, and a Sun Microsystems web site.
- **ILOM firmware** – This system firmware runs on the service processor. In addition to providing the interface between the hardware and OS, ILOM also tracks and reports the health of key server components. ILOM 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 ILOM 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 ILOM 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** – These 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, ILOM, 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 ILOM 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. Use [Table 1-1](#) to find more information about each diagnostic in this chapter.

FIGURE 1-1 Diagnostic Flowchart

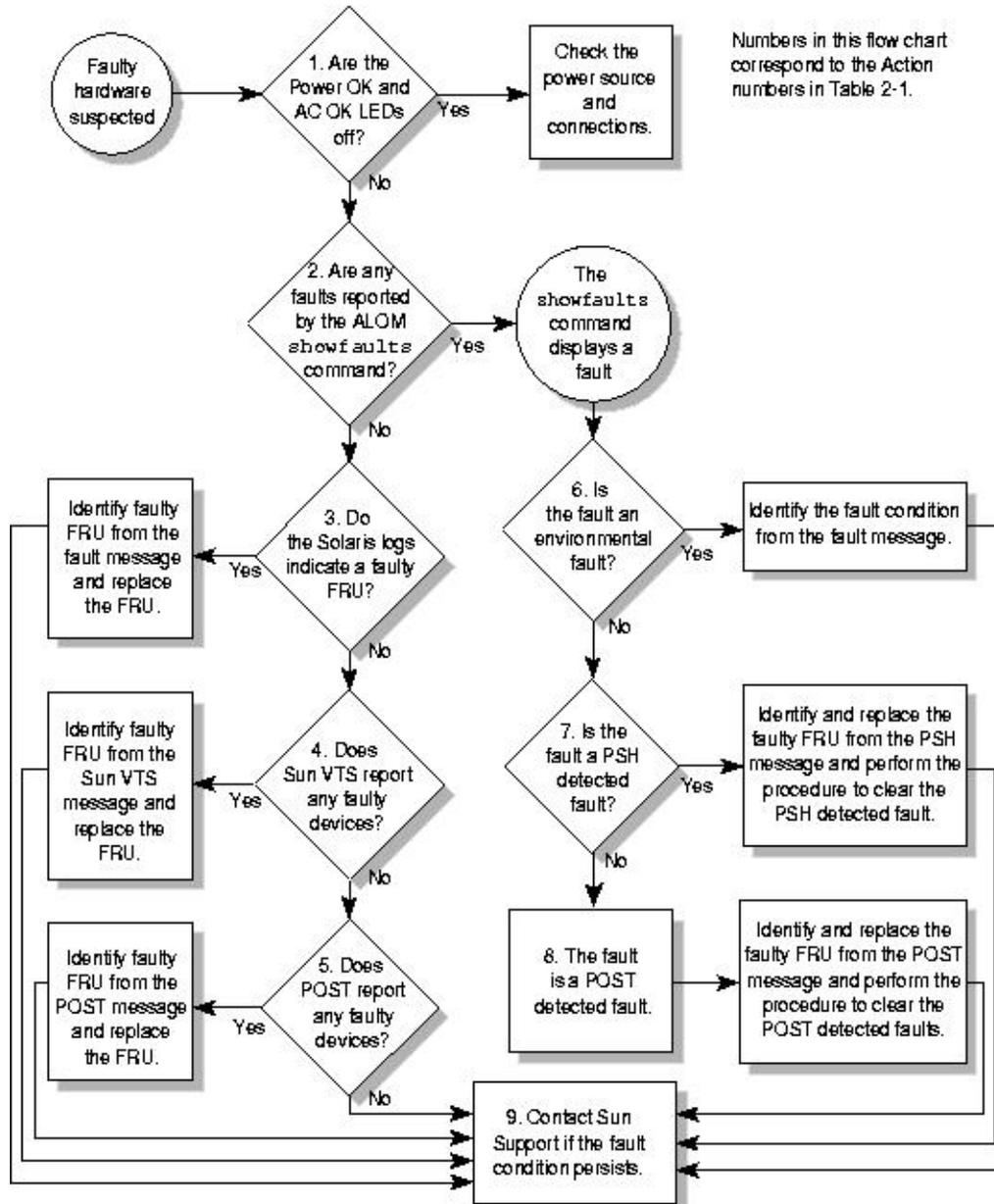


TABLE 1-1 Diagnostic Flowchart Actions

Action No.	Diagnostic Action	Resulting Action	Additional Information
1	Check Power OK and Input OK LEDs on the server.	<p>The Power OK LED is located on the front and rear of the chassis.</p> <p>The Input OK LED is located on the rear of the server on each power supply.</p> <p>If these LEDs are not on, check the power source and power connections to the server.</p>	“1.3 Using LEDs to Identify the State of Devices” on page 16
2	Run the ALOM CMT CLI <code>showfaults</code> command to check for faults.	<p>The <code>showfaults</code> command displays the following kinds of faults:</p> <ul style="list-style-type: none"> ■ Environmental faults ■ Solaris Predictive Self-Healing (PSH) detected faults ■ POST detected faults <p>Faulty FRUs are identified in fault messages using the FRU name.</p>	“Detecting Faults” on page 29
3	Check the Solaris log files for fault information.	<p>The Solaris message buffer and log files record system events and provide information about faults.</p> <ul style="list-style-type: none"> ■ If system messages indicate a faulty device, replace the FRU. ■ To obtain more diagnostic information, go to Action No. 4 	“1.7 Collecting Information From Solaris OS Files and Commands” on page 45
4	Run SunVTS.	<p>SunVTS is an application you can run to exercise and diagnose FRUs. To run SunVTS, the server must be running the Solaris OS.</p> <ul style="list-style-type: none"> ■ If SunVTS reports a faulty device replace the FRU. ■ If SunVTS does not report a faulty device, go to Action No. 5 	“1.9 Exercising the System With SunVTS Software” on page 48
5	Run POST.	<p>POST performs basic tests of the server components and reports faulty FRUs.</p> <ul style="list-style-type: none"> ■ If POST indicates a faulty FRU, replace the FRU. ■ If POST does not indicate a faulty FRU, go to Action No. 9 	“1.5 Running POST” on page 32
6	Determine if the fault is an environmental fault.	<p>If the fault listed by the <code>showfaults</code> 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.</p> <p>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).</p>	<p>“Detecting Faults” on page 29</p> <p>“1.3 Using LEDs to Identify the State of Devices” on page 16</p>
7	Determine if the fault was detected by PSH.	<p>If the fault message displays the following text, the fault was detected by the Solaris Predictive Self-Healing software: <code>Host detected fault</code></p> <p>If the fault is a PSH detected fault, identify the faulty FRU from the fault message and replace the faulty FRU.</p>	<p>“1.6 Using the Solaris Predictive Self-Healing Feature” on page 40</p> <p>“Clearing PSH Detected Faults” on page 43</p>

Action No.	Diagnostic Action	Resulting Action	Additional Information
		After replacing the FRU, perform the procedure to clear PSH detected faults.	
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: <i>FRU-name deemed faulty and disabled</i> In this case, replace the FRU and run the procedure to clear POST detected faults.	“1.5 Running POST” on page 32 “Clearing POST Detected Faults” on page 39
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 “1.10 Obtaining the Chassis Serial Number” on page 54

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 FB-DIMMs in the following FB-DIMM sizes:

- 1 Gbyte (maximum of 32 Gbyte)
- 2 Gbyte (maximum of 64 Gbyte)
- 4 Gbyte (maximum of 128 Gbyte)
- 8 Gbyte (maximum of 256 Gbyte)

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

See [“4.9 Servicing FB-DIMMs” on page 100](#) 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 FB-DIMM continues to function.

The following server features independently manage memory faults:

- **POST** – Based on ILOM configuration variables, POST runs when the server is powered on.
For correctable memory errors (CEs), POST forwards the error to the Solaris Predictive Self-Healing (PSH) daemon for error handling. If an uncorrectable memory fault is detected or if a “storm” of CEs is detected, POST displays the fault with the device name of the faulty FB-DIMMs, logs the fault, and disables the faulty FB-DIMMs by placing them in the ASR blacklist. Depending on the memory configuration and the location of the faulty FB-DIMM, POST disables half of physical memory in the system, or half the physical memory and half the processor threads. When this offlining process occurs in normal operation, you must replace the faulty FB-DIMMs based on the fault message. You then must enable the disabled FB-DIMMs with the ALOM CMT CLI `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 FB-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 ([Figure 1-1](#)). Run the ALOM CMT compatibility CLI (in ILOM) `showfaults` command, see [“1.4.1 Interacting With the Service Processor” on page 24](#) and [“Detecting Faults” on page 29](#). The `showfaults` command lists memory faults and lists the specific FB-DIMMs that are associated with the fault. Once you identify which FB-DIMMs to replace, see [“4.9 Servicing FB-DIMMs” on page 100](#) for FB-DIMM replacement instructions. You must perform the instructions in that chapter to clear the faults and enable the replaced FB-DIMMs.

1.3 Using LEDs to Identify the State of Devices

The server provides the following groups of LEDs:

- [“1.3.1 Front and Rear Panel LEDs” on page 17](#)
- [“1.3.2 Hard Drive LEDs” on page 19](#)
- [“1.3.3 Power Supply LEDs” on page 20](#)
- [“1.3.4 Ethernet Port LEDs” on page 21](#)

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 Location of the Bezel Server Status and Alarm Status Indicators

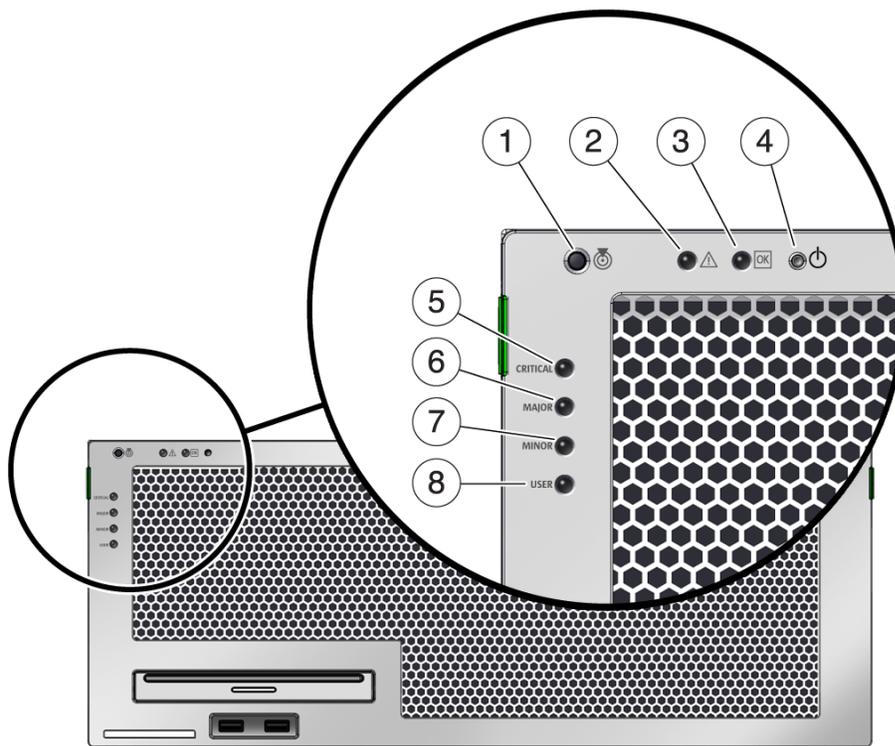


Figure Legend

- 1 Locator LED and Button
- 2 Fault LED
- 3 Activity LED
- 4 Power OK LED
- 5 User (amber) Alarm Status Indicator
- 6 Minor (amber) Alarm Status Indicator

1.3 Using LEDs to Identify the State of Devices

- 7 Major (red) Alarm Status Indicator
- 8 Critical (red) Alarm Status Indicator

FIGURE 1-3 Rear Panel Connectors, LEDs, and Features on the Sun Netra T5440 Server

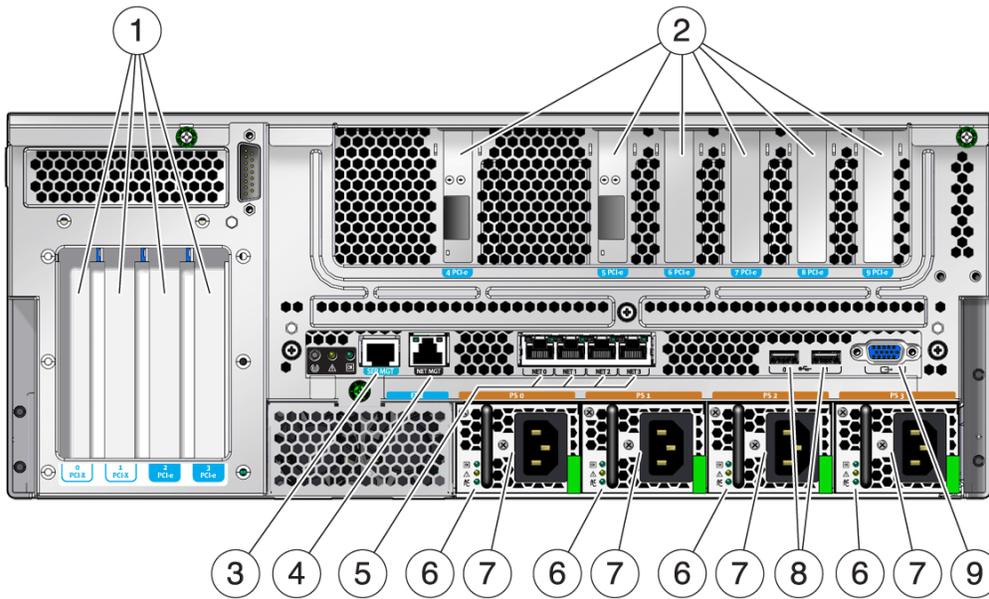


Figure Legend

- 1 PCI Slots 0-3: left to right: PCI-X Slot 0 (25 W maximum load), PCI-X Slot 1 (25 W maximum load), PCIe Slot 2 (25 W maximum load), PCIe Slot 3 (25 W maximum load)
- 2 PCI (or XAUI) Slots 4-9: left to right: PCIe or XAUI Slot 4 (15 W maximum load), PCIe or XAUI Slot 5 (15 W maximum load), PCIe Slot 6 (15 W maximum load), PCIe Slot 7 (15 W maximum load), PCIe Slot 8 (15 W maximum load), PCIe Slot 9 (15 W maximum load)
- 3 Service Processor Serial Management Port
- 4 Service Processor Network Management Port
- 5 Gigabit Ethernet Ports left to right: NET0, NET1, NET2, NET3
- 6 Power Supply 0 LEDs top to bottom: Output On LED (green), Service Required LED (yellow), Input Power OK LED (green)
- 7 Power Supplies (PSs): left to right: PS 0, PS 1, PS 2, PS 3
- 8 Rear left and right USB ports
- 9 TTYA Serial Port

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	<p>Enables you to identify a particular server. The LED is activated using one of the following methods:</p> <ul style="list-style-type: none"> ■ Issuing the setlocator on or off command. ■ Pressing the button to toggle the indicator on or off. <p>This LED provides the following indications:</p> <ul style="list-style-type: none"> ■ 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 CMT CLI <code>showfaults</code> command provides details about any faults that cause this indicator to be lit.
Activity LED	Front upper left	Green	<ul style="list-style-type: none"> ■ 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	<p>The LED provides the following indications:</p> <ul style="list-style-type: none"> ■ Off – The system is unavailable. Either the system has no power or ILOM is not running. ■ Steady on – Indicates that the system is powered on and is running 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. The system diagnostics might be running, or that the system might be 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

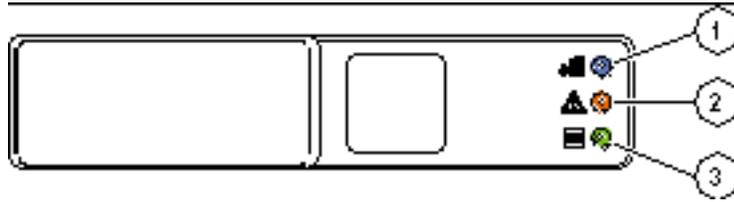


Figure Legend

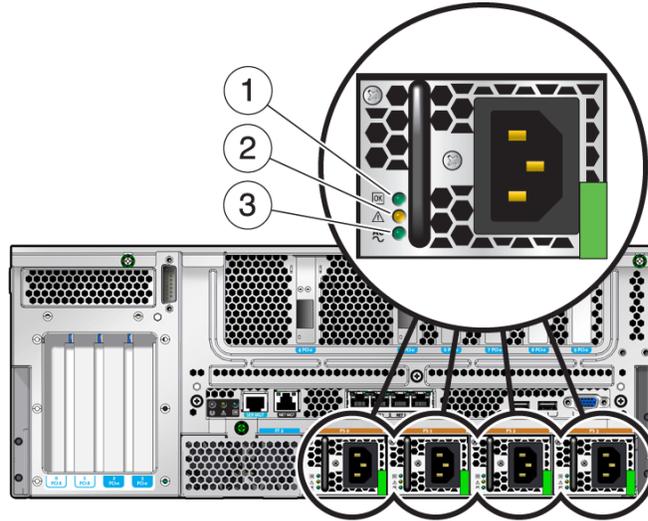
- 1 OK to Remove
- 2 Fault
- 3 Activity

TABLE 1-3 Hard Drive LEDs

LED	Color	Description
OK to Remove	Blue	<ul style="list-style-type: none"> ■ On – The drive is ready for hot-plug removal. ■ Off – Normal operation.
Fault	Amber	<ul style="list-style-type: none"> ■ On – The drive has a fault and requires attention. ■ Off – Normal operation.
Activity	Green	<ul style="list-style-type: none"> ■ On – The 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 rear of each power supply.

FIGURE 1-5 Power Supply LEDs**Figure Legend**

- 1 Power OK power supply LED
- 2 Fault power supply LED
- 3 Input OK power supply LED

TABLE 1-4 Power Supply LEDs

LED	Color	Description
Power OK	Green	<ul style="list-style-type: none"> ■ On – Normal operation. DC output voltage is within normal limits. ■ Off – Power is off.
Fault	Amber	<ul style="list-style-type: none"> ■ On – Power supply has detected a failure. ■ Off – Normal operation.
Input OK	Green	<ul style="list-style-type: none"> ■ 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 ILOM 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

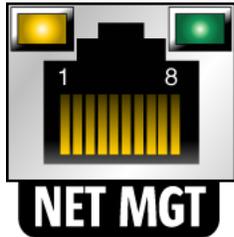


Figure Legend

- 1 Link/Activity indicator LED (Same location for all Ethernet ports)
- 2 Speed indicator LED (Same location for all Ethernet ports)

TABLE 1-5 Ethernet Port LEDs

LED	Color	Description
Left LED	Green	Link/Activity indicator: <ul style="list-style-type: none"> ■ Steady On – a link is established. ■ Blinking – there is activity on this port. ■ Off – No link is established.
Right LED	Amber or Green	Speed indicator: <ul style="list-style-type: none"> ■ 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.

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

1.4 Using the Service Processor Firmware for Diagnosis and Repair Verification

The Sun Integrated Lights Out Manager (ILOM) firmware is a service processor in the server that enables you to remotely manage and administer your server.

ILOM 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 ILOM to

send email alerts of hardware failures, hardware warnings, and other events related to the server or to ILOM.

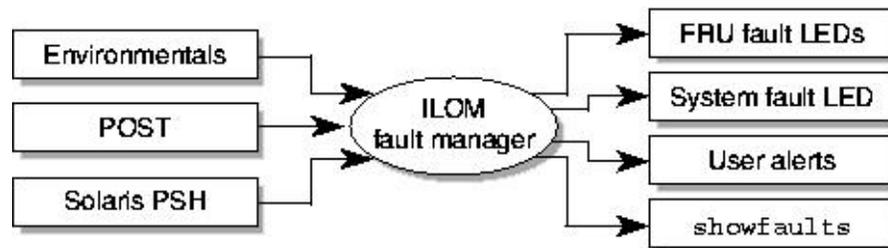
The service processor runs independently of the server, using the server's standby power. Therefore, ILOM firmware and software continue to function when the server operating system goes offline or when the server is powered off.

Note - Refer to the *Integrated Lights Out Management 2.0 Supplement for the Sun Netra T5440 Server* for comprehensive ALOM CMT information.

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

In the event of a system fault, ILOM 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).

FIGURE 1-7 ILOM Fault Management



The service processor detects 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. ILOM 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, the service processor detects the repair and extinguishes the Service Required LED. If the service processor does not perform these actions, you must perform these tasks manually with the `clearfault` or `enablecomponent` commands.

The service processor also detects the removal of a FRU, in many cases even if the FRU is removed while the service processor is powered off (that is, if the system power cables are unplugged during service procedures). This situation enables ILOM to know that a fault, diagnosed to a specific FRU, has been repaired.

Note - ILOM 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. An unplugged power supply can be plugged in, and so on. Recovery of environmental faults is automatically detected.

Note - No ILOM command is needed to manually repair an environmental fault.

The Solaris Predictive Self-Healing technology does not monitor the hard drive for faults. As a result, the service processor does not recognize hard drive faults, and will not light the fault LEDs on either the chassis or the hard drive itself. Use the Solaris message files to view hard drive faults. See [“1.7 Collecting Information From Solaris OS Files and Commands” on page 45.](#)

1.4.1 Interacting With the Service Processor

There are three methods of interacting with the service processor:

- ILOM CLI (default)
- ILOM browser interface (BI)
- ALOM CMT compatibility CLI (ALOM CMT CLI in ILOM)

Note - The code examples in this document depict use of the ILOM shell.

▼ Creating an ALOM CMT CLI Shell

The default shell for the service processor is the ILOM shell. The ALOM CMT CLI emulates the ALOM CMT interface supported on the previous generation of CMT servers. Using the ALOM CMT CLI (with few exceptions) you can use commands that resemble the ALOM CMT commands. The comparisons between the ILOM CLI and The ALOM CMT compatibility CLI are described in the *Sun Integrated Lights Out Management 2.0 Supplement for the Sun Netra T5440 Server*.

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

To create an ALOM CMT CLI, do the following:

- 1. Log in to the service processor with username: root.**

When powered on, the service processor boots to the ILOM login prompt. The factory default password is changeme.

```

SUNSPxxxxxxxxxxx login: root
Password:
Waiting for daemons to initialize...

Daemons ready

Sun(TM) Integrated Lights Out Manager

Version 2.0.0.0

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Warning: password is set to factory default.

```

2. **Create a new user (in this example, the new user name is admin), set the account role to Administrator and the CLI mode to alom:**

```

-> create /SP/users/admin
Creating user...
Enter new password: *****
Enter new password again: *****
Created /SP/users/admin
-> set /SP/users/admin role=Administrator
Set 'role' to 'Administrator'
-> set /SP/users/admin cli_mode=alom
Set 'cli_mode' to 'alom'

```

Note - The asterisks in the example will not appear when you enter your password.

You can combine the create and set commands on a single line:

```

-> create /SP/users/admin role=Administrator cli_mode=alom
Creating user...
Enter new password: *****
Enter new password again: *****\
Created /SP/users/admin

```

3. **Log out of the root account after you have finished creating the new account.**

```

-> exit

```

4. **Log in to the ALOM CMT CLI (indicated by the `sc>` prompt) from the ILOM login prompt.**

```
SUNSPxxxxxxxxx login: admin
Password:
Waiting for daemons to initialize...

Daemons ready

Sun(TM) Integrated Lights Out Manager

Version 2.0.0.0

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sc>
```

Note - Multiple service processor accounts can be active concurrently. A user can be logged in under one account using the ILOM CLI, and another account using the ALOM CMT CLI.

1.4.2 Running Service-Related Commands

This section describes commands commonly used for service-related activities.

1.4.2.1 Connecting to the Service Processor

Before you can run ILOM commands, you must connect to the service processor in one of two ways:

- Connect an ASCII terminal directly to the serial management port.
- Use the `ssh` command to connect to the service processor through an Ethernet connection on the network management port.

Note - Refer to the *Sun Integrated Lights Out Management 2.0 Supplement for the Sun Netra T5440 Server* for instructions on configuring and connecting to the service processor.

1.4.2.2 Switching Between the System Console and Service Processor

- To switch from the console output to the ALOM CMT CLI `sc>` prompt, type `#`. (Hash-Period).
- To switch from the service processor prompt to the console, do one of the following:

- From the ILOM -> prompt, type start /SP/console.
- From the ALOM-CMT sc> prompt, type console.

1.4.2.3 Service-Related Commands

Table 1-6 describes the typical ALOM CMT CLI commands for servicing a server. For descriptions of all ALOM CMT CLI commands, issue the help command or refer to the *Integrated Lights Out Management 2.0 User's Guide*.

TABLE 1-6 Service-Related Commands

ILOM Command	ALOM CMT Command	Description
help [command]	help [command]	Displays a list of all available commands with syntax and descriptions. Specifying a command name as an option displays help for that command.
set /HOST send_break_action=break	break [-y][-c][-D] <ul style="list-style-type: none"> ■ -y skips the confirmation question. ■ -c executes a console command after the break command completes. ■ -D forces a core dump of the Solaris OS. 	Takes the host server from the OS to either kmdb or OpenBoot PROM (equivalent to a Stop-A), depending on the mode Solaris software was booted.
set /SYS/component clear_fault_action=true	clearfault <i>UUID</i>	Manually clears host-detected faults. The <i>UUID</i> is the unique fault ID of the fault to be cleared.
start /SP/console	console [-f] <ul style="list-style-type: none"> ■ -f forces the console to have read and write capabilities. 	Connects you to the host system.
show /SP/console/history	consolehistory [-b <i>lines</i>][-e <i>lines</i>][-v] [-g <i>lines</i>] [boot run] <p>The following options enable you to specify how the output is displayed:</p> <ul style="list-style-type: none"> ■ -g <i>lines</i> specifies the number of lines to display before pausing. ■ -e <i>lines</i> displays <i>n</i> lines from the end of the buffer. ■ -b <i>lines</i> displays <i>n</i> lines from the beginning of the buffer. ■ -v displays the entire buffer. ■ boot run specifies the log to display (run is the default log). 	Displays the contents of the system's console buffer.
set /HOST/bootmode <i>property</i> = <i>value</i> [where <i>property</i> is state, config, or script]	bootmode [normal] [reset_nvram] [config= <i>configname</i>] [bootscript= <i>string</i>]	Controls the host server OpenBoot PROM firmware method of booting.
stop /SYS; start /SYS	powercycle [-f]	Performs a poweroff followed by poweron.

ILOM Command	ALOM CMT Command	Description
stop /SYS	poweroff [-y] [-f] <ul style="list-style-type: none"> ■ -y enables you to skip the confirmation question. ■ -f forces an immediate shutdown. 	Powers off the host server.
start /SYS	poweron [-c] <ul style="list-style-type: none"> ■ -c executes a console command after completion of the poweron command. 	Powers on the host server.
set /SYS/PSx prepare_to_remove_action=true	removefru PS0 PS1	Indicates if it is okay to perform a hot-swap of a power supply. This command does not perform any action. But this command provides a warning if the power supply should not be removed because the other power supply is not enabled.
reset /SYS	reset [-y] [-c] <ul style="list-style-type: none"> ■ -y enables you to skip the confirmation question. ■ -c executes a console command after completion of the reset command. 	Generates a hardware reset on the host server.
reset /SP	resetsc [-y] <ul style="list-style-type: none"> ■ -y enables you to skip the confirmation question. 	Reboots the service processor.
set /SYS keyswitch_state=value normal stby diag locked	setkeyswitch [-y] value normal stby diag locked <ul style="list-style-type: none"> ■ -y enables you to skip the confirmation question when setting the keyswitch to stby. 	Sets the virtual keyswitch.
set /SYS/LOCATE value=value [Fast_blink Off] {No ILOM equivalent.}	setlocator value [on off] showenvironment	Turns the Locator LED on the server on or off. Displays the environmental status of the host server. This information includes system temperatures, power supply, front panel LED, hard drive, fan, voltage, and current sensor status.
show faulty {No ILOM equivalent.}	showfaults [-v] showfru [-g lines] [-s -d] [FRU] <ul style="list-style-type: none"> ■ -g lines specifies the number of lines to display before pausing the output to the screen. 	Displays current system faults. Displays information about the FRUs in the server.

ILOM Command	ALOM CMT Command	Description
	<ul style="list-style-type: none"> ■ -s displays static information about system FRUs (defaults to all FRUs, unless one is specified). ■ -d displays dynamic information about system FRUs (defaults to all FRUs, unless one is specified). 	
show /SYS keyswitch_state	showkeyswitch	Displays the status of the virtual keyswitch.
show /SYS/LOCATE	showlocator	Displays the current state of the Locator LED as either on or off.
show /SP/logs/event/list	showlogs [-b lines -e lines -v] [-g lines] [-p logtype[r p]]	Displays the history of all events logged in the service processor event buffers (in RAM or the persistent buffers).
show /HOST	showplatform [-v]	Displays information about the operating state of the host system, the system serial number, and whether the hardware is providing service.

Note - See [Table 1-9](#) for the automatic system recover (ASR) commands.

▼ Detecting Faults

The ILOM `show faulty` command displays the following kinds of faults:

- Environmental or configuration faults – System configuration faults, or 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 faults – Faults detected by the Solaris Predictive Self-healing (PSH) technology

Use the `show faulty` command for the following reasons:

- To see if any faults have been diagnosed in the system.
- To verify that the replacement of a FRU has cleared the fault and not generated any additional faults.

- **At the `->` prompt, type the `show faulty` command.**

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

- Example of the `show faulty` command when no faults are present:

Detecting Faults

```
-> show faulty
```

Target	Property	Value

- Example of the show faulty command displaying an environmental fault:

```
-> show faulty
```

Target	Property	Value

/SP/faultmgmt/0	fru	/SYS/FANBD0/FM0
/SP/faultmgmt/0	timestamp	Dec 14 23:01:32
/SP/faultmgmt/0/	timestamp	Dec 14 23:01:32 faults/0
/SP/faultmgmt/0/	sp_detected_fault	TACH at /SYS/FANBD0/FM0/F0 has
faults/0		exceeded low non-recoverable
		threshold.

- Example showing a fault that was detected by POST. These kinds of faults are identified by the message Forced fail *reason* where *reason* is the name of the power-on routine that detected the failure.

```
-> show faulty
```

Target	Property	Value

/SP/faultmgmt/0	fru	/SYS/MB/CMP0/BR1/CH0/D0
/SP/faultmgmt/0	timestamp	Dec 21 16:40:56
/SP/faultmgmt/0/	timestamp	Dec 21 16:40:56
faults/0		
/SP/faultmgmt/0/	sp_detected_fault	/SYS/MB/CMP0/BR1/CH0/D0
faults/0		Forced fail(POST)

- 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.

```
-> show faulty
```

Target	Property	Value

/SP/faultmgmt/0	fru	/SYS/MB/CMP0/BR0/CH1/D0
/SP/faultmgmt/0	timestamp	Dec 14 22:43:59
/SP/faultmgmt/0/	sunw-msg-id	SUN4V-8000-DX
faults/0		
/SP/faultmgmt/0/	uuid	3aa7c854-9667-e176-efe5-e487e520
faults/0		7a8a
/SP/faultmgmt/0/	timestamp	Dec 14 22:43:59
faults/0		

1.4.3 Clearing Faults

Use the `clear_fault_action` property of a FRU to manually clear PSH diagnosed faults from the service processor without a FRU replacement or if the service processor was unable to automatically detect the FRU replacement.

Note - This procedure clears the fault from the service processor but not from the host. If the fault persists in the host, it must be manually cleared.

- Example showing a PSH diagnosed fault being cleared manually using the `clear_fault_action` property of the FRU:

```
-> set /SYS/MB/CMP0/BR0/CH0/D0 clear_fault_action=True
Are you sure you want to clear /SYS/MB/CMP0/BR0/CH0/D0 (y/n)? y
Set 'clear_fault_action' to 'true'
```

▼ Displaying FRU Information

Before You Begin Use the `show` command to display information about individual FRUs in the server.

- **At the `->` prompt, enter the `show` command.**

In the following example, the `show` command is used to get information about a memory module (FB-DIMM).

```
-> show /SYS/MB/CMP0/BR0/CH0/D0

/SYS/MB/CMP0/BR0/CH0/D0
Targets:
  R0
  R1
  SEEPROM
  SERVICE
  PRSNT
  T_AMB

Properties:
  type = DIMM
  component_state = Enabled
  fru_name = 1024MB DDR2 SDRAM FB-DIMM 333 (PC2 5300)
  fru_description = FBDIMM 1024 Mbyte
  fru_manufacturer = Micron Technology
  fru_version = FFFFFFFF
  fru_part_number = 18HF12872FD667D6D4
  fru_serial_number = d81813ce
  fault_state = OK
```

```
clear_fault_action = (none)
```

Commands:

```
cd  
show
```

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, the component 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.

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 CMT CLI variables.

[Table 1-7](#) lists the ALOM CMT CLI variables used to configure POST. [Figure 1-8](#) shows how the variables work together.

Note - Use the ALOM CMT CLI `setsc` command to set all the parameters in [Table 1-7](#) except `setkeyswitch`.

TABLE 1-7 ALOM CMT CLI 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 <code>diag_level</code> value.

Parameter	Values	Description
diag_level	service	Runs POST with preset values for <code>diag_level</code> and <code>diag_verbosity</code> .
	max	If <code>diag_mode = normal</code> , runs all the minimum tests plus extensive CPU and memory tests.
diag_trigger	min	If <code>diag_mode = normal</code> , runs minimum set of tests.
	none	Does not run POST on reset.
	user_reset	Runs POST upon user-initiated resets.
	power_on_reset	Only runs POST for the first power on. This option is the default.
diag_verbosity	error_reset	Runs POST if fatal errors are detected.
	all_resets	Runs POST after any reset.
	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 CMT CLI Variables for POST Configuration

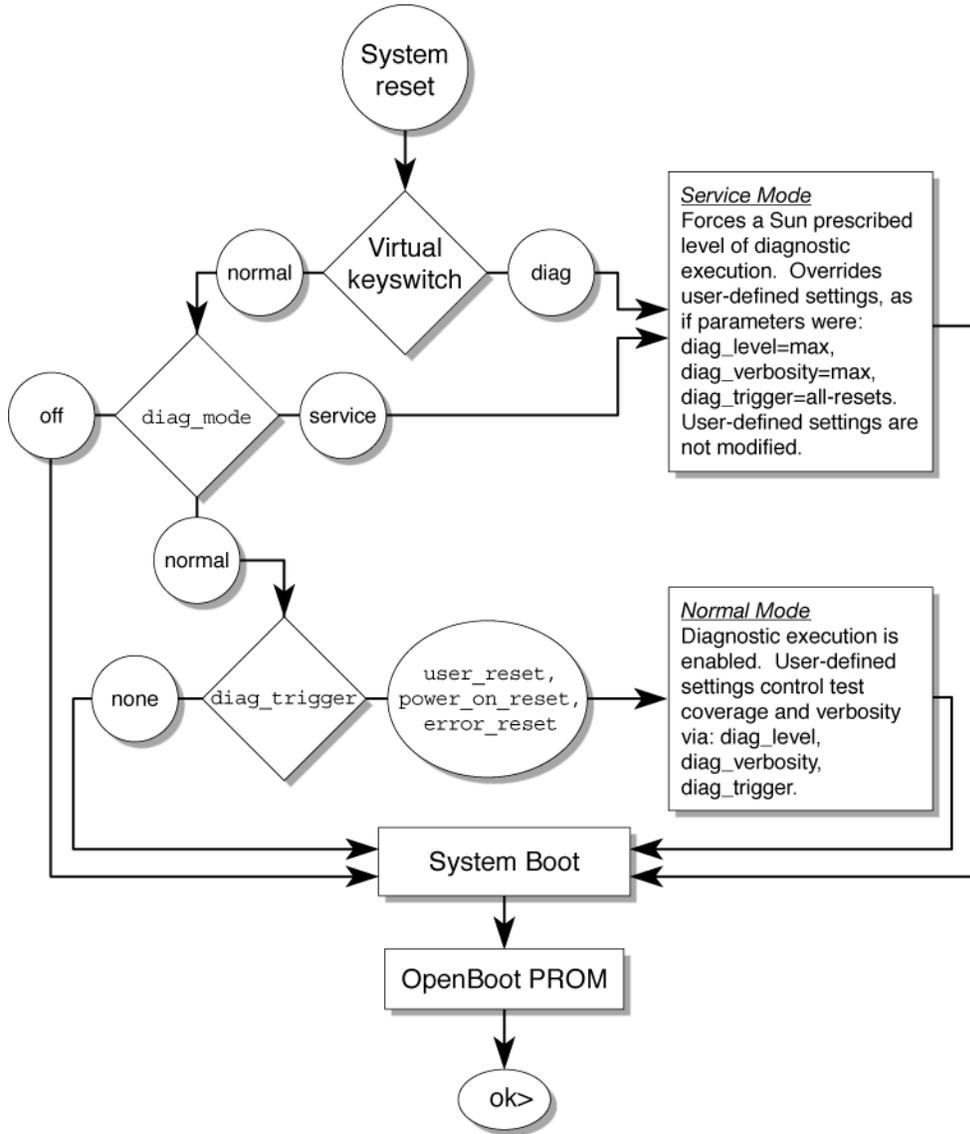


Table 1-8 shows typical combinations of ALOM CMT CLI variables and associated POST modes.

TABLE 1-8 ALOM CMT CLI 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
keyswitch_state [†]	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. 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 `keyswitch_state` parameter, when set to `diag`, overrides all the other ILOM POST variables.

▼ Changing POST Parameters

1. Access the ILOM -> prompt:

If connected to the console, issue the `#.` key sequence to switch to the `->` prompt:

```
#.
```

2. Use the ILOM commands to change the POST parameters.

The `set /SYS keyswitch_state` command sets the virtual keyswitch parameter. For example:

```
-> set /SYS keyswitch_state=Diag
Set ???keyswitch_state' to ???Diag'
```

To change individual POST parameters, you must first set the `keyswitch_state` parameter to `normal`. For example:

```
-> set /SYS keyswitch_state=Normal
Set ???keyswitch_state' to ???Normal'
-> set /HOST/diag property=Min
```

1.5.2 Reasons to Run POST

You can use POST for basic hardware verification and diagnosis, and for troubleshooting as described in the following sections.

1.5.2.1 Verifying Hardware Functionality

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.

1.5.2.2 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 maximum mode (`diag_mode=service`, `setkeyswitch=diag`, `diag_level=max`) for thorough test coverage and verbose output.

▼ Running POST in Maximum Mode

This procedure describes how to run POST when you want maximum testing, as in the case when you are troubleshooting a server or verifying a hardware upgrade or repair.

1. **Switch from the system console prompt to the `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. [Example 1-1](#) shows the `powercycle` command. For other methods, refer to the *Sun Netra T5440 Server Administration Guide*.

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

```
sc> console
```

[Example 1-2](#) depicts abridged POST output.

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 CMT CLI for fault handling. Faulty FRUs are identified in fault messages using the FRU name.

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
```

In [Example 1-3](#), POST reports a memory error at FB-DIMM location /SYS/MB/CMP0/BR1/CH0/D0. The error 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 CMT CLI, where the fault is logged, the Service Required LED is lit, and the faulty component is disabled.

Refer to [Example 1-4](#).

In this example, /SYS/MB/CMP0/BR1/CH0/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 [“1.8 Managing Components With Automatic System Recovery Commands”](#) on page 46.

Example 1-1 Initiating POST Using the powercycle Command

```
sc> powercycle
Are you sure you want to powercycle the system (y/n)? y
Powering host off at Fri Jul 27 08:11:52 2007
Waiting for host to Power Off; hit any key to abort.
Audit | minor: admin : Set : object = /SYS/power_state : value = soft : success
Chassis | critical: Host has been powered off
Powering host on at Fri Jul 27 08:13:08 2007
Audit | minor: admin : Set : object = /SYS/power_state : value = on : success
Chassis | major: Host has been powered on
```

Example 1-2 Initiating POST Using the `powercycle` Command

```

sc> console

/export/delivery/delivery/4.x/4.x.build_119/post4.x/Niagara/t5440/integrated (root)
2007-07-03 10:25:12.386 0:0:0>Copyright 2007 Sun Microsystems, Inc. All rights reserved
2007-07-03 10:25:12.550 0:0:0>VBSC cmp0 arg is: 00ff00ff.ffffffff
2007-07-03 10:25:13.353 0:0:0>Basic Memory Tests.....
2007-07-03 10:25:12.653 0:0:0>POST enabling threads: 00ff00ff.ffffffff
2007-07-03 10:25:12.766 0:0:0>VBSC mode is: 00000000.00000001
2007-07-03 10:25:13.456 0:0:0>Begin: Branch Sanity Check2007-07-03 10:25:38.399 0:0:0>End :
  DRAM Memory BIST
2007-07-03 10:25:13.569 0:0:0>End : Branch Sanity Check2007-07-03 10:25:39.658 0:0:0>L2 Bank
  EFuse = 00000000.000000ff 2007-07-03 10:25:39.547 0:0:0>Sys 166 MHz, CPU 1166 MHz, Mem 332
  MHz 2007-07-03 10:25:39.760 0:0:0>L2 Bank status = 00000000.00000f0f 2007-07-03 10:25:13.066
  0:0:0>VBSC setting verbosity level 32007-07-03 10:25:12.081 0:0:0>@(#)Sun Netra[TM] T5440
  POST 4.x.build_119 2007/06/06 09:48
2007-07-03 10:25:12.867 0:0:0>VBSC level is: 00000000.000000012007-07-03 10:25:12.966 0:
  0:0>VBSC selecting POST MAX Testing.2007-07-03 10:25:39.864 0:0:0>Core available Efuse =
  ffff00ff.ffffffff
2007-07-03 10:25:13.668 0:0:0>Begin: DRAM Memory BIST2007-07-03 10:25:13.793 0:0:
  0>.....
2007-07-03 10:25:13.161 0:0:0> Niagara2, Version 2.12007-07-03 10:25:13.247 0:0:0> Serial
  Number: 0fac006b.0e654482
2007-07-03 10:25:39.982 0:0:0>Test Memory.....Enter #. to return to ALOM.
2007-07-03 10:25:40.070 0:0:0>Begin: Probe and Setup Memory2007-07-03 10:29:21.683 0:0:0>INFO:
2007-07-03 10:25:40.181 0:0:0>INFO: 4096MB at Memory Branch 0 2007-07-03 10:29:21.686 0:0:0>
  POST Passed all devices.
...2007-07-03 10:29:21.692 0:0:0>POST: Return to VBSC.

```

Example 1-3 POST Error Message

```

7:2>
7:2>ERROR: TEST = Data Bitwalk
7:2>H/W under test = /SYS/MB/CMP0/BR1/CH0/D0
7:2>Repair Instructions: Replace items in order listed by 'H/W
  under test' above.
7:2>MSG = Pin 149 failed on /SYS/MB/CMP0/BR1/CH0/D0 (J2001)
7:2>END_ERROR

7:2>Decode of Dram Error Log Reg Channel 2 bits
60000000.0000108c
7:2> 1 MEC 62 R/WIC Multiple corrected
  errors, one or more CE not logged

```

```

7:2> 1 DAC 61 R/WIC 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

```

Example 1-4 showfaults Output

```

ok .#
sc> showfaults
Last POST Run: Wed Jun 27 21:29:02 2007

Post Status: Passed all devices
ID FRU          Fault
0 /SYS/MB/CMP0/BR1/CH0/D0 SP detected fault: /SYS/MB/CMP0/BR1/CH0/D0 Forced fail (POST)

```

▼ 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 [“1.8 Managing Components With Automatic System Recovery Commands” on page 46](#)).

In most cases, the replacement of the faulty FRU is detected when the service processor is reset or power cycled. In this case, the fault is automatically cleared from the system. This procedure describes how to identify POST detected faults and, if necessary, manually clear the fault.

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

POST detected faults are distinguished from other kinds of faults by the text: `Forced fail`, and no UUID number is reported.

See [Example 1-5](#).

If no fault is reported, you do not need to do anything else. Do not perform the subsequent steps.

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 [Step 1](#). See [Example 1-6](#).

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

3. **Power cycle the server.**

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

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

See [Example 1-7](#).

Example 1-5 POST Detected Fault

```
sc> showfaults
Last POST Run: Wed Jun 27 21:29:02 2007

Post Status: Passed all devices
ID FRU          Fault
0 /SYS/MB/CMP0/BR1/CH0/D0 SP detected fault: /SYS/MB/CMP0/BR1/CH0/D0 Forced fail (POST)
```

Example 1-6 Using the `enablecomponent` Command

```
sc> enablecomponent /SYS/MB/CMP0/BR1/CH0/D0
```

Example 1-7 Verifying Cleared Faults Using the `showfaults` Command

```
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 T2 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.

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

1.6.1 Identifying PSH Detected Faults

When a PSH fault is detected, a Solaris console message similar to [Example 1-8](#) is displayed.

EXAMPLE 1-8 Console Message Showing Fault Detected by PSH

```
SUNW-MSG-ID: SUN4V-8000-DX, TYPE: Fault, VER: 1, SEVERITY: Minor
EVENT-TIME: Wed Sep 14 10:09:46 EDT 2005
PLATFORM: SUNW,Sun-Netra-T5440, CSN: -, HOSTNAME: wgs48-37
SOURCE: cpumem-diagnosis, REV: 1.5
EVENT-ID: f92e9fbe-735e-c218-cf87-9e1720a28004
DESC: The number of errors associated with this memory module has exceeded acceptable levels. Refer to http://sun.com/msg/SUN4V-8000-DX for more information.
AUTO-RESPONSE: Pages of memory associated with this memory module are being removed from service as errors are reported.
IMPACT: Total system memory capacity will be reduced as pages are retired.
REC-ACTION: Schedule a repair procedure to replace the affected memory module. Use fmdump -v -u <EVENT_ID> to identify the module.
```

Faults detected by the Solaris PSH facility are also reported through service processor alerts. [Example 1-9](#) depicts an ALOM CMT CLI alert of the same fault reported by Solaris PSH in [Example 1-9](#).

EXAMPLE 1-9 ALOM CMT CLI Alert of PSH Diagnosed Fault

SC Alert: Host detected fault, MSGID: SUN4V-8000-DX

The ALOM CMT CLI `showfaults` command provides summary information about the fault. See “[Detecting Faults](#)” on page 29 for more information about the `showfaults` command.

Note - The Service Required LED is also turns on for PSH diagnosed faults.

▼ Using the `fmdump` Command to Identify Faults

The `fmdump` command displays the list of faults detected by the Solaris PSH facility and identifies the faulty FRU for a particular `EVENT_ID` (UUID).

Do not use `fmdump` to verify a FRU replacement has cleared a fault because the output of `fmdump` is the same after the FRU has been replaced. Use the `fmadm faulty` command to verify the fault has cleared.

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

In [Example 1-10](#), a fault is displayed, indicating the following details:

- **Date and time of the fault (Jul 31 12:47:42.2007)**
- **Universal Unique Identifier (UUID). This is unique for every fault (fd940ac2-d21e-c94a-f258-f8a9bb69d05b)**
- **Sun message identifier, which can be used to obtain additional fault information (SUN4V-8000-JA)**
- **Faulted FRU. The information provided in the example includes the part number of the FRU (part=541215101) and the serial number of the FRU (serial=101083). The Location field provides the name of the FRU. In [Example 1-10](#) the FRU name is MB, meaning the motherboard.**

Note - `fmdump` displays the PSH event log. Entries remain in the log after the fault has been repaired.

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. Obtain the message ID from the console output or the ALOM CMT CLI `showfaults` command.

c. Enter the message ID in the SUNW-MSG-ID field, and click Lookup.

In [Example 1-11](#), the message ID SUN4V-8000-JA provides information for corrective action:

3. Follow the suggested actions to repair the fault.

Example 1-10 Output from the `fmdump -v` Command

```
# fmdump -v -u fd940ac2-d21e-c94a-f258-f8a9bb69d05b
TIME                UUID                SUNW-MSG-ID
Jul 31 12:47:42.2007 fd940ac2-d21e-c94a-f258-f8a9bb69d05b SUN4V-8000-JA
100% fault.cpu.ultraSPARC-T2.misc_regs

Problem in: cpu:///cpuid=16/serial=5D67334847
Affects: cpu:///cpuid=16/serial=5D67334847
FRU: hc:///serial=101083:part=541215101/motherboard=0
Location: MB
```

Example 1-11 PSH Message Output

```
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: SUN4V-8000-JA 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.
```

▼ Clearing PSH Detected Faults

When the Solaris PSH facility detects faults the faults are logged and displayed on the console. In most cases, after the fault is repaired, the corrected state is detected by the system and the

fault condition is repaired automatically. However, this must be verified and, in cases where the fault condition is not automatically cleared, the fault must be cleared manually.

1. **After replacing a faulty FRU, power on the server.**
2. **At the ALOM CMT CLI prompt, use the `showfaults` command to identify PSH detected faults.**

PSH detected faults are distinguished from other kinds of faults by the text: Host detected fault.

Example:

```
sc> showfaults -v
Last POST Run: Wed Jun 29 11:29:02 2007

Post Status: Passed all devices
ID Time          FRU                               Fault
0 Jun 30 22:13:02 /SYS/MB/CMP0/BR1/CH0/D0 Host detected fault, MSGID: SUN4V-8000-DX  UUID:
7ee0e46b-ea64-6565-e684-e996963f7b86
```

- **If no fault is reported, you do not need to do anything else. Do not perform the subsequent steps.**
 - **If a fault is reported, perform [Step 3](#) and [Step 4](#).**
3. **Run the ALOM CMT CLI `clearfault` command with the UUID provided in the `showfaults` output.**

Example:

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

4. **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 Solaris command:

```
fmadm repair UUID
```

Example:

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

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, service processor, or the Solaris PSH features do 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.

▼ Checking the Message Buffer

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

```
# dmesg
```

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

▼ 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. **Type the following command:**

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

3. If you want to view all logged messages, type 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. In the server, the ASR feature manages the following components:

- UltraSPARC T2 processor strands
- Memory FB-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 faulty component. 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.

The ASR commands (Table 1-9) enable you to view, and manually add or remove components from the ASR blacklist. You run these commands from the ALOM CMT CLI `s c>` prompt.

TABLE 1-9 ASR Commands

Command	Description
<code>showcomponent</code>	Displays system components and their current state.
<code>enablecomponent asrkey</code>	Removes a component from the <code>asr-db</code> blacklist, where <code>asrkey</code> is the component to enable.
<code>disablecomponent asrkey</code>	Adds a component to the <code>asr-db</code> blacklist, where <code>asrkey</code> is the component to disable.
<code>clearasrdb</code>	Removes all entries from the <code>asr-db</code> blacklist.

Note - The components (`asrkeys`) vary from system to system, depending on how many cores and memory are present. Use the `showcomponent` command to see the `asrkeys` on a given system.

Note - A reset or power cycle is required after disabling or enabling a component. If the status of a component is changed, there is no effect to the system until the next reset or power cycle.

▼ Displaying System Components

The `showcomponent` command displays the system components (asrkeys) and reports their status.

- **At the `sc>` prompt, enter the `showcomponent` command**

[Example 1-12](#) shows partial output with no disabled components.

[Example 1-13](#) shows `showcomponent` command output with a component disabled:

Example 1-12 Output of the `showcomponent`

```
sc> showcomponent
Keys:
/SYS/MB/PCI_MEZZ
/SYS/MB/PCI_MEZZ/PCIE4
/SYS/MB/PCI_MEZZ/XAUI4
/SYS/MB/PCI_MEZZ/PCIE5
/SYS/MB/PCI_MEZZ/XAUI5
/SYS/MB/PCI_MEZZ/PCIE6
/SYS/MB/PCI_MEZZ/PCIE7
/SYS/MB/PCI_MEZZ/PCIE8
/SYS/MB/PCI_MEZZ/PCIE9
/SYS/MB/PCI_AUX
/SYS/MB/PCI_AUX/PCIX0
...
/SYS/TTYA
State: Clean
```

Example 1-13 Output of the `showcomponent`

```
sc> showcomponent
Keys:
/SYS/MB/PCI_MEZZ
/SYS/MB/PCI_MEZZ/PCIE4
/SYS/MB/PCI_MEZZ/XAUI4
/SYS/MB/PCI_MEZZ/PCIE5
/SYS/MB/PCI_MEZZ/XAUI5
/SYS/MB/PCI_MEZZ/PCIE6
/SYS/MB/PCI_MEZZ/PCIE7
/SYS/MB/PCI_MEZZ/PCIE8
/SYS/MB/PCI_MEZZ/PCIE9
...
/SYS/TTYA
Disabled Devices
/SYS/MB/CMP0/L2_BANK0 Disabled by user
```

▼ Disabling Components

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

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

```
sc> disablecomponent /SYS/MB/CMP0/BR1/CH0/D0
Chassis | major: /SYS/MB/CMP0/BR1/CH0/D0 has been disabled. Disabled by user
```

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

```
sc> reset
```

▼ Enabling Disabled Components

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 /SYS/MB/CMP0/BR1/CH0/D0
Chassis | major: /SYS/MB/CMP0/BR1/CH0/D0 has been enabled.
```

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 Software

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

- [“Checking Whether SunVTS Software Is Installed” on page 49](#)
- [“1.9.1 Exercising the System Using SunVTS Software” on page 49](#)

▼ 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.

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

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

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 software is installed, information about the packages is displayed.**
- **If SunVTS software is not installed, you see an error message for each missing package, as in [Example 1-15](#)**

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

- Solaris Operating System DVDs
- From the 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*.

Example 1-14 Missing Package Errors for SunVTS

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

1.9.1 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 [“Checking Whether SunVTS Software Is Installed” on page 49](#).

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 bitmap 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 6.3 Test Reference Manual for SPARC Platforms
- *SunVTS 6.3 User's Guide*

▼ Exercising the System With SunVTS Software

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 bitmap 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.

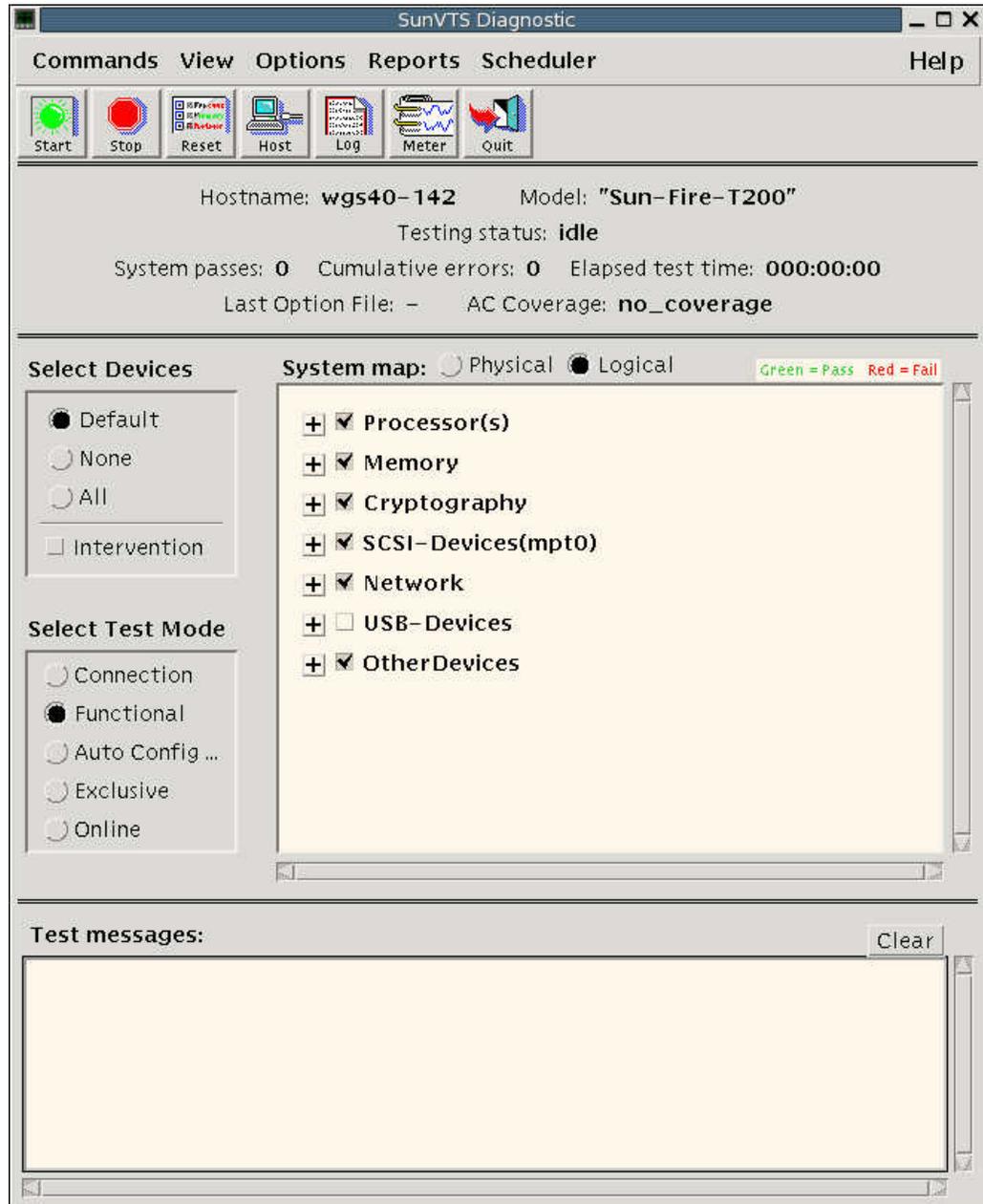
Use a command such as `rlogin` or `telnet`.

4. Start SunVTS software.

If you have installed SunVTS software in a location other than the default `/opt` directory, alter the path, as in [Example 1-15](#) 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*. To expand a category, left-click the expander icon (expand category icon) to the left of the category name.

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.

The following table lists tests that are especially useful to run on this server.

SunVTS Tests	FRUs Exercised by Tests
cmttest, cputest, fputest, iutest, lldcachetest, dtlbttest, and l2sramtest – <i>indirectly</i> : mptest, and systest	FB-DIMMS, CPU motherboard
disktest	Disks, cables, disk backplane
cddvdtest	CD/DVD device, cable, motherboard
nettest, netlbttest	Network interface, network cable, CPU motherboard
pmemtest, vmemtest, ramtest	FB-DIMMs, motherboard
serialtest	I/O (serial port interface)
usbkbtest, disktest	USB devices, cable, CPU motherboard (USB controller)
hscldbtest	Motherboard, service processor (Host to service processor interface)

7. (Optional) Customize individual tests.

You can customize individual tests by right-clicking on the name of the test. 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 messages, click the Log button or select Log Files from the Reports menu. This action 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. Look here if SunVTS software appears to be acting strangely, especially when it starts up.
- **Solaris OS Messages** (`/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.

Example 1-15 Alternate Command for Starting SunVTS Software

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

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 CMT CLI `showplatform` command to obtain the chassis serial number.

For example:

EXAMPLE 1-16 Obtaining the Chassis Serial Number With the `showplatform` Command

```
sc> showplatform
SUNW,Sun-Netra-T5440
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:

- **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://docs.sun.com>

- **Solaris Release Notes** – Contain important information about the Solaris OS. The release notes are available online at: <http://docs.sun.com>
- **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** – Provides access to 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>

Preparing for Service

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

Topics include:

- [“2.1 Safety Information” on page 57](#)
- [“2.2 Required Tools ” on page 58](#)
- [“2.3 Prerequisite Tasks for Component Replacement” on page 58](#)

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:

- [“Power Off the Server” on page 59](#)
- [“Remove the Server From the Rack” on page 60](#)
- [“Perform Antistatic Measures” on page 61](#)
- [“Remove the Top Cover” on page 62](#)

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

- [“Remove the PCI Mezzanine Assembly” on page 86](#)

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.

▼ Power 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 compatibility CLI `sc>` prompt by typing the `#`. (Hash-Period) key sequence.**

- 6. At the ALOM CMT compatibility CLI `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 *Integrated Lights Out Manager (ILOM) Administration Guide* for more information about the ALOM CMT CLI poweroff command.

7. **Disconnect the cables from the server.**
See [“Disconnect Cables From the Server” on page 60](#).

▼ Disconnect 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 or XAUI cards
 - Alarm board
 - TTYA serial port
 - Serial management port
 - Network management port
 - USB ports
 - Ethernet ports
 - Power supplies
3. **If you are going to remove the CMA, also remove the cables from it.**
4. **Remove the server from the rack.**

▼ Remove the Server From the Rack

Remove the server from the rack prior to performing cold-swappable FRU replacement procedures except the FB-DIMMs, PCI cards, and the service processor.



Caution - The server weighs approximately 80 lb (36 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 or remove the necessary hardmount screws, depending on you rack type.**
3. **Set the server on a sturdy work surface.**



Caution - Do not attempt to open the front bezel while the bezel is resting on a flat surface. Doing so results in damage to the bezel hinges on either side.

4. **Perform antistatic measures.**
See [“Perform Antistatic Measures” on page 61.](#)

▼ Perform 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.**

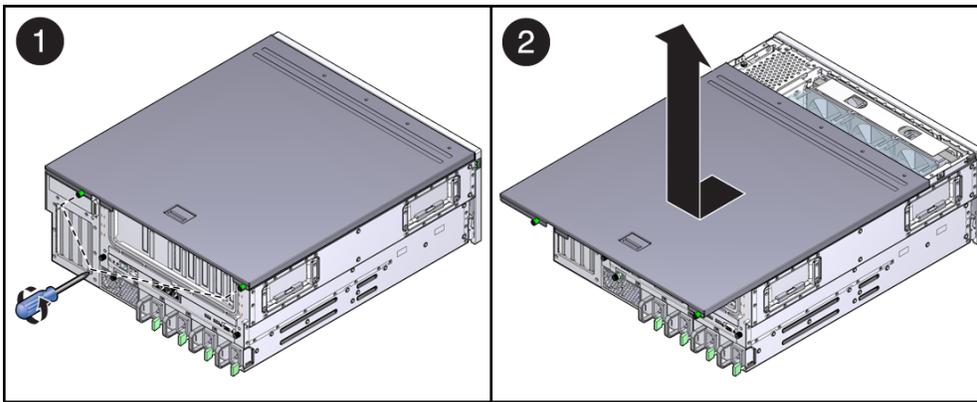
See [“Remove the Top Cover” on page 62.](#)

▼ Remove 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 and loosen the two green captive screws securing the top cover on the rear of the server ([Figure 2-1](#)).

FIGURE 2-1 Top Cover and Release Button



2. Slide the cover toward the rear of the server.
3. Lift the cover off the chassis and set it aside.

Replacing Storage Components

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

- [“3.1 Replacing a Hard Drive” on page 63](#)
- [“3.2 Replacing the Optical Media Drive” on page 67](#)

3.1 Replacing a Hard Drive

The hard 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 before you can remove it. Prevent any applications from accessing the drive and remove the logical software links to 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 one of these conditions, you must shut the system down before you replace the hard drive. See [“Power Off the Server” on page 59](#).

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

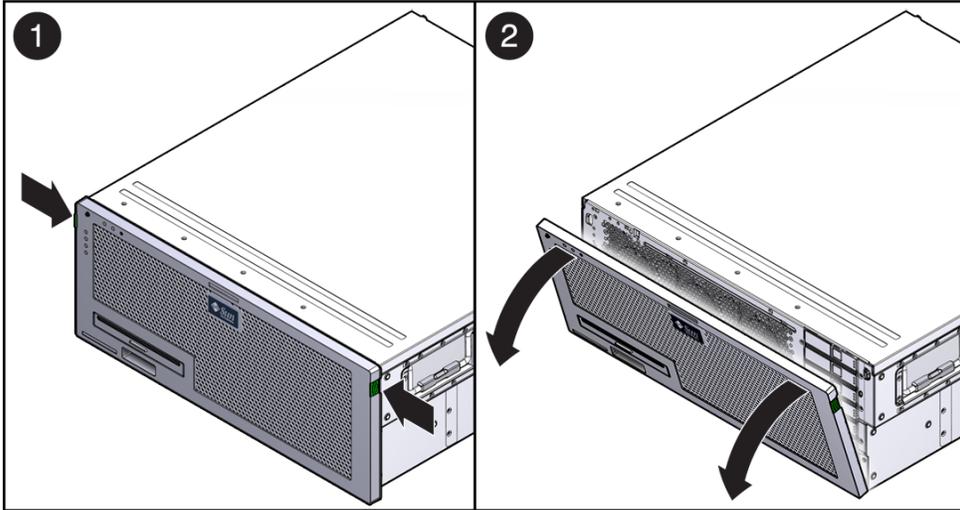
▼ Remove a Hard Drive

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



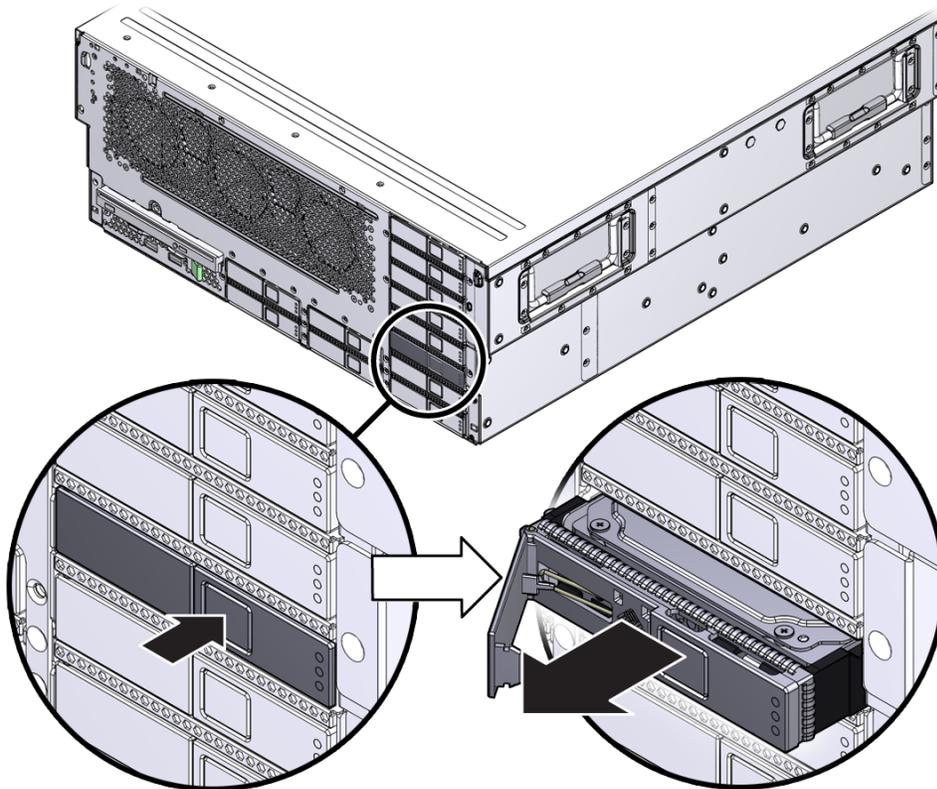
Caution - Do not open the bezel when it is resting on a flat surface. Doing so will result in damage to the hinges on either side.

FIGURE 3-1 Opening the Bezel



2. **Identify the location of the hard drive that you want to remove.**
3. **Type 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 3-2).**
The latch opens.

FIGURE 3-2 Removing a Hard Drive



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

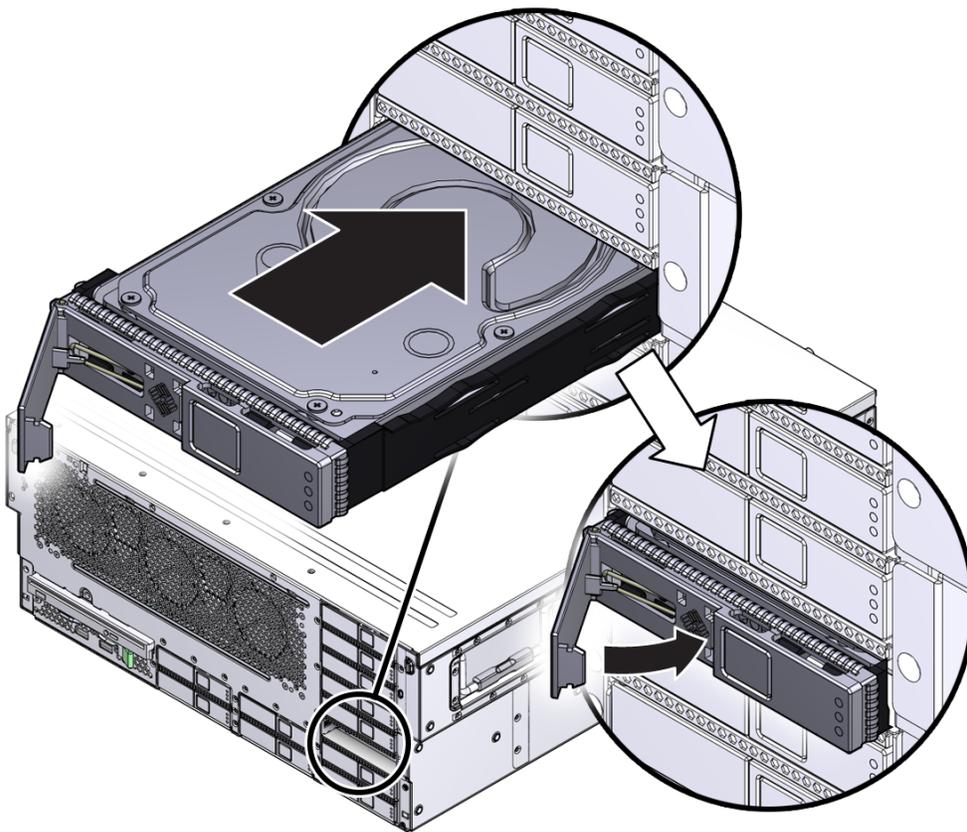
5. Consider your next steps:

- If you are replacing the hard drive, continue to [“Install a Hard Drive” on page 66](#).
- If you are not replacing the hard drive, perform administrative tasks to configure the server to operate without the hard drive.

▼ Install 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. 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 3-3).**

FIGURE 3-3 Installing a Hard Drive



4. **Close the latch to lock the drive in place.**

5. **Close the bezel.**

6. **Perform administrative tasks to reconfigure the hard 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

▼ Remove the Optical Media Drive

1. **Prepare the server for optical media drive removal. See:**

- [“Power Off the Server” on page 59](#)

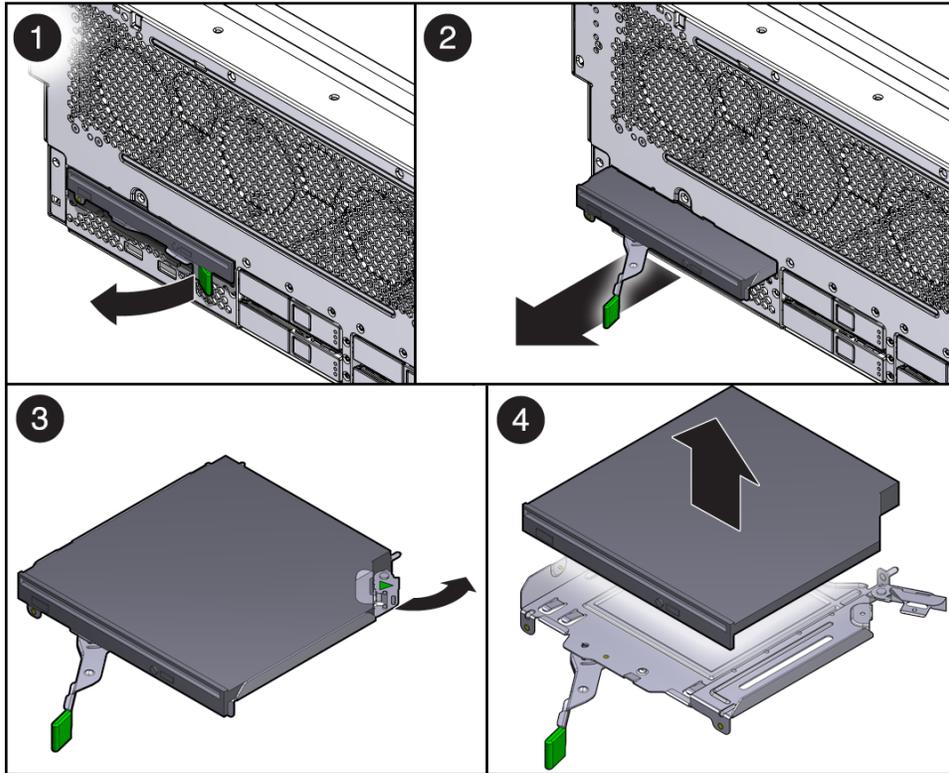
- [“Perform Antistatic Measures” on page 61](#)

2. **Open the bezel.**

3. **Pull the release tab out and to the left, freeing the optical media drive and attached housing ([Figure 3-4](#)).**

4. **Pull the rear release lever out and to the right, freeing the optical media drive from the housing ([Figure 3-4](#)).**

FIGURE 3-4 Releasing the Optical Media Drive

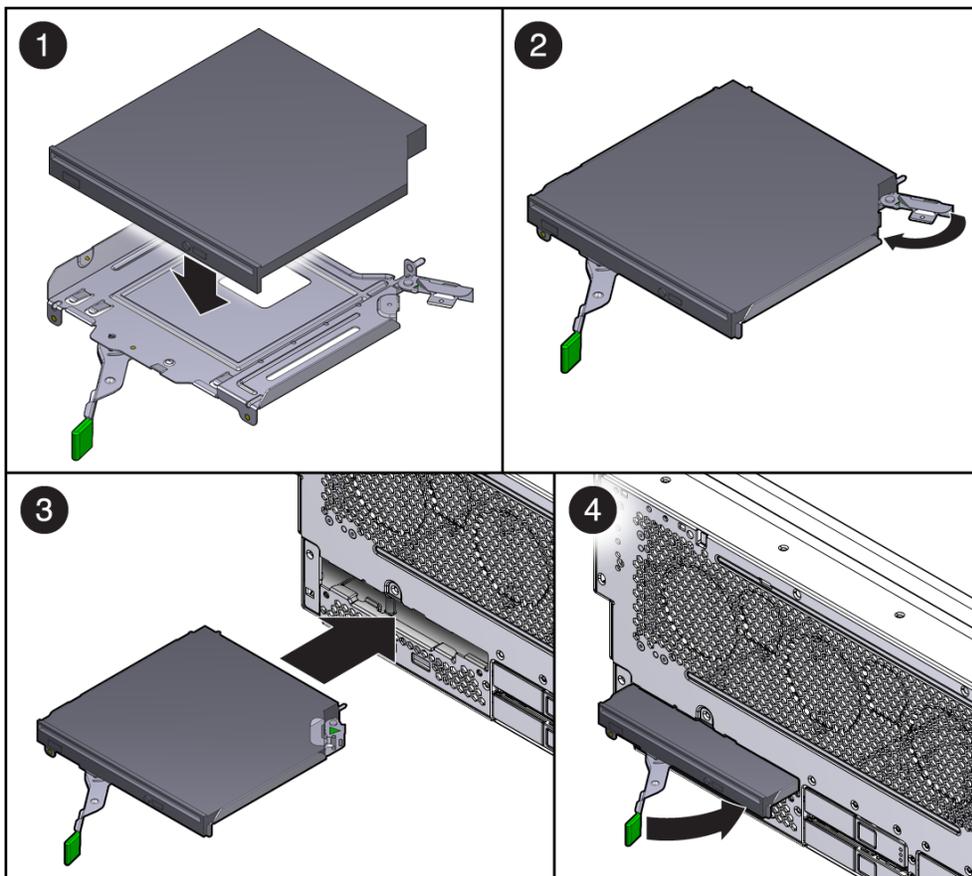


5. Set the optical media drive aside on an antistatic mat.
6. Consider your next step:
 - If you removed the optical media drive as part of another procedure, return to that procedure.
 - Otherwise, continue to [“Install the Optical Media Drive” on page 69.](#)

▼ Install the Optical Media Drive

1. Remove the replacement optical media drive from its packaging and place it on an antistatic mat.
2. Seat the optical media drive into the housing and secure it by pressing the rear release lever to the right (Figure 3-5).
3. Hold the tab to the left and insert the optical media drive into the media bay assembly (Figure 3-5).

FIGURE 3-5 Inserting the Optical Media Drive



4. **Press the optical media drive in until it seats and close the release the tab by pressing it to the right ([Figure 3-5](#)).**
5. **Close the bezel.**
6. **Consider your next step:**
 - **If you installed the optical media drive as part of another procedure, return to that procedure.**
 - **Otherwise, see [Chapter 6, “Returning the Server to Operation”](#) to bring the server back online.**

Replacing Motherboard Assembly Components

This chapter describes how to remove and install components from the motherboard assembly and how to remove the motherboard assembly itself. Topics include:

- “4.1 PCIe, PCI-X, and XAUI Card Configuration Reference” on page 71
- “4.2 Replacing PCI-X 0-1 and PCIe 2-3 Cards” on page 73
- “4.3 Replacing PCIe/XAUI Cards 4-6 and PCIe Cards 7-9” on page 78
- “4.5 Replacing Memory Air Duct” on page 83
- “4.6 Replacing the PCI Mezzanine Assembly” on page 86
- “4.7 FB-DIMM Configuration Reference” on page 90
- “4.8 Replacing the Memory Mezzanine Assembly” on page 95
- “4.9 Servicing FB-DIMMs” on page 100
- “4.10 Replacing the Battery” on page 111
- “4.11 Replacing the SCC Module” on page 112
- “4.12 Replacing the Motherboard Assembly” on page 114

4.1 PCIe, PCI-X, and XAUI Card Configuration Reference

This section describes suggested PCI/XAUI card features and configurations. See [Figure 4-1](#) for back panel locations of the PCI slots.

FIGURE 4-1 Rear Panel Features and Connector Locations

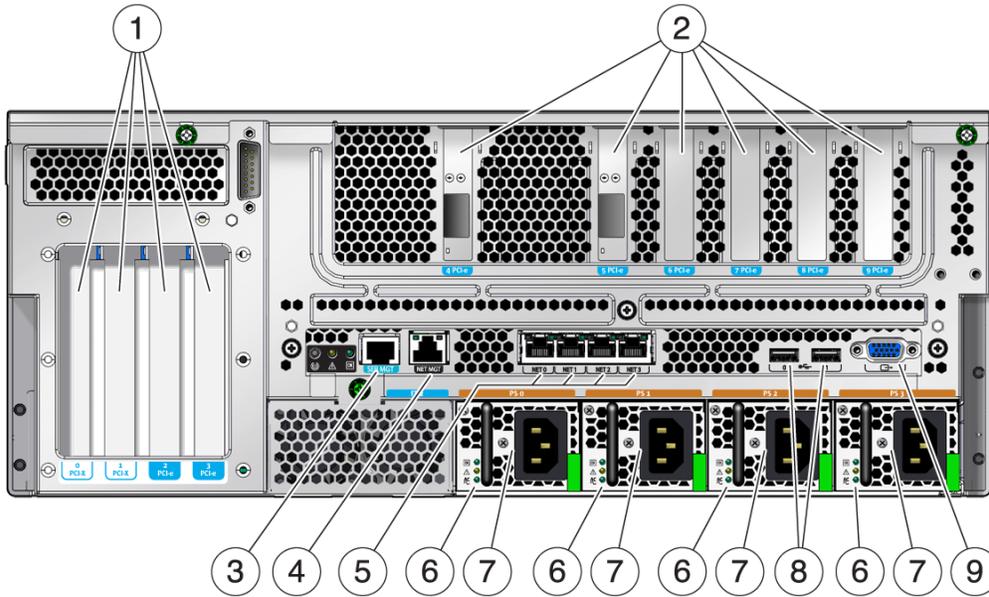


Figure Legend

- 1 PCI Slots 0-3: left to right: PCI-X Slot 0 (25 W maximum load), PCI-X Slot 1 (25 W maximum load), PCIe Slot 2 (75 W maximum load), PCIe Slot 3 (75 W maximum load) Note - Only one 75 W PCIe card can be installed in the server at one time. It is suggested to install the 75 W card in Slot 2 for better cooling.
- 2 PCI (or XAUI) Slots 4-6 and PCIe Slots 7-9: left to right: PCIe or XAUI Slot 4 (15 W maximum load), PCIe or XAUI Slot 5 (15 W maximum load), PCIe Slot 6 (15 W maximum load), PCIe Slot 7 (15 W maximum load), PCIe Slot 8 (15 W maximum load), PCIe Slot 9 (15 W maximum load)
- 3 Service Processor Serial Management Port
- 4 Service Processor Network Management Port
- 5 Gigabit Ethernet ports left to right: NET0, NET1, NET2, NET3
- 6 Power Supply LEDs (each PSU) top to bottom: Output On LED (Green), Service Required LED (Amber), Input Power OK LED (Green)
- 7 Power supplies (PSs): left to right: PS 0, PS 1, PS 2, PS 3
- 8 USB ports left to right: USB2, USB3
- 9 TTYA serial port

4.1.1 PCI Cards on the PCI Auxilliary Board

Slot 0 and Slot 1 are 133MHZ PCI-X slots and support form factor PCI-X cards. The maximum power for each slot is 25 Watts.

Slot 2 and Slot 3 are x8 PCIe slots that have x16 mechanical connectors. These slots support form factor PCIe cards, and support the highest power 75 Watt PCIe card. However, only one 75 Watt PCIe card in either slot can be installed in the server at one time.

Tip - Install the 75 Watt card in Slot 2 for better cooling.

4.1.2 PCI Cards on the PCI Mezzanine Assembly

PCIe Slots 4-9 are x8 PCIe slots and support low profile PCIe cards and Max power for each slot is 25 Watts. PCIe Slot 4 and PCIe Slot 5 are combination slots with XAUI4 and XAUI5. The following restrictions apply:

1. If a XAUI card is installed in the XAUI4 slot, the PCIe Slot 4 cannot be used, and the Ethernet Port 1 on the motherboard will be disabled.
2. If a XAUI card is installed in the XAUI5 slot, the PCIe Slot 5 cannot be used and the Ethernet Port 0 on the motherboard will be disabled.

4.1.3 High Bandwidth PCIe Card Installation

To balance the PCIe bus bandwidth from the upstream of the PCIe buses, it is suggested to limit the numbers of high bandwidth PCIe cards installed in the server. It is also suggested to install the high bandwidth PCIe cards in the assigned slots. The following are two examples:

Example 1 – If one or two XAUI cards are installed in the server, it is suggested to install two high bandwidth PCIe cards: one in Slot 2 and in Slot 8.

Example 2 – If there are no XAUI cards installed in the server, it is suggested to install four high bandwidth PCIe cards: one in Slot 2, 4, 8, and 9.

4.2 Replacing PCI-X 0-1 and PCIe 2-3 Cards

For additional installation information and configuration details, refer to the documentation that shipped with your PCI card.

▼ Remove PCI-X 0-1 and PCIe 2-3 Cards

Before You Begin

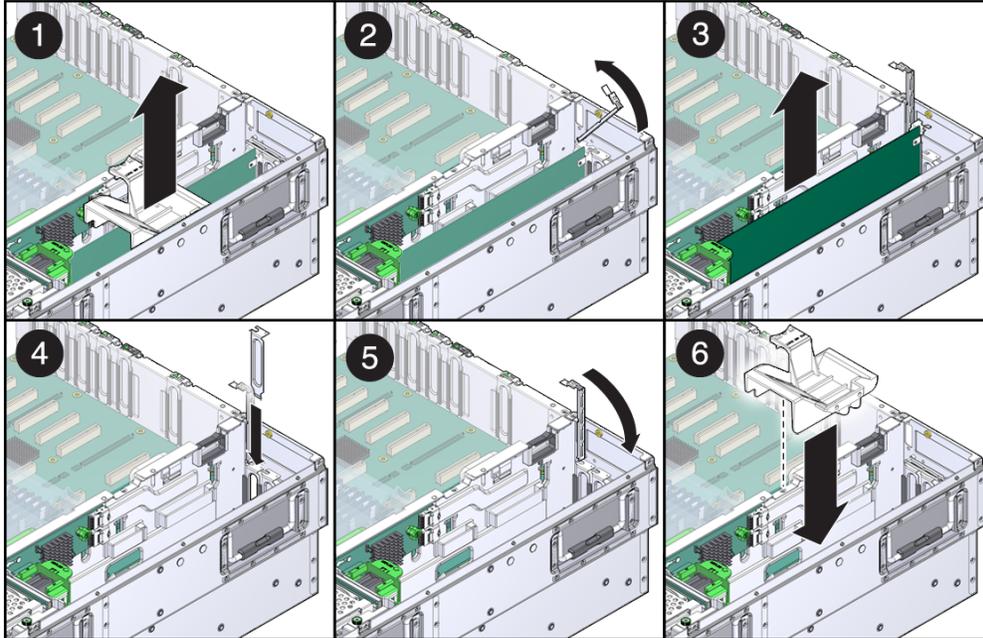
Note - The maximum power of any one PCI card is 25 watts. Only PCI-X slot 4 and PCIe slot 5 accept long cards.

1. **Prepare the server for PCI card removal. See:**
 - **“Power Off the Server” on page 59**
 - **“Disconnect Cables From the Server” on page 60**
 - **“Remove the Server From the Rack” on page 60**
 - **“Perform Antistatic Measures” on page 61**
 - **“Remove the Top Cover” on page 62**
2. **Remove the PCI air duct.**

Lift it straight up ([Figure 4-2](#)).
3. **Release the PCI card release tab.**

Pull it up and to the left ([Figure 4-2](#)).
4. **Remove the PCI card.**

Carefully lift it straight up ([Figure 4-2](#)).

FIGURE 4-2 Removing PCI-X Cards 0-1 and PCIe Cards 2-3

5. **Insert the PCI card filler panel in the appropriate slot.**
Carefully press it straight down until properly seated (Figure 4-2).
6. **Secure the PCI card release tab.**
Press it down and to the right until properly seated (Figure 4-2).
7. **Replace the PCI air duct.**
Carefully press it down until properly seated (Figure 4-2).
8. **See Chapter 6, “Returning the Server to Operation” to bring the server back online:**

▼ Install PCI-X 0-1 and PCIe 2-3 Cards

Before You Begin

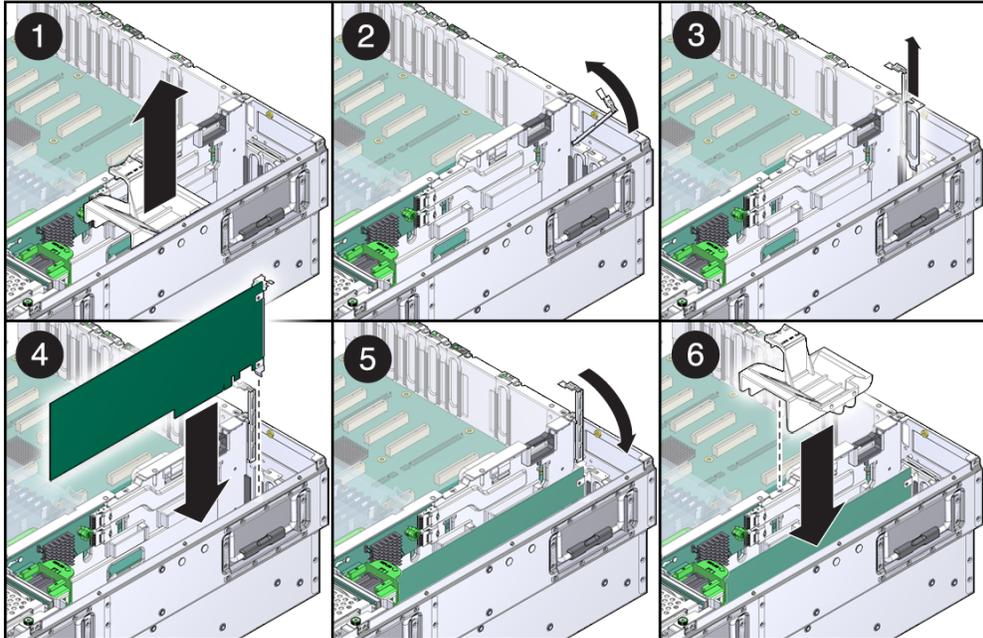
Note - The maximum power of any one PCI card is 25 watts. Only PCI-X Slot 4 and PCIe Slot 5 accept long cards. PCIe Slots 2 and 3 are an exception and support 75 Watt PCIe cards. However, only one 75 Watt card can be installed in the server at one time. It is suggested to install the 75 Watt card in Slot 2 for better cooling.

1. **Prepare the server for PCI card removal. See:**
 - [“Power Off the Server” on page 59](#)
 - [“Disconnect Cables From the Server” on page 60](#)
 - [“Remove the Server From the Rack” on page 60](#)
 - [“Perform Antistatic Measures” on page 61](#)
 - [“Remove the Top Cover” on page 62](#)
2. **Remove the PCI air duct.**

Lift it straight up ([Figure 4-3](#)).
3. **Release the PCI card release tab.**

Pull it up and to the left ([Figure 4-3](#)).
4. **Remove the PCI card filler panel.**

Lift it straight up ([Figure 4-3](#)).

FIGURE 4-3 Install PCI-X Cards 0-1 and PCIe Cards 2-3

5. **Insert the PCI card in the appropriate slot.**
Carefully press it straight down until properly seated (Figure 4-3).
6. **Secure the PCI card release tab.**
Press it down and to the right until properly seated (Figure 4-3).
7. **Replace the PCI air duct.**
Carefully press it down until properly seated (Figure 4-3).
8. **See Chapter 6, “Returning the Server to Operation” to bring the server back online.**

4.3 Replacing PCIe/XAUI Cards 4-6 and PCIe Cards 7-9

For additional installation information and configuration details, refer to the documentation that shipped with your PCI card.



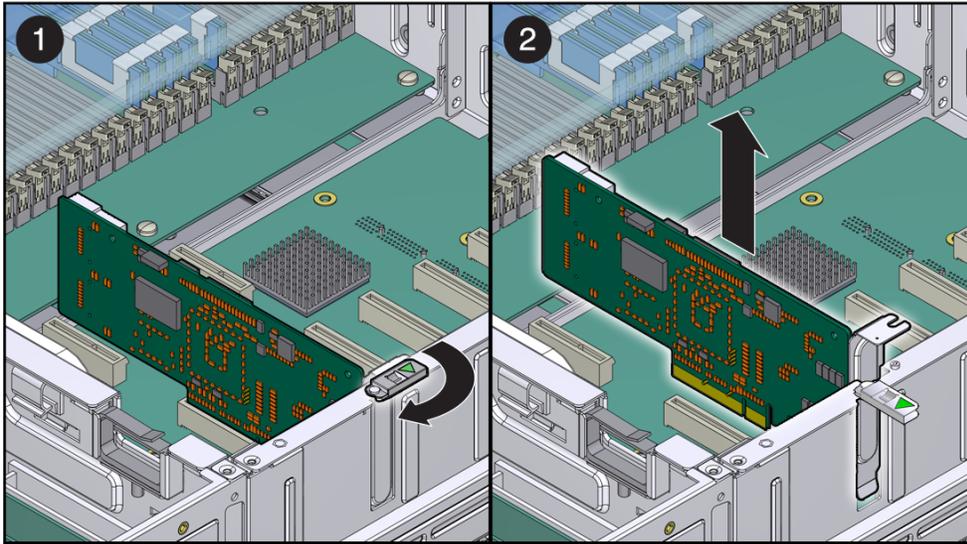
Caution - The Sun Storage 6 Gb SAS PCIe RAID HBA, Internal must be installed in PCIe slot 4 only. If you are installing this HBA, see [“4.4 Cabling the Sun Storage 6 Gb SAS PCIe RAID HBA, Internal” on page 81](#) for important cabling instructions.

Note - XAUI 10 Gigabit Ethernet cards are supported in slots 4 and 5 only.

▼ Remove PCIe/XAUI Cards 4-6 and PCIe Cards 7-9

1. Prepare the server for PCIe card removal. See:
 - [“Power Off the Server” on page 59](#)
 - [“Disconnect Cables From the Server” on page 60](#)
 - [“Remove the Server From the Rack” on page 60](#)
 - [“Perform Antistatic Measures” on page 61](#)
 - [“Remove the Top Cover” on page 62](#)
2. Pull the release tab out ([Figure 4-4](#)).
3. Carefull pull the card straight up and out ([Figure 4-4](#)).
Place it on an antistatic mat.
4. If you are not replacing the card, install a filler panel.

Note - Do not operate the server with empty slots.

FIGURE 4-4 Removing PCIe/XAUI Cards 4-9

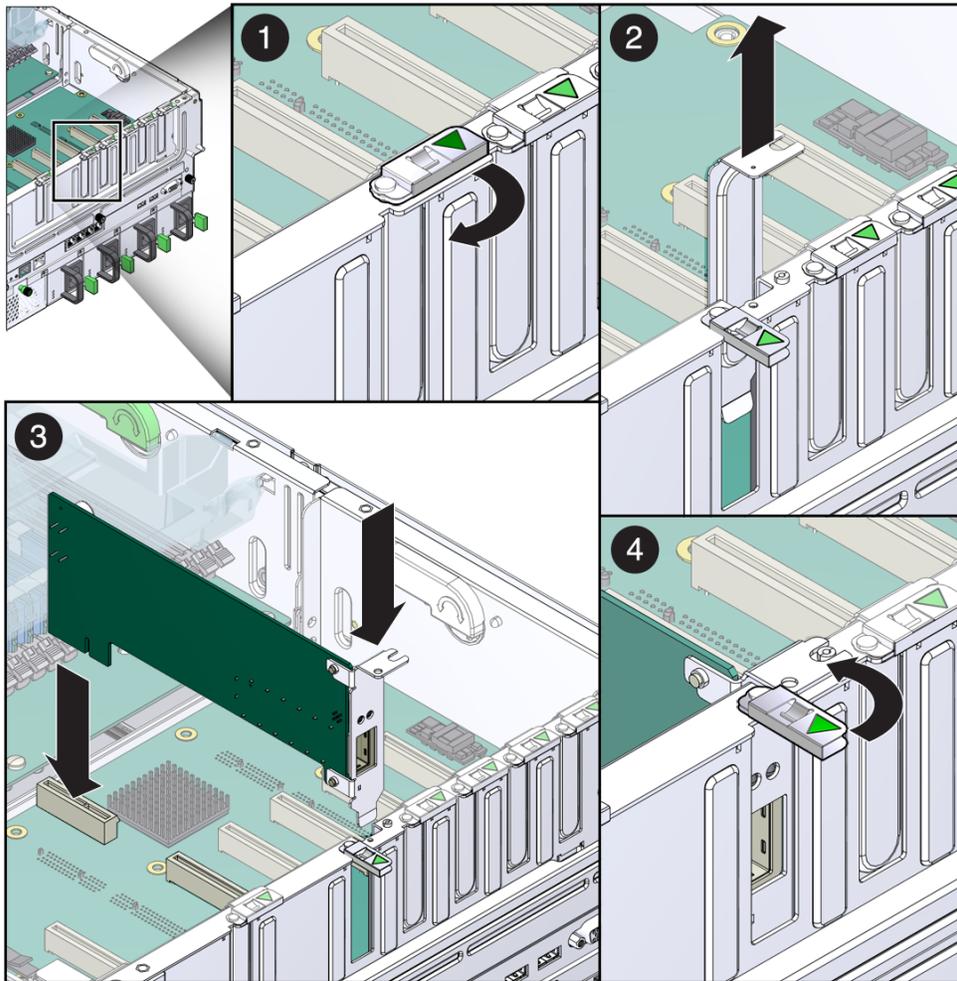
5. See [Chapter 6, “Returning the Server to Operation”](#) to bring the server back online:

▼ Install PCIe/XAUI Cards 4-6 and PCIe Cards 7-9

1. Prepare the server for PCIe card removal. See:
 - [“Power Off the Server”](#) on page 59
 - [“Disconnect Cables From the Server”](#) on page 60
 - [“Remove the Server From the Rack”](#) on page 60
 - [“Perform Antistatic Measures”](#) on page 61
 - [“Remove the Top Cover”](#) on page 62
2. Pull the filler panel release tab out ([Figure 4-5](#)).

3. Lift the filler panel straight up and out (Figure 4-5).
4. Carefully seat the PCIe card in the slot (Figure 4-5).

FIGURE 4-5 Installing PCIe/XAUI Cards 4-9



5. See [Chapter 6, "Returning the Server to Operation"](#) to bring the server back online.

4.4 Cabling the Sun Storage 6 Gb SAS PCIe RAID HBA, Internal

This HBA requires a unique SAS cable (530-3896-03). This cable must be ordered separately.

Refer to the *Sun Storage 6 Gb SAS PCIe RAID HBA, Internal Installation Guide* (E22410) for additional details.

▼ Cable the Sun Storage 6 Gb SAS PCIe RAID HBA, Internal

1. Remove the existing SAS cable connected to the motherboard and port 0 of the SAS expander.
2. Install the card in PCIe slot 4, see [“Install PCIe/XAUI Cards 4-6 and PCIe Cards 7-9” on page 79](#).
3. Connect the SAS cable (530-3896-03) to port SAS0 on the card and port 0 on the SAS expander.

Route the SAS cable as shown in the following figure.

FIGURE 4-6 Removing the Memory Air Duct

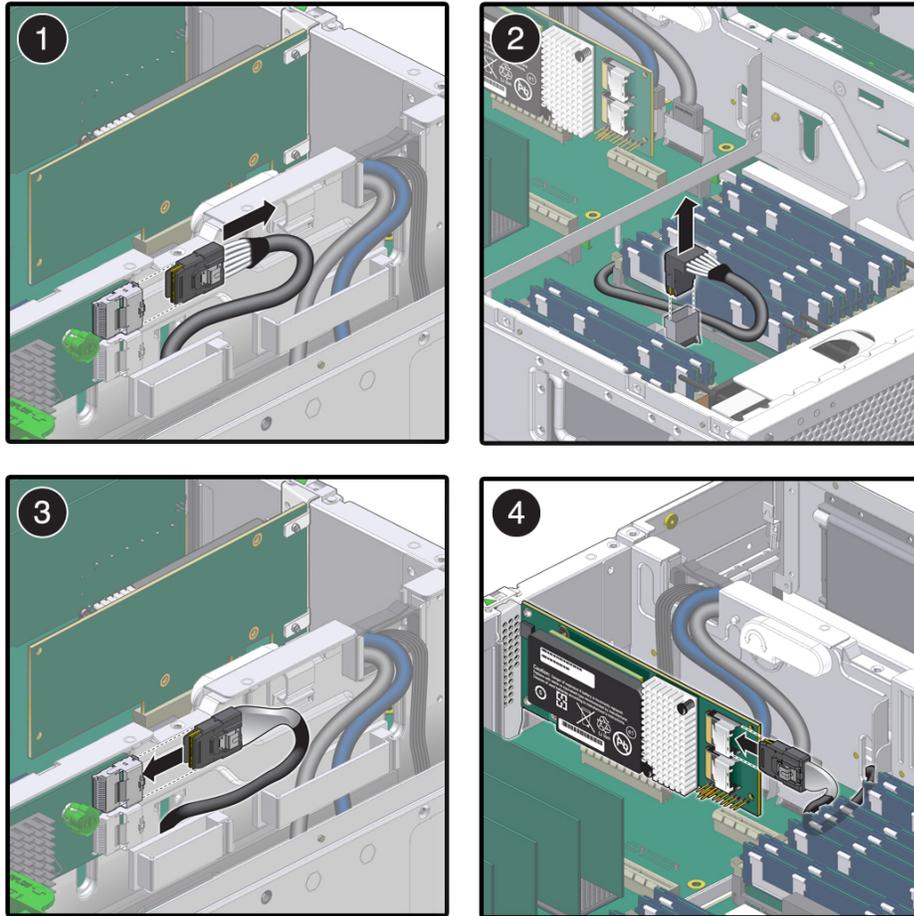


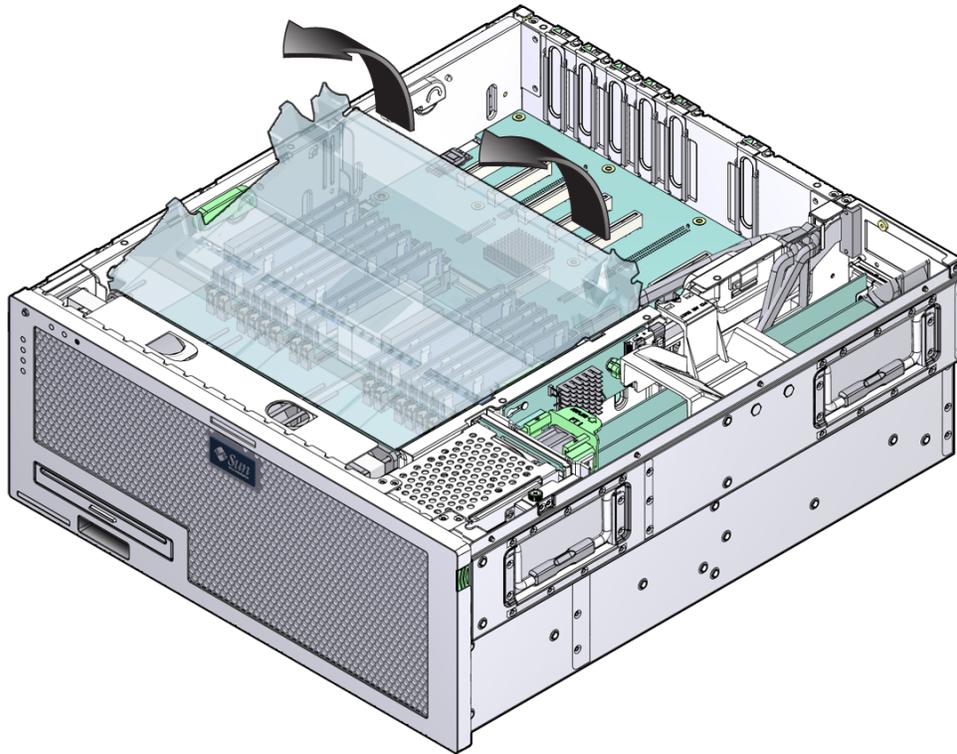
Figure Callout	Instruction
1	Unplug existing SAS cable from port 0 of the SAS expander.
2	Unplug existing SAS cable from the motherboard.
3	Plug the new SAS cable into port 0 of the SAS expander.
4	Plug the new SAS cable into port SAS0 of the HBA.

4.5 Replacing Memory Air Duct

▼ Remove the Memory Air Duct

1. Prepare the server for memory air duct removal. See:
 - [“Power Off the Server” on page 59](#)
 - [“Remove the Server From the Rack” on page 60](#)
 - [“Perform Antistatic Measures” on page 61](#)
 - [“Remove the Top Cover” on page 62](#)
2. Facing the server, carefully lift the rear of the air duct upward ([Figure 4-7](#)).
3. Lift the duct out of the chassis ([Figure 4-7](#)).
Set it aside on an antistatic mat.

FIGURE 4-7 Removing the Memory Air Duct



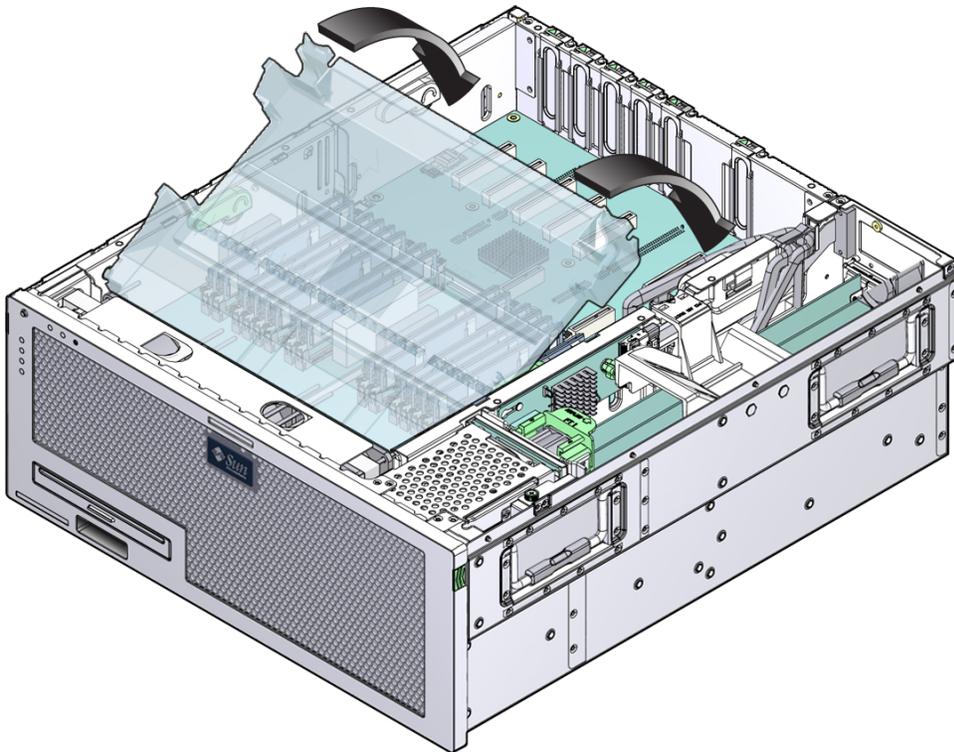
4. Consider your next step:
 - If you removed the memory air duct as part of another procedure, return to that procedure.
 - Otherwise, continue to [“Install the Memory Air Duct” on page 84.](#)

▼ Install the Memory Air Duct

1. Remove the replacement memory air duct from its packaging.

2. With the duct at a 45 degree angle, position the duct to align with the chassis (Figure 4-8).
3. Lower the duct to the horizontal position until the tab secures in place (Figure 4-8).

FIGURE 4-8 Installing the Memory Air Duct



4. Consider your next step:
 - If you installed the air duct as part of another procedure, return to that procedure.
 - Otherwise, see [Chapter 6, “Returning the Server to Operation”](#) to bring the server back online.

4.6 Replacing the PCI Mezzanine Assembly

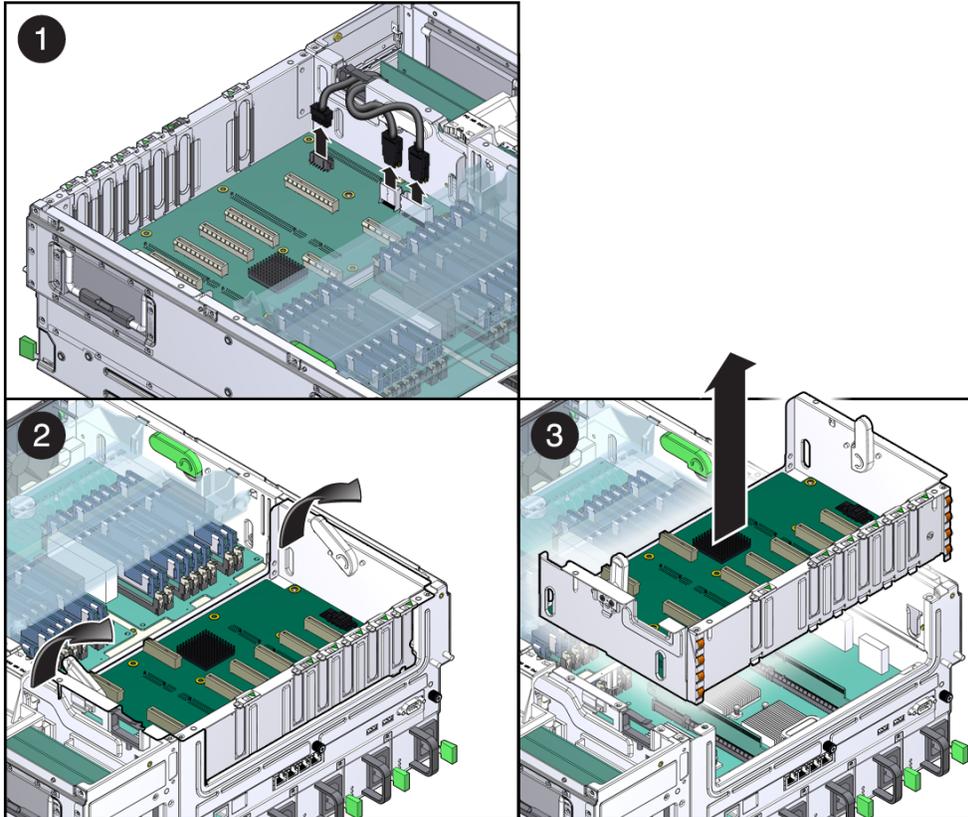
The PCI mezzanine is a carrier for the PCI-X and PCIe cards. Remove the PCI mezzanine to replace the following components:

- LED board
- Alarm board
- FB-DIMMs on the motherboard
- Motherboard assembly
- Power distribution board (PDB)

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

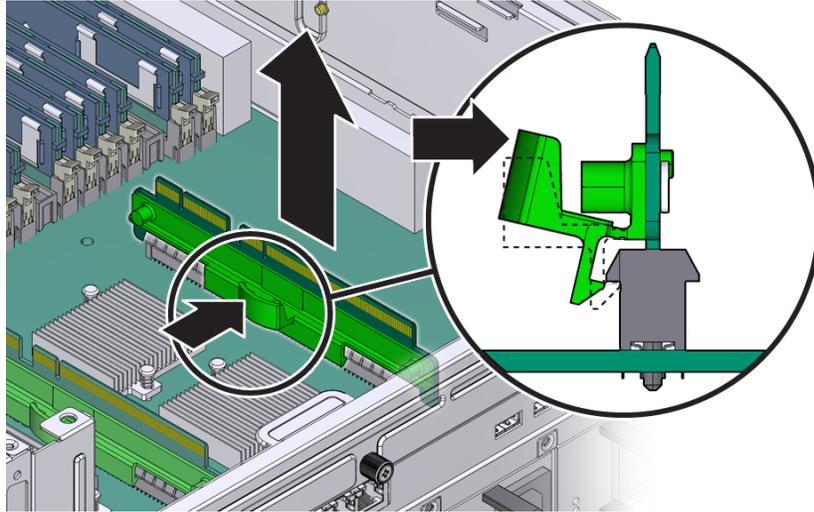
▼ Remove the PCI Mezzanine Assembly

1. **Prepare the server for memory air duct removal. See:**
 - [“Power Off the Server” on page 59](#)
 - [“Remove the Server From the Rack” on page 60](#)
 - [“Perform Antistatic Measures” on page 61](#)
 - [“Remove the Top Cover” on page 62](#)
2. **Disconnect the PCI mezzanine cables (Figure 4-9).**

FIGURE 4-9 Removing the PCI Mezzanine

3. **Pull the release levers up and back. (Figure 4-9).**
The release levers unseat the mezzanine from the riser cards.
4. **Lift the PCI mezzanine up and out (Figure 4-9).**
Place it on an antistatic mat.
5. **Remove the PCI mezzanine riser cards (Figure 4-10).**

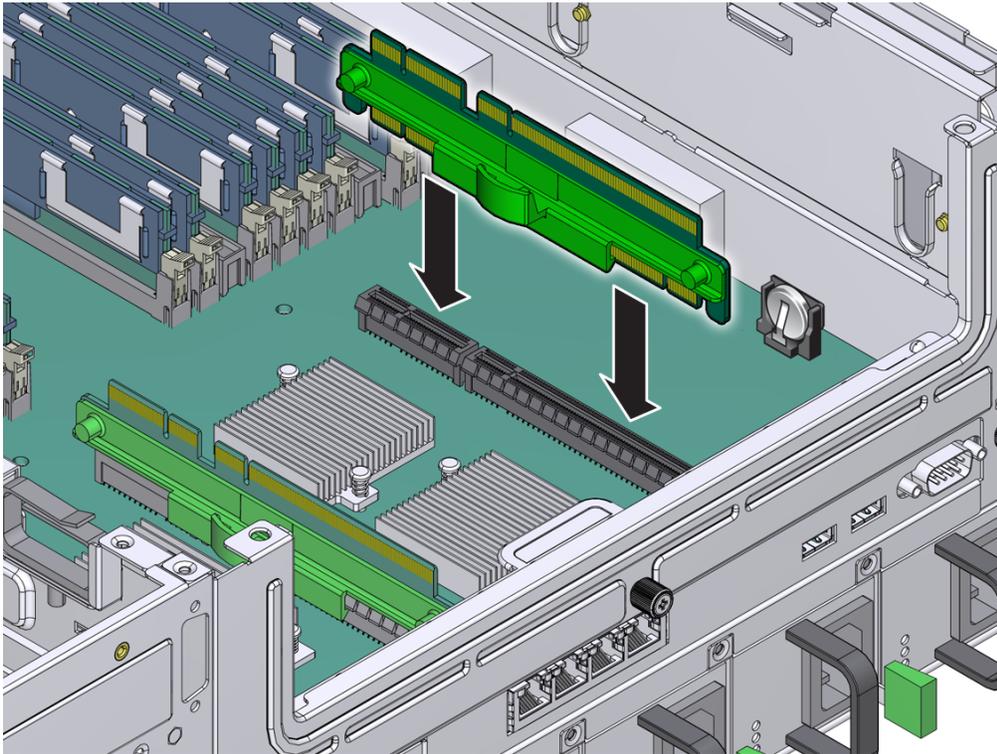
FIGURE 4-10 Removing the PCI Mezzanine Riser Cards



- a. Press the release tab downward ([Figure 4-10](#)).
- b. Pull the riser card straight up and out of the chassis ([Figure 4-10](#)).
- c. Place on an antistatic mat ([Figure 4-10](#)).

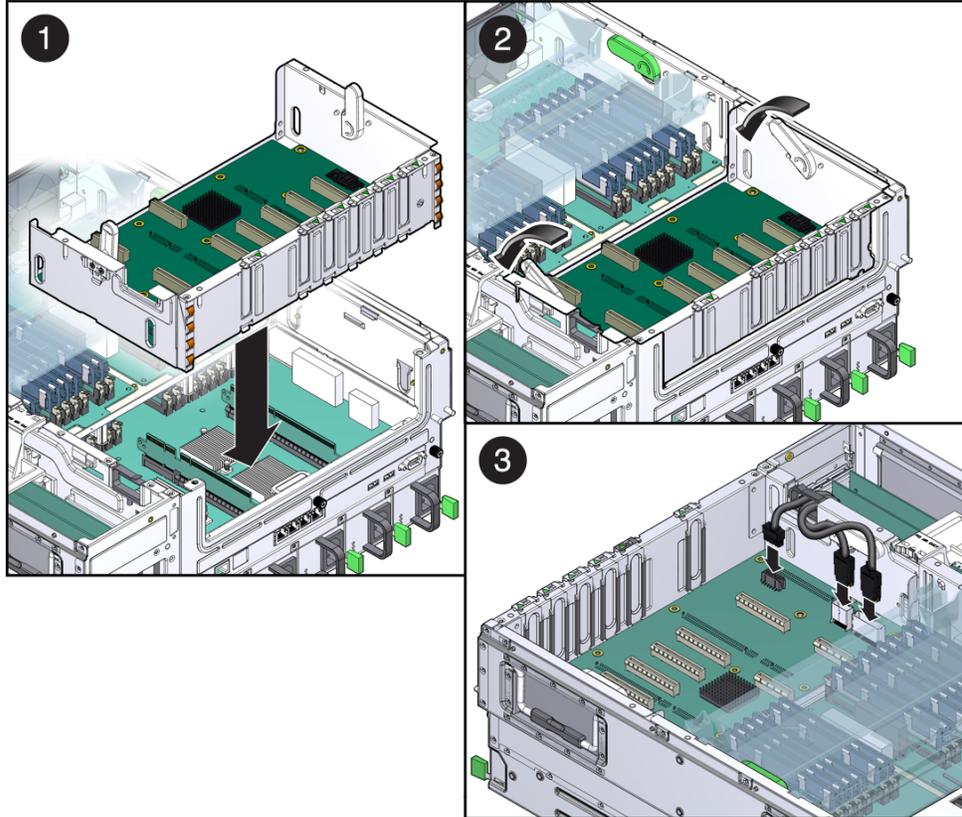
▼ Install the PCI Mezzanine Assembly

1. Install the PCI mezzanine riser cards on the motherboard ([Figure 4-11](#)).

FIGURE 4-11 Installing the PCI Mezzanine Riser Cards

- a. Carefully place the riser cards on the riser card slots ([Figure 4-11](#)).
 - b. Press down until fully seated into slots ([Figure 4-11](#)).
2. Carefully seat the PCI mezzanine on the PCI riser cards ([Figure 4-12](#)).
 3. Secure the release tabs by pressing them forward and down ([Figure 4-12](#)).
Securing the release tabs fully seats the PCI mezzanine onto the riser cards. You do not need to press downward.

FIGURE 4-12 Installing the PCI Mezzanine



4. Reconnect the PCI mezzanine cables ([Figure 4-12](#)).
5. See [Chapter 6, “Returning the Server to Operation”](#) to bring the server back online.

4.7 FB-DIMM Configuration Reference

Use these FB-DIMM configuration rules to help you plan the memory configuration of your server.



Caution - DIMM filler cards are required in all empty slots in the memory mezzanine tray. DIMM filler cards are not required on the motherboard.

- 32 slots hold industry-standard FB-DIMM memory modules. 16 slots are located on the motherboard, and an additional 16 slots are available through a memory expansion upgrade (memory mezzanine).
- All FB-DIMMs must be the same density (same type).
 - Only single- and dual-rank fully buffered (FB) DIMMs, per JEDEC standard JESD206, are supported.
 - FBDIMMs using x4 and x8 DRAMs are supported. However, chipkill is supported only on x4-based FBDIMMs. All FBDIMMs within the system must be of the same total capacity.
 - All FBDIMMs within the system must be of the same number of ranks.
 - All FBDIMMs within the system must use the same width (x4 or x8) DRAMs.
 - Mixing of FBDIMMs from different vendors is allowed.
 - Mixing of FBDIMMs with AMBs from different vendors is allowed.
 - There must be a minimum 8 FBDIMMs installed in the system.
- At minimum, Channel 0, FB-DIMM Slot 0 in all branches must be populated with FB-DIMMs of the same density (same type).
- In branches populated with more than one FB-DIMM (for example, in 8 and 16 FB-DIMM configurations), FB-DIMMs are addressed in pairs. Each pair must be identical (same part number).
- A replacement FB-DIMM must have the same part number as the other FB-DIMM in its pair. For example, a replacement FB-DIMM in J1201 must have the same part number as the FB-DIMM in J1401, in order to ensure an identical pair.
- If you are unable to obtain a matching FB-DIMM, you must replace both FB-DIMMs in the pair.

All Sun Netra T5440 servers support the following configurations, as shown in [Figure 4-13](#):

- 8 FB-DIMMs (Group 1)
- 12 FB-DIMMs (Groups 1 and 2)
- 16 FB-DIMMs (Groups 1, 2, and 3) (fully populated motherboard)

FIGURE 4-13 Motherboard FB-DIMM Configuration

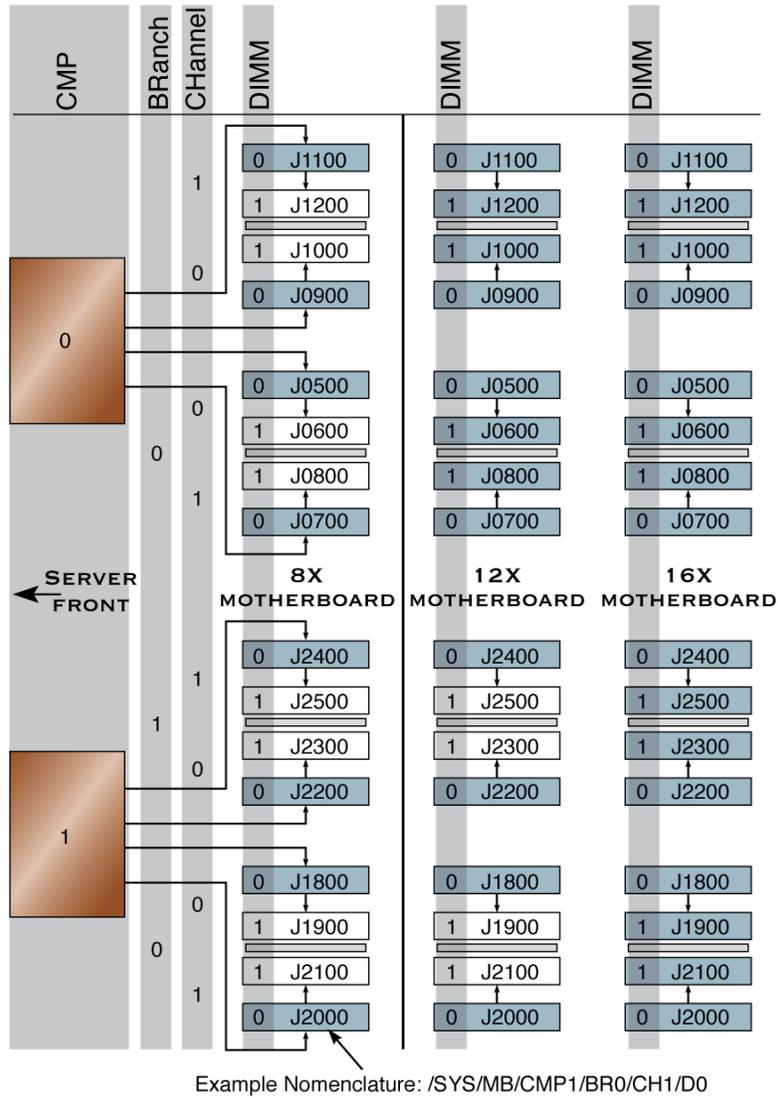


Table 4-1 describes the motherboard FB-DIMM FRU names and installation order.

TABLE 4-1 Standard Motherboard FB-DIMM Configuration

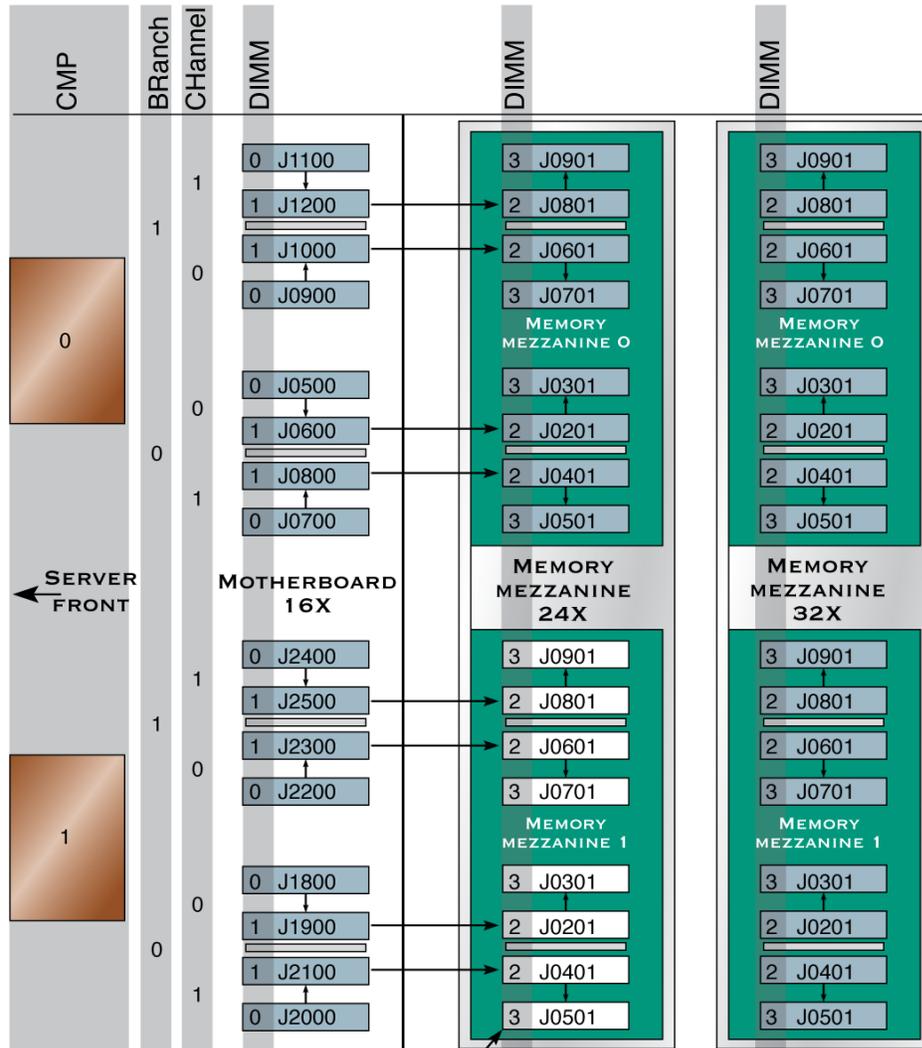
Branch Name	Channel Name	FRU Name	FB-DIMM Connector	FB-DIMM Installation Order [†]
CMP 0, Branch 0	Channel 0	/SYS/MB/CMP0/BR0/CH0/D0	J0500	1
		/SYS/MB/CMP0/BR0/CH0/D1	J0600	2
	Channel 1	/SYS/MB/CMP0/BR0/CH1/D0	J0700	1
		/SYS/MB/CMP0/BR0/CH1/D1	J0800	2
CMP 0, Branch 1	Channel 0	/SYS/MB/CMP0/BR1/CH0/D0	J0900	1
		/SYS/MB/CMP0/BR1/CH0/D1	J1000	2
	Channel 1	/SYS/MB/CMP0/BR1/CH1/D0	J1100	1
		/SYS/MB/CMP0/BR1/CH1/D1	J1200	2
CMP 1, Branch 0	Channel 0	/SYS/MB/CMP1/BR0/CH0/D0	J1800	1
		/SYS/MB/CMP1/BR0/CH0/D1	J1900	3
	Channel 1	/SYS/MB/CMP1/BR0/CH1/D0	J2000	1
		/SYS/MB/CMP1/BR0/CH1/D1	J2100	3
CMP 1, Branch 1	Channel 0	/SYS/MB/CMP1/BR1/CH0/D0	J2200	1
		/SYS/MB/CMP1/BR1/CH0/D1	J2300	3
	Channel 1	/SYS/MB/CMP1/BR1/CH1/D0	J2400	1
		/SYS/MB/CMP1/BR1/CH1/D1	J2500	3

[†]Upgrade path: DIMMs should be added with each group populated in the order shown.

Sun Netra T5440 Servers are upgradable to support an additional 16 FB-DIMMs. These upgraded servers support the following FB-DIMM configurations shown in [Figure 4-14](#):

- 24 FB-DIMMs (Groups 1,2, 3, and 4) (fully populated motherboard + 8 FB-DIMM slots in the memory mezzanine assembly)
- 32 FB-DIMMs (Groups 1,2, 3, 4, and 5) (fully populated motherboard + fully populated memory mezzanine assembly)

FIGURE 4-14 Upgradable Memory Mezzanine FB-DIMM Configuration



Example Nomenclature: /SYS/MB/CMP1/MR1/BR0/CH1/D3

Table 4-2 describes the upgradable memory mezzanine FB-DIMM FRU names and installation order.

TABLE 4-2 Upgradable FB-DIMM Memory Mezzanine Configuration

Branch Name	Channel Name	FRU Name	FB-DIMM Connector	FB-DIMM Installation Order [†]
CMP 0, Branch 0	Channel 0	/SYS/MB/CMP0/MR0/BR0/CH0/D2	J0201	4
		/SYS/MB/CMP0/MR0/BR0/CH0/D3	J0301	4
	Channel 1	/SYS/MB/CMP0/MR0/BR0/CH1/D2	J0401	4
		/SYS/MB/CMP0/MR0/BR0/CH1/D3	J0501	4
CMP 0, Branch 1	Channel 0	/SYS/MB/CMP0/MR0/BR1/CH0/D2	J0601	4
		/SYS/MB/CMP0/MR0/BR1/CH0/D3	J0701	4
	Channel 1	/SYS/MB/CMP0/MR0/BR1/CH1/D2	J0801	4
		/SYS/MB/CMP0/MR0/BR1/CH1/D3	J0901	4
CMP 1, Branch 0	Channel 0	/SYS/MB/CMP1/MR1/BR0/CH0/D2	J0201	5
		/SYS/MB/CMP1/MR1/BR0/CH0/D3	J0301	5
	Channel 1	/SYS/MB/CMP1/MR1/BR0/CH1/D2	J0401	5
		/SYS/MB/CMP1/MR1/BR0/CH1/D3	J0501	5
CMP 1, Branch 1	Channel 0	/SYS/MB/CMP1/MR1/BR1/CH0/D2	J0601	5
		/SYS/MB/CMP1/MR1/BR1/CH0/D3	J0701	5
	Channel 1	/SYS/MB/CMP1/MR1/BR1/CH1/D2	J0801	5
		/SYS/MB/CMP1/MR1/BR1/CH1/D3	J0901	5

[†]Upgrade path: DIMMs should be added with each group populated in the order shown.

Note - FB-DIMM names in ILOM messages are displayed with the full FRU name, such as /SYS/MB/CMP0/BR0/CH0/D0.

4.8 Replacing the Memory Mezzanine Assembly

This section describes how to remove the memory mezzanine filler tray, and remove and install the optional memory mezzanine and riser cards.

▼ Remove the Memory Mezzanine Filler Tray

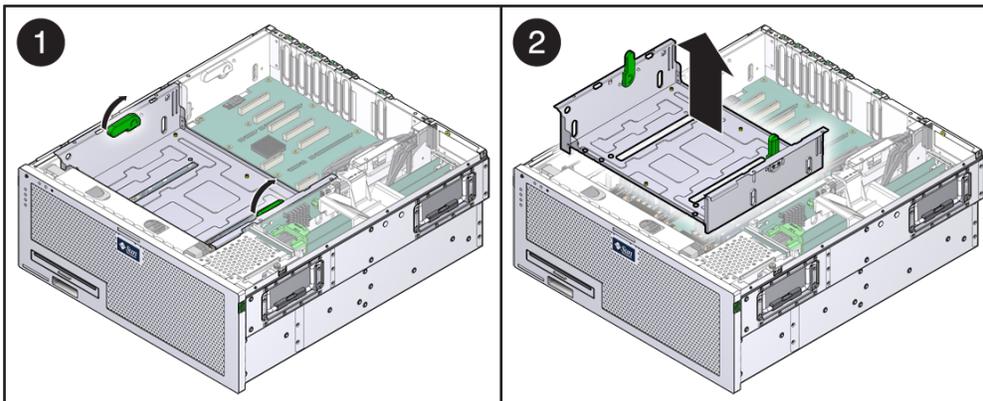
Before You Begin

Note - The standard configuration for the Sun Netra T5440 server includes a memory mezzanine filler tray and riser cards in place of the optional memory mezzanine assembly that provides an additional 16 FB-DIMM slots. To upgrade your server with the memory mezzanine, contact your Sun sales representative.

1. Prepare the server for FB-DIMM removal. See:

- **“Power Off the Server” on page 59**
 - **“Disconnect Cables From the Server” on page 60**
 - **“Remove the Server From the Rack” on page 60**
 - **“Perform Antistatic Measures” on page 61**
 - **“Remove the Top Cover” on page 62**
 - **“Remove the Memory Air Duct” on page 83**
2. **Disconnect all power cables from the server (Figure 4-20).**
 3. **Rotate the memory mezzanine green levers 90 degrees to vertical (Figure 4-18).**
 4. **Lift the memory mezzanine filler tray straight up and out of the chassis (Figure 4-18).**

FIGURE 4-15 Removing the Memory Mezzanine Filler Tray



5. **Remove the white filler riser cards by pulling them straight up.**

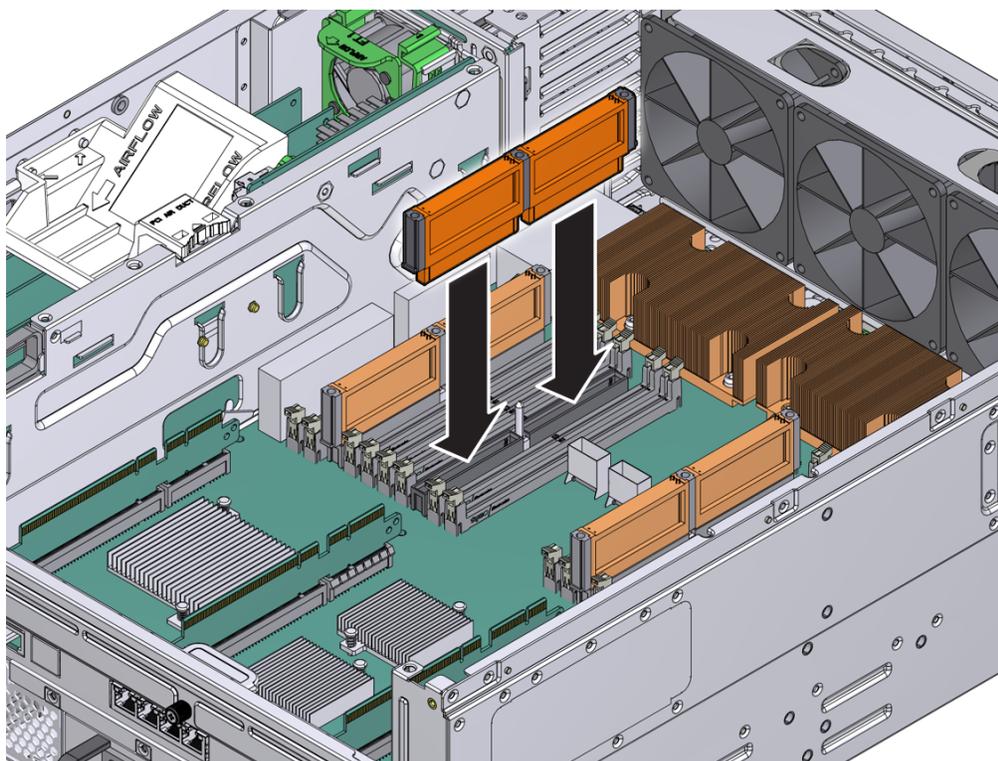
▼ Install the Memory Mezzanine Assembly

Before You Begin

Note - The memory mezzanine is an optional memory expansion assembly that provides an additional 16 FB-DIMM slots for a maximum of 32 FB-DIMM slots.

1. **Install the memory mezzanine riser cards (Figure 4-16).**
Place them on the slot and carefully press until fully seated.

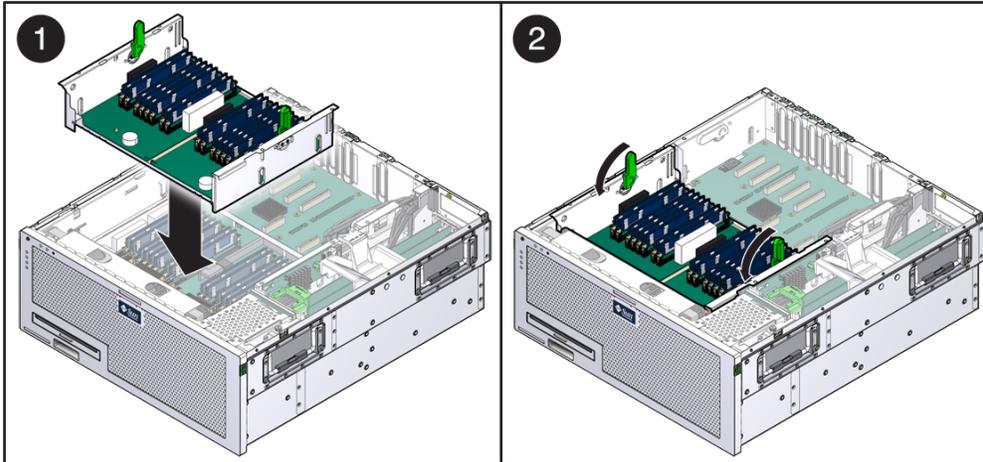
FIGURE 4-16 Installing the Memory Mezzanine Riser Cards



2. **Place the memory mezzanine in the chassis.**
3. **Carefully set the memory mezzanine onto the riser cards (Figure 4-17).**
4. **Rotate the memory mezzanine green levers 90 degrees to horizontal (Figure 4-17).**

These levers handle seating the memory mezzanine onto the riser cards. You do not need to press down.

FIGURE 4-17 Installing the Memory Mezzanine



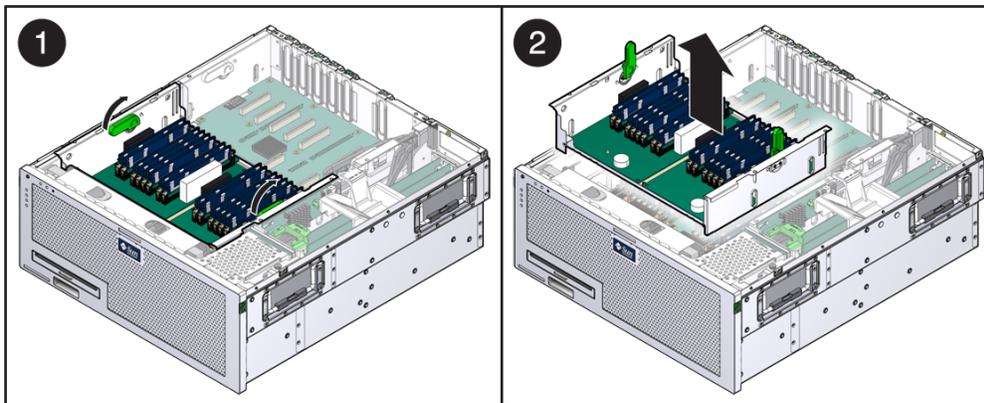
5. See [Chapter 6, “Returning the Server to Operation”](#) to bring the server back online.

▼ Remove the Memory Mezzanine Assembly

1. Prepare the server for FB-DIMM removal. See:
 - [“Power Off the Server”](#) on page 59
 - [“Disconnect Cables From the Server”](#) on page 60
 - [“Remove the Server From the Rack”](#) on page 60
 - [“Perform Antistatic Measures”](#) on page 61
 - [“Remove the Top Cover”](#) on page 62
 - [“Remove the Memory Air Duct”](#) on page 83

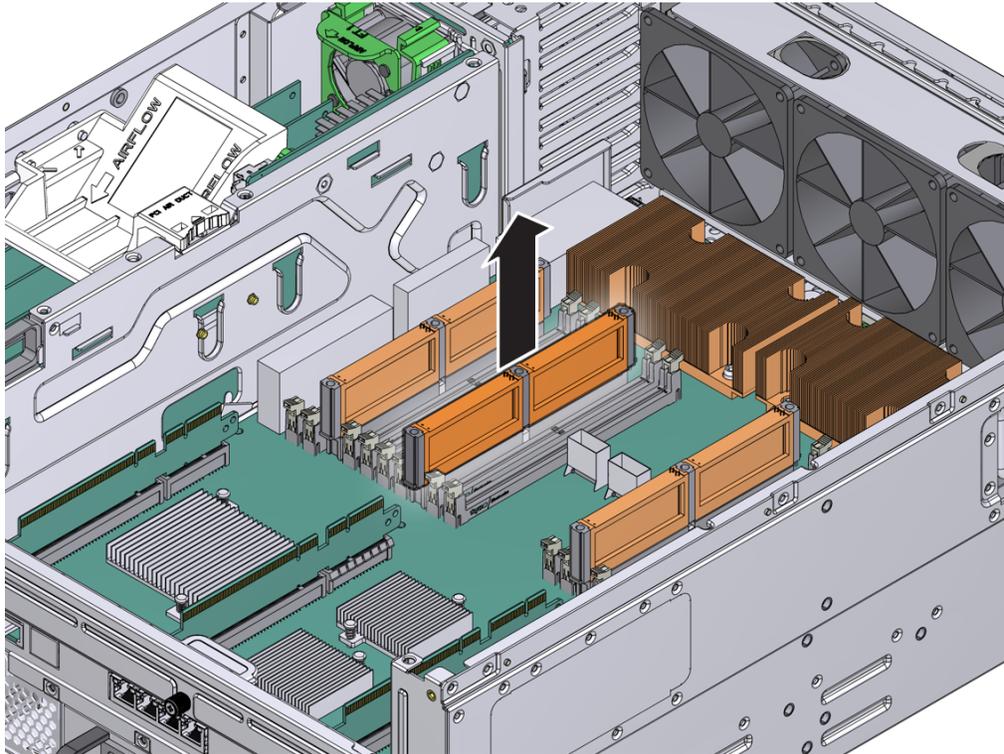
2. Disconnect all power cables from the server (Figure 4-20).
3. Rotate the memory mezzanine green levers 90 degrees to vertical (Figure 4-18).
4. Lift the memory mezzanine straight up and out of the chassis (Figure 4-18).
Place on an antistatic mat.

FIGURE 4-18 Removing the Memory Mezzanine



5. Remove the memory mezzanine riser cards.
6. Remove the riser cards by carefully pulling them straight up (Figure 4-19).
Place on an antistatic mat.

FIGURE 4-19 Removing Memory Mezzanine Riser Cards



7. To install the memory mezzanine assembly, go to [“Install the Memory Mezzanine Assembly” on page 97](#)

4.9 Servicing FB-DIMMs

This section describes how to diagnose and replace faulty FB-DIMMs. If you are upgrading the system with additional FB-DIMMs, see [“Install Additional FB-DIMMs” on page 109](#). For FB-DIMM configuration guidelines, see [“4.7 FB-DIMM Configuration Reference” on page 90](#).



Caution - This procedure requires that you handle components that are sensitive to static discharge. This sensitivity can cause the component to fail. To avoid this problem, ensure that you follow antistatic practices as described in [“Perform Antistatic Measures” on page 61](#).



Caution - Ensure that all power is removed from the server before removing or installing FB-DIMMs. You must disconnect the power cables before performing this procedure.



Caution - DIMM filler cards are required in all empty slots in the memory mezzanine tray. DIMM filler cards are not required on the motherboard.

▼ Locating a Faulty FB-DIMM

The system Service Required LED lights if the system detects a FB-DIMM fault.

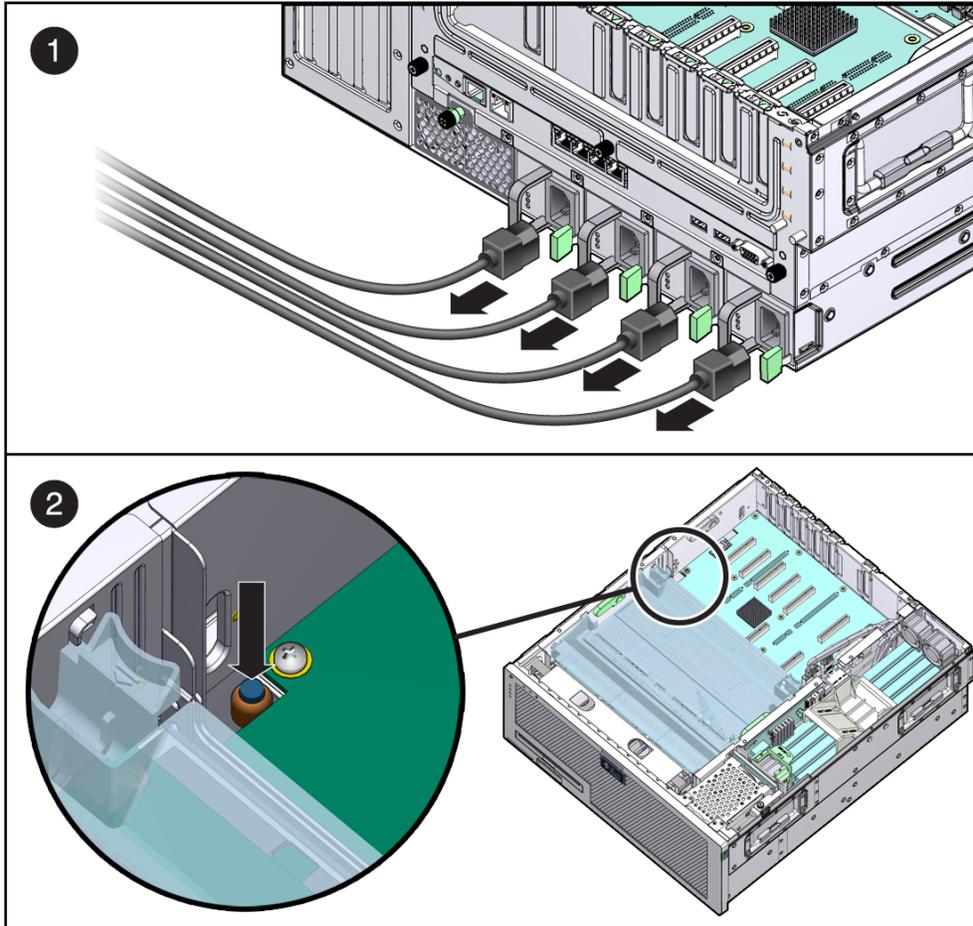
Use the `showfaults` command to identify faulty FB-DIMMs. See [“Detecting Faults” on page 29](#).

Use the FB-DIMM fault locator button on the motherboard to identify faulty FB-DIMMs.

1. **Prepare the server for FB-DIMM removal. See:**
 - [“Power Off the Server” on page 59](#)
 - [“Disconnect Cables From the Server” on page 60](#)
 - [“Remove the Server From the Rack” on page 60](#)
 - [“Perform Antistatic Measures” on page 61](#)
 - [“Remove the Top Cover” on page 62](#)
 - [“Remove the Memory Air Duct” on page 83](#)
2. **Disconnect all power cables from the server ([Figure 4-20](#)).**
3. **Press the Fault Locator button on the motherboard to activate the FB-DIMM status LEDs ([Figure 4-20](#)).**

Any faulty FB-DIMMs will be indicated with a corresponding amber fault LED on the motherboard.

FIGURE 4-20 Identifying an FB-DIMM



Tip - Make a note of the faulty FB-DIMM location so that you can install the replacement FB-DIMM in the same location.

Note - For memory configuration information see [“4.7 FB-DIMM Configuration Reference”](#) on page 90.

4. Document the location of faulty FB-DIMMs.

Faulty FB-DIMMs are identified with a corresponding amber LED on the motherboard.

Note - The FB-DIMM fault LEDs remain lit only for a few minutes.

5. Ensure that all FB-DIMMs are seated correctly in their slots.

▼ Remove FB-DIMMs

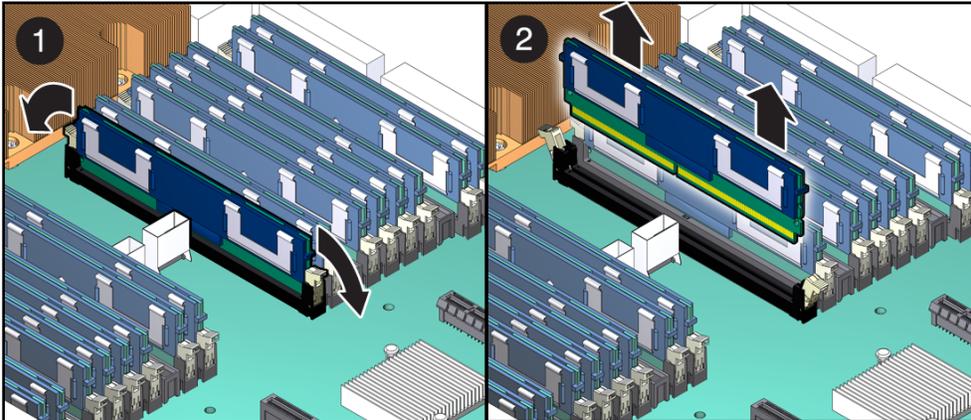
1. Prepare the server for FB-DIMM removal. See:
 - [“Power Off the Server” on page 59](#)
 - [“Disconnect Cables From the Server” on page 60](#)
 - [“Remove the Server From the Rack” on page 60](#)
 - [“Perform Antistatic Measures” on page 61](#)
 - [“Remove the Top Cover” on page 62](#)
 - [“Remove the Memory Air Duct” on page 83](#)
2. If you are replacing a faulty FB-DIMM, locate the FB-DIMMs that you want to replace. See [“Locating a Faulty FB-DIMM ” on page 101](#).
3. If you are removing a FB-DIMM on the motherboard, you must first remove the memory mezzanine, see [“Remove the Memory Mezzanine Assembly” on page 98](#).
4. Push down on the ejector tabs on each side of the FB-DIMM until the FB-DIMM is released ([Figure 4-21](#)).



Caution - FB-DIMMs may be hot. Use caution when servicing FB-DIMMs.

5. Grasp the top corners of the faulty FB-DIMM and remove it from the server.

FIGURE 4-21 Removing FB-DIMMs



6. Place the FB-DIMM on an antistatic mat.
7. Repeat [Step 4](#) through [Step 6](#) to remove any additional FB-DIMMs.
8. Install filler panels in the empty FB-DIMM slots, if you are not replacing the FB-DIMMs right away.

▼ Install FB-DIMMs



Caution - Ensure that all power is removed from the server before removing or installing FB-DIMMs or damage to the FB-DIMMs might occur. You must disconnect the power cables from the system before performing this procedure.

1. **Unpackage the replacement FB-DIMMs and place them on an antistatic mat.**

Tip - See [“4.7 FB-DIMM Configuration Reference”](#) on [page 90](#) for information about configuring the FB-DIMMs.

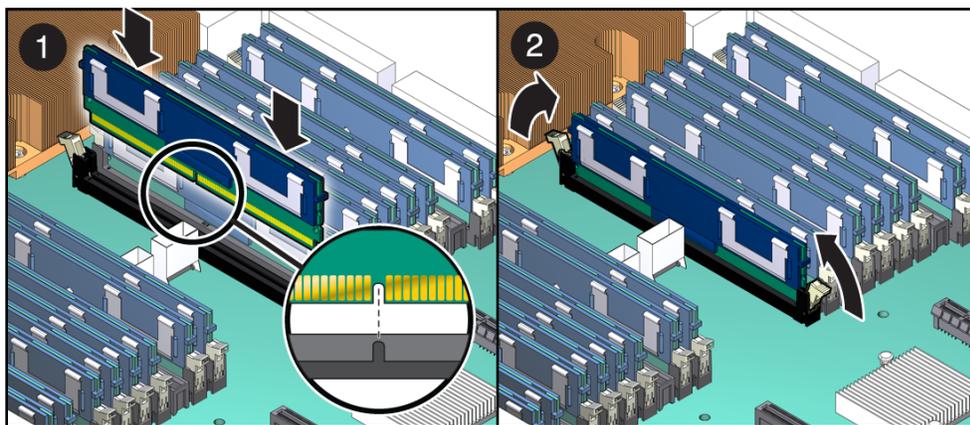
2. **Ensure that the ejector tabs are in the open position.**
3. **Line up the replacement FB-DIMM with the connector ([Figure 4-22](#)).**

Align the FB-DIMM notch with the key in the connector. This ensures that the FB-DIMM is oriented correctly.

4. **Push the FB-DIMM into the connector until the ejector tabs lock the FB-DIMM in place.**

If the FB-DIMM does not easily seat into the connector, verify that the orientation of the FB-DIMM is as shown in [Figure 4-22](#). If the orientation is reversed, damage to the FB-DIMM might occur.

FIGURE 4-22 Inserting the FB-DIMM Into the Slot



5. Repeat [Step 2](#) through [Step 4](#) until all replacement FB-DIMMs are installed.
6. Consider your next step:
 - If you installed FB-DIMMs as part of another procedure, return to that procedure.
 - If you are to only install FB-DIMMs go to [Step 7](#).

Note - If you removed the memory mezzanine, you must reinstall it. See ***

7. See [Chapter 6, “Returning the Server to Operation”](#) to bring the server back online.

▼ Verifying Successful Replacement of a Faulty FB-DIMM

1. Access the ILOM -> prompt.

Refer to the *Integrated Lights Out Manager 2.0 (ILOM 2.0) Supplement for the Sun Netra T5440 Server* for instructions.

2. Run the `show faulty` command to determine how to clear the fault.

The method you use to clear a fault depends on how the fault is identified by the `showfaults` command.

Examples:

- If the fault is a *host-detected fault* (displays a UUID), continue to [Step 3](#). For example:

```
-> show faulty
Target          | Property          | Value
-----+-----+-----
/SP/faultmgmt/0 | fru               | /SYS/MB/CMP0/BR0/CH1/D0
/SP/faultmgmt/0 | timestamp         | Dec 14 22:43:59
/SP/faultmgmt/0/ | sunw-msg-id      | SUN4V-8000-DX
faults/0        |                   |
/SP/faultmgmt/0/ | uuid              | 3aa7c854-9667-e176-efe5-e487e520
faults/0        |                   | 7a8a
/SP/faultmgmt/0/ | timestamp         | Dec 14 22:43:59
faults/0        |                   |
```

- If the fault was detected by POST and resulted in the FB-DIMM being disabled, such as the following,

```
-> show faulty
Target          | Property          | Value
-----+-----+-----
/SP/faultmgmt/0 | fru               | /SYS/MB/CMP0/BR1/CH0/D0
/SP/faultmgmt/0 | timestamp         | Dec 21 16:40:56
/SP/faultmgmt/0/ | timestamp         | Dec 21 16:40:56 faults/0
/SP/faultmgmt/0/ | sp_detected_fault | /SYS/MB/CMP0/BR1/CH0/D0
faults/0        |                   | Forced fail(POST)
```

- In most cases, the replacement of the faulty FB-DIMM(s) is detected when the service processor is power cycled. In this case, the fault is automatically cleared from the system. If the fault is still displayed by the `show faulty` command, then run the `set` command to enable the FB-DIMM and clear the fault. For example:

```
-> set /SYS/MB/CMP0/BR0/CH0/D0 component_state=Enabled
```

3. Perform the following steps to verify the repair:

a. Set the virtual keyswitch to diag so that POST will run in Service mode.

```
-> set /SYS/keyswitch_state=Diag
Set ???keyswitch_state' to ???Diag'
```

b. Powercycle the system.

```
-> stop /SYS
Are you sure you want to stop /SYS (y/n)? y
Stopping /SYS
-> start /SYS
Are you sure you want to start /SYS (y/n)? y
Starting /SYS
```

Note - The server takes about one minute to power off. Use the show /HOST command to determine when the host has been powered off. The console will display status=Powered Off.

c. Switch to the system console to view POST output.

```
-> start /SYS/console
```

Watch the POST output for possible fault messages. The following output is a sign that POST did not detect any faults:

```
.
.
.
0:0:0>INFO:
0:0:0>    POST Passed all devices.
0:0:0>POST:    Return to VBSC.
0:0:0>Master set ACK for vbsc runpost command and spin...
```

Note - Depending on the configuration of ILOM POST variables and whether POST detected faults or not, the system might boot, or the system might remain at the ok prompt. If the system is at the ok prompt, type boot.

d. Return the virtual keyswitch to normal mode.

```
-> set /SYS keyswitch_state=Normal
Set 'keyswitch_state' to 'Normal'
```

- e. **Switch to the system console and issue the Solaris OS `fmadm faulty` command.**

```
# fmadm faulty
```

No memory faults should be displayed.

If faults are reported, refer to the diagnostics flowchart in [Figure 1-1](#) for an approach to diagnose the fault.

4. **Switch to the ILOM -> command shell.**

5. **Run the `show faulty` command.**

- **If the fault was detected by the host and the fault information persists, the output will be similar to the following example:**

```
-> show faulty
Target          | Property          | Value
-----+-----+-----
/SP/faultmgmt/0 | fru              | /SYS/MB/CMP0/BR0/CH1/D0
/SP/faultmgmt/0 | timestamp        | Dec 14 22:43:59
/SP/faultmgmt/0 | sunw-msg-id      | SUN4V-8000-DX
faults/0        |                  |
/SP/faultmgmt/0 | uuid             | 3aa7c854-9667-e176-efe5-e487e520
faults/0        |                  | 7a8a
/SP/faultmgmt/0 | timestamp        | Dec 14 22:43:59
faults/0        |                  |
```

- **If the `showfaults` command does not report a fault with a UUID, then you do not need to proceed with the following steps because the fault is cleared.**

6. **Run the `set` command.**

```
-> set /SYS/MB/CMP0/BR0/CH1/D0 clear_fault_action=True
Are you sure you want to clear /SYS/MB/CMP0/BR0/CH1/D0 (y/n)? y
Set 'clear_fault_action' to 'true'
```

7. **Switch to the system console and issue the `fmadm repair` command with the **UUID**.**

Use the same UUID that was displayed from the output of the ILOM `show faulty` command.

```
# fmadm repair 3aa7c854-9667-e176-efe5-e487e520
```

▼ Install Additional FB-DIMMs

Before You Begin Before you begin, see [“4.7 FB-DIMM Configuration Reference” on page 90](#) to familiarize yourself with FB-DIMM configuration guidelines.



Caution - Ensure that all power is removed from the server before installing FB-DIMMs or damage to the FB-DIMMs might occur.



Caution - You must disconnect the power cables from the system before performing this procedure.

1. **Prepare the server for installing FB-DIMMs. See:**
 - [“Power Off the Server” on page 59](#)
 - [“Disconnect Cables From the Server” on page 60](#)
 - [“Remove the Server From the Rack” on page 60](#)
 - [“Perform Antistatic Measures” on page 61](#)
 - [“Remove the Top Cover” on page 62](#)
2. **Unpackage the replacement FB-DIMMs and place them on an antistatic mat.**
3. **Remove any filler panels from the FB-DIMM slots, if necessary.**
4. **Place the ejector tabs are in the open position.**
5. **Line up the FB-DIMM with the connector ([Figure 4-21](#)).**

Align the FB-DIMM notch with the key in the connector. This alignment ensures that the FB-DIMM is oriented correctly.
6. **Push the FB-DIMM into the connector until the ejector tabs lock the FB-DIMM in place.**

If the FB-DIMM does not easily seat into the connector, verify that the orientation of the FB-DIMM is as shown in [Figure 4-21](#). If the orientation is reversed, damage to the FB-DIMM might occur.
7. **Repeat [Step 4](#) through [Step 6](#) until all FB-DIMMs are installed.**
8. **See [Chapter 6, “Returning the Server to Operation”](#) to bring the server back online:**

9. Perform the following steps to verify that there are no faults:

a. Set the virtual keyswitch to diag so that POST will run in Service mode.

```
-> set /SYS/keyswitch_state=Diag
Set ???keyswitch_state' to ???Diag'
```

b. Power cycle the system.

```
-> stop /SYS
Are you sure you want to stop /SYS (y/n)? y
Stopping /SYS
-> start /SYS
Are you sure you want to start /SYS (y/n)? y
Starting /SYS
```

Note - The server takes about one minute to power off. The ILOM console does not indicate when the system is actually powered off.

c. Switch to the system console to view POST output.

```
-> start /SYS/console
```

Watch the POST output for possible fault messages. The following output is a sign that POST did not detect any faults:

```
.
.
.
0:0:0>INFO:
0:0:0> POST Passed all devices.
0:0:0>POST: Return to VBSC.
0:0:0>Master set ACK for vbsc runpost command and spin...
```

Note - Depending on the configuration of ILOM POST variables and whether POST detected faults or not, the system might boot, or the system might remain at the ok prompt. If the system is at the ok prompt, type boot.

d. Return the virtual keyswitch to Normal mode.

```
-> set /SYS keyswitch_state=Normal
Set ???keyswitch_state' to ???Normal'
```

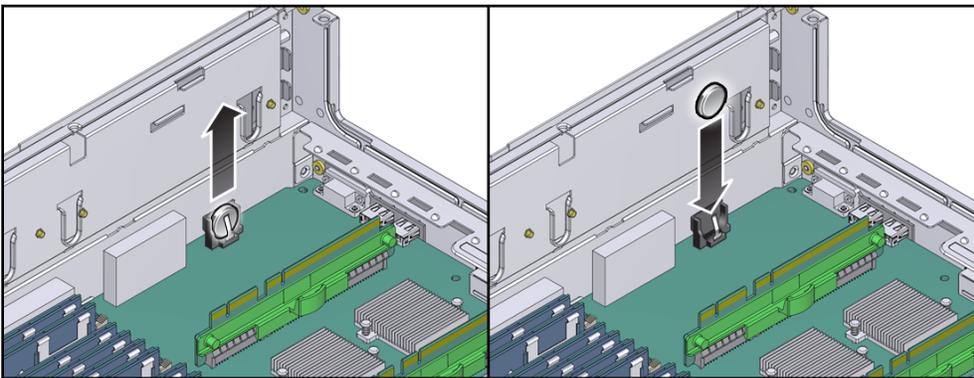
4.10 Replacing the Battery

This section describes how to remove install the system battery on the motherboard.

▼ Remove the Battery

1. Prepare the server for installing the battery. See:
 - “Power Off the Server” on page 59
 - “Disconnect Cables From the Server” on page 60
 - “Remove the Server From the Rack” on page 60
 - “Perform Antistatic Measures” on page 61
 - “Remove the Top Cover” on page 62
 - “Remove the PCI Mezzanine Assembly” on page 86
2. Gently depress the release tab and pull the battery out of the battery housing (Figure 4-23).

FIGURE 4-23 Replacing the Battery



3. Place the battery on an antistatic mat.

▼ Install the Battery

Before You Begin

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

1. Remove the replacement battery from its packaging.
2. Carefully press the new battery in the slot (Figure 4-23).
3. See Chapter 6, “Returning the Server to Operation” to bring the server back online.

4.11 Replacing the SCC Module

This section describes how to remove install the system SCC module on the motherboard.

Note - The SCC module is also known as the IDPROM chip.



Caution - This procedure must be performed by a certified Sun Oracle Service Technician only.



Caution - The SCC module contains system host ID, MAC addresses, and configuration variable settings for ILOM. If you are replacing a motherboard, you must move the SCC module from the old motherboard to the new one.

▼ Remove the SCC Module

1. **Back up OpenBoot PROM variables with one of the following procedures:**
 - For ILOM 3.0 Web Interface: Back up per Chapter 10, “Backing Up and Restoring ILOM Configuration,” from the *Oracle Integrated Lights Out Manager (ILOM) 3.0 Web Interface Procedure Guide* (820-0052) available at: <http://docs.oracle.com/cd/E19860-01/index.html>. Use a passphrase to backup the OpenBoot PROM variables.
 - For ILOM 3.0 CLI: Back up per Chapter 10, “Backing Up and Restoring ILOM Configuration,” from the *Oracle Integrated Lights Out Manager (ILOM) 3.0 CLI Procedure Guide* (821-1611) available at: <http://docs.oracle.com/cd/E19860-01/index.html>. Use a passphrase to backup the OpenBoot PROM variables.
 - For ILOM 2.0: The ILOM Back up/Restore feature is absent. Record output from the OpenBoot PROM `printenv` command or the Oracle Solaris `eeeprom` command for use after motherboard replacement.

2. Prepare the server for removing the SCC module. See:
 - “Power Off the Server” on page 59
 - “Disconnect Cables From the Server” on page 60
 - “Remove the Server From the Rack” on page 60
 - “Perform Antistatic Measures” on page 61
 - “Remove the Top Cover” on page 62
 - “Remove the PCI Mezzanine Assembly” on page 86
“Remove the Memory Mezzanine Assembly” on page 98
3. Locate the SCC module.
4. Carefully pull the SCC module straight up from its connector.

▼ Install the SCC Module

1. Align the SCC module with its connector on the motherboard.

Note - The SCC module and its connector are keyed.

2. Press the SCC module down until it seats.
3. Perform the tasks to bring the server back online. See:
 - “Install the Memory Mezzanine Assembly” on page 97
 - “Install the PCI Mezzanine Assembly” on page 88
4. Restore OpenBoot PROM variables with one of the following procedures:
 - For ILOM 3.0 Web Interface: Restore OpenBoot PROM variables per Chapter 10, “Backing Up and Restoring ILOM Configuration,” from the *Oracle Integrated Lights Out Manager (ILOM) 3.0 Web Interface Procedure Guide (820-0052)* available at: <http://docs.oracle.com/cd/E19860-01/index.html>. Use the same passphrase used during the back up to restore the OpenBoot PROM variables.

- For ILOM 3.0 CLI: Restore OpenBoot PROM variables per Chapter 10, “Backing Up and Restoring ILOM Configuration,” from the *Oracle Integrated Lights Out Manager (ILOM) 3.0 CLI Procedure Guide (821-1611)* available at: <http://docs.oracle.com/cd/E19860-01/index.html>. Use the same passphrase used during the back up to restore the OpenBoot PROM variables.
 - For ILOM 2.0: Use the data collected during Step 1 of “Remove the Motherboard Assembly” on page 114 to restore the OpenBoot PROM variables with the OpenBoot PROM `setenv` command.
5. Return the server to operation. See Chapter 6, “Returning the Server to Operation”.

4.12 Replacing the Motherboard Assembly

This section describes how to remove and install the motherboard assembly.



Caution - This procedure must be performed by a certified Sun Oracle Service Technician only.



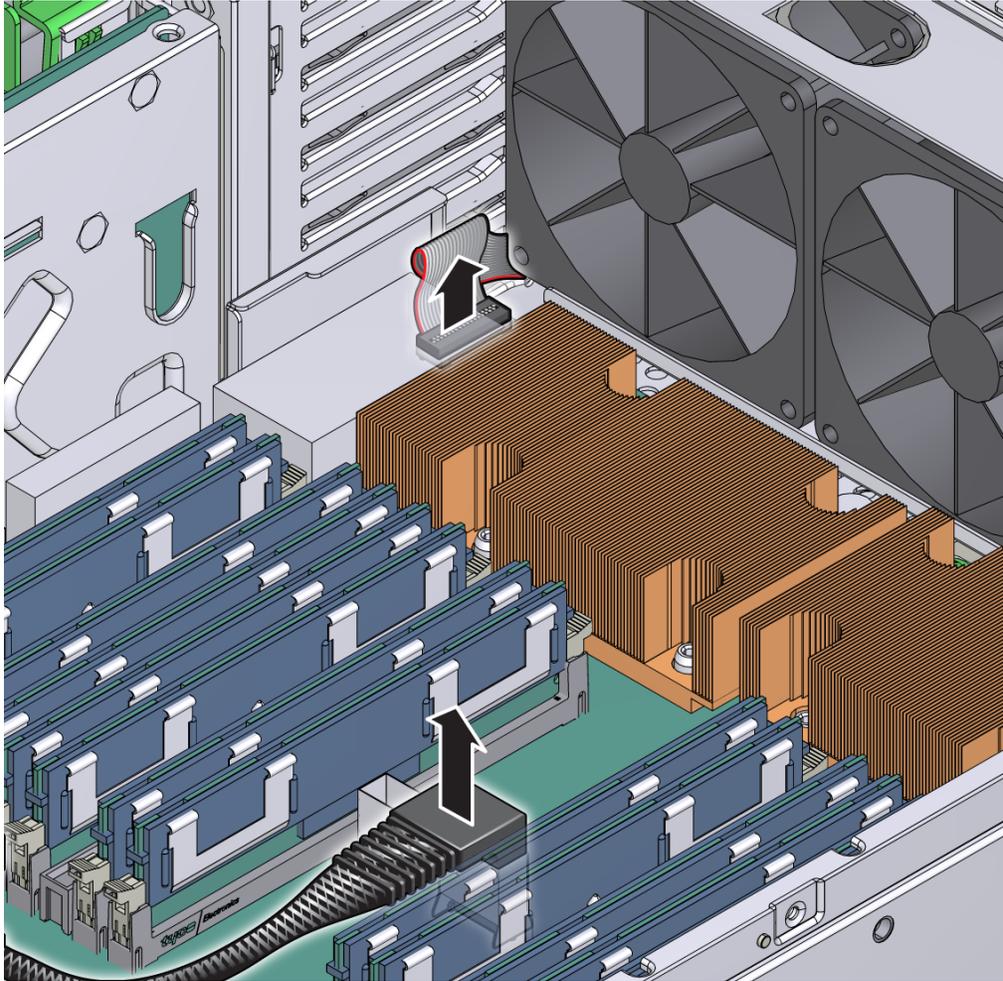
Caution - The SCC module contains system host ID, MAC addresses, and configuration variable settings for ILOM. If you are replacing a motherboard, you must move the SCC module from the old motherboard to the new one. You must also backup OpenBoot PROM variables for restoring after motherboard replacement.

▼ Remove the Motherboard Assembly

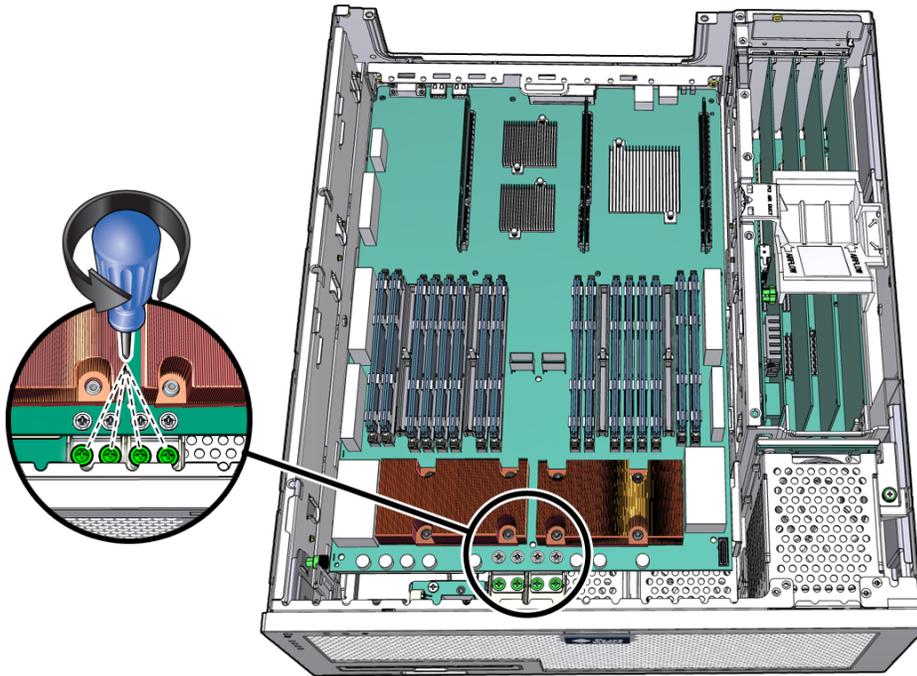
1. **Back up OpenBoot PROM variables with one of the following procedures:**
 - For ILOM 3.0 Web Interface: Back up per Chapter 10, “Backing Up and Restoring ILOM Configuration,” from the *Oracle Integrated Lights Out Manager (ILOM) 3.0 Web Interface Procedure Guide (820-0052)* available at: <http://docs.oracle.com/cd/E19860-01/index.html>. Use a passphrase to backup the OpenBoot PROM variables.
 - For ILOM 3.0 CLI: Back up per Chapter 10, “Backing Up and Restoring ILOM Configuration,” from the *Oracle Integrated Lights Out Manager (ILOM) 3.0 CLI Procedure Guide (821-1611)* available at: <http://docs.oracle.com/cd/E19860-01/index.html>. Use a passphrase to backup the OpenBoot PROM variables.
 - For ILOM 2.0: The ILOM Back up/Restore feature is absent. Record output from the OpenBoot PROM `printenv` command or the Oracle Solaris `eeprom` command for use after motherboard replacement.

2. **Perform the following to prepare the server for motherboard assembly removal:**
 - **“Power Off the Server” on page 59**
 - **“Disconnect Cables From the Server” on page 60**
 - **“Remove the Server From the Rack” on page 60**
 - **“Perform Antistatic Measures” on page 61**
 - **“Remove the Top Cover” on page 62**
 - **“Remove the PCI Mezzanine Assembly” on page 86**
 - **“Remove the Memory Mezzanine Assembly” on page 98**
 - **“Remove the System Fan Assembly (Fan Tray 0)” on page 135**
 - **“Remove the SCC Module” on page 112**
3. **Disconnect the optical media ribbon cable and the PDB cable connected to the motherboard in between the FB-DIMM slots (Figure 4-24).**

FIGURE 4-24 Disconnecting the Cables Connected to the Motherboard

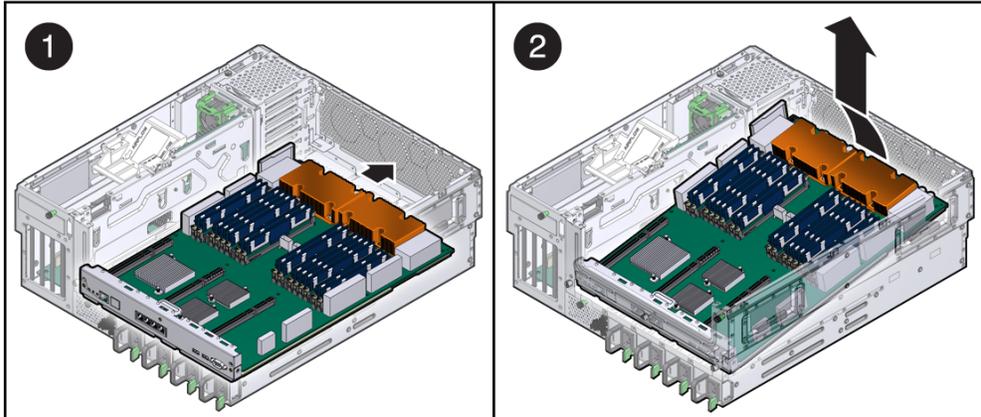


4. Loosen the screws that secure the motherboard assembly to the chassis ([Figure 4-25](#)).

FIGURE 4-25 Removing the Motherboard Screws

5. Lift slightly and slide the motherboard 1 inch (25 mm) toward the front of the server ([Figure 4-26](#)).
6. Tilt the end of the motherboard (closest to the front of the server) upward ([Figure 4-26](#)).
7. Lift the motherboard out of the server chassis and place it on an antistatic mat ([Figure 4-26](#)).

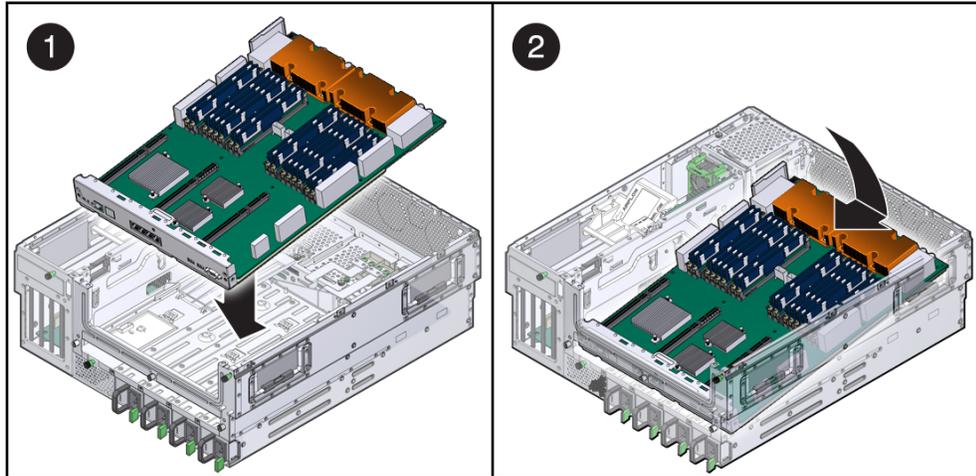
FIGURE 4-26 Lifting the Motherboard Out of the Chassis



▼ Install the Motherboard Assembly

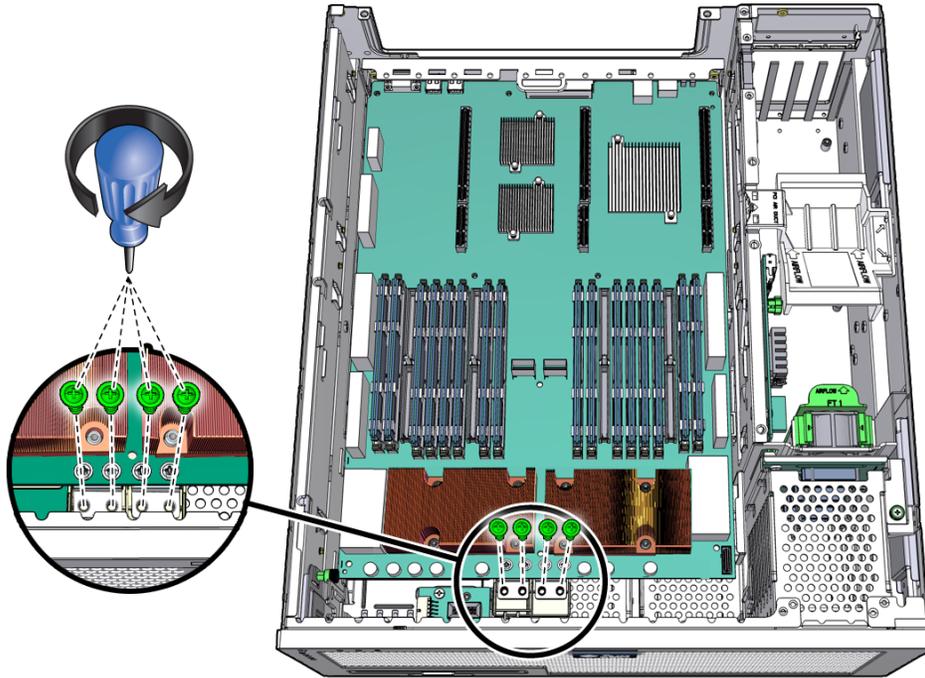
1. Unpack the replacement motherboard and place it on an antistatic mat ([Figure 4-27](#)).
2. Lower the end closest the rear of the server ([Figure 4-27](#)).
3. Carefully slide the motherboard 1 inch (25 mm) toward the rear of the server, seating it into place ([Figure 4-27](#)).

FIGURE 4-27 Install the Motherboard Into the Chassis

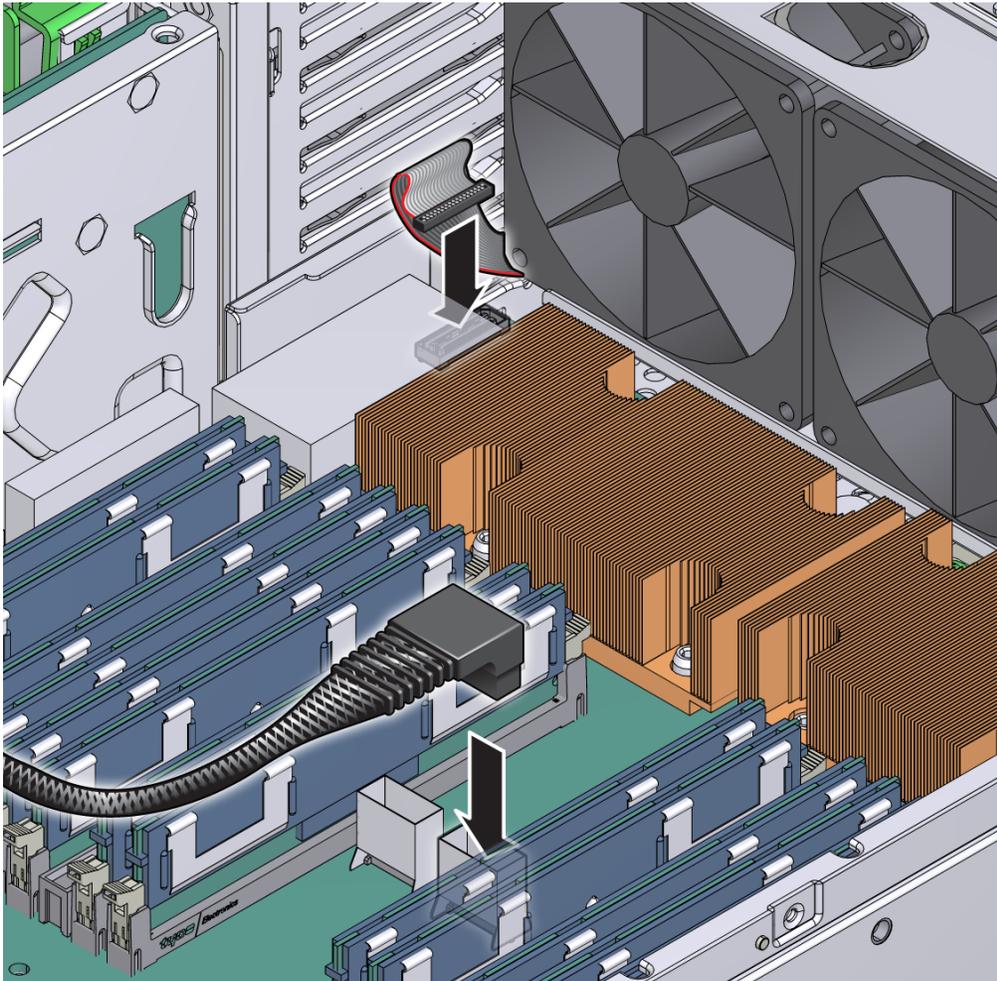


4. Align the motherboard assembly screw holes over the chassis standoffs.
5. Tighten the screws that attach the motherboard to the chassis ([Figure 4-28](#)).

FIGURE 4-28 Tightening the Motherboard Screws to the Chassis



6. Reconnect the motherboard cables ([Figure 4-29](#)).

FIGURE 4-29 Reconnecting the Motherboard Cables

7. Perform the tasks to bring the server back online. See:
 - [“Install the SCC Module” on page 113](#)
 - [“Install the System Fan Assembly \(Fan Tray 0\)” on page 136](#)
 - [“Install the Memory Mezzanine Assembly” on page 97](#)

- [“Install the PCI Mezzanine Assembly” on page 88](#)
8. Restore OpenBoot PROM variables with one of the following procedures:
 - For ILOM 3.0 Web Interface: Restore OpenBoot PROM variables per Chapter 10, “Backing Up and Restoring ILOM Configuration,” from the *Oracle Integrated Lights Out Manager (ILOM) 3.0 Web Interface Procedure Guide (820-0052)* available at: <http://docs.oracle.com/cd/E19860-01/index.html>. Use the same passphrase used during the back up to restore the OpenBoot PROM variables.
 - For ILOM 3.0 CLI: Restore OpenBoot PROM variables per Chapter 10, “Backing Up and Restoring ILOM Configuration,” from the *Oracle Integrated Lights Out Manager (ILOM) 3.0 CLI Procedure Guide (821-1611)* available at: <http://docs.oracle.com/cd/E19860-01/index.html>. Use the same passphrase used during the back up to restore the OpenBoot PROM variables.
 - For ILOM 2.0: Use the data collected during Step 1 of [“Remove the Motherboard Assembly” on page 114](#) to restore the OpenBoot PROM variables with the OpenBoot PROM `setenv` command.
 9. Return the server to operation. See [Chapter 6, “Returning the Server to Operation”](#).

4.13 Replacing the Disk Backplane Assembly

This section describes how to remove and install the disk backplane assembly.



Caution - This procedure must be performed by a certified Sun Oracle Service Technician only.



Caution - Handle the internal components and boards with care. Label the disks, cards, and cables before removing them.

▼ Remove the Disk Backplane Assembly

1. **Back up OpenBoot PROM variables.**
See [Step 1 in “Remove the Motherboard Assembly” on page 114](#).

2. **Perform the following tasks to prepare the server for disk backplane assembly removal:**
 - **[“Power Off the Server” on page 59](#)**
 - **[“Disconnect Cables From the Server” on page 60](#)**
 - **[“Remove the Server From the Rack” on page 60](#)**
 - **[“Perform Antistatic Measures” on page 61](#)**
 - **[“Remove the Top Cover” on page 62](#)**
 - **[“Remove the PCI Mezzanine Assembly” on page 86](#)**
 - **[“Remove the Memory Mezzanine Assembly” on page 98](#)**
 - **[“Remove the System Fan Assembly \(Fan Tray 0\)” on page 135](#)**
 - **[“Remove the SCC Module” on page 112](#)**
 - **[“Remove the Motherboard Assembly” on page 114](#)**
 - **[“Remove the SAS Expander Assembly” on page 125](#)**
 - **[“Remove the Hard Drive Fan Assembly \(Fan Tray 1\)” on page 138](#)**
3. **Remove all of the hard drives.**

Note their positions before removing. See [“Install a Hard Drive” on page 66](#).
4. **Remove the two bus bars that secure the disk backplane in place.**
5. **Remove the ribbon cables from the disk backplane.**
6. **Loosen the three green captive screws securing the disk backplane.**
7. **Slide the disk backplane upward to remove it from the chassis.**
8. **Place the disk backplane on an antistatic mat.**

▼ Install the Disk Backplane Assembly

1. **Unpack the replacement disk backplane assembly and place it on an antistatic mat.**
2. **Slide the disk backplane down into position.**
3. **Tighten the three green captive screws.**
4. **Attach the ribbon cables.**
5. **Attach the SAS cable.**
6. **Attach the two bus bars that secure the disk backplane in place.**
7. **Perform the following tasks to bring the server back online:**
 - **[“Install the Motherboard Assembly” on page 118](#)**
 - **[“Install the SCC Module” on page 113](#)**
 - **[“Install the System Fan Assembly \(Fan Tray 0\)” on page 136](#)**
 - **[“Install the Memory Mezzanine Assembly” on page 97](#)**
 - **[“Install the PCI Mezzanine Assembly” on page 88](#)**
 - **[“Install the SAS Expander Assembly” on page 125](#)**
 - **[“Install the Hard Drive Fan Assembly \(Fan Tray 1\)” on page 139](#)**
8. **Install the hard drives.**
See [“Install a Hard Drive” on page 66](#).
9. **Restore the OpenBoot PROM variables.**
See [Step 8 in “Install the Motherboard Assembly” on page 118](#).
10. **Return the server to operation.**
See [Chapter 6, “Returning the Server to Operation”](#).

4.14 Replacing the SAS Expander Assembly

This section describes how to remove and install the SAS expander assembly.



Caution - This procedure must be performed by a certified Sun Oracle Service Technician only.

▼ Remove the SAS Expander Assembly

1. Perform the following tasks to prepare the server for SAS expander assembly removal:
 - [“Power Off the Server” on page 59](#)
 - [“Disconnect Cables From the Server” on page 60](#)
 - [“Remove the Server From the Rack” on page 60](#)
 - [“Perform Antistatic Measures” on page 61](#)
 - [“Remove the Top Cover” on page 62](#)
 - [“Remove the Hard Drive Fan Assembly \(Fan Tray 1\)” on page 138](#)
2. Remove the PCI cards in slots 1-4.

Note each card position and external cabling before removing. See [“Remove PCI-X 0-1 and PCIe 2-3 Cards” on page 73](#) and [“Remove PCIe/XAUI Cards 4-6 and PCIe Cards 7-9” on page 78](#).
3. Remove the SAS cable from the SAS expander.
4. Loosen the green captive screw.
5. Slide the SAS expander rearward to remove it from the chassis and place it on an antistatic mat.

▼ Install the SAS Expander Assembly

1. Unpack the replacement SAS expander assembly and place it on an antistatic mat.
2. Insert the SAS expander assembly into position and slide it forward to install.
3. Tighten the green captive screw.

4. **Place the SAS cable in its original position and plug it into the SAS expander.**
5. **Install the PCI cards in slots 1-4.**
See [“Install PCI-X 0-1 and PCIe 2-3 Cards” on page 76](#) and [“Install PCIe/XAUI Cards 4-6 and PCIe Cards 7-9” on page 79](#).
6. **Install the hard drive fan assembly (Fan Tray 1).**
See [“Install the Hard Drive Fan Assembly \(Fan Tray 1\)” on page 139](#).
7. **Return the server to operation.**
See [Chapter 6, “Returning the Server to Operation”](#).

4.15 Replacing the Auxillary Board Assembly

This section describes how to remove and install the auxillary board assembly.



Caution - This procedure must be performed by a certified Sun Oracle Service Technician only.

▼ Remove the Auxillary Board Assembly

1. **Perform the following tasks to prepare the server for SAS expander assembly removal:**
 - [“Power Off the Server” on page 59](#)
 - [“Disconnect Cables From the Server” on page 60](#)
 - [“Remove the Server From the Rack” on page 60](#)
 - [“Perform Antistatic Measures” on page 61](#)
 - [“Remove the Top Cover” on page 62](#)
 - [“Remove the Hard Drive Fan Assembly \(Fan Tray 1\)” on page 138](#)
2. **Remove the PCI cards in slots 1-4.**
Note each card position and external cabling before removing. See [“Remove PCI-X 0-1 and PCIe 2-3 Cards” on page 73](#) and [“Remove PCIe/XAUI Cards 4-6 and PCIe Cards 7-9” on page 78](#).

3. **Remove the cables attached to the auxillary board.**
4. **Remove the six screws from the auxillary board assembly.**
5. **Lift the auxillary board assembly from the chassis and place it on an antistatic mat.**

▼ **Install the Auxillary Board Assembly**

1. **Align the auxillary board assembly with the six standoffs.**
2. **Install the six screws.**
3. **Install the PCI cards into slots 1-4.**
See [“Install PCI-X 0-1 and PCIe 2-3 Cards” on page 76](#) and [“Install PCIe/XAUI Cards 4-6 and PCIe Cards 7-9” on page 79](#).
4. **Install the hard drive fan assembly (Fan Tray 1).**
See [“Install the Hard Drive Fan Assembly \(Fan Tray 1\)” on page 139](#).
5. **Return the server to operation.**
See [Chapter 6, “Returning the Server to Operation”](#).

Replacing Chassis Components

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

- “5.1 Replacing the Air Filter” on page 129
- “5.2 Replacing a Power Supply” on page 132
- “5.3 Replacing the System Fan Assembly (Fan Tray 0)” on page 135
- “5.5 Replacing the FB-DIMM Fan Assembly (Fan Tray 2)” on page 140
- “5.4 Replacing the Hard Drive Fan Assembly (Fan Tray 1)” on page 138
- “5.5 Replacing the FB-DIMM Fan Assembly (Fan Tray 2)” on page 140
- “5.6 Replacing the Power Board” on page 142

5.1 Replacing the Air Filter

Server filter maintenance is dependent on the environmental air quality in which the server is installed. The filter should be checked, at a minimum, annually and cleaned or replaced if there is evidence of airflow blockage. In environments with high particulate matter, the filter should be checked, cleaned or replaced more often. Should the filter require cleaning, remove the filter from the server. See “[Remove the Air Filter](#)” on page 129. Take the filter to an open area and blow the particles from the filter using a can of compressed air. Do not use a coarse brush or anything abrasive since they may damage the filter.

▼ Remove the Air Filter

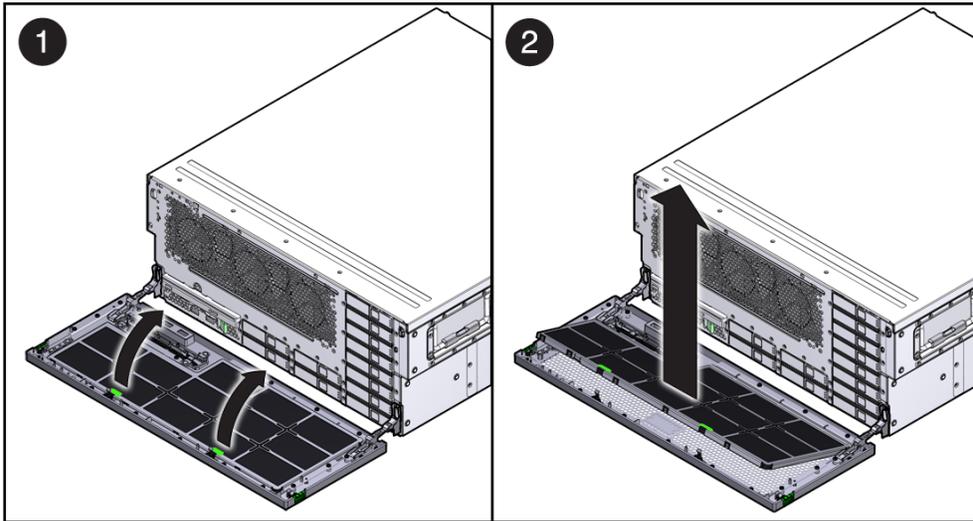
Before You Begin



Caution - Do not open the bezel when the server is on a flat surface. Open the bezel while the server is installed in a rack or the front of the server (including the bezel) is hanging over the edge of a flat surface.

1. **Press the green tabs on both sides of the bezel and pull forward and down.**
2. **Grasp the tabs and lift the air filter from the bezel ([Figure 5-1](#)).**

FIGURE 5-1 Removing the Air Filter



Note - Do not operate the server without an air filter.

3. Continue to [“Install the Air Filter” on page 130.](#)

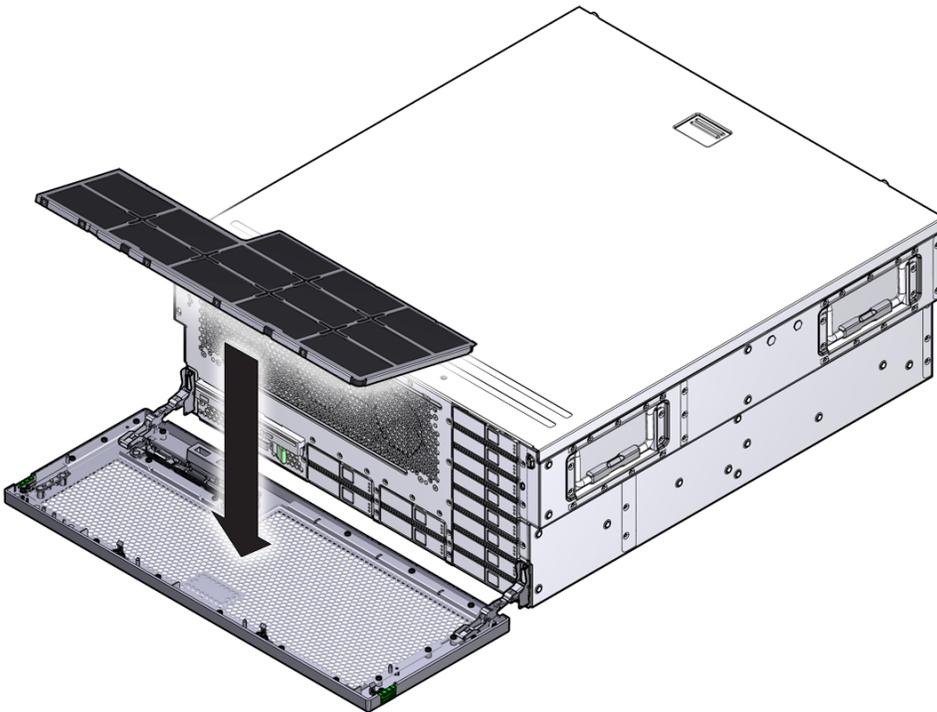
▼ Install the Air Filter

Installing the air filter is a hot-plug operation. You do not need to power off the server before installing the air filter.

1. Consider your first steps:
 - If you are replacing an air filter, remove the faulty air filter first, then return to Step 2 of this procedure.
 - If you are installing the filter tray as part of another component’s removal or installation procedure, go to Step 4.
2. Remove the replacement air filter from its packaging.

3. **Feed the edges of the air filter under the restraining hooks of the filter tray.**
See (Figure 5-2).
4. **Massage the filter in the filter tray so that there are no folds or wrinkles, and so that the air filter lies flat against the filter tray.**
5. **Install the filter tray to the server, with the indicators in the upper left corner.**
The bezel snaps into place.
6. **Close the bezel.**

FIGURE 5-2 Installing the Air Filter



5.2 Replacing a Power Supply

The server's redundant hot-swappable power supplies enable you to remove and install a power supply without shutting the server down provided that at least two other power supplies are operating.

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.

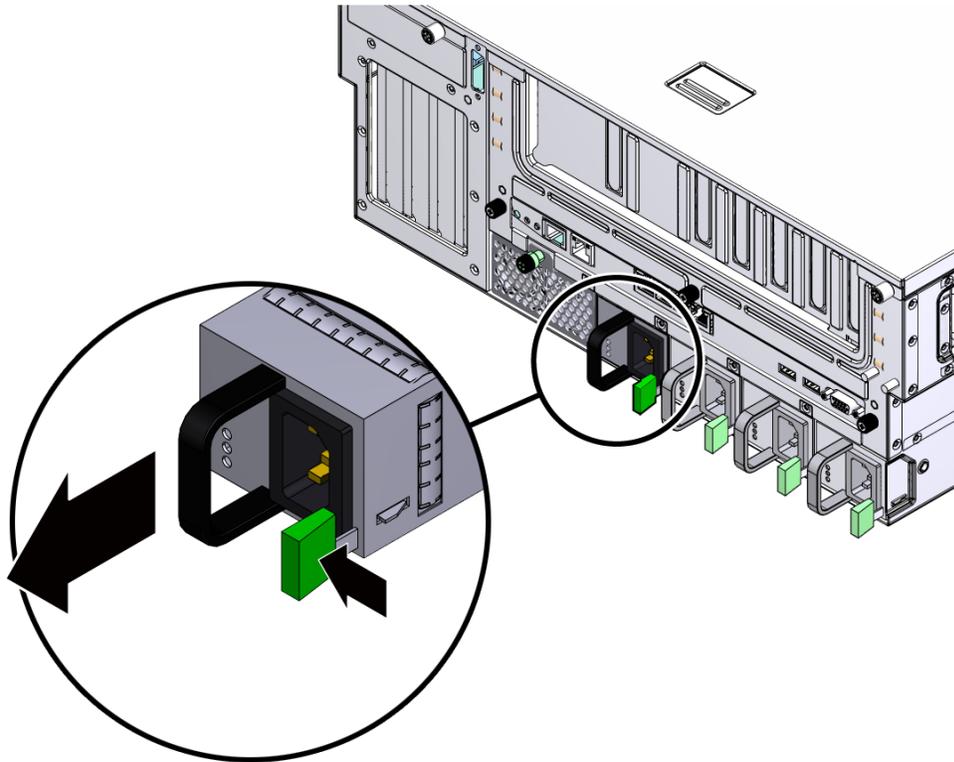
▼ Remove a Power Supply

1. **Identify which power supply requires replacement.**

Power supplies from left to right: PS 0, PS 1, PS 2, PS 3.

A lit (amber) Fault LED on a power supply indicates that a failure was detected. See [“Detecting Faults” on page 29](#).

2. **Disconnect the power cord from the faulty power supply.**
3. **Grasp the power supply handle and push the power supply latch to the left while pushing inward on the power supply ([Figure 5-3](#)).**
4. **Pull the power supply out of the chassis ([Figure 5-3](#)).**

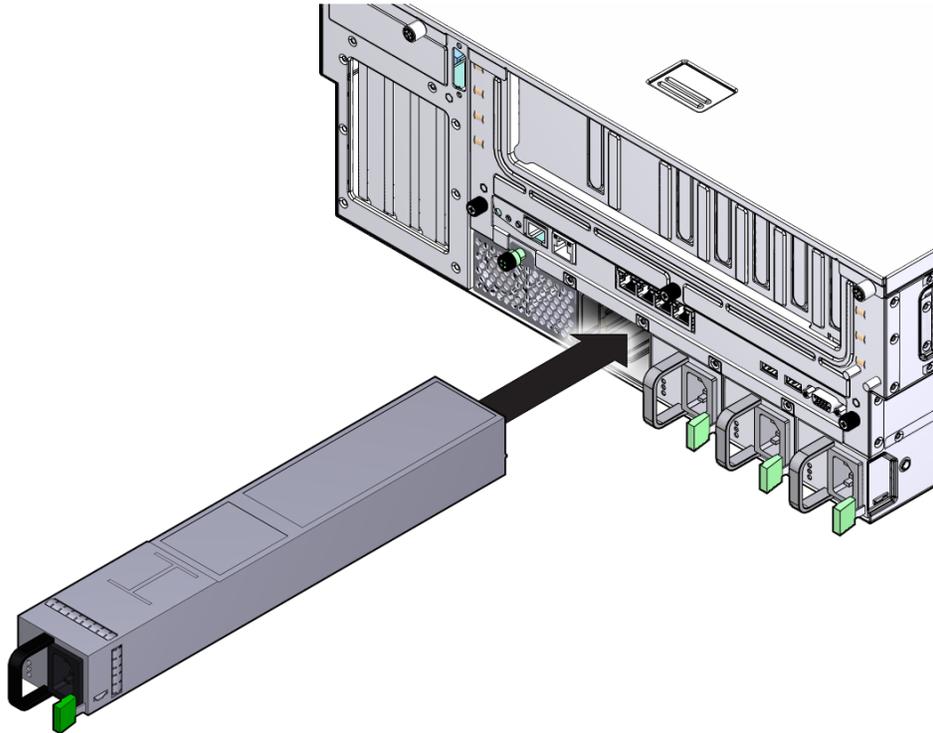
FIGURE 5-3 Removing a Power Supply

5. Continue to [“Install a Power Supply” on page 133.](#)

▼ Install 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 chassis bay.
3. Slide the power supply into the bay until it is fully seated ([Figure 5-4](#)).

FIGURE 5-4 Installing a Power Supply



4. **Reconnect the power cord to the power supply.**
Verify that the Input Power OK LED is lit.
If the system is in operation, the Output On LED should also be lit.
5. **On the replaced power supply, verify that the amber Fault LED is not lit.**
the Service Required LEDs are not lit.
6. **Verify that the System Power Supply Fault LED and the Service Required LED is not lit on the front and rear panels of the server.**
7. **At the ILOM -> prompt, issue the `show faulty` command to verify the status of the power supplies.**

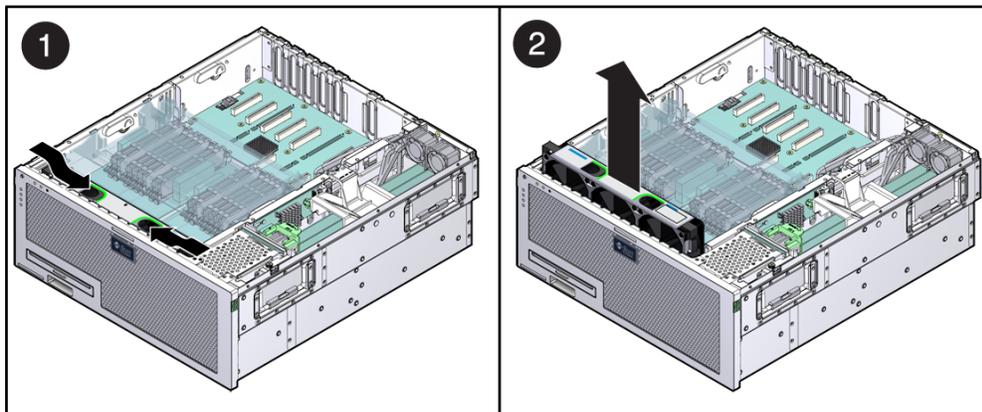
5.3 Replacing the System Fan Assembly (Fan Tray 0)

The system fan assembly is labeled FT0.

▼ Remove the System Fan Assembly (Fan Tray 0)

1. Prepare the server for fan assembly removal. See:
 - “Power Off the Server” on page 59
 - “Disconnect Cables From the Server” on page 60
 - “Remove the Server From the Rack” on page 60
 - “Perform Antistatic Measures” on page 61
 - “Remove the Top Cover” on page 62
2. Insert your forefinger and thumb into the holes at the top of the fan assembly, squeeze them together (**Figure 5-5**).

FIGURE 5-5 Disconnecting the System Fan Assembly Cable



3. Remove the fan assembly from the chassis by lifting it straight out..

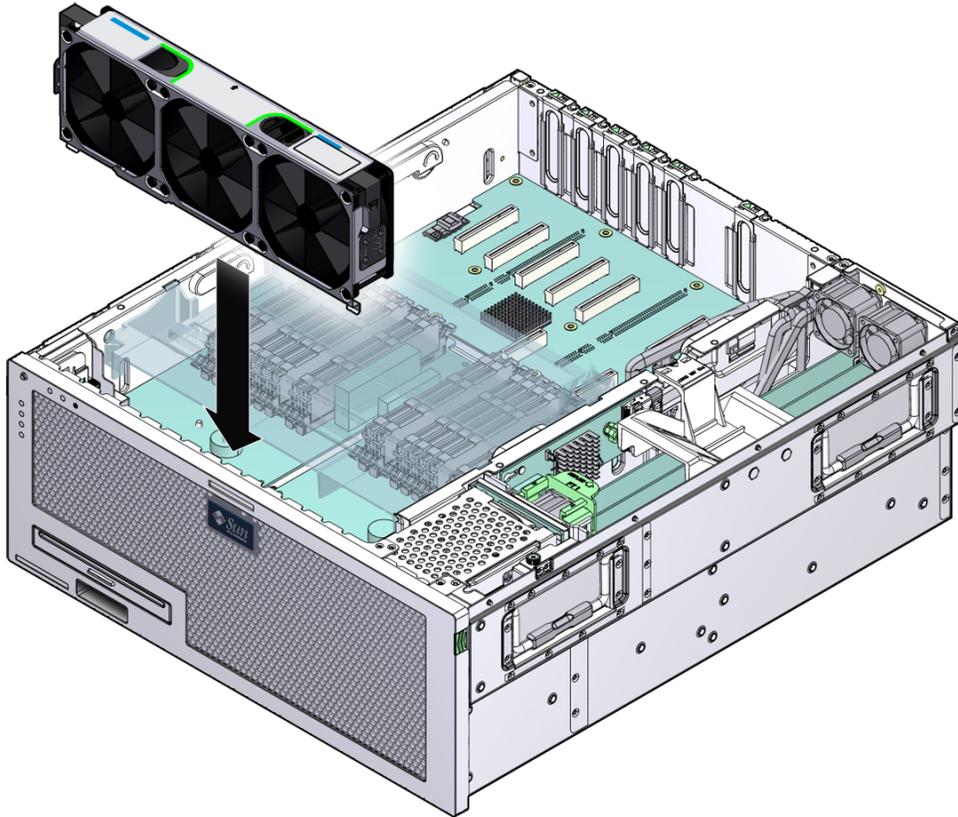
4. **Set the fan assembly aside on an antistatic mat.**
5. **Consider your next step:**
 - **If you removed the fan assembly as part of another procedure, return to that procedure.**
 - **Otherwise, continue to [“Install the System Fan Assembly \(Fan Tray 0\)” on page 136.](#)**

▼ **Install the System Fan Assembly (Fan Tray 0)**

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 5-6](#)).**

Ensure the fan tray is fully inserted into the connector.

FIGURE 5-6 Installing the System Fan Assembly Into the Chassis



3. Consider your next step:

- If you installed the fan assembly as part of another procedure, return to that procedure.
- Otherwise, see [Chapter 6, “Returning the Server to Operation”](#) to bring the server back online.

5.4 Replacing the Hard Drive Fan Assembly (Fan Tray 1)

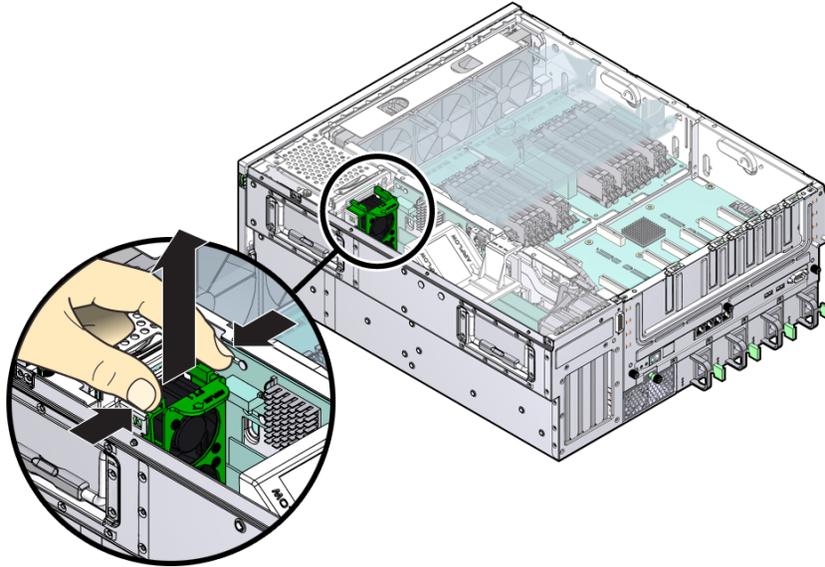
The hard drive fan assembly is labeled FT1.

▼ Remove the Hard Drive Fan Assembly (Fan Tray 1)

1. Prepare the server for hard drive fan removal. See:
 - [“Power Off the Server” on page 59](#)
 - [“Disconnect Cables From the Server” on page 60](#)
 - [“Remove the Server From the Rack” on page 60](#)
 - [“Perform Antistatic Measures” on page 61](#)
 - [“Remove the Top Cover” on page 62](#)
2. Push the release button on the hard drive fan bracket, and pull the fan tray up and out of the chassis. ([Figure 5-7](#)).

Place it on an antistatic mat.

FIGURE 5-7 Releasing the Hard Drive Fan Bracket

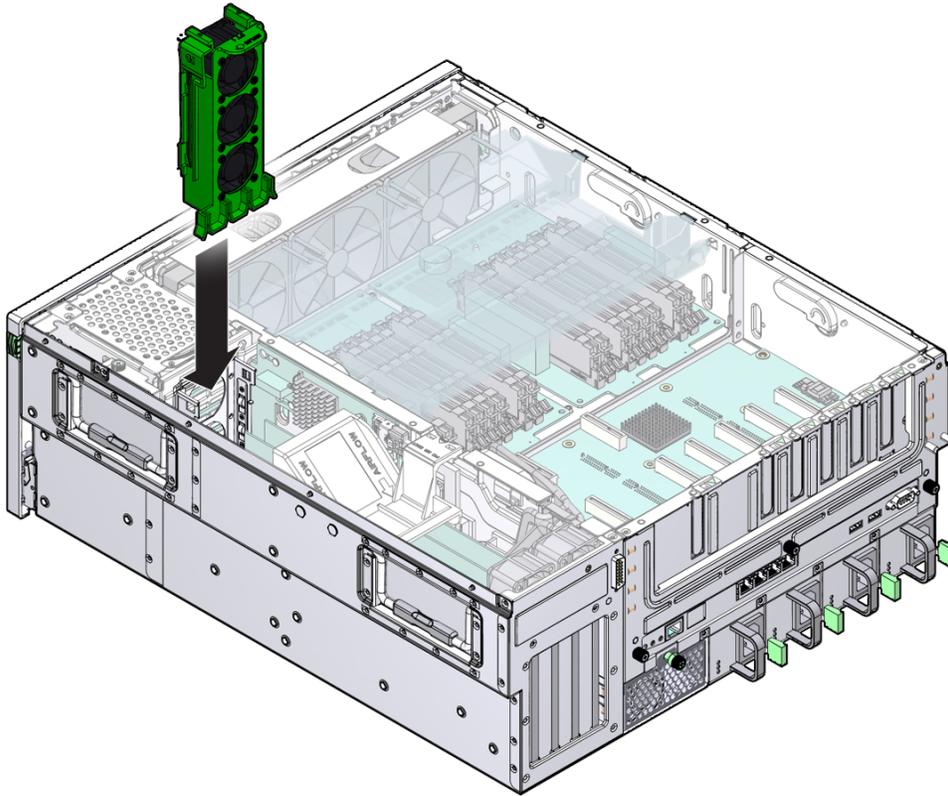


3. Continue to [“Install the Hard Drive Fan Assembly \(Fan Tray 1\)”](#) on page 139.

▼ Install the Hard Drive Fan Assembly (Fan Tray 1)

1. Remove the replacement hard drive fan assembly from its packaging and place it on an antistatic mat.
2. Lower the fan tray into the chassis ([Figure 5-8](#)).

FIGURE 5-8 Installing the Hard Drive Fan Tray Assembly



3. **Press the release tab and ensure the fan tray is completely seated in the connector.**
Release the tab.
4. **See [Chapter 6, “Returning the Server to Operation”](#) to bring the server back online.**

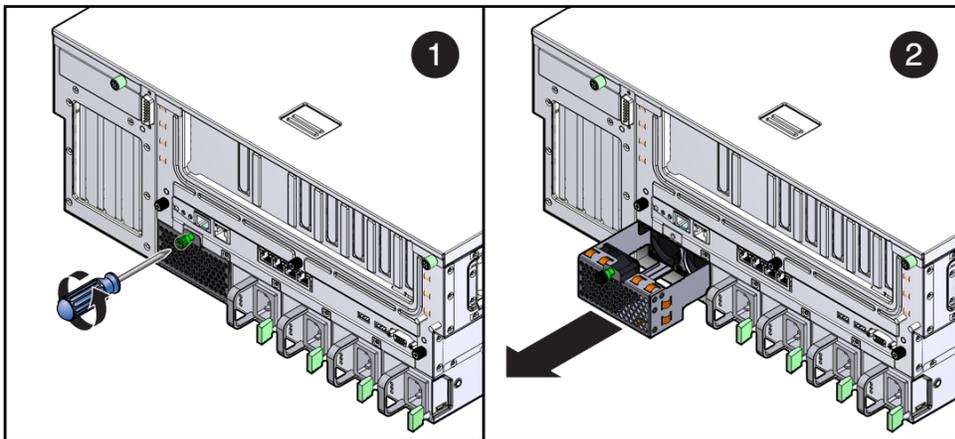
5.5 Replacing the FB-DIMM Fan Assembly (Fan Tray 2)

The FB-DIMM fan assembly is labeled FT2.

▼ Remove the FB-DIMM Fan Assembly (Fan Tray 2)

1. Prepare the server for FB-DIMM fan removal. See:
 - [“Power Off the Server” on page 59](#)
 - [“Disconnect Cables From the Server” on page 60](#)
 - [“Remove the Server From the Rack” on page 60](#)
 - [“Perform Antistatic Measures” on page 61](#)
 - [“Remove the Top Cover” on page 62](#)
2. Loosen the green FB-DIMM fan assembly captive screw..

FIGURE 5-9 Removing the FB-DIMM Fan Assembly

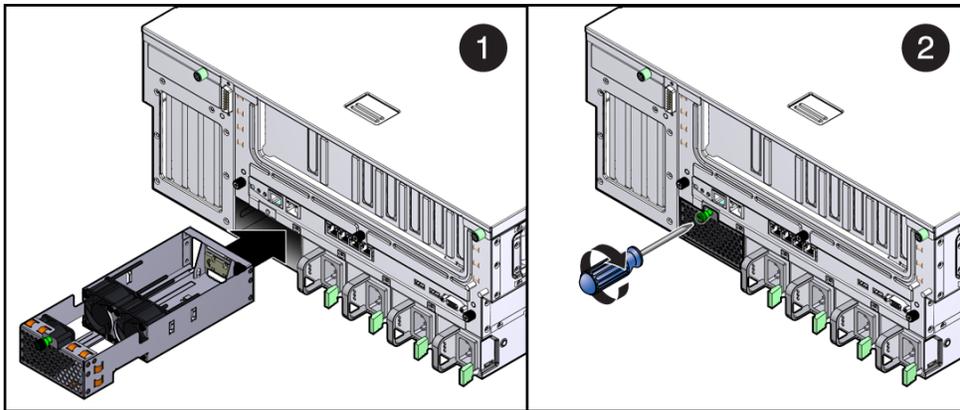


3. Pull the FB-DIMM fan assembly out of the chassis.
4. Set the FB-DIMM fan assembly aside on an antistatic mat.
5. Continue to [“Install the Hard Drive Fan Assembly \(Fan Tray 1\)” on page 139](#).

▼ Install the FB-DIMM Fan Assembly (Fan Tray 2)

1. Remove the replacement FB-DIMM fan assembly from its packaging and place it on an antistatic mat.
2. Reinsert the FB-DIMM fan assembly in the rear chassis slot.

FIGURE 5-10 Installing the FB-DIMM Fan Assembly



3. Slide the FB-DIMM fan assembly in the slot until fully seated.
4. Tighten the green FB-DIMM fan assembly captive screw.
5. See [Chapter 6, “Returning the Server to Operation”](#) to bring the server back online:

5.6 Replacing the Power Board

To remove the power board, you must remove the following components as part of preparing the server for power board replacement:

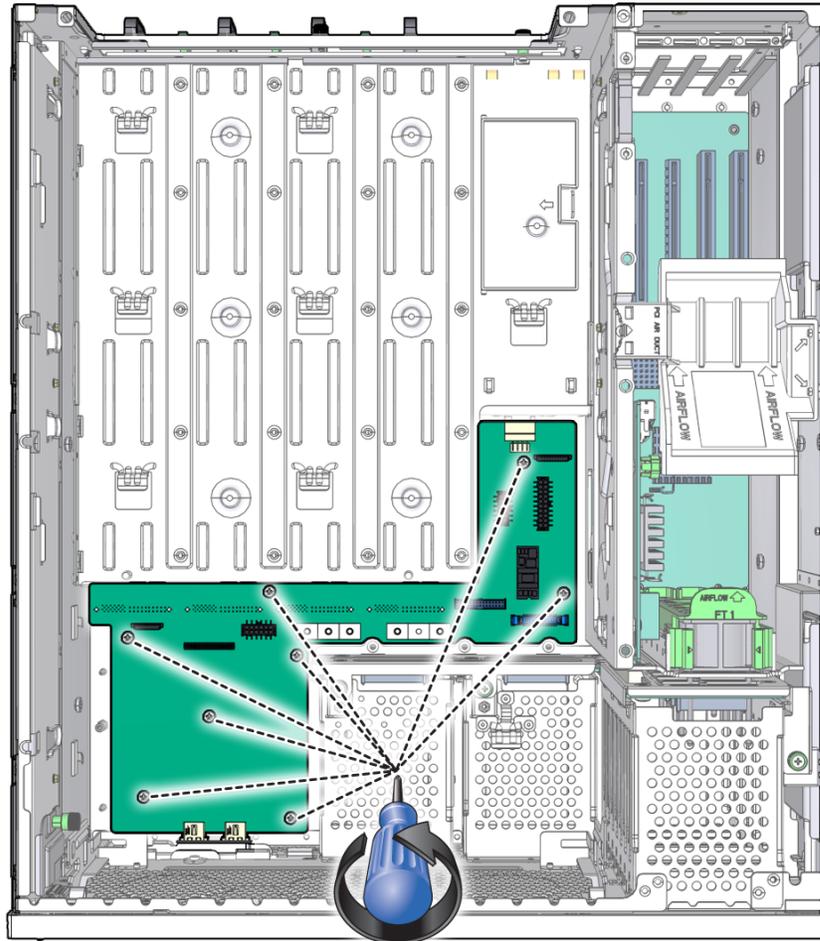
- Memory mezzanine (see [“Remove the Memory Mezzanine Assembly”](#) on page 98)
- PCI mezzanine (see [“Remove the PCI Mezzanine Assembly”](#) on page 86)

- System Fan 0 (see [“Remove the System Fan Assembly \(Fan Tray 0\)”](#) on page 135)
- Optical media drive (see [“Remove the Optical Media Drive”](#) on page 67)
- Motherboard (see [“Remove the Motherboard Assembly”](#) on page 114)

▼ Remove the Power Board

1. Prepare the server for power board removal. See:
 - [“Power Off the Server”](#) on page 59
 - [“Disconnect Cables From the Server”](#) on page 60
 - [“Remove the Server From the Rack”](#) on page 60
 - [“Perform Antistatic Measures”](#) on page 61
 - [“Remove the Top Cover”](#) on page 62
2. Perform the removal instructions in the following sections:
 - [“Remove the Memory Mezzanine Assembly”](#) on page 98
 - [“Remove the PCI Mezzanine Assembly”](#) on page 86
 - [“Remove the System Fan Assembly \(Fan Tray 0\)”](#) on page 135
 - [“Remove the Optical Media Drive”](#) on page 67
 - [“Remove the Motherboard Assembly”](#) on page 114
3. Remove the screws that secure the power board to the chassis ([Figure 5-11](#)).

FIGURE 5-11 Removing the Power Board Screws



4. Lift the power board out of the chassis, and set it aside on an antistatic mat.
5. Continue to [“Install the Power Board” on page 145.](#)

▼ Install 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.
3. Install the screws firmly to secure the power board to the chassis.
4. Perform the installation instructions in the following sections:
 - [“Install the Motherboard Assembly” on page 118](#)
 - [“Install the System Fan Assembly \(Fan Tray 0\)” on page 136](#)
 - [“Install the Optical Media Drive” on page 69](#)
 - [“Install the PCI Mezzanine Assembly” on page 88](#)
 - [“Install the Memory Mezzanine Assembly” on page 97](#)
5. See [Chapter 6, “Returning the Server to Operation”](#) to perform the tasks needed to bring the server back online.

Note - After replacing the power distribution board and powering on the system, you must run the ALOM CMT `setcsn` and `setcpn` commands to set the electronically readable chassis serial number and server part number.

6. At the ALOM CMT command line interface, use the `setcsn` command to set the chassis serial number and the `setcpn` command to set the server part number on the power distribution board.



Caution - When performing the following steps, use special care to enter the correct numbers. Once the power distribution board has been programmed with a chassis serial number or server part number, the number cannot be changed.

```
sc> setsc sc_servicemode true
Warning: misuse of this mode may invalidate your warranty.
sc> setcsn -c chassis_serial_number
Are you sure you want to permanently set the Chassis Serial Number
to chassis_serial_number [y/n]? y
setcsn: Chassis serial number recorded.
```

```
sc> setcpn -p chassis_part_number
Are you sure you want to permanently set the Chassis Part Number
to chassis_part_number [y/n]? y
setcpn: Chassis part number recorded.
sc> showplatform
Sun-Netra-T5440
Chassis Serial Number: chassis_serial_number
Domain Status
-----
SO Running
sc> setsc sc_servicemode false
```

Returning the Server to Operation

This chapter describes tasks to perform after replacing components within Oracle's Sun Netra T5440 server. Topics include:

- [“6.1 Tasks for Finishing Up” on page 147](#)

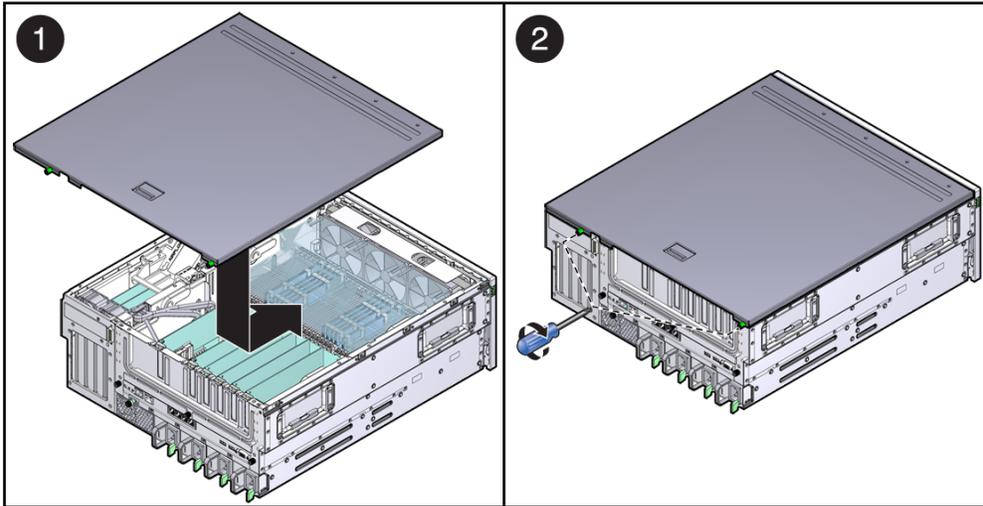
6.1 Tasks for Finishing Up

▼ Return the Server to Operation

1. **If removed, install the top cover.**

Position the top cover on the chassis, and tighten the two green captive screws on the rear of the top cover ([Figure 6-1](#)).

FIGURE 6-1 Installing the Top Cover



2. Install the server into the rack.

Refer to the *Sun Netra T5440 Server Installation Guide (820-4442)*.

3. Cable the server.

Refer to the *Sun Netra T5440 Server Installation Guide (820-4442)*.

4. Power on the server.

Refer to the *Sun Netra T5440 Server Installation Guide (820-4442)*.

◆◆◆ **A P P E N D I X A**

Signal Pinouts

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

- [“A.1 Gigabit Ethernet Ports” on page 149](#)
- [“A.2 Network Management Port” on page 150](#)
- [“A.3 Serial Ports” on page 151](#)
- [“A.4 Alarm Port” on page 154](#)
- [“A.5 USB Ports” on page 154](#)

A.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 A-1](#). [Figure A-1](#) shows the pin numbering of the ports. [Table A-2](#) describes the pin signals.

TABLE A-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 A-1 Gigabit Ethernet Port Pin Numbering

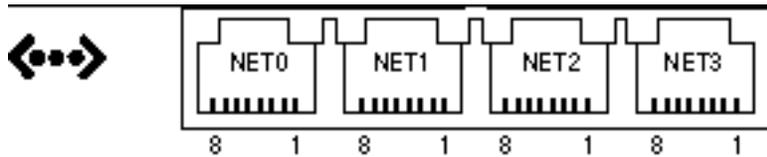


TABLE A-2 Gigabit Ethernet Port Signals

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 –

A.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 ILOM, refer to the *Sun Netra T5440 Server Administration Guide*.



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 A-2 Network Management Port Pin Numbering



TABLE A-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

A.3 Serial Ports

The server has two serial ports, labeled SERIAL MGT and TTYA. [Table A-4](#) lists the default serial connection settings for both serial ports.

TABLE A-4 Default Serial Connection Settings

Parameter	Setting
Connector	SERIAL MGT or I0I0I
Rate	9600 baud
Parity	None
Stop bits	1
Data bits	8

A.3.1 Serial Management Port

The serial management connector (labeled SER 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 A-3](#) shows the pin numbering of the serial management port. [Table A-5](#) describes the pin signals.

FIGURE A-3 Serial Management Port Pin Numbering**TABLE A-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 A-6](#) and [Table A-7](#).

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

TABLE A-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
5	Signal Ground	5	Signal Ground
6	RXD	3	TXD
7	DSR	4	DTR
8	CTS	7	RTS

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

TABLE A-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

A.3.2 Serial Port TTYA

The port labeled TTYA accepts a DB-9 connector. Use this port for general purpose serial data transfers. [Figure A-4](#) shows the pin numbering of the serial port. [Table A-8](#) describes the pin signals.

FIGURE A-4 Serial Port (TTYA) Pin Numbering



TABLE A-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

Pin	Signal Description	Pin	Signal Description
5	Ground		

A.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 A-5](#) shows the pin numbering of the alarm port. [Table A-9](#) describes the pin signals.

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

FIGURE A-5 Alarm Port Pin Numbering

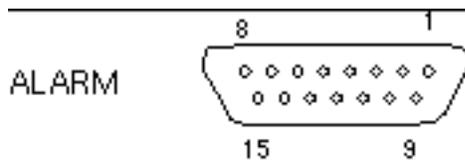
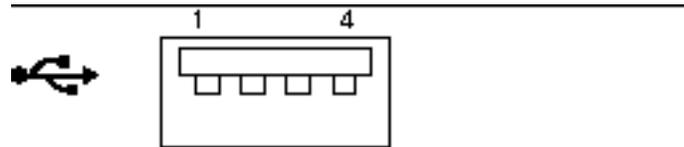


TABLE A-9 Alarm Connector Signals

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

A.5 USB Ports

The server has four USB ports for attaching supported USB 1.1 and 2.0 compliant devices. [Figure A-6](#) shows the pin numbering of the USB ports. [Table A-10](#) describes the pin signals.

FIGURE A-6 USB Ports Pin Numbering**TABLE A-10** USB Connector Pin Signals

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

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