Sun SPARC® Enterprise T2000 Server Service Manual

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Preface

The *Sun SPARC Enterprise T2000 Server Service Manual* provides information to aid in diagnosing hardware problems and describes how to replace components within the Sun SPARC® Enterprise T2000 server. This guide also describes how to add components such as hard drives and memory to the server.

This manual is written for technicians, service personnel, and system administrators who service and repair computer systems. The person qualified to use this manual:

- Can open a system chassis, identify, and replace internal components.
- Understands the Solaris™ Operating System and the command-line interface.
- Has superuser privileges for the system being serviced.
- Understands typical hardware troubleshooting tasks.

How This Book Is Organized

This guide is organized into the following chapters:

Chapter 1 describes the safety precautions of the server.

Chapter 2 describes the main features of the server.

Chapter 3 describes the diagnostics that are available for monitoring and diagnosing the Sun SPARC Enterprise T2000 server.

Chapter 4 explains how to remove and replace hot-swappable and hot-pluggable field-replaceable units (FRUs).

Chapter 5 describes how to remove and replace the FRUs that cannot be hot-swapped.

Chapter 6 explains how to add new components such as hard drives, memory, and PCI cards to the Sun SPARC Enterprise T2000 server.

Appendix A provides an illustrated breakdown of parts and lists the field-replaceable units (FRUs).

Sun SPARC Enterprise T2000 Server Documentation

You can view and print the following manuals from the Sun documentation web site at: http://www.sun.com/documentation

Title	Description	Part Number
Sun SPARC Enterprise T2000 Server Product Notes	Information about the latest product updates and issues	819-7992
Sun SPARC Enterprise T2000 Server Overview Guide	Product features	819-7986
Sun SPARC Enterprise T2000 Server Site Planning Guide	Server specifications for site planning	819-7987
Sun SPARC Enterprise T2000 Server Installation Guide	Detailed rackmounting, cabling, power on, and configuring information	819-7988
Sun SPARC Enterprise T2000 Server System Administration Guide	How to perform administrative tasks that are specific to this server	819-7990
Advanced Lights Out Manager (ALOM) CMT v1.x User's Guide	How to use the Advanced Lights Out Manager (ALOM) software	Varies based on version
Sun SPARC Enterprise T2000 Server Service Manual	How to run diagnostics to troubleshoot the server, and how to remove and replace parts in the server	819-7989
Sun SPARC Enterprise T2000 Server Safety and Compliance Manual	Safety and compliance information about this server	819-7993

Additional Service Related Information

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

- **Product Notes** – The *Sun SPARC Enterprise T2000 Server Product Notes* (819-7992) contain late-breaking information about the system including required software patches, updated hardware and compatibility information, and solutions to know issues. The product notes are available online at:
  http://www.sun.com/documentation
- **Release Notes** – The Solaris OS release notes contain important information about the Solaris OS. The release notes are available online at:
  http://www.sun.com/documentation
- **SunSolve℠ Online** – Provides a collection of support resources. Depending on the level of your service contract, you have access to Sun patches, the Sun System Handbook, the SunSolve™ knowledge base, the Sun Support Forum, and additional documents, bulletins, and related links. Access this site at:
  http://sunsolve.sun.com
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  http://www.sun.com/msg

Typographic Conventions

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

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

Shell Prompts

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

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Sun SPARC Enterprise T2000 Server Service Manual, part number 819-7989-10

CHAPTER 1

Safety Information

This chapter provides important safety information for servicing the server.

The following topics are covered:

- Section 1.1, “Safety Information” on page 1-1
- Section 1.2, “Safety Symbols” on page 1-1
- Section 1.3, “Electrostatic Discharge Safety” on page 1-2

1.1 Safety Information

This section describes 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 Section 1.3, “Electrostatic Discharge Safety” on page 1-2.

1.2 Safety Symbols

The following symbols might appear in this document. 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.

1.3 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.

1.3.1 Using 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. Do this after you disconnect the power cords from the server. Following this practice equalizes the electrical potentials between you and the server.

1.3.2 Using an Antistatic Mat

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

CHAPTER 2

Server Overview

This chapter provides an overview of the features of the server.

The following topics are covered:

- Section 2.1, “Server Features” on page 2-2
- Section 2.2, “Chassis Identification” on page 2-9

2.1 Server Features

The server is a high-performance entry-level server that is highly scalable and extremely reliable.

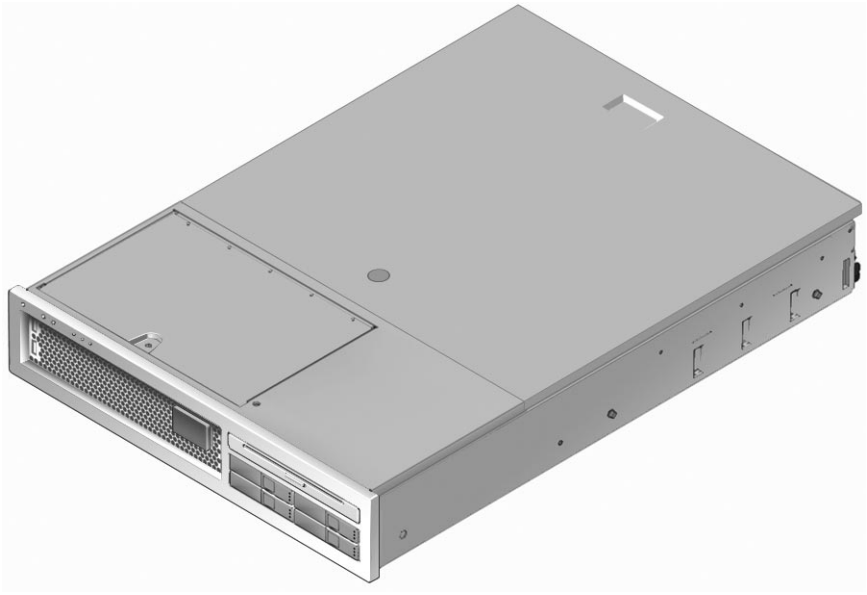

FIGURE 2-1 Server

2.1.1 Chip Multitheaded Multicore Processor and Memory Technology

The UltraSPARC® T1 multicore processor is the basis of the server. The UltraSPARC T1 processor is based on chip multithreading (CMT) technology that is optimized for highly threaded transactional processing. The UltraSPARC T1 processor improves throughput while using less power and dissipating less heat than conventional processor designs.

Depending on the model purchased, the processor has four or eight UltraSPARC cores. Each core equates to a 64-bit execution pipeline capable of running four threads. The result is that the 8-core processor handles up to 32 active threads concurrently.

Additional processor components, such as L1 cache, L2 cache, memory access crossbar, DDR2 memory controllers, and a JBus I/O interface have been carefully tuned for optimal performance.

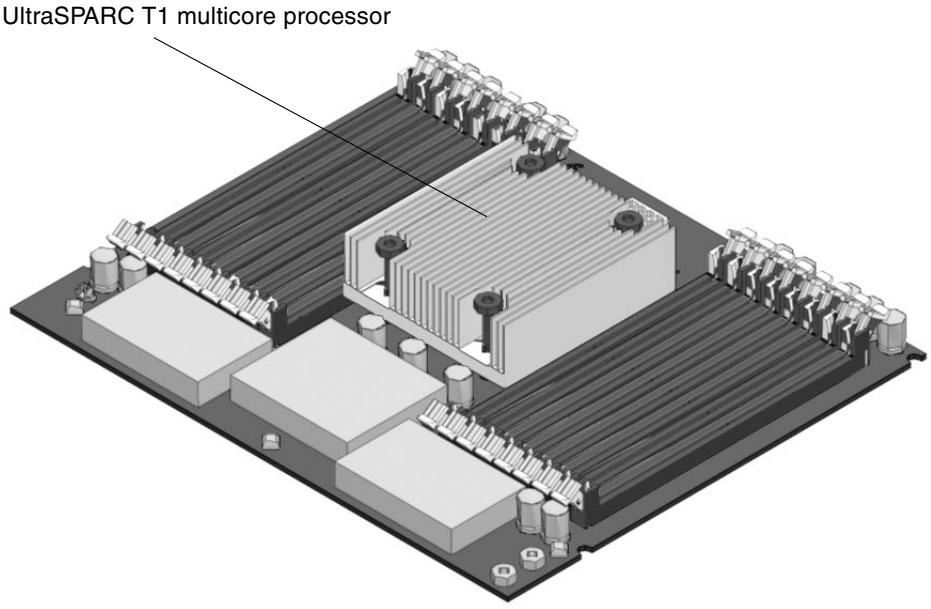

FIGURE 2-2 Motherboard and UltraSPARC T1 Multicore Processor

2.1.2 Performance Enhancements

The server introduces several new technologies with its sun4v architecture and multithreaded UltraSPARC T1 multicore processor.

Some of these enhancements are:

- Large page optimization
- Reduction on TLB misses
- Optimized block copy

TABLE 2-1 lists feature specifications for the server.

TABLE 2-1 Server Features

Feature	Description
Processor	1 UltraSPARC T1 multicore processor (4 or 8 cores)
Architecture	SPARC® V9 architecture, ECC protected Platform group: sun4v Platform name: SUNW, SPARC-Enterprise-T2000
Memory	16 slots that can be populated with one of the following types of DDR-2 DIMMS: • 512 MB (8 GB maximum) • 1 GB (16 GB maximum) • 2 GB (32 GB maximum) • 4 GB (64 GB maximum) The memory subsystem supports the chipkill feature.
Ethernet ports	4 ports, 10/100/1000 Mb autonegotiating
Internal hard drives	1-4 SAS 2.5-inch form factor drives (hot- pluggable)
Other internal peripherals	1 slimline DVD-R/CD-RW device
USB ports	4 USB 1.1 ports (2 in front and 2 in rear)
Cooling	3 hot-swappable and redundant system fans and 1 blower unit
PCI interfaces	3 PCI-Express (PCI-E) slots that support* cards with the following specifications: • Low-profile • x1, x4, and x8 width • 12v and 3.3v as defined by the PCI-Express specification 2 PCI-X slots that support* cards with the following specifications: • 64-bit, 133 MHz • Low-profile • 3.3v (5v is also supplied, as defined by the PCI-X specification, using a 3.3V form factor connector)
Power	2 hot-swappable and redundant power supply units (PSUs) Refer to the *Sun SPARC Enterprise T2000 Server Site Planning Guide* for power and environmental specifications.

TABLE 2-1 Server Features *(Continued)*

Feature	Description
Remote management	ALOM CMT management controller with a serial and 10/100 Mb Ethernet port
Firmware	System firmware comprising: • OpenBoot™ PROM for system settings and power-on self-test (POST) support • ALOM CMT for remote management administration
Cryptography	Hardware-assisted cyptographic acceleration

* PCI-Express and PCI-X specifications described in this table list the physical requirements for PCI cards. Additional support capabilities (such as device drivers) must also be provided for a PCI card to function in the server. Refer to the specifications and documentation for a given PCI card to determine if the required drivers are provided that enable the card to function in this server.

2.1.3 Remote Manageability With ALOM CMT

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

The ALOM CMT software is preinstalled as firmware, and it initializes as soon as you apply power to the system. You can customize ALOM CMT to work with your particular installation.

ALOM CMT enables you to monitor and control your server over a network, or by using a dedicated serial port for connection to a terminal or terminal server. ALOM CMT provides a command-line interface for remotely administering geographically distributed or physically inaccessible machines. In addition, ALOM CMT enables you to run diagnostics (such as POST) remotely that would otherwise require physical proximity to the server's serial port.

You can configure ALOM CMT to send email alerts of hardware failures, hardware warnings, and other events related to the server or to ALOM CMT. The ALOM CMT circuitry runs independently of the server, using the server's standby power. Therefore, ALOM CMT firmware and software continue to function when the server operating system goes offline or when the server is powered off. ALOM CMT monitors the following server components:

- CPU temperature conditions
- Hard drive status
- Enclosure thermal conditions
- Fan speed and status
- Power supply status
- Voltage levels
- Faults detected by POST (power-on self-test)
- Solaris Predictive Self-Healing (PSH) diagnostic facilities

For information about configuring and using the ALOM system controller, refer to the latest *Advanced Lights Out Manager (ALOM) CMT Guide*.

2.1.4 System Reliability, Availability, and Serviceability

Reliability, availability, and serviceability (RAS) are aspects of a system's design that affect its ability to operate continuously and to minimize the time necessary to service the system. Reliability refers to a system's ability to operate continuously without failures and to maintain data integrity. System availability refers to the ability of a system to recover to an operational state after a failure, with minimal impact. Serviceability relates to the time it takes to restore a system to service following a system failure. Together, reliability, availability, and serviceability features provide for near continuous system operation.

To deliver high levels of reliability, availability, and serviceability, the server offers the following features:

- Hot-pluggable hard drives
- Redundant, hot-swappable power supplies (two)
- Redundant hot-swappable fan units (three)
- Environmental monitoring
- Error detection and correction for improved data integrity
- Easy access for most component replacements
- Extensive POST tests that automatically delete faulty components from the configuration
- PSH automated run-time diagnosis capability that takes faulty components offline.

For more information about using RAS features, refer to the *Sun SPARC Enterprise T2000 Server Administration Guide*.

2.1.4.1 Hot-Pluggable and Hot-Swappable Components

The server hardware supports hot-plugging or hot-swapping of the chassis-mounted hard drives, fans, power supplies, and the rear blower. Using the proper software commands, you can install or remove these components while the server is running. Hot-plug and hot-swap technologies significantly increase the server's serviceability and availability by providing the ability to replace hard drives, fan units, rear blower, and power supplies without service disruption.

2.1.4.2 Power Supply Redundancy

The server features two hot-swappable power supplies, which enable the system to continue operating should a power supply or power sources fail.

The server also has a single hot-swappable blower unit that works in conjunction with the power supply fans to provide cooling for the internal hard drives. If the blower unit fails, the two power supply fan units provide enough cooling for the hard drive bay to keep the server running.

2.1.4.3 Fan Redundancy

The server features three hot-swappable system fans. Multiple fans enable the server to continue operating with adequate cooling in the event that one of the fans fails.

2.1.4.4 Environmental Monitoring

The server features an environmental monitoring subsystem designed to protect the server and its components against:

- Extreme temperatures
- Lack of adequate airflow through the system
- Power supply failures
- Hardware faults

Temperature sensors located throughout the server monitor the ambient temperature of the server and internal components. The software and hardware ensure that the temperatures within the enclosure do not exceed predetermined safe operating ranges. If the temperature observed by a sensor falls below a low-temperature threshold or rises above a high-temperature threshold, the monitoring subsystem software lights the amber Service Required LEDs on the front and back panel. If the temperature condition persists and reaches a critical threshold, the system initiates a graceful server shutdown.

All error and warning messages are sent to the system controller (SC), console, and are logged in the ALOM CMT log file. Additionally, some FRUs such as power supplies provide LEDs that indicate a failure within the FRU.

2.1.4.5 Error Correction and Parity Checking

The UltraSPARC T1 multicore processor provides parity protection on its internal cache memories, including tag parity and data parity on the D-cache and I-cache. The internal 3 Mbyte L2 cache has parity protection on the tags, and ECC protection of the data.

Advanced ECC, also called *chipkill*, corrects up to 4-bits in error on nibble boundaries, as long as the bits are all in the same DRAM. If a DRAM fails, the DIMM continues to function.

2.1.5 Predictive Self-Healing

The server features the latest fault management technologies. The Solaris 10 Operating System (OS), introduces a new architecture for building and deploying systems and services capable of *Predictive Self-Healing*. Self-healing technology enables systems to accurately predict component failures and mitigate many serious problems before they occur. This technology is incorporated into both the hardware and software of the server.

At the heart of the Predictive Self-Healing capabilities is the Solaris Fault Manager, a service that receives data relating to hardware and software errors, and automatically and silently diagnoses the underlying problem. Once a problem is diagnosed, a set of agents automatically responds by logging the event, and if necessary, takes the faulty component offline. By automatically diagnosing problems, business-critical applications and essential system services can continue uninterrupted in the event of software failures, or major hardware component failures.

2.2 Chassis Identification

FIGURE 2-3 and FIGURE 2-4 show the physical characteristics of the server.

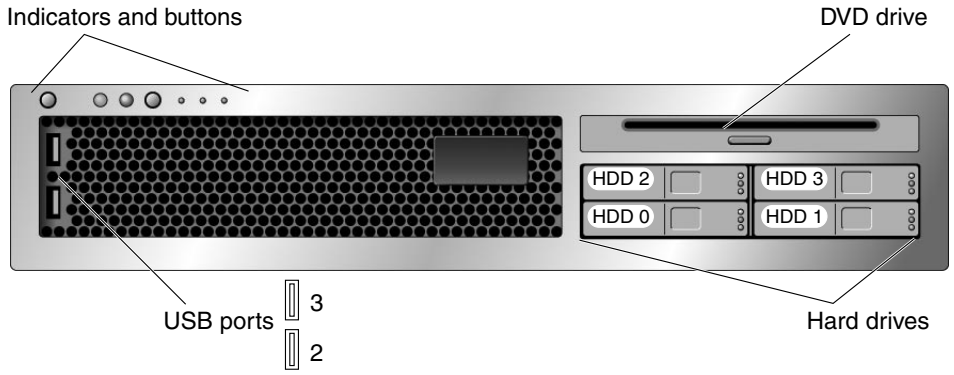

FIGURE 2-3 Server Front Panel

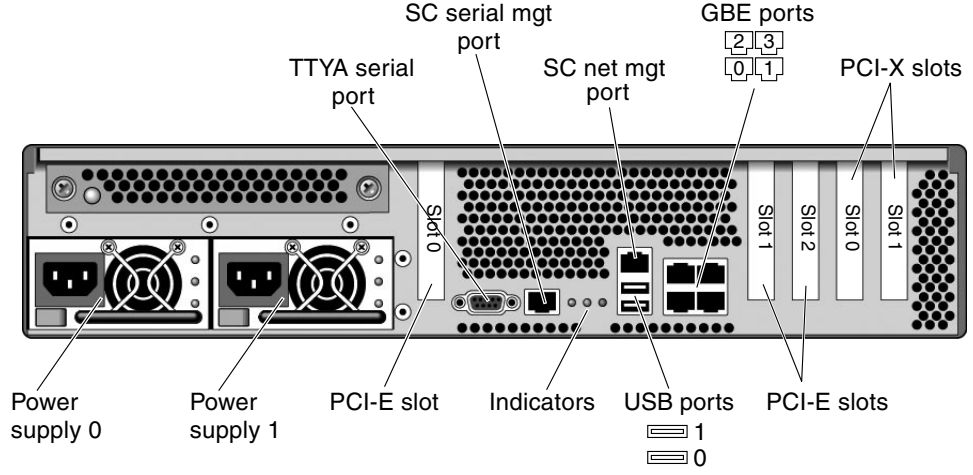

FIGURE 2-4 Server Rear Panel

2.3 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 `showplatform` command to obtain the chassis serial number.

Example:

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

CHAPTER 3

Server Diagnostics

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

This chapter is intended for technicians, service personnel, and system administrators who service and repair computer systems.

The following topics are covered:

- Section 3.1, "Overview of Server Diagnostics" on page 3-1
- Section 3.2, "Using LEDs to Identify the State of Devices" on page 3-8
- Section 3.3, "Using ALOM CMT for Diagnosis and Repair Verification" on page 3-16
- Section 3.4, "Running POST" on page 3-26
- Section 3.5, "Using the Solaris Predictive Self-Healing Feature" on page 3-40
- Section 3.6, "Collecting Information From Solaris OS Files and Commands" on page 3-45
- Section 3.7, "Managing Components With Automatic System Recovery Commands" on page 3-46
- Section 3.8, "Exercising the System With SunVTS" on page 3-49

3.1 Overview of Server Diagnostics

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

- **LEDs** – Provide a quick visual notification of the status of the server and of some of the FRUs.

- **ALOM CMT firmware** – This system firmware runs on the system controller. In addition to providing the interface between the hardware and OS, ALOM CMT also tracks and reports the health of key server components. ALOM CMT 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 configureable and works with ALOM CMT to take faulty components offline if needed.
- **Solaris OS Predictive Self-Healing (PSH)** – This technology continuously monitors the health of the CPU and memory, and works with ALOM CMT to take a faulty component offline if needed. The Predictive Self-Healing technology enables systems to accurately predict component failures and mitigate many serious problems before they occur.
- **Log files and console messages** – Provide the standard Solaris OS log files and investigative commands that can be accessed and displayed on the device of your choice.
- **SunVTS™** – An application that exercises the system, provides hardware validation, and discloses possible faulty components with recommendations for repair.

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

The flow chart in FIGURE 3-1 and TABLE 3-1 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 flow chart assumes that you have already performed some troubleshooting such as verification of proper installation, and visual inspection of cables and power, and possibly performed a reset of the server (refer to the *Sun SPARC Enterprise T2000 Server Installation Guide* and *Sun SPARC Enterprise T2000 Server Administration Guide* for details).

FIGURE 3-1 is a flow chart of the diagnostics available to troubleshoot faulty hardware. TABLE 3-1 has more information about each diagnostic in this chapter.

Note – POST is configured with ALOM CMT configuration variables (TABLE 3-9). If `diag_level` is set to `max` (`diag_level=max`), POST reports *all* detected FRUs including memory devices with errors correctable by Predictive Self-Healing (PSH). Thus, not all memory devices detected by POST need to be replaced. See Section 3.4.5, "Correctable Errors Detected by POST" on page 3-36.

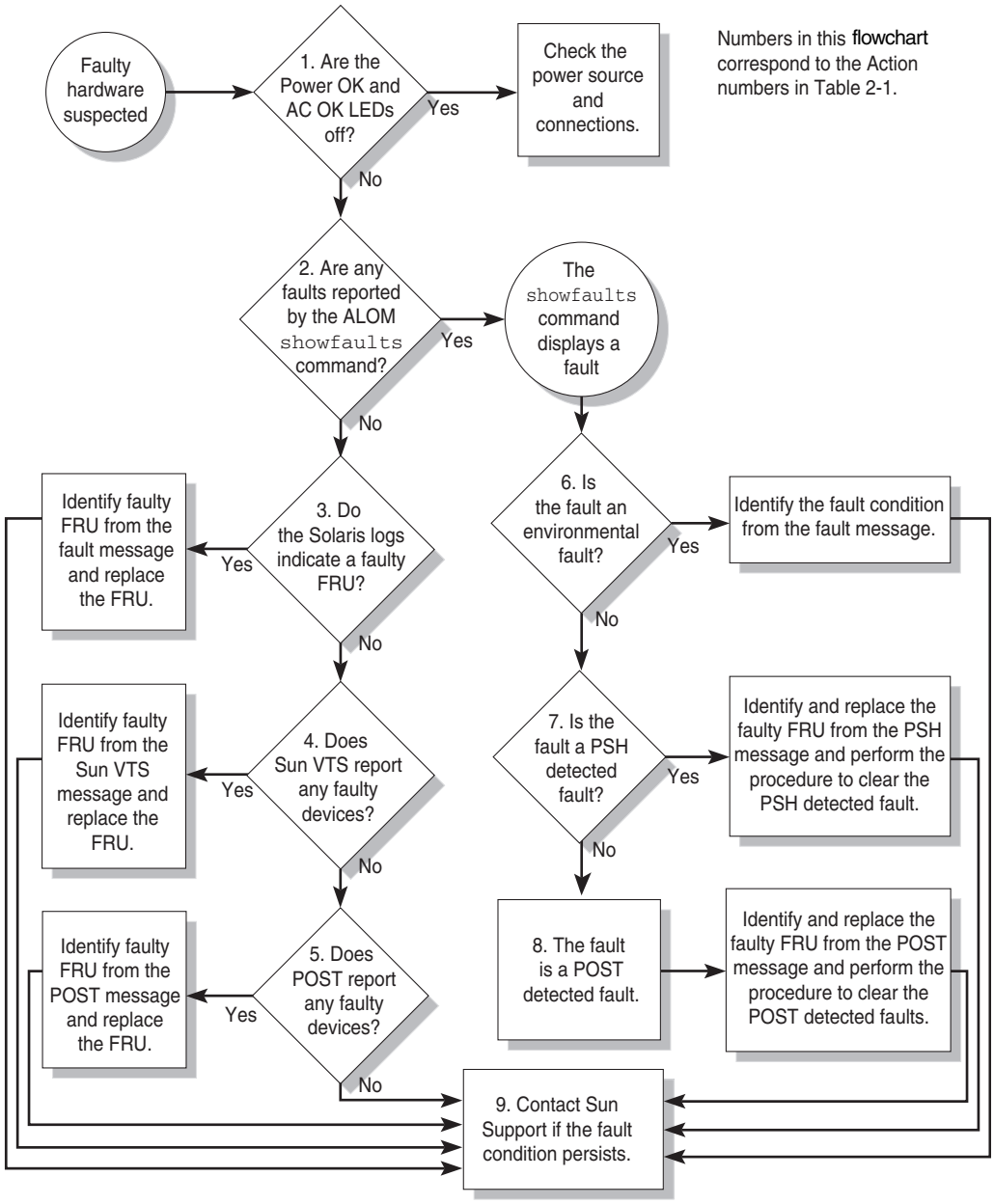

FIGURE 3-1 Diagnostic Flow Chart

TABLE 3-1 Diagnostic Flowchart Actions

Action No.	Diagnostic Action	Resulting Action	For more information, see these sections
1.	Check Power OK and AC OK LEDs on the server.	The Power OK LED is located on the front and rear of the chassis. The AC OK LED is located on the rear of the server on each power supply. If these LEDs are not on, check the power source and power connections to the server.	Section 3.2, "Using LEDs to Identify the State of Devices" on page 3-8
2.	Run the ALOM CMT `showfaults` command to check for faults.	The `showfaults` command displays the following kinds of faults: • Environmental faults • Solaris Predictive Self-Healing (PSH) detected faults • POST detected faults Faulty FRUs are identified in fault messages using the FRU name. For a list of FRU names, see Appendix A.	Section 3.3.2, "Running the `showfaults` Command" on page 3-21
3.	Check the Solaris log files for fault information.	The Solaris message buffer and log files record system events and provide information about faults. • If system messages indicate a faulty device, replace the FRU. • To obtain more diagnostic information, go to Action No. 4.	Section 3.6, "Collecting Information From Solaris OS Files and Commands" on page 3-45 Chapter 5
4.	Run SunVTS.	SunVTS is an application you can run to exercise and diagnose FRUs. To run SunVTS, the server must be running the Solaris OS. • If SunVTS reports a faulty device replace the FRU. • If SunVTS does not report a faulty device, go to Action No. 5.	Section 3.8, "Exercising the System With SunVTS" on page 3-49 Chapter 5

TABLE 3-1 Diagnostic Flowchart Actions *(Continued)*

Action No.	Diagnostic Action	Resulting Action	For more information, see these sections
5.	Run POST.	POST performs basic tests of the server components and reports faulty FRUs. **Note -** `diag_level=min` is the default ALOM CMT setting, which tests devices required to boot the server. Use `diag_level=max` for troubleshooting and hardware replacement. • If POST indicates a faulty FRU while `diag_level=min`, replace the FRU. • If POST indicates a faulty memory device while `diag_level=max`, the detected errors might be correctable by PSH after the server boots. • If POST does not indicate a faulty FRU, go to Action No. 9.	Section 3.4, "Running POST" on page 3-26 TABLE 3-9, TABLE 3-10 Chapter 5 Section 3.4.5, "Correctable Errors Detected by POST" on page 3-36
6.	Determine if the fault is an environmental fault.	If the fault listed by the `showfaults` command displays a temperature or voltage fault, then the fault is an environmental fault. Environmental faults can be caused by faulty FRUs (power supply, fan, or blower) or by environmental conditions such as when computer room ambient temperature is too high, or the server airflow is blocked. When the environmental condition is corrected, the fault will automatically clear. If the fault indicates that a fan, blower, or power supply is bad, you can perform a hot-swap of the FRU. You can also use the fault LEDs on the server to identify the faulty FRU (fans, blower, and power supplies).	Section 3.3.2, "Running the `showfaults` Command" on page 3-21 Chapter 4 Section 3.2, "Using LEDs to Identify the State of Devices" on page 3-8

TABLE 3-1 Diagnostic Flowchart Actions *(Continued)*

Action No.	Diagnostic Action	Resulting Action	For more information, see these sections
7.	Determine if the fault was detected by PSH.	If the fault message displays the following text, the fault was detected by the Solaris Predictive Self-Healing software: `Host detected fault` If the fault is a PSH detected fault, identify the faulty FRU from the fault message and replace the faulty FRU. After the FRU is replaced, perform the procedure to clear PSH detected faults.	Section 3.5, "Using the Solaris Predictive Self-Healing Feature" on page 3-40 Chapter 5 Section 3.5.2, "Clearing PSH Detected Faults" on page 3-44
8.	Determine if the fault was detected by POST.	POST performs basic tests of the server components and reports faulty FRUs. When POST detects a faulty FRU, it logs the fault and if possible, takes the FRU offline. POST detected FRUs display the following text in the fault message: *FRU_name* `deemed faulty and disabled` In this case, replace the FRU and run the procedure to clear POST detected faults.	Section 3.4, "Running POST" on page 3-26 Chapter 5 Section 3.4.6, "Clearing POST Detected Faults" on page 3-39
9.	Contact technical 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.	Section 2.3, "Obtaining the Chassis Serial Number" on page 2-10

3.1.1 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.

3.1.1.1 Memory Configuration

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

- 512 MB (maximum of 8 GB)
- 1 GB (maximum of 16 GB)
- 2 GB (maximum of 32 GB)
- 4 GB (maximum of 64 GB)

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

See Section 5.2.3, "Removing DIMMs" on page 5-12 for instructions about adding memory to a server.

3.1.1.2 Memory Fault Handling

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

The following server features independently manage memory faults:

- **POST** – Based on ALOM CMT configuration variables, POST runs when the server is powered on. In normal operation, the default configuration of POST (`diag_level=min`), provides a check to ensure the server will boot. Normal operation applies to any boot of the server not intended to test power-on errors, hardware upgrades, or repairs. Once the Solaris OS is running, PSH provides run-time diagnosis of faults.

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

  In other than normal operation, POST can be configured to run various levels of testing (see TABLE 3-9 and TABLE 3-10) and can thoroughly test the memory subsystem based on the purpose of the test. However, with thorough testing enabled (`diag_level=max`), POST finds faults and offlines memory devices with errors that could be correctable with PSH. Thus, not all memory devices detected and offlined by POST need to be replaced. See Section 3.4.5, "Correctable Errors Detected by POST" on page 3-36.

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

3.1.1.3 Troubleshooting Memory Faults

If you suspect that the server has a memory problem, follow the flowchart (see FIGURE 3-1). Run the ALOM CMT `showfaults` command. The `showfaults` command lists memory faults and lists the specific DIMMS that are associated with the fault. Once you identify which DIMMs you want to replace, see Section 5.2.3, "Removing DIMMs" on page 5-12 for DIMM removal and replacement instructions. It is important that you perform the instructions in that chapter to clear the faults and enable the replaced DIMMs.

3.2 Using LEDs to Identify the State of Devices

The server provides the following groups of LEDs:

- Section 3.2.1, "Front and Rear Panel LEDs" on page 3-8
- Section 3.2.2, "Hard Drive LEDs" on page 3-11
- Section 3.2.3, "Power Supply LEDs" on page 3-12
- Section 3.2.4, "Fan LEDs" on page 3-13
- Section 3.2.5, "Blower Unit LED" on page 3-13
- Section 3.2.6, "Ethernet Port LEDs" on page 3-14

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

3.2.1 Front and Rear Panel LEDs

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

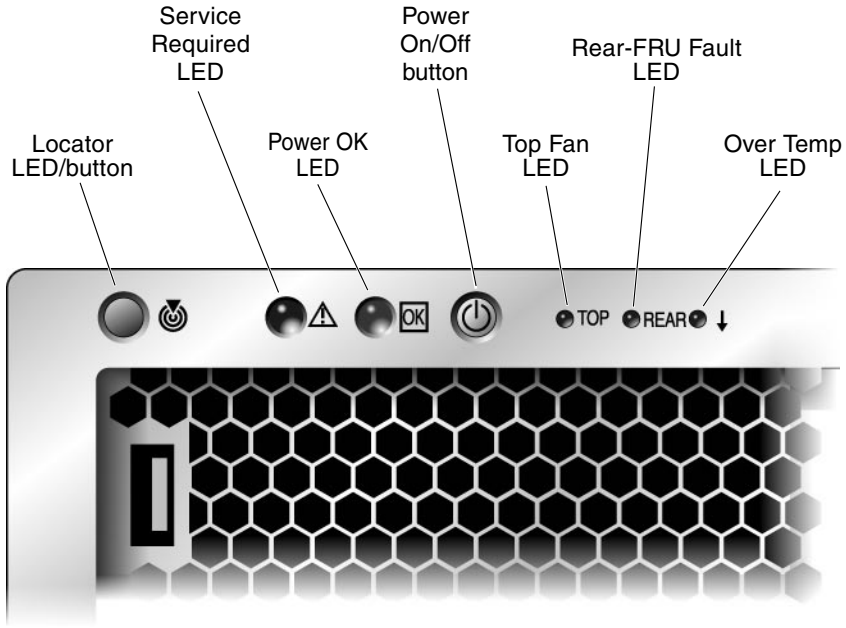

FIGURE 3-2 Front Panel LEDs

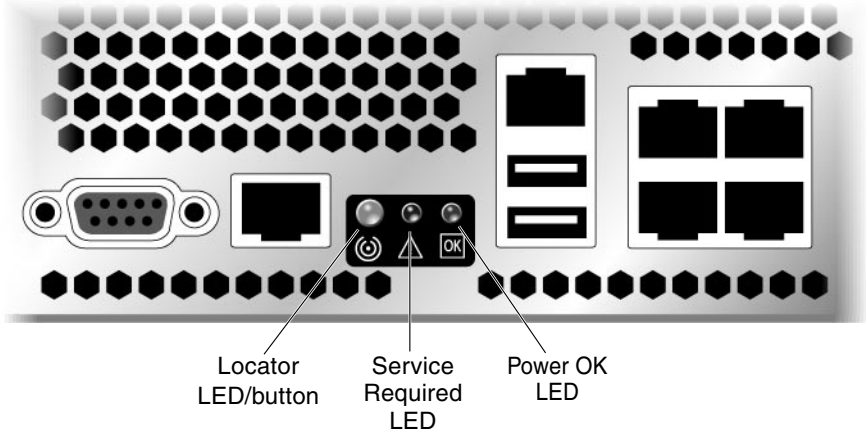

FIGURE 3-3 Rear Panel LEDs

TABLE 3-2 lists and describes the front and rear panel LEDs.

TABLE 3-2 Front and Rear Panel LEDs

LED	Color	Description
Locator LED/ button	White	Enables you to identify a particular server. Activate the LED using one of the following methods: • Issuing the `setlocator on` or `off` command. • Pressing the button to toggle the indicator on or off. This LED provides the following indications: • Off – Normal operating state. • Fast blink – The server received a signal as a result of one of the preceding methods and is indicating that it is operational.
Service Required LED*	Amber	If on, indicates that service is required. The ALOM CMT `showfaults` command provides details about any faults that cause this indicator to light.
Power OK LED*	Green	The LED provides the following indications: • Off – The server is unavailable. Either it has no power or ALOM CMT is not running. • Steady on – Indicates that the server is powered on and is running in its normal operating state. • Standby blink – Indicates that the service processor is running, while the server is running at a minimum level in standby mode and ready to be returned to its normal operating state. • Slow blink – Indicates that a normal transitory activity is taking place. Server diagnostics might be running, or the system might be powering on.
Power on/off button		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.
Top fan LED	Amber	Provides the following operational fan indications: • Off – Indicates a steady state, no service action is required. • Steady on – Indicates that a fan failure event has been acknowledged and a service action is required on at least one of the three fans. Use the fan LEDs to determine which fan requires service.
Rear-FRU Fault LED	Amber	Provides the following indications: • Off – Indicates a steady state, no service action is required. • Steady on – Indicates a failure of a rear-access FRU (a power supply or the rear blower). Use the FRU LEDs to determine which FRU requires service.

TABLE 3-2 Front and Rear Panel LEDs *(Continued)*

LED	Color	Description
OverTemp LED	Amber	Provides the following operational temperature indications: • Off – Indicates a steady state, no service action is required. • Steady on – Indicates that a temperature failure event has been acknowledged and a service action is required. View the ALOM CMT reports for further information on this event.

3.2.2 Hard Drive LEDs

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

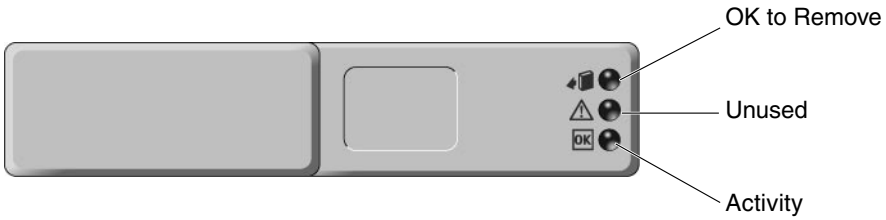

FIGURE 3-4 Hard Drive LEDs

TABLE 3-3 Hard Drive LEDs

LED	Color	Description
OK to Remove	Blue	• On – The drive is ready for hot-plug removal. • Off – Normal operation.
Unused	Amber	
Activity	Green	• On – Drive is receiving power. Solidly lit if drive is idle. Flashes while the drive processes a command. • Off – Power is off.

3.2.3 Power Supply LEDs

The power supply LEDs (FIGURE 3-5 and TABLE 3-4) are located on the back of each power supply.

FIGURE 3-5 Power Supply LEDs

TABLE 3-4 Power Supply LEDs

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

3.2.4 Fan LEDs

The fan LEDs are located on the top of each fan unit and are visible when you open the top fan door (FIGURE 3-6)

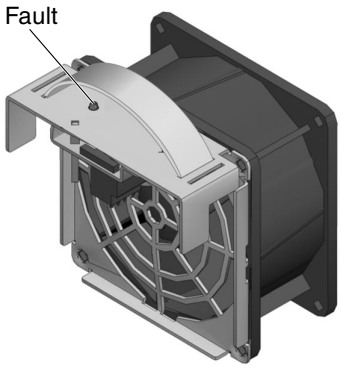

FIGURE 3-6 Location of Fan LEDs

TABLE 3-5 Fan LEDs

LED	Color	Description
Fan LEDs	Amber	• On – This fan is faulty. • Off – Normal operation. Note: When a fan fault is detected, the front panel Top Fan LED is lit.

3.2.5 Blower Unit LED

The blower unit LED is located on the back of the blower unit and visible from the rear of the server (TABLE 3-6).

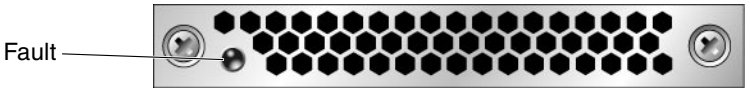

FIGURE 3-7 Location of the Blower Unit LED

TABLE 3-6 Blower Unit LED

LED	Color	Description
Blower Unit LED	Amber	• On – The blower unit is faulty. • Off – Normal operation. Note: When a blower fault is detected the Rear-FRU Fault LED is lit.

3.2.6 Ethernet Port LEDs

The ALOM CMT management Ethernet port and the four 10/100/1000 Mbps Ethernet ports each have two LEDs, as shown in FIGURE 3-8 and described in TABLE 3-7.

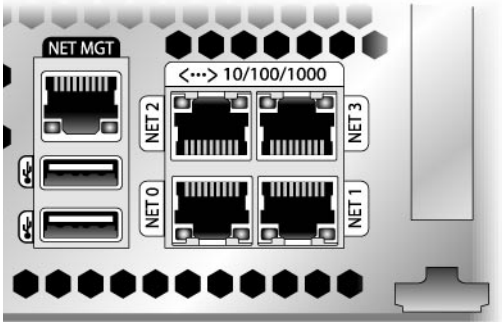

FIGURE 3-8 Ethernet Port LEDs

TABLE 3-7 Ethernet Port LEDs

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

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

3.3 Using ALOM CMT for Diagnosis and Repair Verification

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

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

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

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

Faults detected by ALOM CMT, POST, and the Solaris Predictive Self-healing (PSH) technology are forwarded to ALOM CMT for fault handling (FIGURE 3-9).

In the event of a system fault, ALOM CMT ensures that the Service Required LED is lit, FRU ID PROMs are updated, the fault is logged, and alerts are displayed. Faulty FRUs are identified in fault messages using the FRU name. For a list of FRU names, see Appendix A.

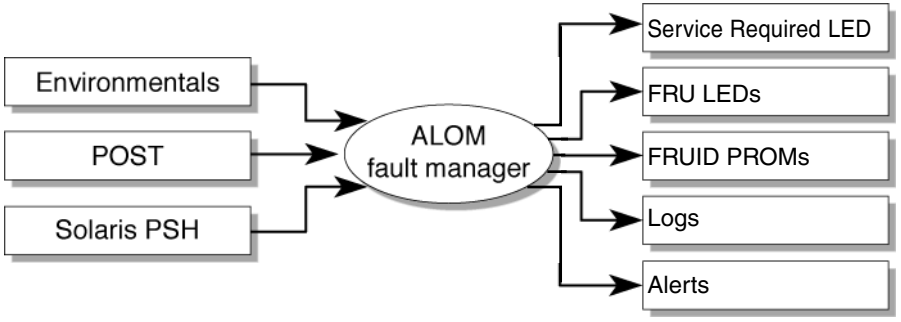

FIGURE 3-9 ALOM CMT Fault Management

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

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

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

ALOM CMT can detect the removal of a FRU, in many cases even if the FRU is removed while ALOM CMT is powered off. This enables ALOM CMT to know that a fault, diagnosed to a specific FRU, has been repaired. The ALOM CMT `clearfault` command enables you to manually clear certain types of faults without a FRU replacement or if ALOM CMT was unable to automatically detect the FRU replacement.

Note – ALOM CMT 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 a power supply can be plugged in, and so on. Recovery of environmental faults is automatically detected. Recovery events are reported using one of two forms:

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

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

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

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

The Solaris Predictive Self-Healing technology does not monitor the hard drive for faults. As a result, ALOM CMT 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 Section 3.6, "Collecting Information From Solaris OS Files and Commands" on page 3-45.

3.3.1 Running ALOM CMT Service-Related Commands

This section describes the ALOM CMT commands that are commonly used for service-related activities.

3.3.1.1 Connecting to ALOM CMT

Before you can run ALOM CMT commands, you must connect to the ALOM CMT. There are several ways to connect to the system controller:

- Connect an ASCII terminal directly to the serial management port.
- Use the `telnet` command to connect to ALOM CMT through an Ethernet connection on the network management port.

Note – Refer to the *Advanced Lights Out Manager (ALOM) CMT Guide* for instructions on configuring and connecting to ALOM CMT.

3.3.1.2 Switching Between the System Console and ALOM CMT

- To switch from the console output to the ALOM CMT `sc>` prompt, type **`#.`** (Hash-Period).
- To switch from the `sc>` prompt to the console, type **`console`**.

3.3.1.3 Service-Related ALOM CMT Commands

TABLE 3-8 describes the typical ALOM CMT commands for servicing a server. For descriptions of all ALOM CMT commands, issue the `help` command or refer to the *Advanced Lights Out Management (ALOM) CMT Guide*.

TABLE 3-8 Service-Related ALOM CMT Commands

ALOM CMT Command	Description
`help` [*command*]	Displays a list of all ALOM CMT commands with syntax and descriptions. Specifying a command name as an option displays help for that command.
`break` [`-y`][`-c`][`-D`]	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. • `-y` skips the confirmation question • `-c` executes a `console` command after the `break` command completes • `-D` forces a core dump of the Solaris OS
`clearfault` *UUID*	Manually clears host-detected faults. The UUID is the unique fault ID of the fault to be cleared.
`console [-f]`	Connects you to the host system. The `-f` option forces the console to have read and write capabilities.
`consolehistory [-b` *lines*`|-e` *lines*`|-v] [-g` *lines*`] [boot|run]`	Displays the contents of the system's console buffer. The following options enable you to specify how the output is displayed: • `-g` *lines* specifies the number of lines to display before pausing. • `-e` *lines* displays *n* lines from the end of the buffer. • `-b` *lines* displays *n* lines from beginning of buffer. • `-v` displays entire buffer. • `boot|run` specifies the log to display (`run` is the default log).
`bootmode [normal|reset_nvram| bootscript=`*string*`]`	Enables control of the firmware during system initialization with the following options: • `normal` is the default boot mode. • `reset_nvram` resets OpenBoot PROM parameters to their default values. • `bootscript=`*string* enables the passing of a string to the `boot` command.
`powercycle` [`-f`]	Performs a `poweroff` followed by `poweron`. The `-f` option forces an immediate `poweroff`, otherwise the command attempts a graceful shutdown.
`poweroff` [`-y`] [`-f`]	Powers off the host server. The `-y` option enables you to skip the confirmation question. The `-f` option forces an immediate shutdown.
`poweron [-c]`	Powers on the host server. Using the `-c` option executes a `console` command after completion of the `poweron` command.

TABLE 3-8 Service-Related ALOM CMT Commands *(Continued)*

ALOM CMT Command	Description
`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 it provides a warning if the power supply should not be removed because the other power supply is not enabled.
`reset` [`-y`] [`-c`]	Generates a hardware reset on the host server. The `-y` option enables you to skip the confirmation question. The `-c` option executes a `console` command after completion of the `reset` command.
`resetsc` [`-y`]	Reboots the system controller. The `-y` option enables you to skip the confirmation question.
`setkeyswitch [-y] normal | stby | diag | locked`	Sets the virtual keyswitch. The `-y` option enables you to skip the confirmation question when setting the keyswitch to `stby`.
`setlocator` [`on` | `off`]	Turns the Locator LED on the server on or off.
`showenvironment`	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. See Section 3.3.3, "Running the `showenvironment` Command" on page 3-22.
`showfaults` [`-v`]	Displays current system faults. See Section 3.3.2, "Running the `showfaults` Command" on page 3-21.
`showfru` [`-g` *lines*] [`-s` | `-d`] [*FRU*]	Displays information about the FRUs in the server. • `-g` *lines* specifies the number of lines to display before pausing the output to the screen. • `-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). See Section 3.3.4, "Running the `showfru` Command" on page 3-25.
`showkeyswitch`	Displays the status of the virtual keyswitch.
`showlocator`	Displays the current state of the Locator LED as either on or off.
`showlogs` [`-b` *lines* | `-e` *lines* | `-v`] [`-g` *lines*] [`-p` `logtype[r|p]`]]	Displays the history of all events logged in the ALOM CMT event buffers (in RAM or the persistent buffers).
`showplatform` [`-v`]	Displays information about the host system's hardware configuration, the system serial number, and whether the hardware is providing service.

Note – See TABLE 3-11 for the ALOM CMT ASR commands.

3.3.2 Running the `showfaults` Command

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

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

Use the `showfaults` command for the following reasons:

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

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

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

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

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

No failures found in System
```

- Example of the `showfaults` command displaying an environmental fault:

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

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

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

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

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

3.3.3 Running the `showenvironment` Command

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

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

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

Example:

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

```
95      100
MB/CMP0/T_BCORE  OK        45    -10      -5       0      85
95      100
IOBD/IOB/TCORE   OK        41    -10      -5       0      95
100      105
IOBD/T_AMB       OK        30    -10      -5       0      45
50       55
-----------------------------------------------------
System Indicator Status:
-----------------------------------------------------
SYS/LOCATE           SYS/SERVICE          SYS/ACT
OFF                  ON                   ON
-----------------------------------------------------
SYS/REAR_FAULT       SYS/TEMP_FAULT       SYS/TOP_FAN_FAULT
OFF                  OFF                  OFF
-----------------------------------------------------
-------------------------------------------
System Disks:
-------------------------------------------
Disk   Status            Service  OK2RM
-------------------------------------------
HDD0   OK                OFF      OFF
HDD1   OK                OFF      OFF
HDD2   OK                OFF      OFF
HDD3   OK                OFF      OFF
-------------------------------------------------
Fans Status:
-------------------------------------------------
Fans (Speeds Revolution Per Minute):
Sensor           Status           Speed   Warn    Low
-----------------------------------------------------------
FT0/FM0          OK                3618     --   1920
FT0/FM1          OK                3437     --   1920
FT0/FM2          OK                3556     --   1920
FT2              OK                2578     --   1900
-----------------------------------------------------------
-------------------------------------------------------------------------------
--
Voltage sensors (in Volts):
-------------------------------------------------------------------------------
--
Sensor           Status      Voltage LowSoft LowWarn HighWarn HighSoft
-------------------------------------------------------------------------------
--
MB/V_+1V5        OK            1.48    1.36    1.39    1.60     1.63
MB/V_VMEML       OK            1.78    1.69    1.72    1.87     1.90
MB/V_VMEMR       OK            1.78    1.69    1.72    1.87     1.90
MB/V_VTTL        OK            0.87    0.84    0.86    0.93     0.95
MB/V_VTTR        OK            0.87    0.84    0.86    0.93     0.95
```

```
MB/V_+3V3STBY   OK            3.33    3.13    3.16    3.53     3.59
MB/V_VCORE      OK            1.30    1.20    1.24    1.36     1.39
IOBD/V_+1V5     OK            1.48    1.27    1.35    1.65     1.72
IOBD/V_+1V8     OK            1.78    1.53    1.62    1.98     2.07
IOBD/V_+3V3MAIN OK            3.38    2.80    2.97    3.63     3.79
IOBD/V_+3V3STBY OK            3.33    2.80    2.97    3.63     3.79
IOBD/V_+1V      OK            1.11    0.93    0.99    1.21     1.26
IOBD/V_+1V2     OK            1.17    1.02    1.08    1.32     1.38
IOBD/V_+5V      OK            5.09    4.25    4.50    5.50     5.75
IOBD/V_-12V     OK          -12.11  -13.80  -13.20  -10.80   -10.20
IOBD/V_+12V     OK           12.18   10.20   10.80   13.20    13.80
SC/BAT/V_BAT    OK            3.03      --    2.69      --       --
-------------------------------------------------------------
System Load (in amps):
-------------------------------------------------------------
Sensor           Status              Load     Warn Shutdown
-------------------------------------------------------------
MB/I_VCORE       OK                25.280   80.000   88.000
MB/I_VMEML       OK                 4.680   60.000   66.000
MB/I_VMEMR       OK                 4.680   60.000   66.000
-------------------------------------------------------------
----------------------
Current sensors:
----------------------
Sensor          Status
----------------------
IOBD/I_USB0      OK
IOBD/I_USB1      OK
FIOBD/I_USB      OK
-------------------------------------------------------------------------------
Power Supplies:
-------------------------------------------------------------------------------
Supply  Status          Underspeed  Overtemp  Overvolt  Undervolt
Overcurrent
-------------------------------------------------------------------------------
PS0     OK              OFF         OFF       OFF       OFF        OFF
PS1     OK              OFF         OFF       OFF       OFF        OFF

sc>
```

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

3.3.4 Running the showfru Command

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

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

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

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

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

3.4 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.

In normal operation*, the default configuration of POST (`diag_level=min`), provides a sanity check to ensure the server will boot. Normal operation applies to any power on of the server not intended to test power-on errors, hardware upgrades, or repairs. Once the Solaris OS is running, PSH provides run-time diagnosis of faults.

***Note –** Earlier versions of firmware have `max` as the default setting for the POST `diag_level` variable. To set the default to `min`, use the ALOM CMT command, **`setsc diag_level min`**

For validating hardware upgrades or repairs, configure POST to run in maximum mode (`diag_level=max`). Note that with maximum testing enabled, POST detects and offlines memory devices with errors that could be correctable by PSH. Thus, not all memory devices detected by POST need to be replaced. See Section 3.4.5, "Correctable Errors Detected by POST" on page 3-36.

Note – Devices can be manually enabled or disabled using ASR commands (see Section 3.7, "Managing Components With Automatic System Recovery Commands" on page 3-46).

3.4.1 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 variables.

TABLE 3-9 lists the ALOM CMT variables used to configure POST and FIGURE 3-10 shows how the variables work together.

Note – Use the ALOM CMT `setsc` command to set all the parameters in TABLE 3-9 except `setkeyswitch`.

TABLE 3-9 ALOM CMT 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 3-10. This parameter overrides all other commands.
	`diag`	The system runs POST based on predetermined settings.
	`stby`	The system cannot power on.
	`locked`	The system can power on and run POST, but no flash updates can be made.
`diag_mode`	`off`	POST does not run.
	`normal`	Runs POST according to `diag_level` value.
	`service`	Runs POST with preset values for `diag_level` and `diag_verbosity`.
`diag_level`	`min`	If `diag_mode` = `normal`, runs minimum set of tests.
	`max`	If `diag_mode` = `normal`, runs all the minimum tests plus extensive CPU and memory tests.
`diag_trigger`	`none`	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.
	`error_reset`	Runs POST if fatal errors are detected.
	`all_resets`	Runs POST after any reset.
`diag_verbosity`	`none`	No POST output is displayed.

TABLE 3-9 ALOM CMT Parameters Used For POST Configuration *(Continued)*

Parameter	Values	Description
	`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.

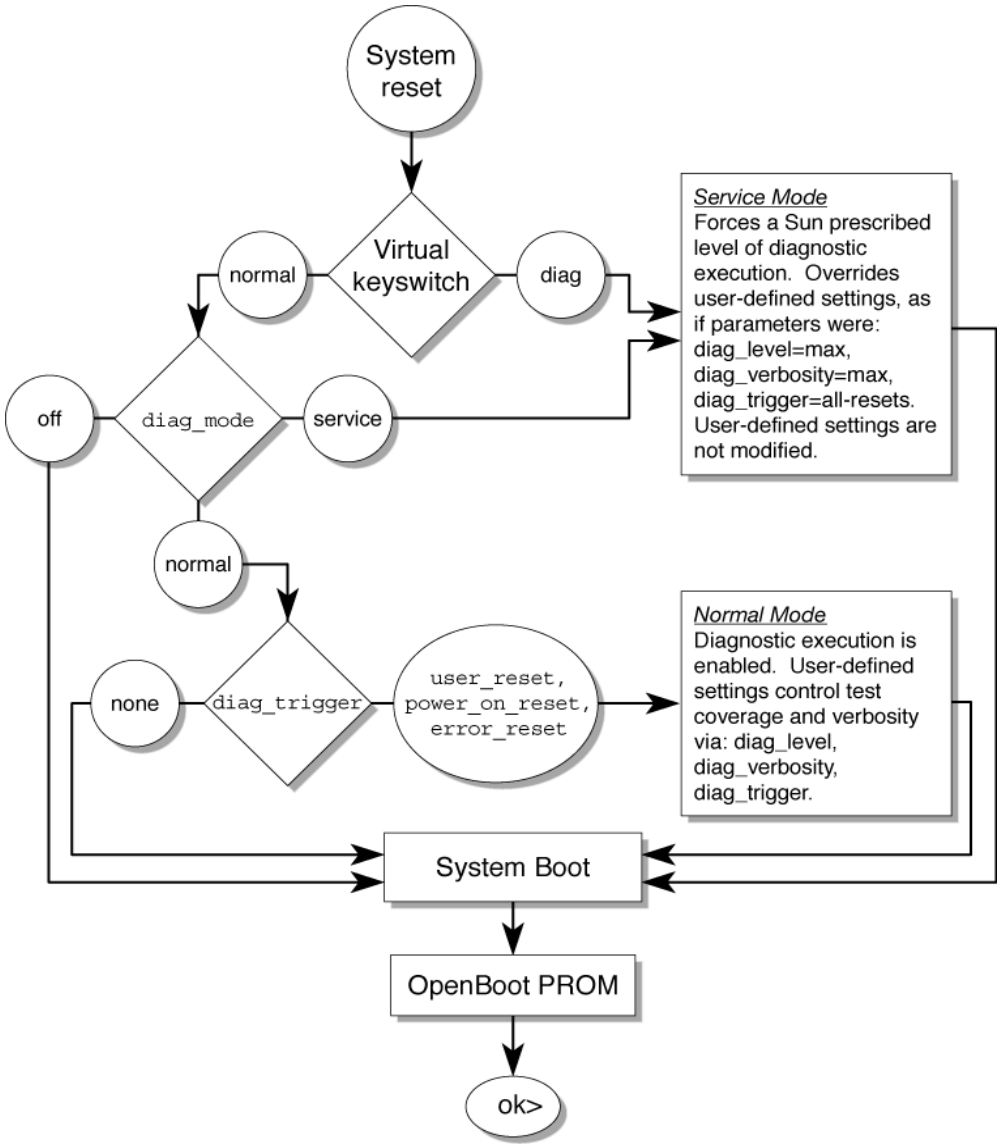

FIGURE 3-10 Flowchart of ALOM CMT Variables for POST Configuration

TABLE 3-10 shows typical combinations of ALOM CMT variables and associated POST modes.

TABLE 3-10 ALOM CMT Parameters and POST Modes

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

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

\ Earlier versions of firmware have `max` as the default setting for the POST `diag_level` variable. To set the default to `min`, use the ALOM CMT command, `setsc diag_level min`

3.4.2 Changing POST Parameters

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

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

```
#.
```

2. **Use the ALOM CMT `sc>` prompt to change the POST parameters.**

   Refer to TABLE 3-9 for a list of ALOM CMT POST parameters and their values.

   The `setkeyswitch` parameter sets the virtual keyswitch, so it does not use the `setsc` command. For example, to change the POST parameters using the `setkeyswitch` command, enter the following:

```
sc> setkeyswitch diag
```

To change the POST parameters using the `setsc` command, you must first set the `setkeyswitch` parameter to normal, then you can change the POST parameters using the `setsc` command:

```
sc> setkeyswitch normal
sc> setsc value
```

Example:

```
sc> setkeyswitch normal
sc> setsc diag_mode service
```

3.4.3 Reasons to Run POST

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

3.4.3.1 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.

In normal operation (`diag_level=min`), POST runs in mimimum mode by default to test devices required to power on the server. Replace any devices POST detects as faulty in minimum mode.

Run POST in maximum mode (`diag_level=max`) for all power-on or error-generated resets, and to validate hardware upgrades or repairs. With maximum testing enabled, POST finds faults and offlines memory devices with errors that could be correctable by PSH. Check the POST-generated errors with the `showfaults -v` command to verify if memory devices detected by POST can be corrected by PSH or need to be replaced. See Section 3.4.5, “Correctable Errors Detected by POST” on page 3-36.

3.4.3.2 Diagnosing the System Hardware

You can use POST as an initial diagnostic tool for the system hardware. In this case, configure POST to run in maximum mode (`diag_mode=service`, `setkeyswitch=diag`, `diag_level=max`) for thorough test coverage and verbose output.

3.4.4 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. The following example uses the `powercycle` command. For other methods, refer to the *Sun SPARC Enterprise T2000 Server Administration Guide*.

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

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

SC Alert: SC Request to Power Off Host.

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

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

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

```
sc> console
```

Example of POST output:

```
SC Alert: Host System has Reset                    Note: some output omitted.
 0:0>
 0:0>Copyright © 2005 Sun Microsystems, Inc. All rights reserved
 SUN PROPRIETARY/CONFIDENTIAL.
 Use is subject to license terms.
 0:0>VBSC selecting POST MAX Testing.
 0:0>VBSC enabling L2 Cache.
 0:0>VBSC enabling Full Memory Scrub.
 0:0>VBSC enabling threads: fffff00f
 0:0>Init CPU
 0:0>Start Selftest.....
 0:0>CPU =: 0
 0:0>DMMU Registers Access
 0:0>IMMU Registers Access
 0:0>Init mmu regs
 0:0>D-Cache RAM
 0:0>Init MMU.....
 0:0>DMMU TLB DATA RAM Access
 0:0>DMMU TLB TAGS Access
 0:0>DMMU CAM
 0:0>IMMU TLB DATA RAM Access
 0:0>IMMU TLB TAGS Access
 0:0>IMMU CAM
 0:0>Setup and Enable DMMU
 0:0>Setup DMMU Miss Handler
 0:0>Niagara, Version 2.0
 0:0>Serial Number 00000098.00000820 = fffff231.17422755
 0:0>Init JBUS Config Regs
 0:0>IO-Bridge unit 1 init test
0:0>sys 150 MHz, CPU 600 MHz, mem 150 MHz.
 0:0>Integrated POST Testing
 0:0>Setup L2 Cache
 0:0>L2 Cache Control = 00000000.00300000
 0:0>Scrub and Setup L2 Cache
 0:0>L2 Directory clear
 0:0>L2 Scrub VD & UA
 0:0>L2 Scrub Tags
 0:0>Test Memory.....
```

```
 0:0>Scrub 00000000.00600000->00000001.00000000 on Memory Channel
[0 1 2 3 ] Rank 0 Stack 0
 0:0>Scrub 00000001.00000000->00000002.00000000 on Memory Channel
[0 1 2 3 ] Rank 1 Stack 0
 3:0>IMMU Functional
 7:0>IMMU Functional
 7:0>DMMU Functional
 0:0>IMMU Functional
 0:0>DMMU Functional
 0:0>Print Mem Config
 0:0>Caches : Icache is ON, Dcache is ON.
 0:0>Bank 0 4096MB : 00000000.00000000 -> 00000001.00000000.
 0:0>Bank 2 4096MB : 00000001.00000000 -> 00000002.00000000.
 0:0>Block Mem Test
 0:0>Test 4288675840 bytes at 00000000.00600000 Memory Channel [
0 1 2 3 ] Rank 0 Stack 0
 0:0>........
 0:0>Test 4294967296 bytes at 00000001.00000000 Memory Channel [
0 1 2 3 ] Rank 1 Stack 0
 0:0>........
 0:0>IO-Bridge Tests.....
 0:0>IO-Bridge Quick Read
 0:0>
 0:0>------------------------------------------------------------
--
 0:0>--------- IO-Bridge Quick Read Only of CSR and ID ----------
-----
 0:0>------------------------------------------------------------
--
 0:0>fire 1 JBUSID 00000080.0f000000 =
 0:0>IO-Bridge unit 1 Config MB bridges
 0:0>Config port A, bus 2 dev 0 func 0, tag IOBD/PCI-SWITCH0
 0:0>Config port A, bus 3 dev 1 func 0, tag IOBD/GBE0
 0:0>INFO:Master Abort for probe, device IOBD/PCIE1 looks like it
is not present!
 0:0>INFO:Master Abort for probe, device IOBD/PCIE2 looks like it
is not present!
 0:0>INFO:
 0:0>POST Passed all devices.
 0:0>
 0:0>DEMON: (Diagnostics Engineering MONitor)
 0:0>Select one of the following functions
 0:0>POST:Return to OBP.
```

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

5. Perform further investigation if needed.

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

a. Interpret the POST messages:

POST error messages use the following syntax:

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

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

Warning and informational messages use the following syntax:

INFO or WARNING: *message*

The following example shows a POST error message.

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

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

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

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

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

Example:

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

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

Note – You can use ASR commands to display and control disabled components. See Section 3.7, "Managing Components With Automatic System Recovery Commands" on page 3-46.

3.4.5 Correctable Errors Detected by POST

In maximum mode, POST detects and offlines memory devices with errors that could be correctable by PSH. Use the examples in this section to verify if the detected memory devices are correctable.

Note – For servers powered on in maximum mode without the intention of validating a hardware upgrade or repair, examine *all* faults detected by POST to verify if the errors can be corrected by Solaris PSH. See Section 3.5, "Using the Solaris Predictive Self-Healing Feature" on page 3-40.

When using maximum mode, if no faults are detected, return POST to minimum mode.

```
sc> setkeyswitch normal
sc> setsc diag_mode normal
sc> setsc diag_level min
```

3.4.5.1 Correctable Errors for Single DIMMs

If POST faults a single DIMM (CODE EXAMPLE 3-1) that was not part of a hardware upgrade or repair, it is likely that POST encountered a correctable error that can be handled by PSH.

CODE EXAMPLE 3-1 POST Fault for a Single DIMM

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

In this case, reenable the DIMM and run POST in minimum mode as follows:

1. **Reenable the DIMM.**

```
sc> enablecomponent name-of-DIMM
```

2. **Return POST to minimum mode.**

```
sc> setkeyswitch normal
sc> setsc diag_mode normal
sc> setsc diag_level min
```

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

   There are several ways to initiate a reset. The following example uses the `powercycle` command. For other methods, refer to the *Sun SPARC Enterprise T2000 Server Administration Guide*.

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

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

SC Alert: SC Request to Power Off Host.

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

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

4. **Replace the DIMM if POST continues to fault the device in minimum mode.**

3.4.5.2 Determining When to Replace Detected Devices

Note – This section assumes faults are detected by POST in maximum mode.

If a detected device is part of a hardware upgrade or repair, or if POST detects multiple DIMMs (CODE EXAMPLE 3-2), replace the detected devices.

CODE EXAMPLE 3-2 POST Fault for Multiple DIMMs

```
sc> showfaults -v
ID Time           FRU               Fault
1 OCT 13 12:47:27 MB/CMP0/CH0/R0/D0 MB/CMP0/CH0/R0/D0 deemed
faulty and disabled
2 OCT 13 12:47:27 MB/CMP0/CH0/R0/D1 MB/CMP0/CH0/R0/D1 deemed
faulty and disabled
```

Note – The previous example shows two DIMMs on the same channel/rank, which could be an uncorrectable error.

If the detected device is *not* a part of a hardware upgrade or repair, use the following list to examine and repair the fault:

1. If a detected device is not a DIMM, or if more than a single DIMM is detected, replace the detected devices.
2. If a detected device is a single DIMM and the same DIMM is also detected by PSH, replace the DIMM (CODE EXAMPLE 3-3).

CODE EXAMPLE 3-3 PSH and POST Faults on the Same DIMM

```
sc> showfaults -v
ID Time           FRU               Fault
0 SEP 09 11:09:26 MB/CMP0/CH0/R0/D0 Host detected fault,
MSGID:SUN4V-8000-DX UUID: 7ee0e46b-ea64-6565-e684-e996963f7b86
1 OCT 13 12:47:27 MB/CMP0/CH0/R0/D0 MB/CMP0/CH0/R0/D0 deemed
faulty and disabled
```

Note – The detected DIMM in the previous example must also be replaced because it exceeds the PSH page retire threshold.

3. If a device detected by POST is a single DIMM and the same DIMM is not detected by PSH, follow the procedure in Section 3.4.5.1, "Correctable Errors for Single DIMMs" on page 3-37.

After the detected devices are repaired or replaced, return POST to the default minimum level.

```
sc> setkeyswitch normal
sc> setsc diag_mode normal
sc> setsc diag_level min
```

3.4.6 Clearing POST Detected Faults

In most cases, when POST detects a faulty component, POST logs the fault and automatically takes the failed component out of operation by placing the component in the ASR blacklist (see Section 3.7, "Managing Components With Automatic System Recovery Commands" on page 3-46).

After the faulty FRU is replaced, you must clear the fault by removing the component from the ASR blacklist. This procedure describes how to do this.

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

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

   Example:

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

   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 the previous step.

   Example:

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

   The fault is cleared and should not show up when you run the `showfaults` command. Additionally, the 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 prompt, use the** `showfaults` **command to verify that no faults are reported.**

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

No failures found in System
```

3.5 Using the Solaris Predictive Self-Healing Feature

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

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

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

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

The PSH console message provides the following information:

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

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

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

3.5.1 Identifying PSH Detected Faults

When a PSH fault is detected, a Solaris console message similar to the following is displayed:

```
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-Fire-T200, 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.
```

The following is an example of the ALOM CMT alert for the same PSH diagnosed fault:

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

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

3.5.1.1 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.

Note – Faults detected by the Solaris PSH facility are also reported through ALOM CMT alerts. In addition to the PSH `fmdump` command, the ALOM CMT `showfaults` command provides information about faults and displays fault UUIDs. See Section 3.3.2, "Running the `showfaults` Command" on page 3-21.

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

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

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

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

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 `showfaults` command.

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

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

```
CPU errors exceeded acceptable levels

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

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

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

3. **Follow the suggested actions to repair the fault.**

3.5.2 Clearing PSH Detected Faults

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

Note – If you are dealing with faulty DIMMs, do not follow this procedure. Instead, perform the procedure in Section 5.2.4, "Replacing DIMMs" on page 5-14.

---

1. **After replacing a faulty FRU, power on the server.**

2. **At the ALOM CMT 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
ID Time              FRU               Fault
0 SEP 09 11:09:26   MB/CMP0/CH0/R0/D0 Host detected fault, MSGID:
SUN4U-8000-2S  UUID: 7ee0e46b-ea64-6565-e684-e996963f7b86
```

   - 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 2 through Step 4.

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

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

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 command:

   `fmadm repair` *UUID*

   Example:

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

3.6 Collecting Information From Solaris OS Files and Commands

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

If POST, ALOM CMT, 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.

3.6.1 Checking the Message Buffer

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

```
# dmesg
```

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

3.6.2 Viewing System Message Log Files

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

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

1. **Log in as superuser.**

2. **Issue the following command:**

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

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

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

3.7 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 following components are managed by the ASR feature:

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

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

In most cases, POST automatically disables a 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 3-11) enable you to view, and manually add or remove components from the ASR blacklist. You run these commands from the ALOM CMT `sc>` prompt.

TABLE 3-11 ASR Commands

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

* The `showcomponent` command might not report all blacklisted DIMMS.

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

3.7.1 Displaying System Components

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

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

Example with no disabled components:

```
sc> showcomponent

Keys:

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

ASR state: clean
```

Example showing a disabled component:

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

3.7.2 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 MB/CMP0/CH3/R1/D1

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

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

```
sc> reset
```

3.7.3 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 MB/CMP0/CH3/R1/D1

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

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

```
sc> reset
```

3.8 Exercising the System With SunVTS

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

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

- Section 3.8.1, "Checking Whether SunVTS Software Is Installed" on page 3-49
- Section 3.8.2, "Exercising the System Using SunVTS Software" on page 3-50

3.8.1 Checking Whether SunVTS Software Is Installed

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

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

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

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.

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

If SunVTS is not installed, you can obtain the installation packages from the Solaris Operating System DVDs.

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*.

3.8.2 Exercising the System Using SunVTS Software

Before you begin, the Solaris OS must be running. You also need to ensure that SunVTS validation test software is installed on your system. See Section 3.8.1, "Checking Whether SunVTS Software Is Installed" on page 3-49.

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*

3.8.3 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 in the following command accordingly.

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

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

   The SunVTS GUI is displayed (FIGURE 3-11).

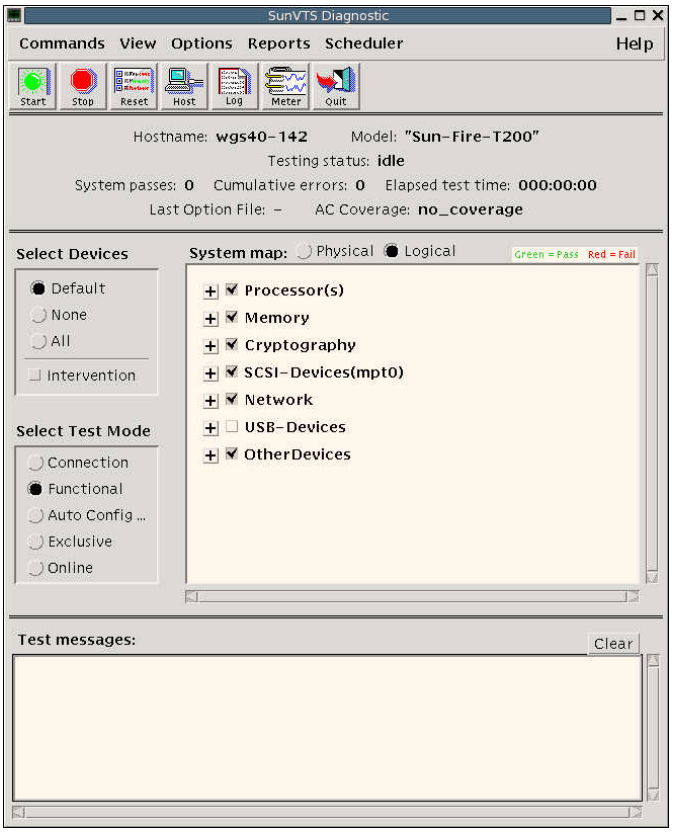

FIGURE 3-11 SunVTS GUI

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

   The test selection area lists tests in categories, such as *Network*, as shown in FIGURE 3-12. To expand a category, left-click the ⊞ icon (expand category icon) to the left of the category name.

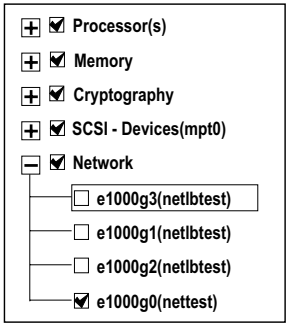

FIGURE 3-12 SunVTS Test Selection Panel

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

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

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

   TABLE 3-12 lists tests that are especially useful to run on this server.

TABLE 3-12 Useful SunVTS Tests to Run on This Server

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

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

   You can customize individual tests by right-clicking on the name of the test. For example, in FIGURE 3-12, 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 Message***s* (`/var/adm/messages`) – A file containing messages generated by the operating system and various applications.
   - **Log Files** (`/var/opt/SUNWvts/logs`) – A directory containing the log files.

CHAPTER 4

Replacing Hot-Swappable and Hot-Pluggable FRUs

This chapter describes how to remove and replace the hot-swappable and hot-pluggable field-replaceable units (FRUs) in the server.

The following topics are covered:

- Section 4.1, “Devices That Are Hot-Swappable and Hot-Pluggable” on page 4-2
- Section 4.2, “Hot-Swapping a Fan” on page 4-2
- Section 4.3, “Hot-Swapping a Power Supply” on page 4-4
- Section 4.4, “Hot-Swapping the Rear Blower” on page 4-7
- Section 4.5, “Hot-Plugging a Hard Drive” on page 4-9

4.1 Devices That Are Hot-Swappable and Hot-Pluggable

Hot-swappable devices are those devices that you can remove and install while the server is running without affecting the rest of the server's capabilities. In a server, the following devices are hot-swappable:

- Fans
- Power supplies
- Rear blower

Hot-pluggable devices are those devices that can be removed and installed while the system is running, but you must perform administrative tasks beforehand. In a server, the chassis-mounted hard drives can be hot-swappable (depending on how they are configured).

4.2 Hot-Swapping a Fan

Three hot-swappable fans are located under the fan door.

Two working fans are required to provide adequate cooling for the server. If a fan fails, replace it as soon as possible to ensure system availability.

The following LEDs are lit when a fan fault is detected:

- Front and rear Service Required LEDs
- Top Fan LED on the front of the server
- LED on the faulty fan

If an overtemperature conditions occurs, the front panel Overtemp LED lights.

A message is displayed on the console and logged by ALOM. Use the `showfaults` command at the `sc>` prompt to view the current faults.

4.2.1 Removing a Fan

1. **Gain access to the top of the server where the fan door is located (**FIGURE 4-1**).**

You might need to extend the server to a maintenance position. See Section 5.1.3, "Extending the Server to the Maintenance Position" on page 5-3

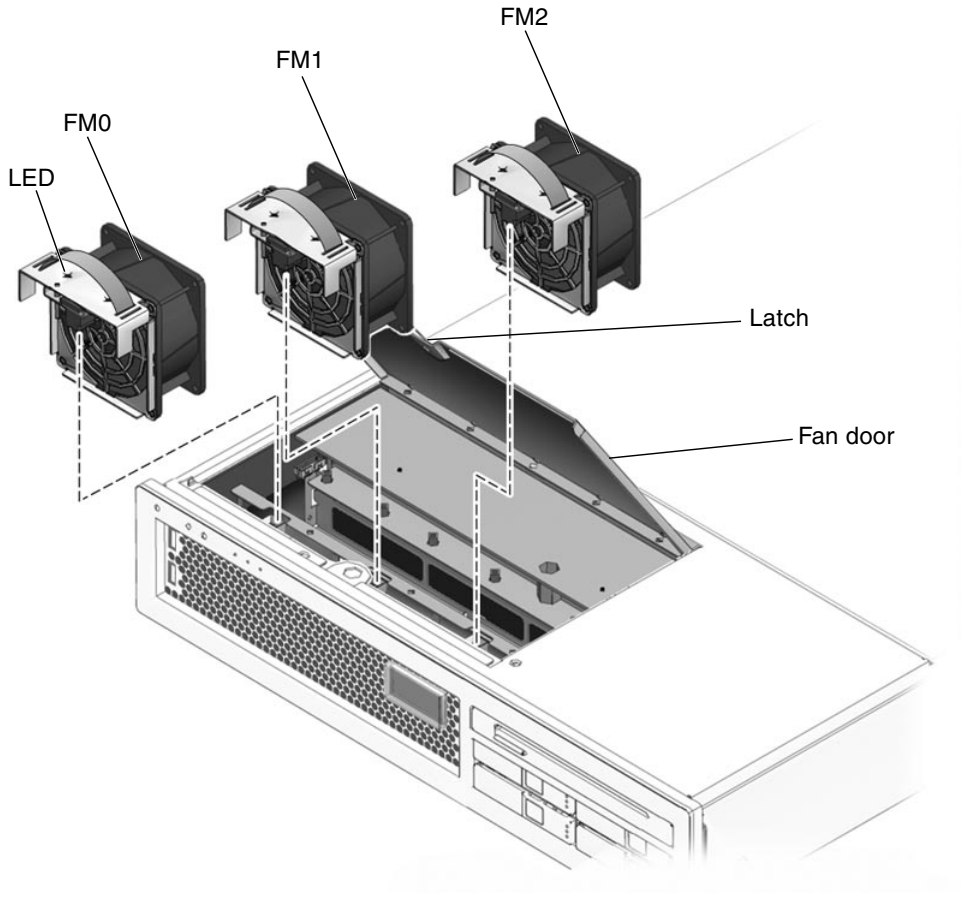

FIGURE 4-1 Fan Identification and Removal

2. **Unpackage the replacement fan and place it near the server.**
3. **Lift the latch on the top of the fan door (FIGURE 4-1), and lift the fan door open.**
   The fan door is spring loaded, and you must hold it in the open position.
4. **Identify the faulty fan.**
   A lighted LED on the top of a fan indicates that the fan is faulty.
5. **Pull up on the fan strap handle until the fan is removed from the fan bay.**

4.2.2 Replacing a Fan

1. **With the fan door held open, slide the replacement fan into the fan bay.**
2. **Apply firm pressure to fully seat the fan.**
3. **Verify that the LED on the replaced fan and the Top fan, Service Required, and Locator LEDs are not lit.**
4. **Close the fan door.**
5. **If necessary, return the server to its normal position in the rack.**

4.3 Hot-Swapping a Power Supply

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

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

- Front and rear Service Required LEDs.
- Rear-FRU Fault LED on the front of the server
- 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.

4.3.1 Removing a Power Supply

1. **Identify which power supply (0 or 1) requires replacement (**FIGURE 4-2**).**

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

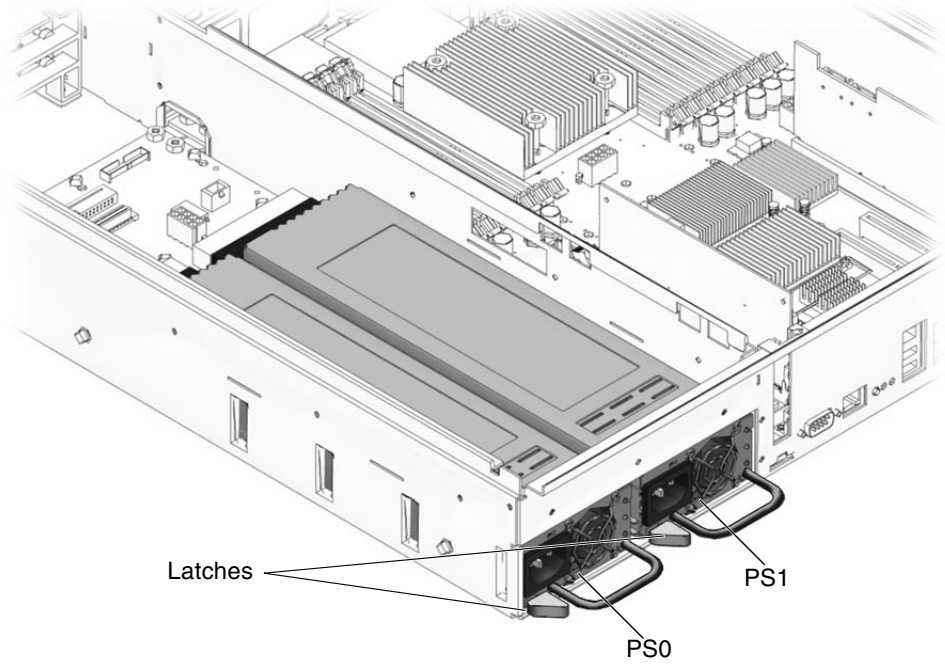

FIGURE 4-2 Locating Power Supplies and Release Latch

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

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

   Example:

```
sc> removefru PSn
Are you sure you want to remove PS0 [y/n]? y
<PSn> is safe to remove.
```

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

3. **Gain access to the rear of the server where the faulty power supply is located.**

4. **At the rear of the server, release the cable management arm (CMA) tab (FIGURE 4-3) and swing the CMA out of the way so you can access the power supply.**

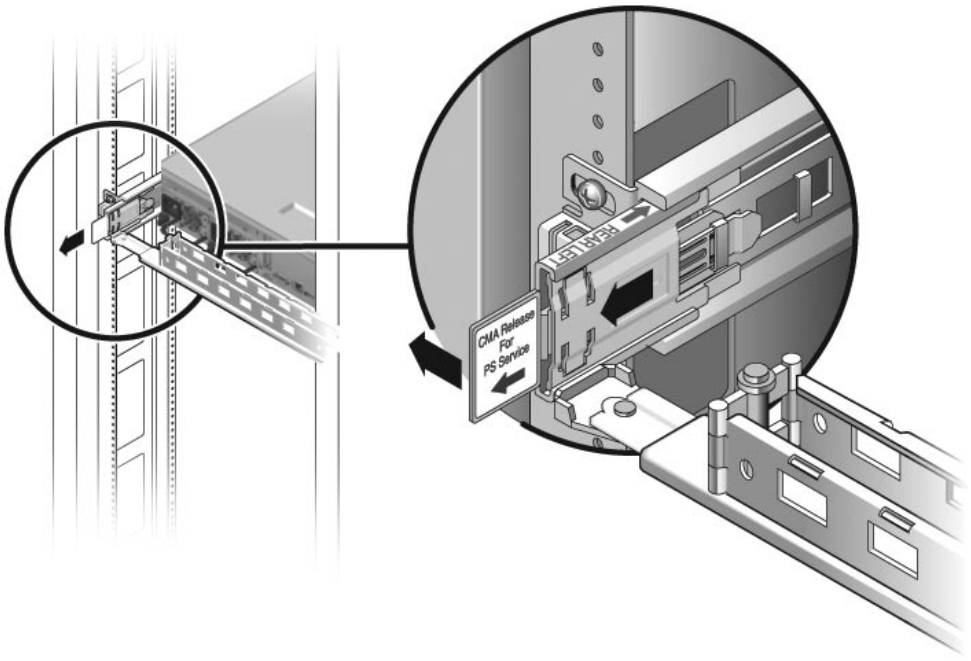

FIGURE 4-3 Rotating the Cable Management Arm

5. **Disconnect the power cord from the faulty power supply.**
6. **Grasp the power supply handle and push the power supply latch to the right.**
7. **Pull the power supply out of the chassis.**

4.3.2 Replacing a Power Supply

1. **Align the replacement power supply with the empty power supply bay.**
2. **Slide the power supply into bay until it is fully seated.**
3. **Reconnect the power cord to the power supply.**
4. **Close the CMA, inserting the end of the CMA into the rear left rail bracket.**
5. **Verify that the amber LED on the replaced power supply, the Service Required LED, and Rear-FRU Fault LEDs are not lit.**
6. **At the** `sc>` **prompt, issue the** `showenvironment` **command to verify the status of the power supplies.**

4.4 Hot-Swapping the Rear Blower

The rear blower on the server is hot-swappable.

The following LEDs are lit when a blower unit fault is detected:

- Front and rear Service Required LEDs
- LED on the blower.

4.4.1 Removing the Rear Blower

1. **Gain access to the rear of the server where the faulty blower unit is located.**
2. **Release the cable management arm tab (FIGURE 4-3) and swing the cable management arm out of the way so you can access the power supply.**
3. **Unscrew the two thumbscrews (FIGURE 4-4) that secure the rear blower to the chassis.**

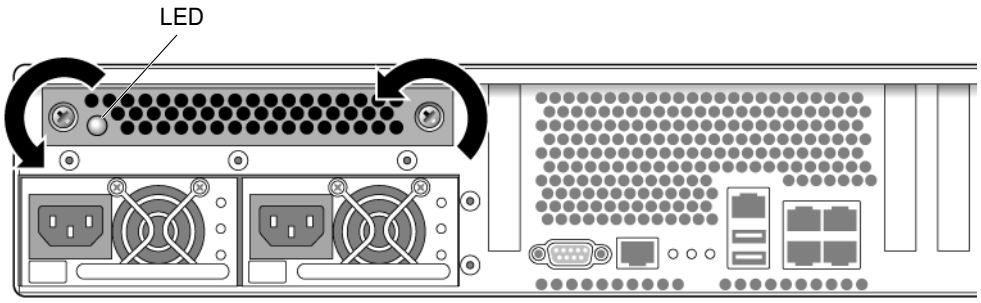

FIGURE 4-4 Removing the Rear Blower

4. **Grasp the thumbscrews and slowly slide the blower out of the chassis, keeping the blower level as you remove it.**

4.4.2 Replacing the Rear Blower

1. **Unpackage the replacement blower.**
2. **Slide the blower into the chassis until it locks into the power connector at the front of the blower compartment (FIGURE 4-5).**

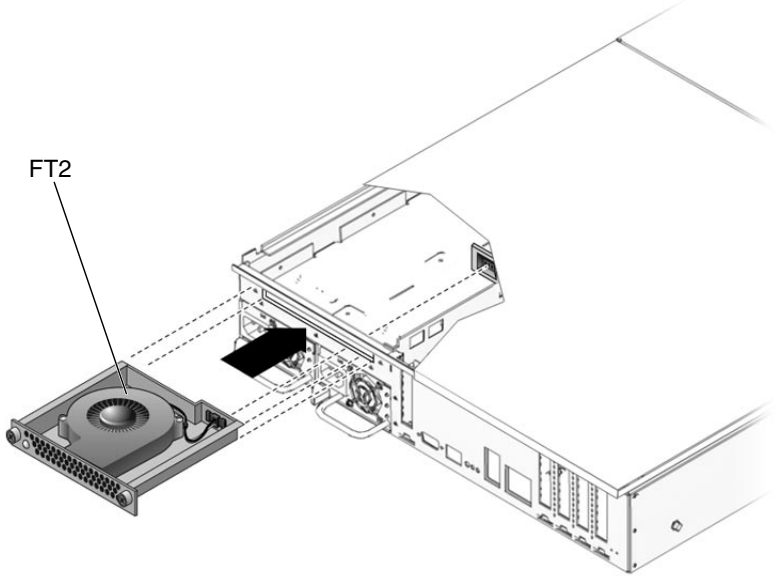

FIGURE 4-5 Replacing the Blower Unit

3. **Tighten the two thumbscrews to secure the blower to the chassis.**
4. **Verify that the Rear Blower and Service Required LEDs are not lit.**
5. **Close the CMA, inserting the end of the CMA into the rear left rail bracket.**

4.5 Hot-Plugging 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 (prevent any applications from accessing it, and remove the logical software links to it) before you can safely remove it.

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

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

If your drive falls into these conditions, you must shut the system down before you replace the hard drive. See Section 5.1.2, “Shutting the System Down” on page 5-2.

4.5.1 Removing a Hard Drive

1. **Identify the location of the hard drive that you want to replace (**FIGURE 4-6**).**

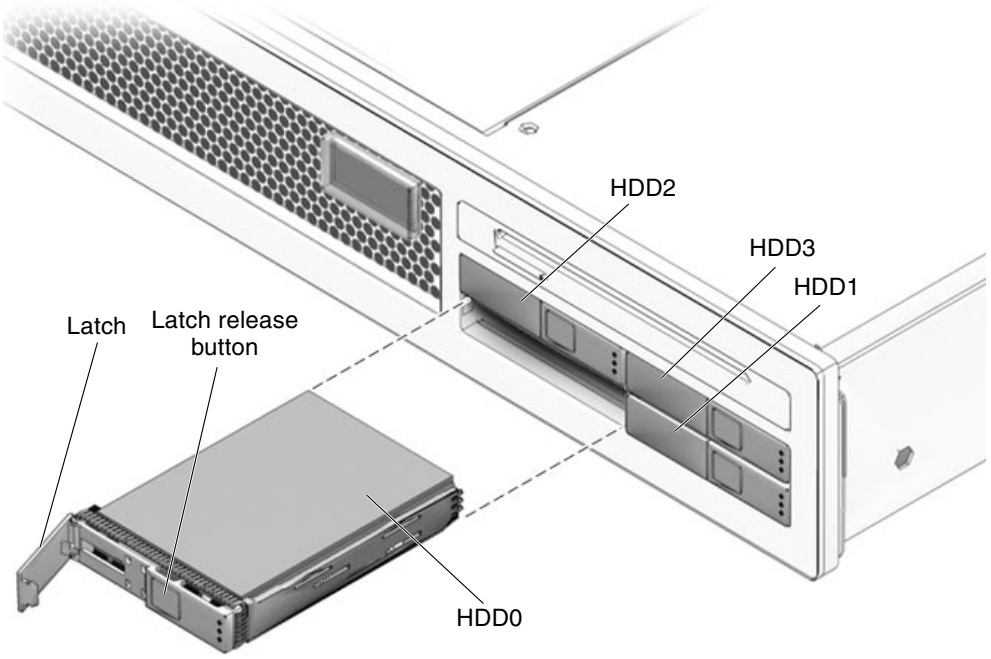

FIGURE 4-6 Locating the Hard Drive Release Button and Latch

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

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

3. **On the drive you plan to remove, push the latch release button (**FIGURE 4-6**).**

   The latch opens.

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

4. **Grasp the latch and pull the drive out of the drive slot.**

4.5.2 Replacing a Hard Drive

1. **Align the replacement drive to the drive slot.**

   The hard drive is physically addressed according to the slot in which it is installed. See FIGURE 4-6. It is important to install a replacement drive in the same slot from which the drive was removed.

2. **Slide the drive into the bay until it is fully seated.**
3. **Close the latch to lock the drive in place.**
4. **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 data updated from a RAID configuration.

CHAPTER 5

Replacing Cold-Swappable FRUs

This chapter describes how to remove and replace field-replaceable units (FRUs) in the server that must be cold-swapped.

The following topics are covered:

- Section 5.1, "Common Procedures for Parts Replacement" on page 5-1
- Section 5.2, "Removing and Replacing FRUs" on page 5-8
- Section 5.3, "Common Procedures for Finishing Up" on page 5-41

For a list of FRUs, see Appendix A.

Note – Never attempt to run the system with the cover removed. The cover must be in place for proper air flow. The cover interlock switch (intrusion switch) immediately shuts the system down when the cover is removed.

5.1 Common Procedures for Parts Replacement

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

- Section 5.1.2, "Shutting the System Down" on page 5-2
- Section 5.1.3, "Extending the Server to the Maintenance Position" on page 5-3
- Section 5.1.6, "Performing Electrostatic Discharge Prevention Measures" on page 5-6
- Section 5.1.5, "Disconnecting Power From the Server" on page 5-6
- Section 5.1.7, "Removing the Top Cover" on page 5-6
- Section 5.1.8, "Removing the Front Bezel and Top Front Cover" on page 5-7

Note – These procedures do not apply to the hot-pluggable and hot-swappable devices (fans, power supplies, hard drives, and rear blower) described in Chapter 4.

The corresponding procedures that you perform when maintenance is complete are described in Section 5.3, "Common Procedures for Finishing Up" on page 5-41.

5.1.1 Required Tools

The server can be serviced with the following tools:

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

5.1.2 Shutting the System Down

Performing a graceful shutdown ensures that 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 *Sun SPARC Enterprise T2000 Server Administration Guide* for log file information.

2. **Notify affected users.**

   Refer to your Solaris system administration documentation for additional information.

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

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

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

   Refer to the Solaris system administration documentation for additional information.

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

   d. At the ALOM CMT `sc>` prompt, issue the `poweroff` command.

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

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

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

5.1.3 Extending the Server to the Maintenance Position

If the server is installed in a rack with the extendable slide rails that were supplied with the server, use this procedure to extend the server to the maintenance position.

Note – Remove the server from the rack for all cold-swappable FRU replacement procedures except the DIMMs, PCI cards, and the system controller.

1. **(Optional) Issue the following command from the ALOM CMT `sc>` prompt to locate the system that requires maintenance.**

```
sc> setlocator on
Locator LED is on.
```

   Once you have located the server, press the Locator LED button to turn it off.

2. **Check to see that no cables will be damaged or interfere when the server is extended.**

   Although the cable management arm (CMA) that is supplied with the server is hinged to accommodate extending the server, ensure that all cables and cords are capable of extending.

3. **From the front of the server, release the slide rail latches on each side.**

   Pinch the green latches as shown in FIGURE 5-1.

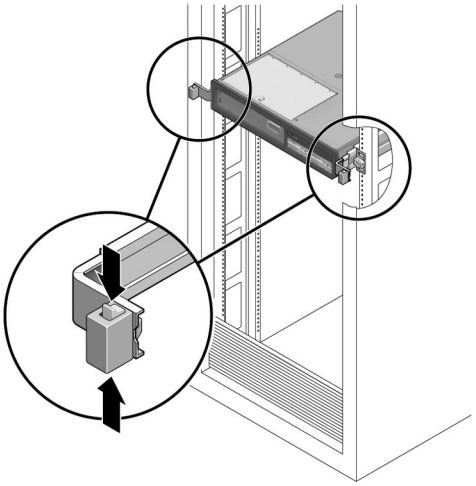

FIGURE 5-1 Slide Release Latches

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

5.1.4 Removing the Server From a Rack

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

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

1. **Disconnect all the cables and power cords from the server.**
2. **Extend the server to the maintenance position as described in** Section 5.1.3, "Extending the Server to the Maintenance Position" on page 5-3**.**
3. **Press the metal lever (**FIGURE 5-2**) that is located on the inner side of the rail to disconnect the CMA from the rail assembly (on the right side from the back of the rack).**

   This action leaves the CMA still attached to the cabinet, but the server chassis is now disconnected from the CMA.

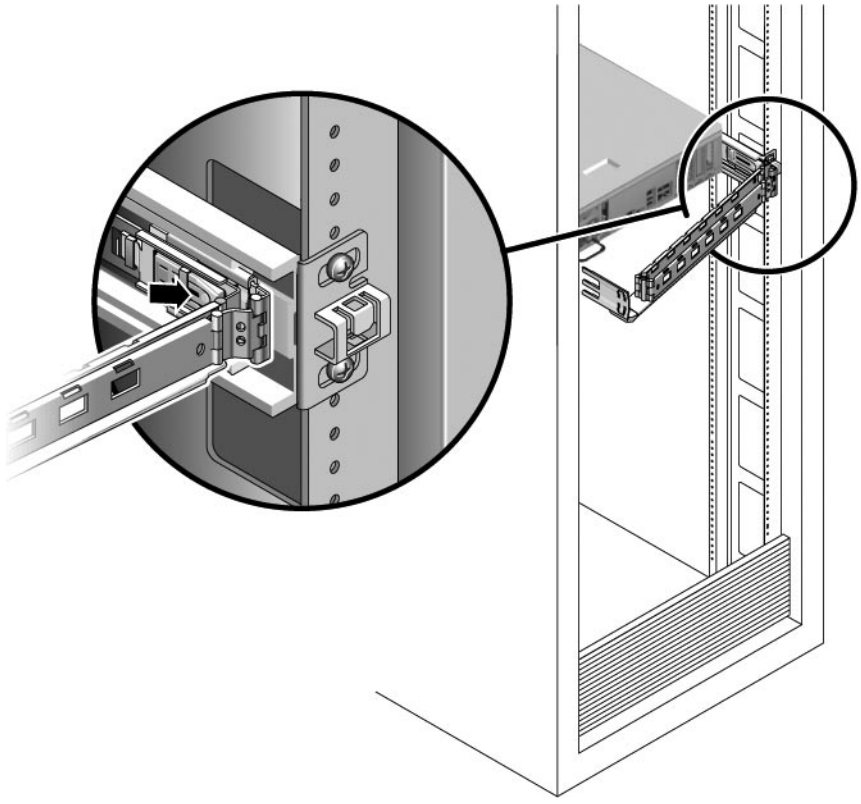

FIGURE 5-2 Locating the Metal Lever

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

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

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

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

5.1.5 Disconnecting Power From the Server

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

- **Disconnect both power cords from the power supplies.**

Note – The following FRU replacements do not require that power be removed: DIMMs and PCI cards.

5.1.6 Performing Electrostatic Discharge Prevention 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. Do this after you disconnect the power cords from the server.

5.1.7 Removing the Top Cover

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

1. **Press the top cover release button (**FIGURE 5-3**).**

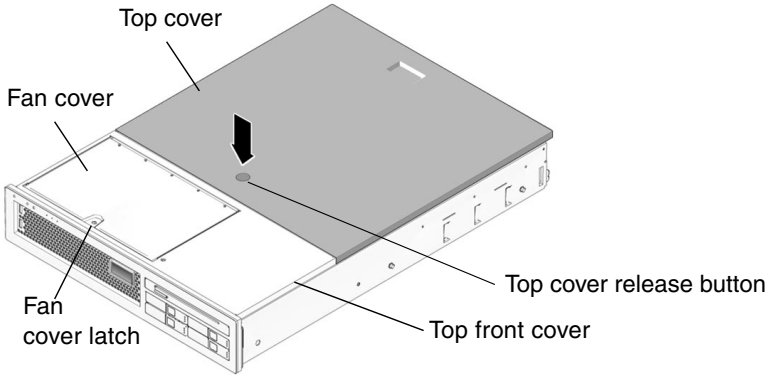

FIGURE 5-3 Top Cover and Release Button

2. **While pressing the top cover release button, slide the cover toward the rear of the server about half of an inch.**
3. **Lift the cover off the chassis.**

5.1.8 Removing the Front Bezel and Top Front Cover

The following field-replaceable units (FRUs) require the removal of the top front cover and front bezel:

- Motherboard
- SAS disk backplane
- LED board
- Front I/O board
- Fan power board
- DVD

1. **Remove the top cover as described in** Section 5.1.7, “Removing the Top Cover” on page 5-6**.**
2. **Lift the fan cover latch (**FIGURE 5-3**) and open the fan cover.**
3. **Loosen the captive screw (near the farthest right fan) that secures the bezel to the chassis (**FIGURE 5-4**).**

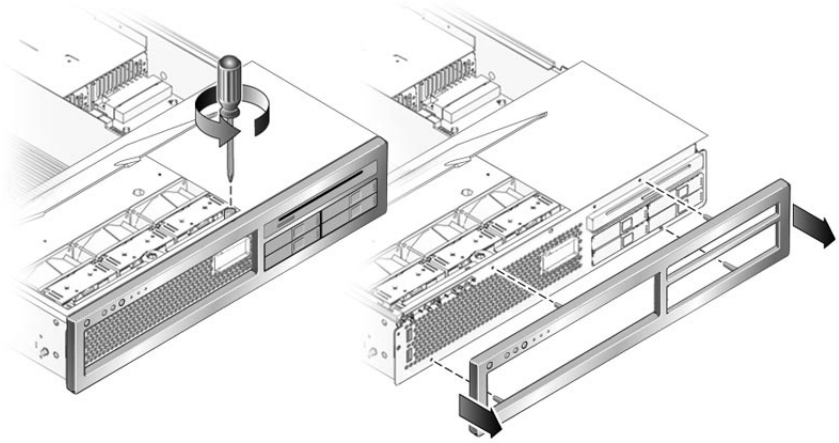

FIGURE 5-4 Removing the Front Bezel From the Server Chassis

4. **Remove the front bezel from the chassis (**FIGURE 5-4**).**

   The bezel is held in place by a mounting tab and four fasteners that clamp the bezel to the chassis.

5. **While holding the fan cover open, slide the top front cover forward to disengage the top front cover from the chassis.**

6. **Lift the top front cover from the chassis.**

5.2 Removing and Replacing FRUs

This section provides procedures for replacing the following field-replaceable parts (FRUs) inside the server chassis:

- Section 5.2.1, "Removing PCI-Express and PCI-X Cards" on page 5-9 and Section 5.2.2, "Replacing PCI Cards" on page 5-11
- Section 5.2.3, "Removing DIMMs" on page 5-12 and Section 5.2.4, "Replacing DIMMs" on page 5-14
- Section 5.2.5, "Removing the System Controller Card" on page 5-17 and Section 5.2.6, "Replacing the System Controller Card" on page 5-18
- Section 5.2.7, "Removing the Motherboard Assembly" on page 5-19 and Section 5.2.8, "Replacing the Motherboard Assembly" on page 5-23
- Section 5.2.9, "Removing the Power Distribution Board" on page 5-27 and Section 5.2.10, "Replacing the Power Distribution Board" on page 5-30

- Section 5.2.11, “Removing the LED Board” on page 5-32 and Section 5.2.12, “Replacing the LED Board” on page 5-33
- Section 5.2.13, “Removing the Fan Power Board” on page 5-34 and Section 5.2.14, “Replacing the Fan Power Board” on page 5-34
- Section 5.2.15, “Removing the Front I/O Board” on page 5-35 and Section 5.2.16, “Replacing the Front I/O Board” on page 5-36
- Section 5.2.17, “Removing the DVD Drive” on page 5-37 and Section 5.2.18, “Replacing the DVD Drive” on page 5-37
- Section 5.2.19, “Removing the SAS Disk Backplane” on page 5-37 and Section 5.2.20, “Replacing the SAS Disk Backplane” on page 5-38
- Section 5.2.21, “Removing the Battery on the System Controller” on page 5-40 and Section 5.2.22, “Replacing the Battery on the System Controller” on page 5-40

To locate these FRUs, refer to Appendix A.

5.2.1 Removing PCI-Express and PCI-X Cards

1. **Perform the procedures described in** Section 5.1, “Common Procedures for Parts Replacement” on page 5-1**.**
2. **Locate the PCI card that you want to remove.**

   To locate the PCI card slots, refer to FIGURE 5-5 and FIGURE 5-6. The PCI card slots are located on the I/O portion of the motherboard assembly.

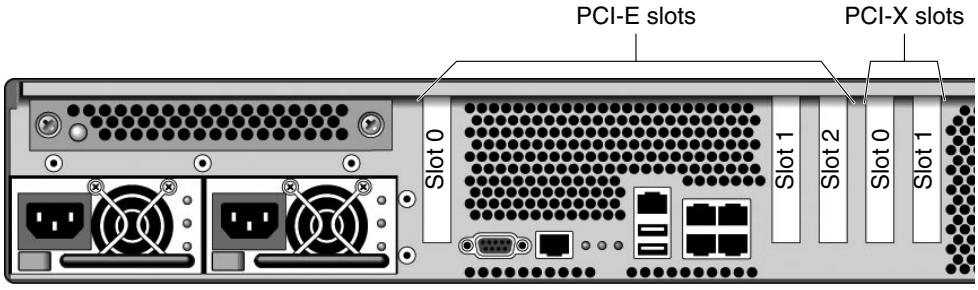

FIGURE 5-5 Location of PCI-Express and PCI-X Card Slots

3. **Note where the PCI card is installed, and note any cables so you know where to reinstall the card and cables.**

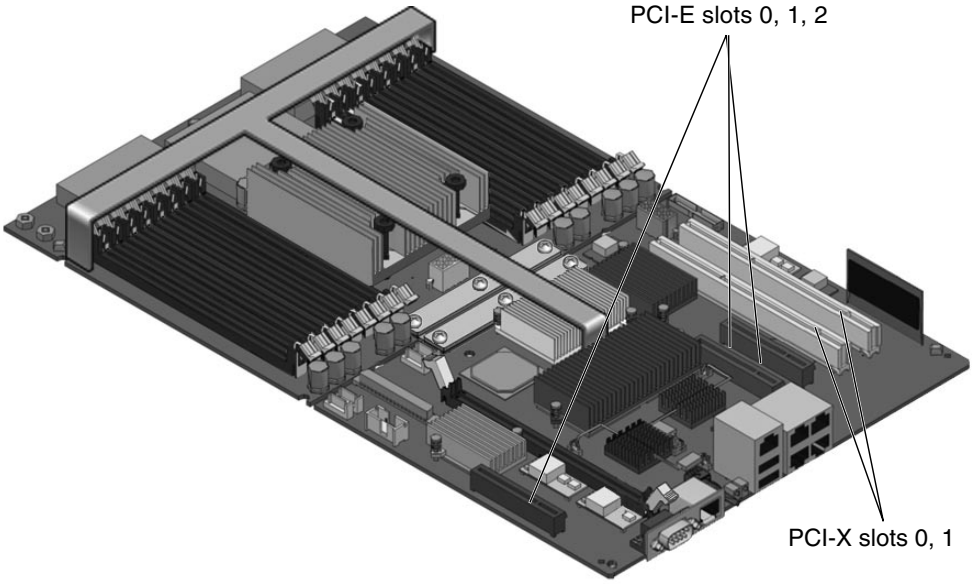

FIGURE 5-6 Location of PCI-Express and PCI-X Card Slots

4. **Note and remove any cables that are attached to the card.**
5. **Rotate the PCI hold-down bracket 90 degrees so it no longer covers the PCI card (**FIGURE 5-7**).**

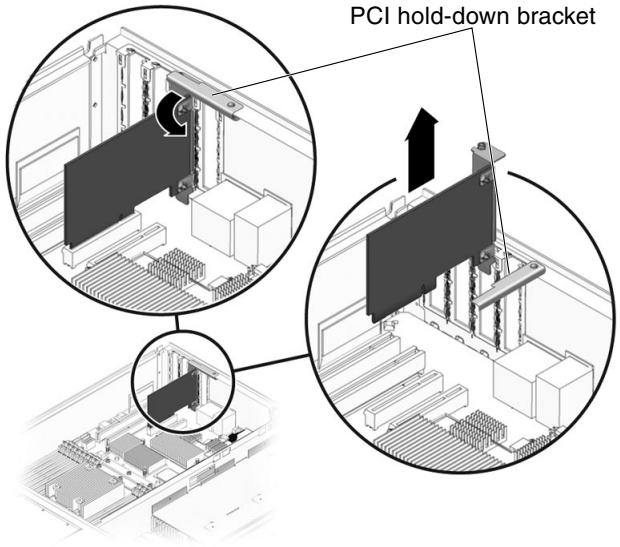

FIGURE 5-7 PCI Card and Hold-Down Bracket

6. **Carefully pull the card out of the socket.**
7. **Place the card on an antistatic mat.**
8. **Rotate the hold-down bracket so that it does not protrude into the chassis.**

5.2.2 Replacing PCI Cards

1. **Unpackage the replacement PCI-Express or PCI-X card and place it on an antistatic mat.**
2. **Locate the proper socket for the card you are replacing.**
3. **Rotate the PCI hold-down bracket 90 degrees so you can install the card.**
4. **Insert the card into the socket.**
5. **Rotate the PCI hold-down bracket 90 degrees to lock the card in place.**
6. **Perform the procedures described in** Section 5.3, "Common Procedures for Finishing Up" on page 5-41.

5.2.3 Removing DIMMs

Note – Not all DIMMs detected as faulty and offlined by POST must be replaced. In service (maximum) mode, POST detects memory devices with errors that might be corrected with Solaris PSH. See Section 3.4.5, "Correctable Errors Detected by POST" on page 3-36.

Caution – This procedure requires that you handle components that are sensitive to static discharges that can cause the component to fail. To avoid this problem, ensure that you follow antistatic practices as described in Section 5.1.6, "Performing Electrostatic Discharge Prevention Measures" on page 5-6.

---

1. **Perform the procedures described in** Section 5.1, "Common Procedures for Parts Replacement" on page 5-1**.**
2. **Locate the DIMMs (**FIGURE 5-8**) that you want to replace.**

   Use FIGURE 5-8 and TABLE 5-1 to identify the DIMMs you want to remove.

Note – For memory configuration information see Section 6.2.1, "Memory Guidelines" on page 6-4.

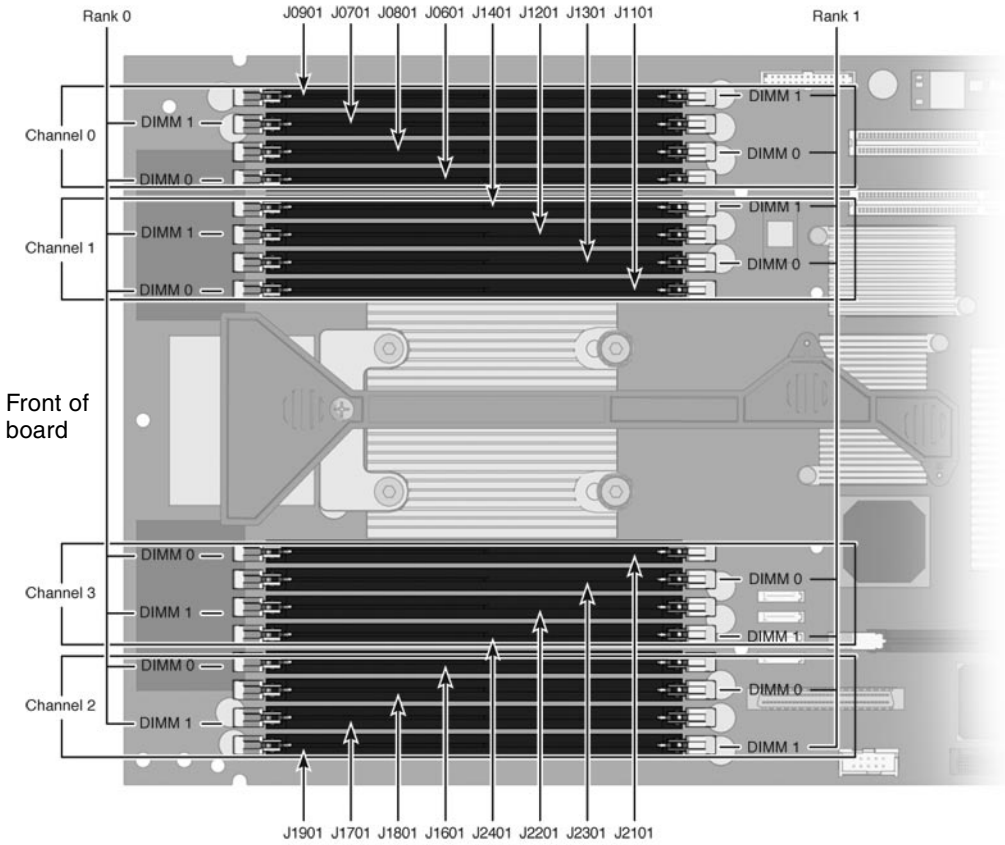

FIGURE 5-8 DIMM Locations

Use FIGURE 5-8 and TABLE 5-1 to map DIMM names that are displayed in faults to socket numbers that identify the location of the DIMM on the motherboard.

TABLE 5-1 DIMM Names and Socket Numbers

DIMM Name Used in Messages*	Socket No.
CH0/R1/D1	J0901
CH0/R0/D1	J0701
CH0/R1/D0	J0801
CH0/R0/D0	J0601
CH1/R1/D1	J1401
CH1/R0/D1	J1201

TABLE 5-1 DIMM Names and Socket Numbers *(Continued)*

DIMM Name Used in Messages*	Socket No.
CH1/R1/D0	J1301
CH1/R0/D0	J1101
CH2/R1/D1	J1901
CH2/R0/D1	J1701
CH2/R1/D0	J1801
CH2/R0/D0	J1601
CH3/R1/D1	J2401
CH3/R0/D1	J2201
CH3/R1/D0	J2301
CH3/R0/D0	J2101

* DIMM names in messages are displayed with the full name such as MB/CMP0/CH1/R1/D1. This table omits the preceding MB/CMP0 for clarity.

3. **Note the DIMM locations so you can install the replacement DIMMs in the same sockets.**
4. **Push down on the ejector levers on each side of the DIMM connector until the DIMM is released.**
5. **Grasp the top corners of the faulty DIMM and remove it from the system.**
6. **Place DIMMs on an antistatic mat.**

5.2.4 Replacing DIMMs

1. **Unpackage the replacement DIMMs and place them on an antistatic mat.**
2. **Ensure that the connector ejector tabs are in the open position.**
3. **Line up the replacement DIMM with the connector.**

   Align the DIMM notch with the key in the connector. This action ensures that the DIMM is oriented correctly.
4. **Push the DIMM into the connector until the ejector tabs lock the DIMM in place.**
5. **Perform the procedures described in** Section 5.3, “Common Procedures for Finishing Up” on page 5-41**.**

6. **Gain access to the ALOM CMT `sc>` prompt.**

   Refer to the *Sun SPARC Enterprise T2000 Advanced Lights Out Management (ALOM) Guide* for instructions.

7. **Run the `showfaults -v` 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 8. For example:

```
sc> showfaults -v
ID Time               FRU               Fault
0 SEP 09 11:09:26   MB/CMP0/CH0/R0/D0 Host detected fault,
MSGID:
SUN4V-8000-DX UUID: 7ee0e46b-ea64-6565-e684-e996963f7b86
```

   - If the fault resulted in the FRU being disabled, such as the following,

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

   Then run the `enablecomponent` command to enable the FRU:

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

8. **Perform the following steps to verify the repair:**

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

```
sc> setkeyswitch diag
```

   b. **Issue the `poweron` command.**

```
sc> poweron
```

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

```
sc> console
```

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

```
.
.
.
0:0>POST Passed all devices.
0:0>
0:0>DEMON: (Diagnostics Engineering MONitor)
0:0>Select one of the following functions
0:0>POST:Return to OBP.
0:0>INFO:
0:0>POST Passed all devices.
0:0>Master set ACK for vbsc runpost command and spin...
```

Note – Depending on the configuration of ALOM CMT 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.

```
sc> setkeyswitch normal
```

e. Issue the Solaris OS `fmadm faulty` command.

```
# fmadm faulty
```

No memory or DIMM faults should be displayed.

If faults are reported, refer to the diagnostics flowchart in FIGURE 3-1 for an approach to diagnose the fault.

9. **Gain access to the ALOM CMT `sc>` prompt.**
10. **Run the `showfaults` command.**

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

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

- 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.

11. **Run the `clearfault` command.**

```
sc> clearfault 7ee0e46b-ea64-6565-e684-e996963f7b86
```

12. **Switch to the system console.**

```
sc> console
```

13. **Issue the `fmadm repair` command with the UUID.**

    Use the same UUID that you used with the `clearfault` command.

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

5.2.5 Removing the System Controller Card

Caution – The system controller card can be hot. To avoid injury, handle it carefully.

1. **Perform the procedures described in** Section 5.1, "Common Procedures for Parts Replacement" on page 5-1**.**
2. **Locate the system controller card.**

   See Appendix A for an illustration of the servers FRUs that shows the system controller card.
3. **Push down on the ejector levers on each side of the system controller until the card is released from the socket.**

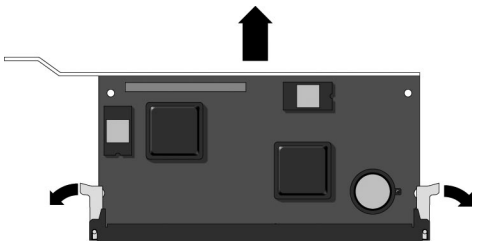

FIGURE 5-9 Ejecting and Removing the System Controller Card

4. **Grasp the top corners of the card and pull it out of the socket.**
5. **Place the system controller card on an antistatic mat.**
6. **Remove the system configuration PROM (FIGURE 5-10) from the system controller and place it on an antistatic mat.**

   The system controller contains the persistent storage for the host ID and Ethernet MAC addresses of the system, as well as the ALOM CMT configuration including the IP addresses and ALOM CMT user accounts, if configured. This information will be lost unless the system configuration PROM is removed and installed in the replacement system controller. The PROM does not hold the fault data, and this data will no longer be accessible when the system controller is replaced.

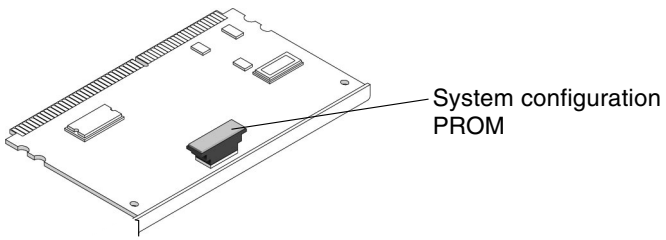

FIGURE 5-10 Locating the System Configuration PROM

5.2.6 Replacing the System Controller Card

1. **Unpackage the replacement system controller card and place it on an antistatic mat.**
2. **Install the system configuration PROM that you removed from the faulty system controller card.**

   The PROM is keyed to ensure proper orientation.
3. **Locate the system controller slot on the motherboard assembly.**

4. **Ensure that the ejector levers are open.**

5. **Holding the bottom edge of the system controller parallel to its socket, carefully align the system controller so that each of its contacts is centered on a socket pin.**

   Ensure that the system controller is correctly oriented. A notch along the bottom of the system controller corresponds to a tab on the socket.

6. **Push firmly and evenly on both ends of the system controller until it is firmly seated in the socket.**

   You hear a click when the ejector levers lock into place.

7. **Perform the procedures described in** Section 5.3, "Common Procedures for Finishing Up" on page 5-41**.**

5.2.7 Removing the Motherboard Assembly

The motherboard for your server has two distinct boards for the CPU and the I/O board. However, they must be removed and replaced as a single motherboard assembly (FIGURE 5-11).

Caution – Remove and replace the motherboard carefully. The motherboard rests on metal standoffs. If the motherboard is not handled carefully, the components mounted on the underside of the motherboard can be damaged if they hit the standoffs. To ensure that this damage does not occur, perform the removal and replacement instructions described in this document.

Caution – A flexible cable connects the CPU and I/O boards. This flexible cable is fragile. Handle these parts very carefully to prevent damage.

Caution – This procedure requires that you handle components that are sensitive to static discharges that can cause the component to fail. To avoid this problem, ensure that you follow antistatic practices as described in Section 5.1.6, "Performing Electrostatic Discharge Prevention Measures" on page 5-6.

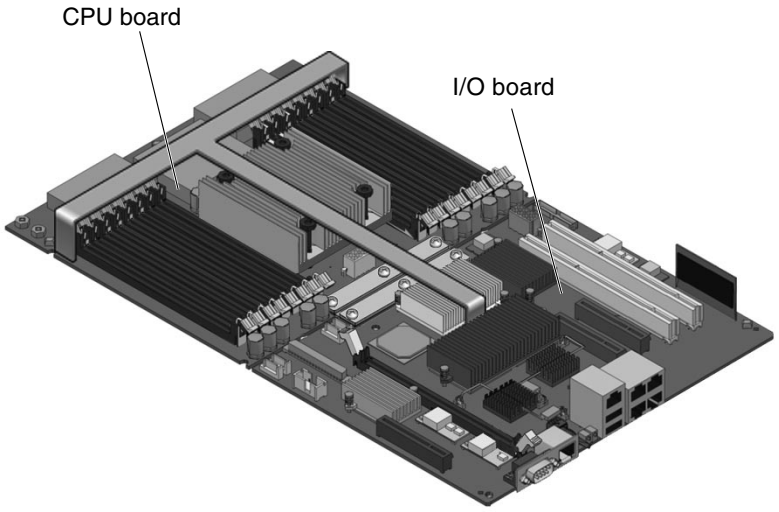

FIGURE 5-11 Motherboard Assembly

1. **Perform the procedures described in** Section 5.1, "Common Procedures for Parts Replacement" on page 5-1**.**
2. **Remove all cables from the rear of the server.**

   Ensure that you remove all cables and power cords.
3. **Remove any PCI option cards that are installed and then rotate the hold-down brackets so they do not protrude into the chassis.**
4. **Remove all DIMMs** from the motherboard assembly**.**

   See Section 5.2.3, "Removing DIMMs" on page 5-12.

   Note the memory configuration so you can reinstall the memory in the replacement board.
5. **Remove the system controller card from the motherboard assembly.**

   See Section 5.2.5, "Removing the System Controller Card" on page 5-17.
6. **Disconnect cables from the motherboard assembly:**
   - Disconnect the gray ribbon cable that runs along the left side of the chassis and motherboard.
   - Disconnect the cable marked P8 (FIGURE 5-12).
   - Disconnect the hard drive data cables and carefully pull them through the interior wall of the chassis.

The SAS hard drive and the cable marked P8 pass through a cutout in the interior wall of the chassis. Before removing the motherboard assembly, ensure that these cables are out of the way. The SAS hard drive cables can be folded back over the interior wall or passed through the cutout (FIGURE 5-12). However, the cable marked P8 is large and contains a number of small wires. The cable will not easily pass through the cutout. While pushing and pulling the cables through the cutout be careful not to damage the wires.

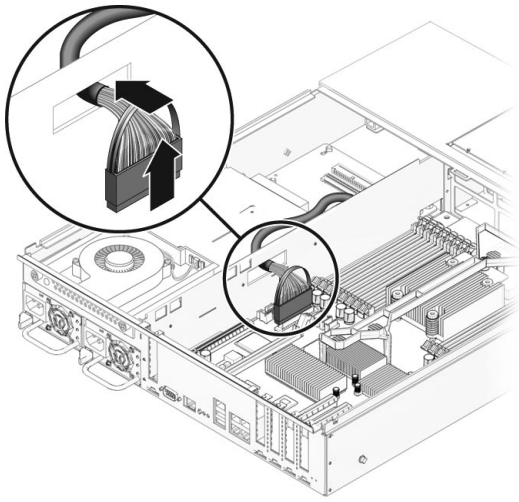

FIGURE 5-12 Cable Cutout

7. **Remove the screws that secure the motherboard assembly to the chassis (FIGURE 5-13).**

Caution – Do not remove the screws that hold the flexible cable in place. These screws must be installed at the factory, and they must not be removed.

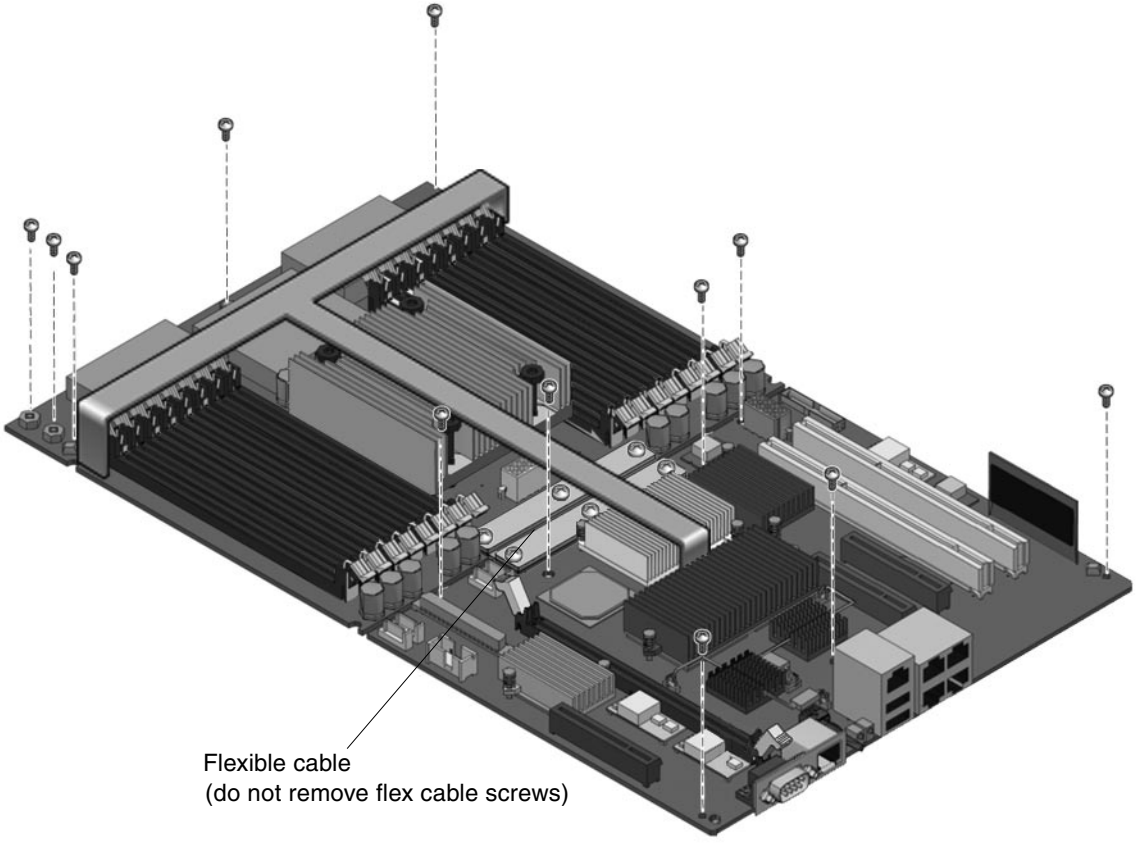

FIGURE 5-13 Location of the Screws in the Motherboard Assembly

8. **Lift the front of the motherboard to clear the front standoffs.**

   The front of the motherboard refers to the part of the motherboard nearest the front of the server.

9. **Slide the motherboard forward to clear the connectors from the cutouts in the rear of the chassis.**

10. **Using the handle, tilt the motherboard assembly over the interior chassis wall and lift it out of the chassis (**FIGURE 5-14**).**

Caution – Do not lift the motherboard assembly over the front fan housing to remove it from the chassis, because doing so can damage the assembly.

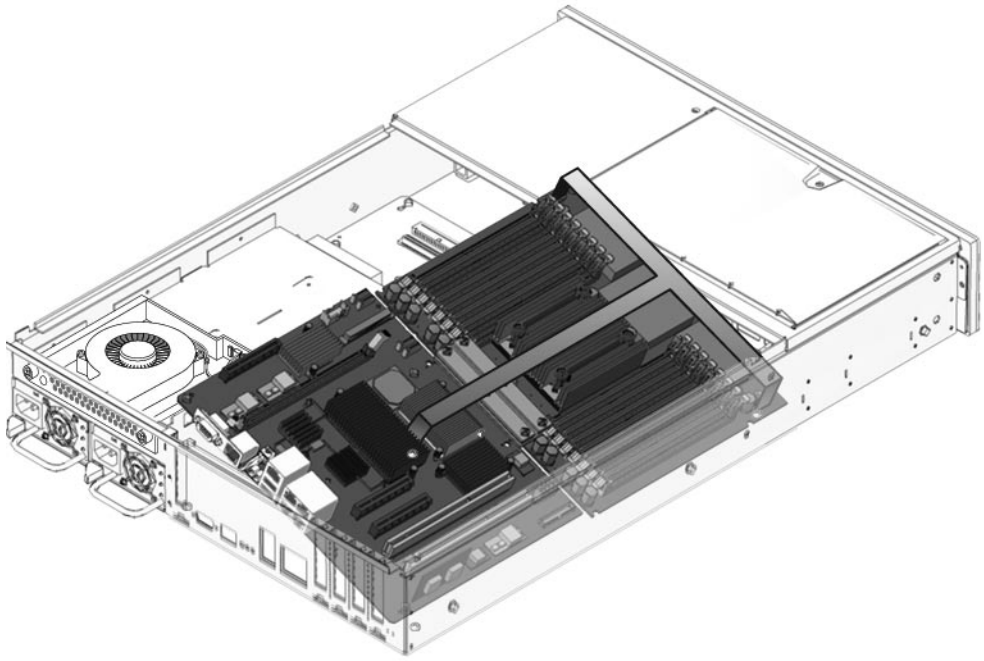

FIGURE 5-14 Removing the Motherboard Assembly From the Server Chassis.

11. **Place the motherboard assembly on an antistatic mat.**

5.2.8 Replacing the Motherboard Assembly

Caution – Remove and replace the motherboard carefully. The motherboard rests on metal standoffs. If the motherboard is not handled carefully, the components mounted on the underside of the motherboard can be damaged if they hit the standoffs. To ensure that this damage does not occur, perform the removal and replacement instructions described in this document.

Caution – A flexible cable connects the CPU and I/O boards. This flexible cable is fragile. Handle these parts very carefully to prevent damage.

Caution – This procedure requires that you handle components that are sensitive to static discharges that can cause the component to fail. To avoid this problem, ensure that you follow antistatic practices as described in Section 5.1.6, "Performing Electrostatic Discharge Prevention Measures" on page 5-6.

1. **Unpackage the replacement motherboard assembly and place it on an antistatic mat.**
2. **Tilt the motherboard assembly over the interior wall into the chassis (**FIGURE 5-15**) and place it down on the rear standoffs**

   Avoid touching the front standoffs with the motherboard.
3. **Slide the motherboard backward on the rear standoffs to engage the connectors in the rear cutouts.**
4. **Place the front of the motherboard down on the front standoffs.**

   The front of the motherboard refers to the part of the motherboard nearest the front of the server.

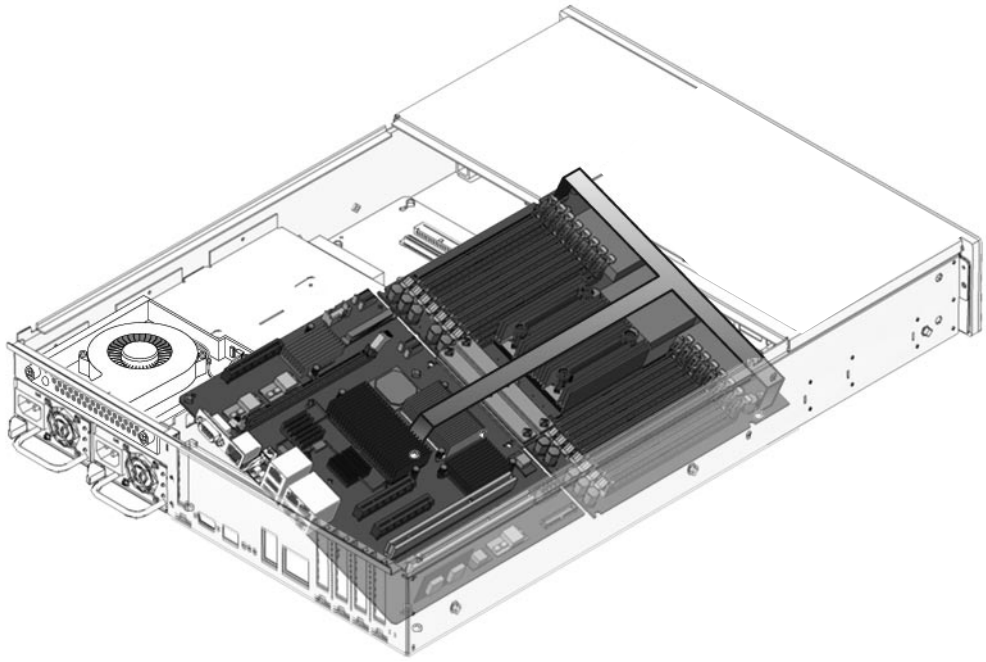

FIGURE 5-15 Installing the Motherboard Assembly

5. **Adjust the position of the motherboard assembly so that it is mounted on the bus bar.**
6. **Adjust the position of the motherboard assembly so that it lines up with the standoff screw holes.**
7. **Loosely install two screws shown in** FIGURE 5-16**.**

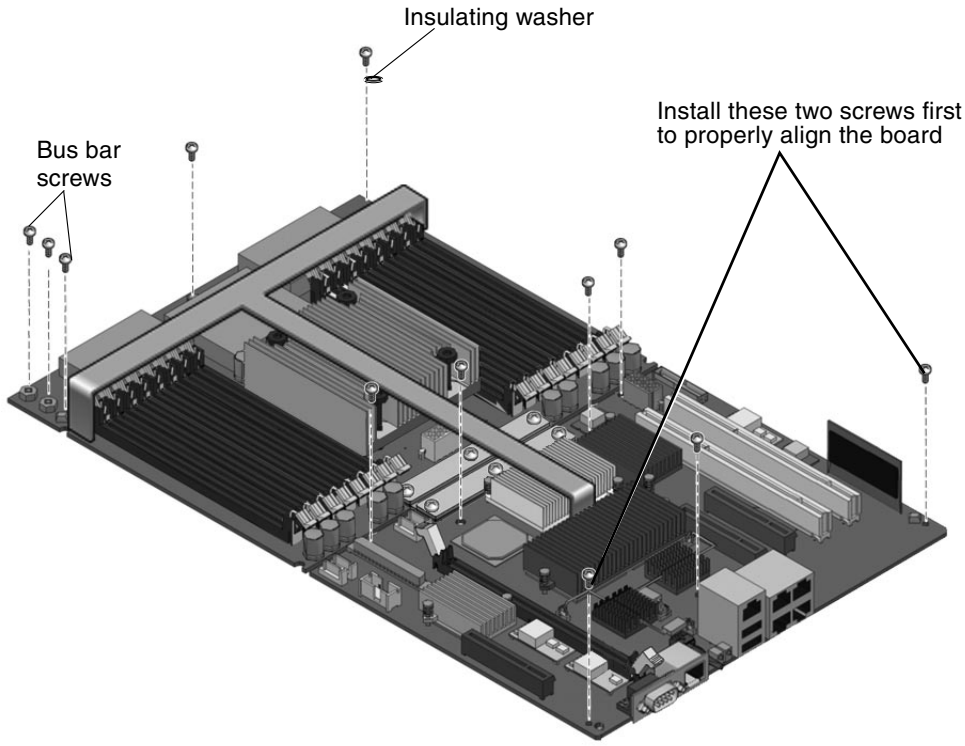

FIGURE 5-16 Securing the Motherboard Assembly to the Chassis

8. **Secure the motherboard assembly to the chassis with the remaining screws and an insulating washer (**FIGURE 5-16**).**

   Do not fully tighten any screws until all of the screws are loosely installed.

   One insulating washer is required in the position shown in FIGURE 5-16. A washer is supplied with the replacement FRU. Install the washer in this position even if the original motherboard did not have a washer.

9. **Tighten the two bus bar screws to secure the bus bar to the motherboard assembly.**

10. **Reinstall the system controller card in the motherboard assembly.**

    See Section 5.2.6, “Replacing the System Controller Card” on page 5-18.

11. **Reinstall all DIMMs in the motherboard assembly in the slots from which they were removed.**

    See Section 5.2.4, “Replacing DIMMs” on page 5-14.

12. **Reinstall any PCI option cards that were removed.**

    See Section 5.2.2, “Replacing PCI Cards” on page 5-11.

13. **Reconnect the cables to the motherboard:**
    - Reconnect the cable marked P8 to the I/O board.
    - Reconnect the gray ribbon cable that runs along the left side of the chassis.
    - Pull the hard drive data cables through the interior wall of the chassis and reconnect the cables to the motherboard.
14. **Reconnect all cables that were removed from the rear of the server.**
15. **Perform the procedures described in** Section 5.3, "Common Procedures for Finishing Up" on page 5-41**.**

5.2.9 Removing the Power Distribution Board

The power distribution board (PDB) provides the circuitry that distributes power to the other components in the system. The PDB also contains an electronic copy of the chassis serial number (see Section 2.3, "Obtaining the Chassis Serial Number" on page 2-10). When you replace this board, you must run certain service commands to update the replacement PDB with the chassis serial number. The steps to perform these service commands are provided in Section 5.2.10, "Replacing the Power Distribution Board" on page 5-30.

Caution – The system supplies power to the power distribution board even when the system is powered off. To avoid personal injury or damage to the system, you must disconnect power cords before servicing the PDB.

1. **Perform the procedures described in** Section 5.1, "Common Procedures for Parts Replacement" on page 5-1**.**
2. **Disengage both power supplies from the power distribution board.**

   To disengage a power supply, push the power supply latch to the right and pull the power supply out a few inches to disengage it from the PDB (FIGURE 5-17).

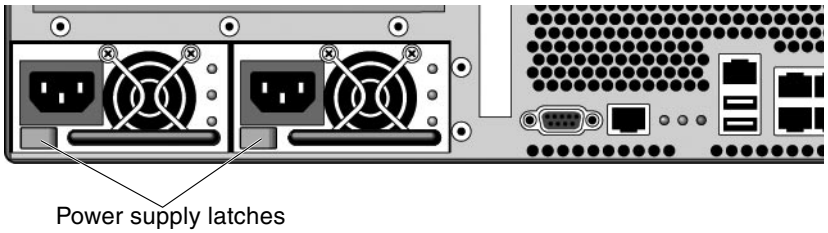

FIGURE 5-17 Location of Power Supply Latch

3. **Disconnect all cables from the PDB:**
   - Disconnect the hard drive power connector from the PDB.
   - Release the latches on the DVD cable and disconnect it.
   - Disconnect the cable marked P7.
   - Disconnect the blower power cable from the power distribution board.

4. **Remove the two screws that secure the power distribution board to the bus bar (FIGURE 5-18).**

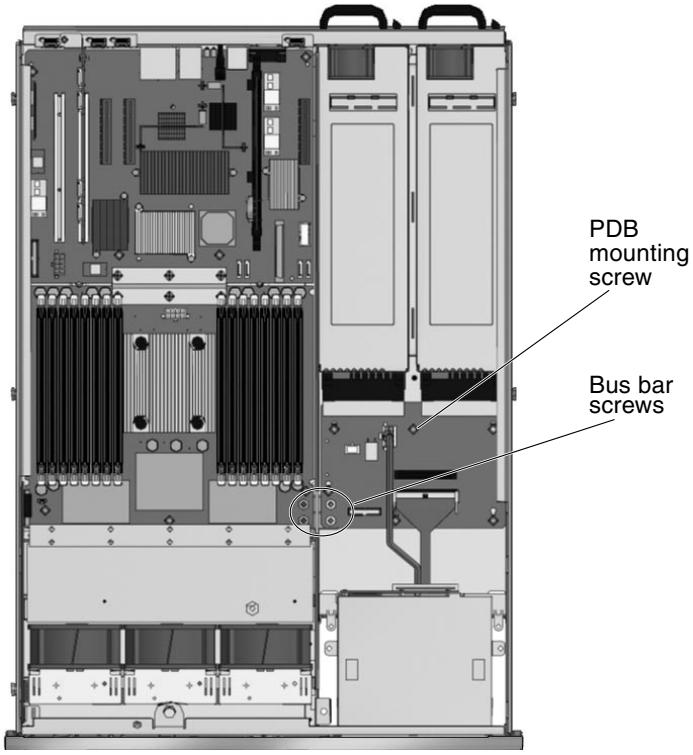

FIGURE 5-18 Location of Bus Bar Screws on the Power Distribution Board and the Motherboard Assembly

5. **Remove the screw (FIGURE 5-19) that secures the power distribution board to the chassis.**

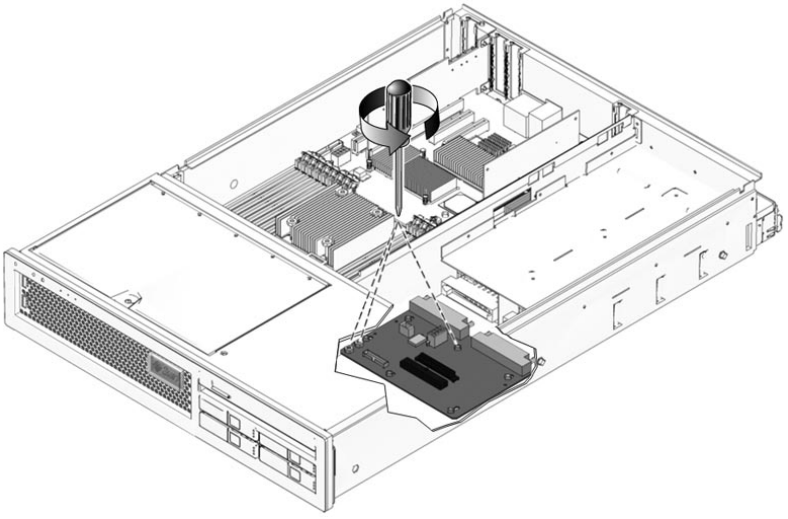

FIGURE 5-19 Removing the Power Distribution Board

6. **Slide the power distribution board toward the front of the chassis and remove it from the chassis (FIGURE 5-19).**

7. **Place the power distribution board on an antistatic mat.**

5.2.10 Replacing the Power Distribution Board

Caution – The system supplies power to the power distribution board even when the system is powered off. To avoid personal injury or damage to the system, you must disconnect all power cords before servicing the power distribution board.

1. **Loosely fit the power distribution board (PDB) onto the locator pins in the chassis and slide the board toward the rear of the chassis.**

2. **Secure the PDB to the chassis with the mounting screw.**

   Do not tighten the screw yet.

3. **Secure the PDB to the bus bar with two screws, and tighten all three screws (FIGURE 5-20).**

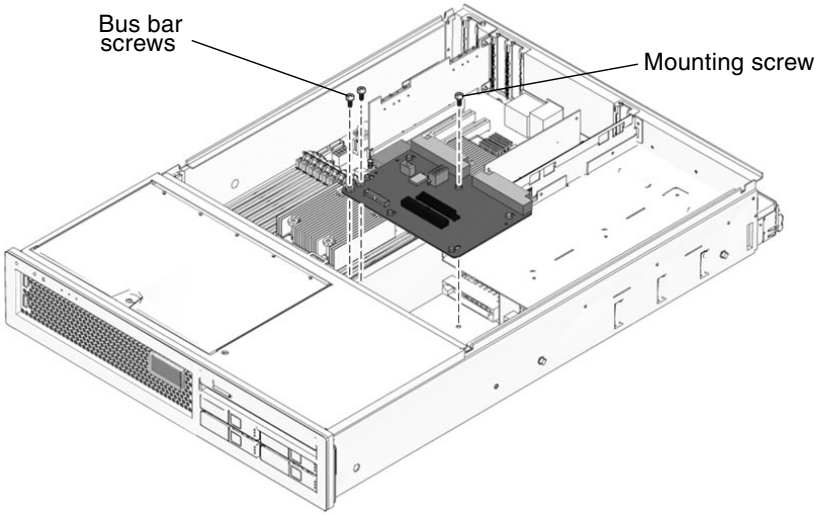

FIGURE 5-20 Installing the Power Distribution Board

4. **Connect the cables to the power distribution board:**
   - Blower power cable
   - Cable marked P7
   - DVD cable
   - Hard drive power connector
5. **Re-engage the power supplies with the power distribution board connectors.**
6. **Note the chassis serial number.**

   The chassis serial number is located on a sticker on the front of the server and on a sticker on the side of the server. The serial number is unique to each server. You need this number for subsequent steps in this procedure.
7. **Perform the procedures described in** Section 5.3, "Common Procedures for Finishing Up" on page 5-41**, and then return to this procedure to complete the remaining steps.**

Note – After replacing the power distribution board and powering on the system, you must run the `setcsn` command on the ALOM CMT console to set the electronically readable chassis serial number. The following steps describe how to do this.

---

8. **Gain access to the ALOM CMT `sc>` prompt.**

9. **Perform the following service commands to set the electronic chassis serial number in the power distribution board:**

Caution – Once the power distribution board is programmed with an electronic chassis serial number, the serial number cannot be changed. When executing the following commands, ensure that you run the commands correctly and that you enter the correct chassis serial number because you will not be able to change it. The chassis serial number is used to obtain support from Sun. If the `showplatform` command outputs `SUNW,SPARC-Enterprise-T2000`, the `setpartner -c 1` command was executed correctly.

```
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
Chassis serial number recorded.
sc> setpartner -c 1
sc> resetsc -y
*** System controller reboot message ***
login:admin
password admin-password
sc> showplatform
SUNW,SPARC-Enterprise-T2000
Chassis Serial Number: chassis-serial-number
Domain Status
------ ------
S0 Running
sc>setsc sc_servicemode false
```

5.2.11 Removing the LED Board

1. **Perform the procedures described in** Section 5.1, “Common Procedures for Parts Replacement” on page 5-1.

2. **Remove all three fans.**

   See Section 4.2.1, “Removing a Fan” on page 4-2.

3. **Remove the screws that secure the LED board to the chassis (**FIGURE 5-21**).**

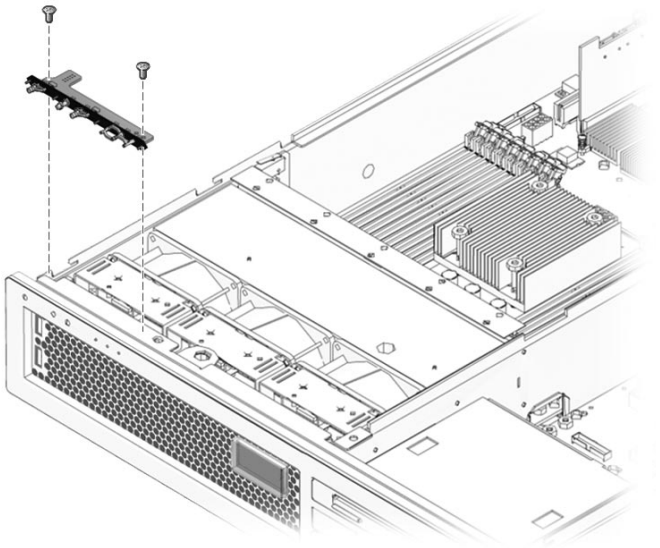

FIGURE 5-21 Removing the LED Board From the Chassis

4. **Slide the LED board to the right to disconnect it from the front I/O board.**
5. **Remove the LED board from the chassis and place it on an antistatic mat.**

5.2.12 Replacing the LED Board

1. **Install the LED board in the chassis.**
2. **Slide the board to the left to connect it to the front I/O board.**
3. **Secure the LED board to the chassis using two M3x6 flat-head screws (**FIGURE 5-21**).**
4. **Replace all three fans.**

   See Section 4.2.2, “Replacing a Fan” on page 4-4.
5. **Perform the procedures described in** Section 5.3, “Common Procedures for Finishing Up” on page 5-41**.**

5.2.13 Removing the Fan Power Board

1. **Perform the procedures described in** Section 5.1, "Common Procedures for Parts Replacement" on page 5-1**.**
2. **Remove all three fans.**

   See Section 4.2.1, "Removing a Fan" on page 4-2)
3. **Remove the screw that secures the fan power board to the chassis (**FIGURE 5-22**).**
4. **Slide the fan power board to the right to disengage it from the front I/O board.**
5. **Remove the fan power board from the front fan bay and place the board on an antistatic mat.**

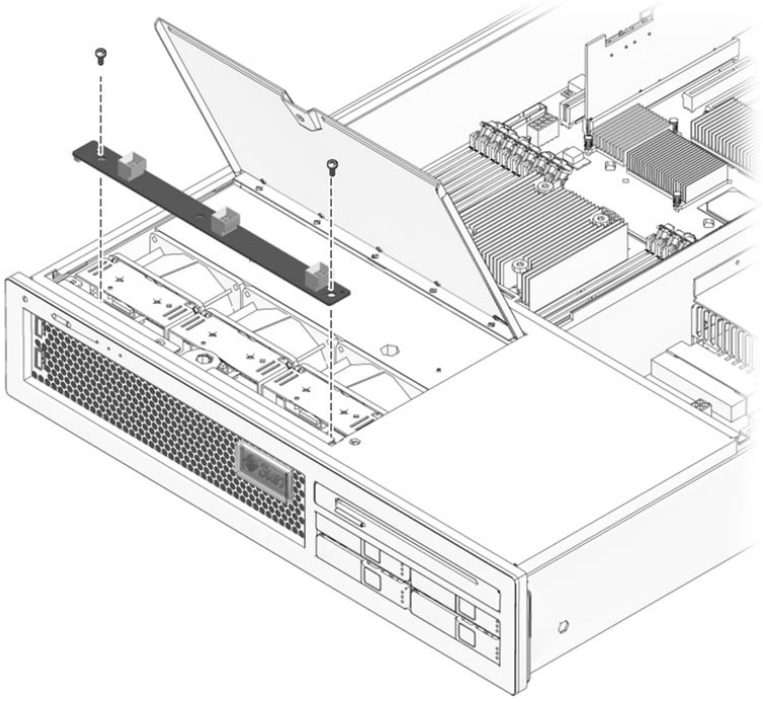

FIGURE 5-22 Removing the Fan Power Board

5.2.14 Replacing the Fan Power Board

1. **Unpackage the replacement fan power board and place it on an antistatic mat.**

2. **Lower the board into place and slide the board to the left to plug it into the front I/O board.**
3. **Secure the board to the chassis with the screws.**
4. **Reinstall all three fans.**

   See Section 4.2.2, "Replacing a Fan" on page 4-4.
5. **Perform the procedures described in** Section 5.3, "Common Procedures for Finishing Up" on page 5-41**.**

5.2.15 Removing the Front I/O Board

1. **Perform the procedures described in** Section 5.1, "Common Procedures for Parts Replacement" on page 5-1**.**
2. **Remove all three fans.**

   See Section 4.2.1, "Removing a Fan" on page 4-2.
3. **Disengage the fan power board from the front I/O board**

   Step 3 and Step 4 in Section 5.2.13, "Removing the Fan Power Board" on page 5-34.
4. **Remove the fan guard to gain access to the M3x6 flat-head screw that secures the front I/O board to the chassis.**

   a. Remove the screw that secures the fan guard to the chassis.

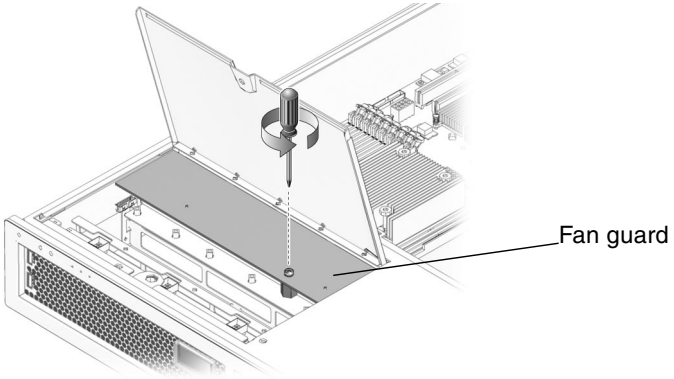

FIGURE 5-23 Removing the Fan Guard

   b. Remove the fan guard from the chassis.
5. **Disconnect the front I/O board data cable.**

6. **Remove the LED board. See** Section 5.2.11, "Removing the LED Board" on page 5-32**.**

7. **Remove the screw that secures the front I/O board to the chassis.**

8. **Slide the front I/O board back, tilt it up, clear the two mounting tabs in the front, and lift the board straight out of the chassis (**FIGURE 5-24**).**

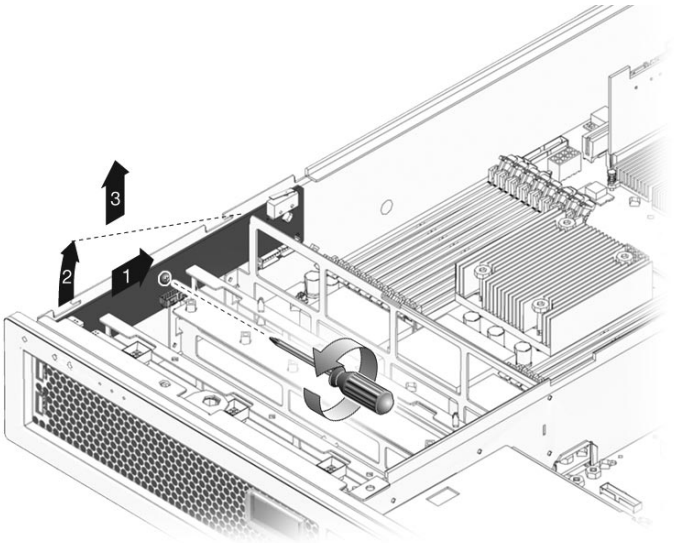

FIGURE 5-24 Removing the Front I/O Board

9. **Place the front I/O board on an antistatic mat.**

5.2.16 Replacing the Front I/O Board

1. **Unpackage the front I/O board and place it on an antistatic mat.**

2. **Tip the front I/O board downwards and slightly forward, and push it into place, aligning the board with the screw hole in the exterior wall of the chassis.**

   When the board is fully seated, both connectors on the USB ports are mounted flush against the motherboard assembly.

3. **Using the screw, secure the front I/O board to the chassis.**

4. **Reconnect the front I/O board data cable.**

5. **Reinstall the LED board.**

   See Section 5.2.12, "Replacing the LED Board" on page 5-33.

6. **Reconnect and secure the fan power board.**
7. **Replace all three fans.**

   See Section 4.2.2, "Replacing a Fan" on page 4-4.
8. **Perform the procedures described in** Section 5.3, "Common Procedures for Finishing Up" on page 5-41**.**

5.2.17 Removing the DVD Drive

1. **Perform the procedures described in** Section 5.1, "Common Procedures for Parts Replacement" on page 5-1**.**
2. **Remove the DVD interconnect board from the back of the DVD drive.**
3. **Press the release latch and pull the DVD drive out of the chassis.**

5.2.18 Replacing the DVD Drive

1. **Slide the DVD drive into the front of the chassis.**
2. **Replace the DVD interconnect board on the back of the DVD drive.**
3. **Perform the procedures described in** Section 5.3, "Common Procedures for Finishing Up" on page 5-41**.**

5.2.19 Removing the SAS Disk Backplane

1. **Perform the procedures described in** Section 5.1, "Common Procedures for Parts Replacement" on page 5-1**.**
2. **Remove the DVD from the chassis.**

   See Section 5.2.17, "Removing the DVD Drive" on page 5-37.
3. **Remove all hard drives from the chassis.**

   See Section 4.5.1, "Removing a Hard Drive" on page 4-9. Note the slot in which each drive belongs.
4. **Disconnect the SAS power cable from the power cable plug.**
5. **Note of which SAS data cable is plugged into which slot and disconnect the four SAS data cables from the SAS disk backplane.**

6. **Remove the five screws that secure the SAS disk backplane to the chassis (**FIGURE 5-25**).**

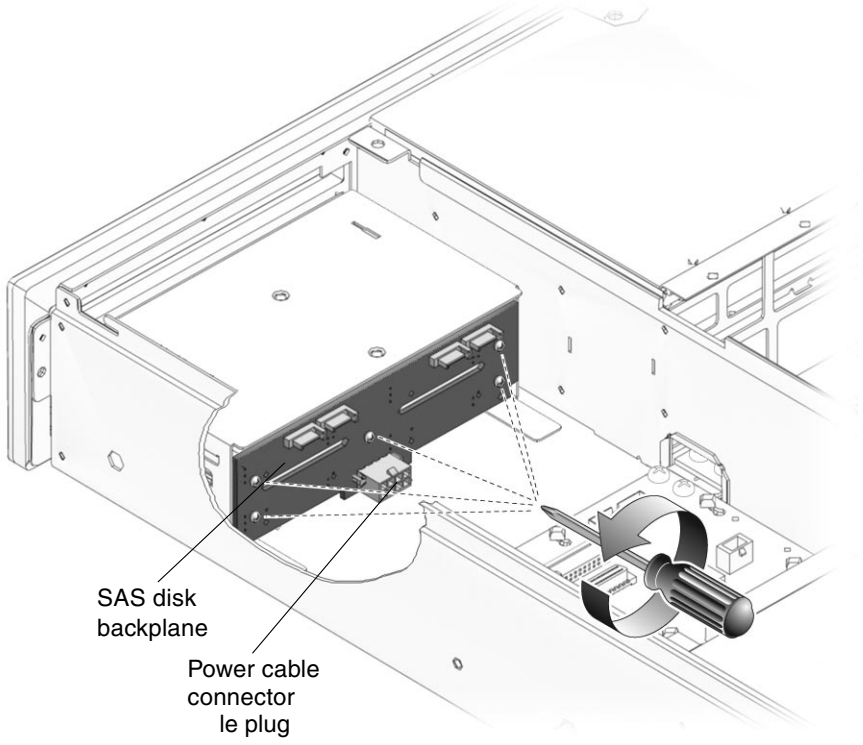

FIGURE 5-25 Removing the SAS Disk Backplane

7. **Remove the SAS disk backplane from the chassis and place it on an antistatic mat.**

5.2.20 Replacing the SAS Disk Backplane

1. **Unpackage the replacement SAS disk backplane and place it on an antistatic mat.**
2. **Place the SAS disk backplane on the two ledges on the bottom of the drive cage assembly, with the power connector facing down toward the bottom of the chassis.**

   The ledges hold the backplane in place temporarily.

3. **Secure the backplane to the drive cage assembly with five insulating washers and five screws (**FIGURE 5-26**).**

   Do not fully tighten any screws until all of the screws are loosely installed.

   Insulating washers are supplied with the replacement FRU. Install one insulating washer with each screw even if the original SAS disk backplane did not have any washers.

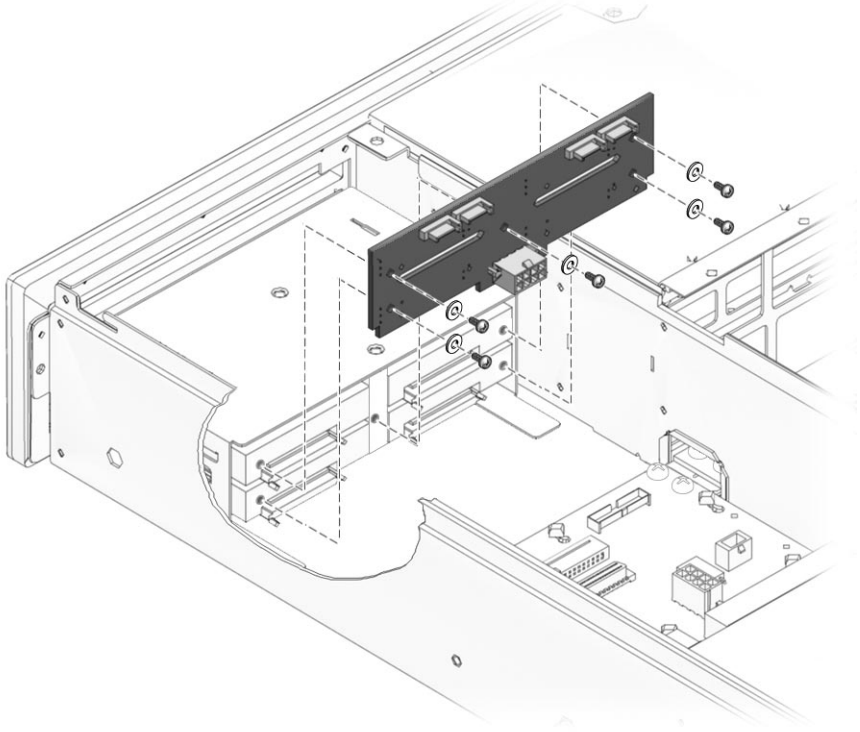

FIGURE 5-26 Replacing the SAS Disk Backplane

4. **Connect the SAS power cable from the power cable connector.**
5. **Connect the four SAS data cables to the replacement SAS disk backplane, ensuring that you connect the cables in the same positions on the replacement SAS disk backplane.**
6. **Reinstall all four hard drives in the slots from which you removed them.**
7. **Reinstall the DVD drive.**

   See Section 5.2.18, “Replacing the DVD Drive” on page 5-37.

8. **Perform the procedures described in** Section 5.3, "Common Procedures for Finishing Up" on page 5-41

5.2.21 Removing the Battery on the System Controller

1. **Perform the procedures described in** Section 5.1, "Common Procedures for Parts Replacement" on page 5-1**.**
2. **Remove the system controller from the chassis (**Section 5.2.5, "Removing the System Controller Card" on page 5-17**) and place the system controller on an antistatic mat.**
3. **Using a small flat-head screwdriver, carefully pry the battery (**FIGURE 5-27**) from the system controller.**

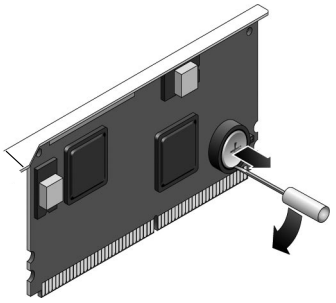

FIGURE 5-27 Removing the Battery From the System Controller

5.2.22 Replacing the Battery on the System Controller

1. **Unpackage the replacement battery.**
2. **Press the new battery into the system controller (**FIGURE 5-28**) with the positive side (+) facing upward (away from the card).**

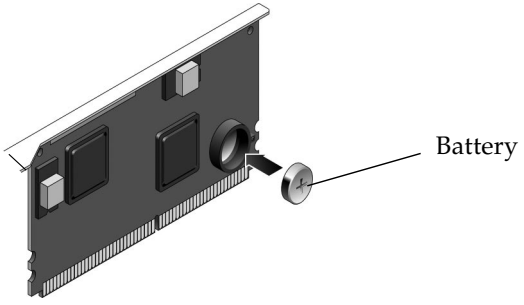

FIGURE 5-28 Replacing the Battery in the System Controller

3. **Replace the system controller.**

   See Section 5.2.6, “Replacing the System Controller Card” on page 5-18.

4. **Perform the procedures described in** Section 5.3, “Common Procedures for Finishing Up” on page 5-41**.**

5. **Use the ALOM CMT** `setdate` **command to set the day and time.**

   Use the `setdate` command before you power on the host system. For details about this command, refer to the *Advanced Lights Out Management (ALOM) CMT Guide*.

5.3 Common Procedures for Finishing Up

5.3.1 Replacing the Top Front Cover and Front Bezel

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

2. **Slide the front top cover forward until it snaps into place, being careful to avoid catching the cover on the intrusion switch (**FIGURE 5-29**).**

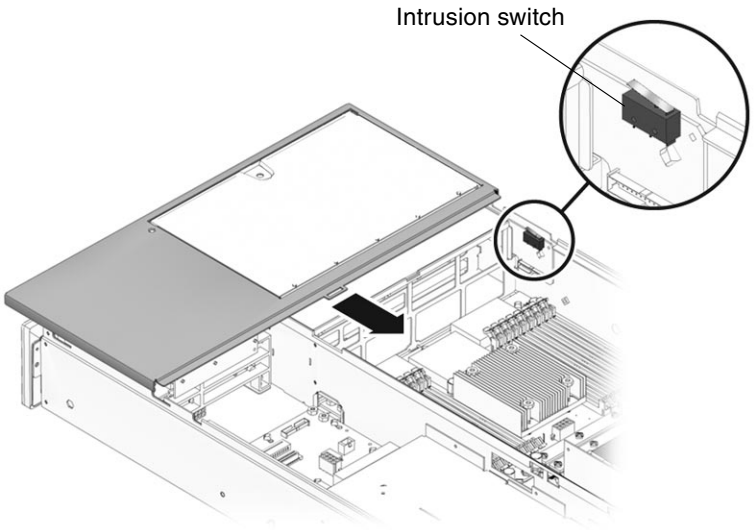

FIGURE 5-29 Replacing the Top Front Cover

3. **Position the bezel on the front of the chassis and snap it into place.**
4. **Open the fan door.**
5. **Tighten the captive screw to secure the front bezel to the chassis.**

5.3.2 Replacing the Top Cover

1. **Place the top cover on the chassis.**
   Set the cover down so that it hangs over the rear of the server by about an inch.
2. **Slide the cover forward until it latches into place.**

5.3.3 Reinstalling the Server Chassis in the Rack

If you removed the server chassis from the rack, perform these steps.

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

1. **Ensure that the rack rails are extended.**
2. **Place the ends of the chassis mounting brackets (inner section) into the slide rails (**FIGURE 5-30**).**

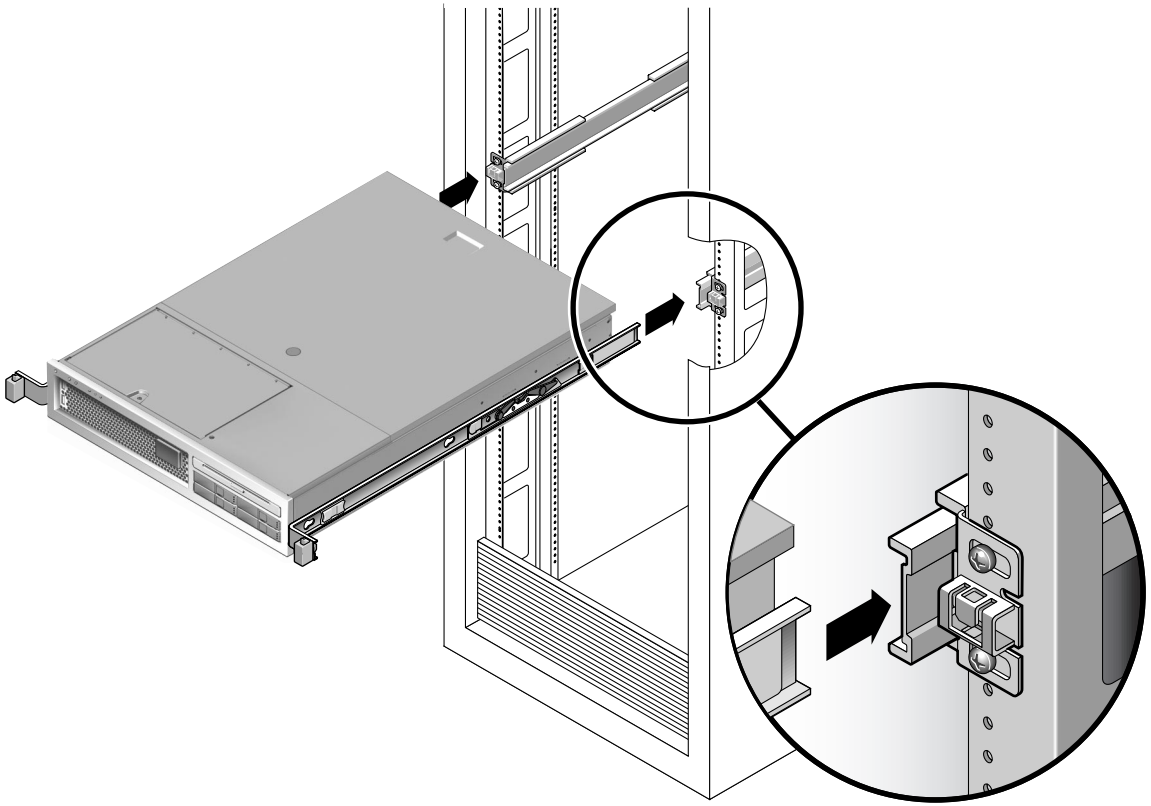

FIGURE 5-30 Returning the Server to the Rack

3. **Slide the server into the rack until the brackets lock into place.**

   The server is now in the extended maintenace position.

5.3.4 Returning the Server to the Normal Rack Position

If you extended the server to the maintenance position, use this procedure to return the server to the normal rack position.

1. **Release the slide rails from the fully extended position by pushing the release levers on the side of each rail (**FIGURE 5-31**).**

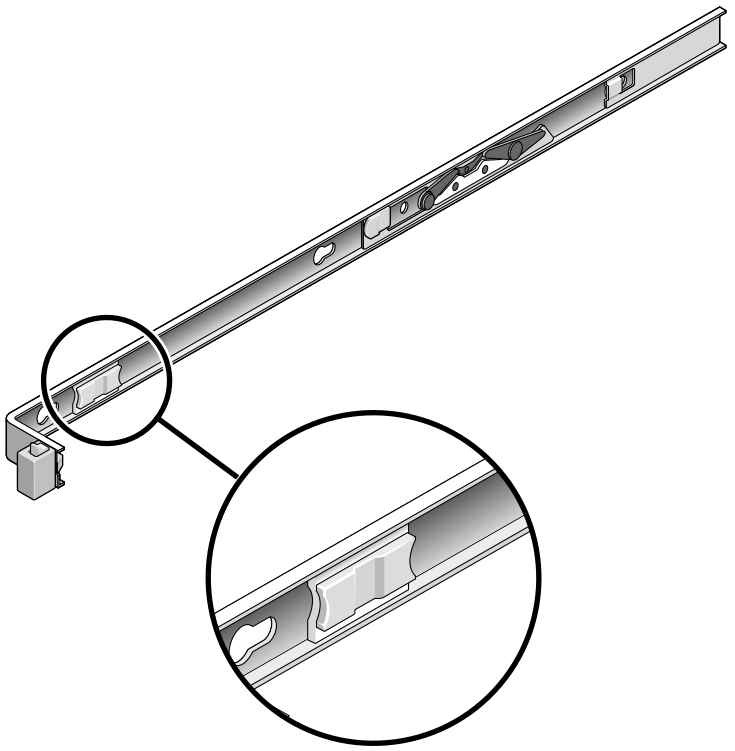

FIGURE 5-31 Release Levers

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

   Ensure that the cables do not get in the way.

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

Note – Refer to the *Sun SPARC Enterprise T2000 Server Installation Guide* for detailed CMA installation instructions.

---

   a. **Insert the inner latch (smaller, right side) into the clip located at the end of the mounting bracket (**FIGURE 5-32**).**

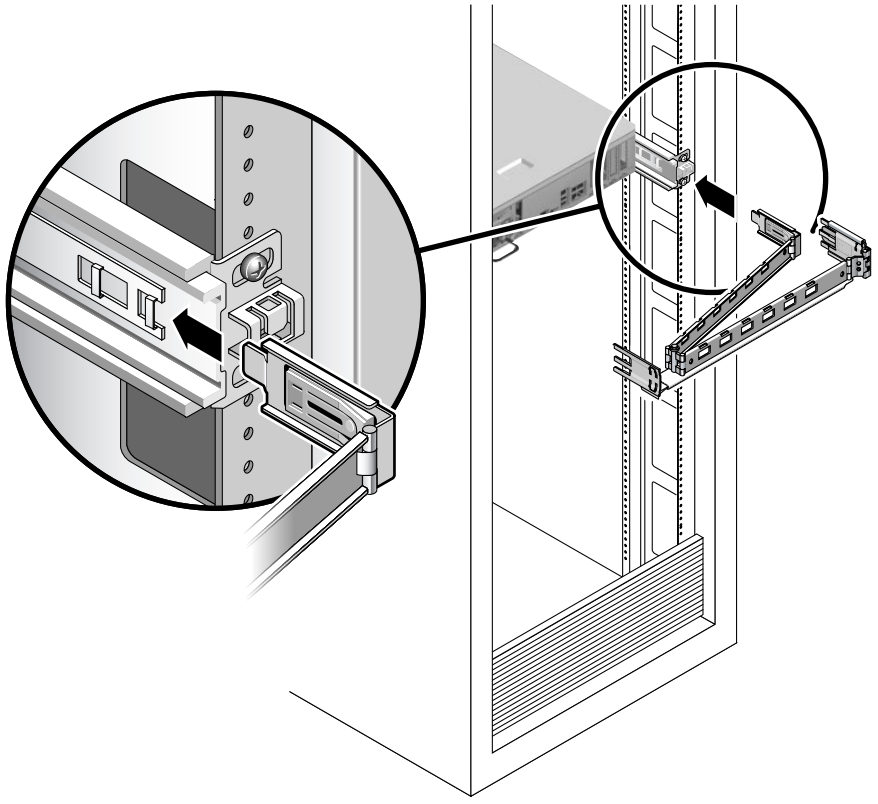

FIGURE 5-32 Installing the CMA

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

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

4. **Reconnect the cables to the back of the server.**

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

5.3.5 Applying Power to the Server

- **Reconnect both power cords to the power supplies.**

Note – As soon as the power cords are connected, standby power is applied, and depending on the configuration of the firmware, the system might boot.

CHAPTER 6

Adding New Components and Devices

This chapter describes how to add new components and devices to the server.

The following topics are covered:

- Section 6.1, “Adding Hot-Pluggable and Hot-Swappable Devices” on page 6-1
- Section 6.2, “Adding Components Inside the Chassis” on page 6-4

6.1 Adding Hot-Pluggable and Hot-Swappable Devices

Hot-pluggable devices, such as hard drives, require administration during installation.

Hot-swappable devices, such as USB devices, can be connected to, and disconnected from, the system while the system is running.

Other components and devices require you to shut down the system prior to installation. See Section 6.2, “Adding Components Inside the Chassis” on page 6-4.

6.1.1 Adding a Hard Drive to the Server

Hard drives are physically addressed according to the slot in which they are installed. Depending on the server model, the hard drives might be connected to a PCI-X SAS controller card, or connected to a drive controller that is built into the

motherboard (an *onboard* hard drive controller). Regardless of the type of controller, the hard drives are installed into the chassis the same way as described in this procedure.

Note – Not all servers have the on-board hard drive controller support. These servers have the PCI-X SAS controller card installed.

---

1. **Remove the blank panel from the chassis:**

   a. **On the blank panel, push the latch release button.**

   b. **Grasp the latch and pull the blank panel out.**

2. **Align the disk drive to the drive bay slot.**

   See FIGURE 6-1. For additional details, see Section 4.5.1, "Removing a Hard Drive" on page 4-9.

3. **Slide the hard drive into the bay until the drive is fully seated.**

4. **Close the hard drive lever to lock the drive in place.**

5. **Use `cfgadm -al` to list all disks in the device tree, including unconfigured disks.**

   If the disk is not in list, such as with a newly installed disk, then use `devfsadm` to configure it into the tree. See the `devfsadm` man page for details.

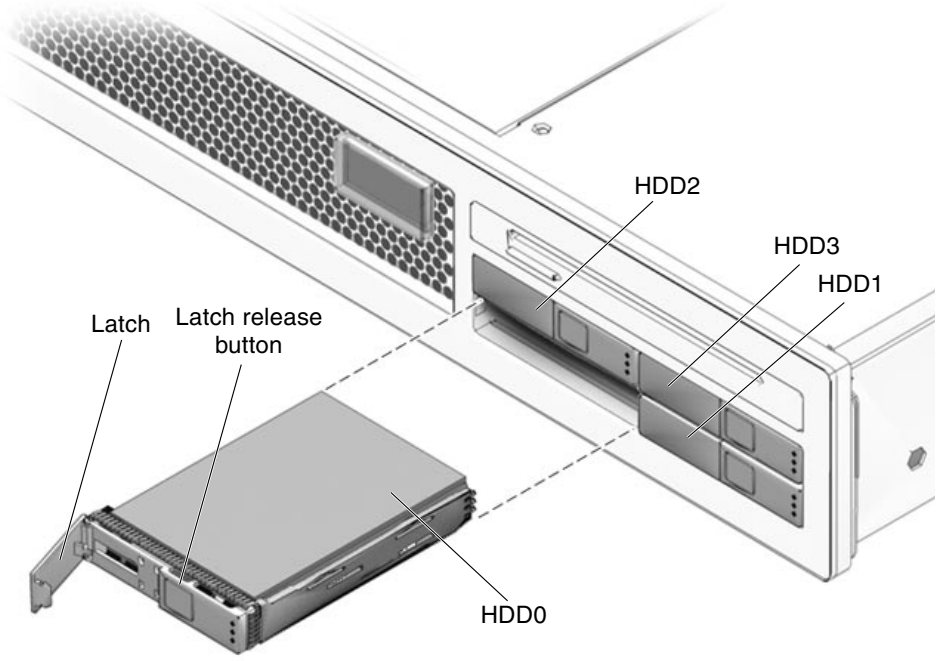

FIGURE 6-1 Hard Drive Slots

6.1.2 Adding a USB Device

Follow these guidelines:

- Only perform USB hot-plug operations while the operating system is running.
- Do not perform USB hot-plug operations when the system `ok` prompt is displayed or before the system has completed booting.
- You can connect up to 126 devices to each of the two USB controllers (each controller provides two connectors) for a total of 252 USB devices.
- The USB ports on the server support USB 1.1 devices.

Note – There are many USB devices on the market. Read the product documentation for your USB device for additional installation requirements and instructions that are not covered here.

- **Plug a standard USB device into one of the USB ports (FIGURE 6-2) on the front or rear of the server.**

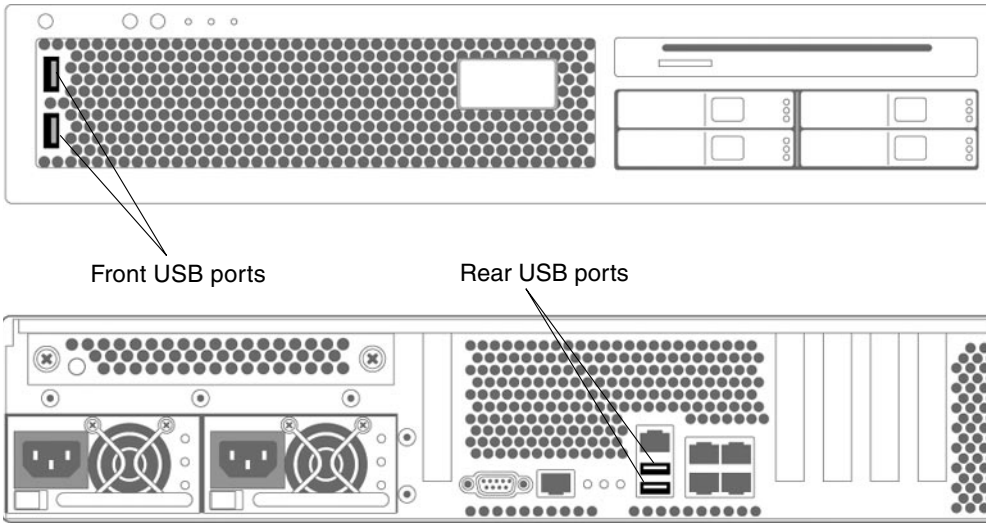

FIGURE 6-2 Adding a USB Device

6.2 Adding Components Inside the Chassis

You can add the following components to the server:

- Memory
- PCI-X cards
- PCI-Express cards

6.2.1 Memory Guidelines

Use the following guidelines and FIGURE 6-3 and TABLE 6-1 to plan the memory configuration of your server.

- There are 16 slots that hold DDR2 memory DIMMs.
- The server accepts the following DIMM sizes:
  - 512 MB
  - 1 GB
  - 2 GB
  - 4 GB
- The server supports two ranks of eight DIMMs each.

- At minimum, rank 0 must be fully populated with eight DIMMS of the same capacity.
- DIMMs can be added eight at a time, of the same capacity, to fill rank 1.

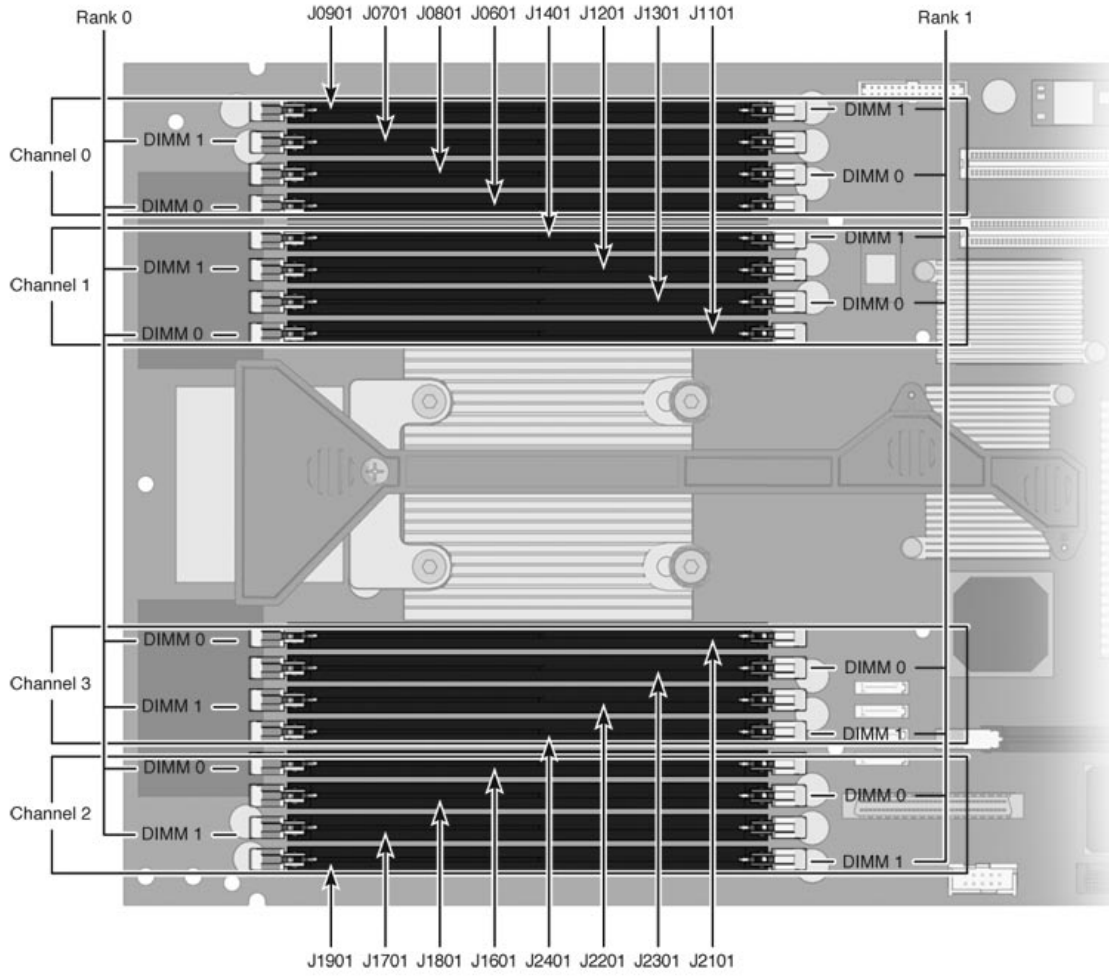

FIGURE 6-3 DIMM Layout

TABLE 6-1 DIMM Names and Socket Numbers

	DIMM Name	Socket Number
Rank 0 DIMMs	CH0/R0/D1	J0701
	CH0/R0/D0	J0601
	CH1/R0/D1	J1201
	CH1/R0/D0	J1101
	CH2/R0/D1	J1701
	CH2/R0/D0	J1601
	CH3/R0/D1	J2201
	CH3/R0/D0	J2101
Rank 1 DIMMs	CH0/R1/D1	J0901
	CH0/R1/D0	J0801
	CH1/R1/D1	J1401
	CH1/R1/D0	J1301
	CH2/R1/D1	J1901
	CH2/R1/D0	J1801
	CH3/R1/D1	J2401
	CH3/R1/D0	J2301

6.2.2 Adding DIMMs

1. **Perform all of the procedures in** Section 5.1, “Common Procedures for Parts Replacement” on page 5-1**.**
2. **Unpackage the DIMMs and place them on an antistatic mat.**
3. **Ensure that the connector ejector tabs on the CPU board DIMM connectors are in the open position.**
4. **Line up the DIMM with the connector.**
5. **Push the DIMM into the connector until the ejector tabs lock the DIMM in place.**
6. **Repeat** Step 3 **through** Step 5 **for each additional DIMM.**

7. **Perform the procedures described in** Section 5.1, "Common Procedures for Parts Replacement" on page 5-1**.**

6.2.3 PCI Express or PCI-X Card Guidelines

Follow these guidelines and FIGURE 6-4 to plan your configuration:

- The server provides the following PCI capabilities:
  - 3 PCI-Express (PCI-E) slots for low-profile cards (supports lane widths of x1, x2, x4, and x8)
  - 2 PCI-X slots for low-profile cards

Note – There are a variety of PCI-X and PCI-Express cards on the market. Read the product documentation for your device for additional installation requirements and instructions that are not covered here.

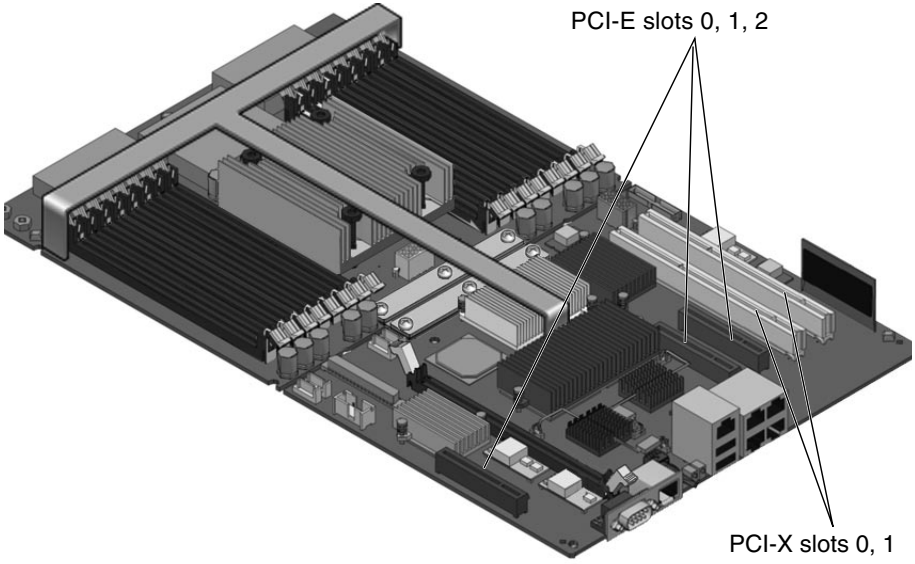

FIGURE 6-4 Location of PCI-Express and PCI-X Card Slots

6.2.4 Adding a PCI-Express or PCI-X Card

1. **Perform all of the procedures in** Section 5.1, "Common Procedures for Parts Replacement" on page 5-1**.**

2. **Rotate the PCI hold-down bracket (located on the edge of the chassis) 90 degrees so that the chassis edge can accept the card.**

   You might need to loosen the screw that holds the bracket to the chassis.

3. **Line up the PCI card with the PCI connector on the rear of the motherboard.**

4. **Push the card into the connector so it is fully seated.**

5. **Rotate the PCI hold-down bracket to the closed position and secure the screw on the bracket.**

6. **Install any cables that go to the PCI card.**

7. **Perform the procedures described in** Section 5.1, "Common Procedures for Parts Replacement" on page 5-1**.**

APPENDIX **A**

Field-Replaceable Units

This appendix provides illustrated parts breakdown diagrams and a table that lists the server FRUs.

The following topic is covered:

- Section A.1, “Illustrated FRU Locations” on page A-2

A.1 Illustrated FRU Locations

FIGURE A-1, FIGURE A-2, and TABLE A-1 list the locations of the field-replaceable units (FRUS) in the server.

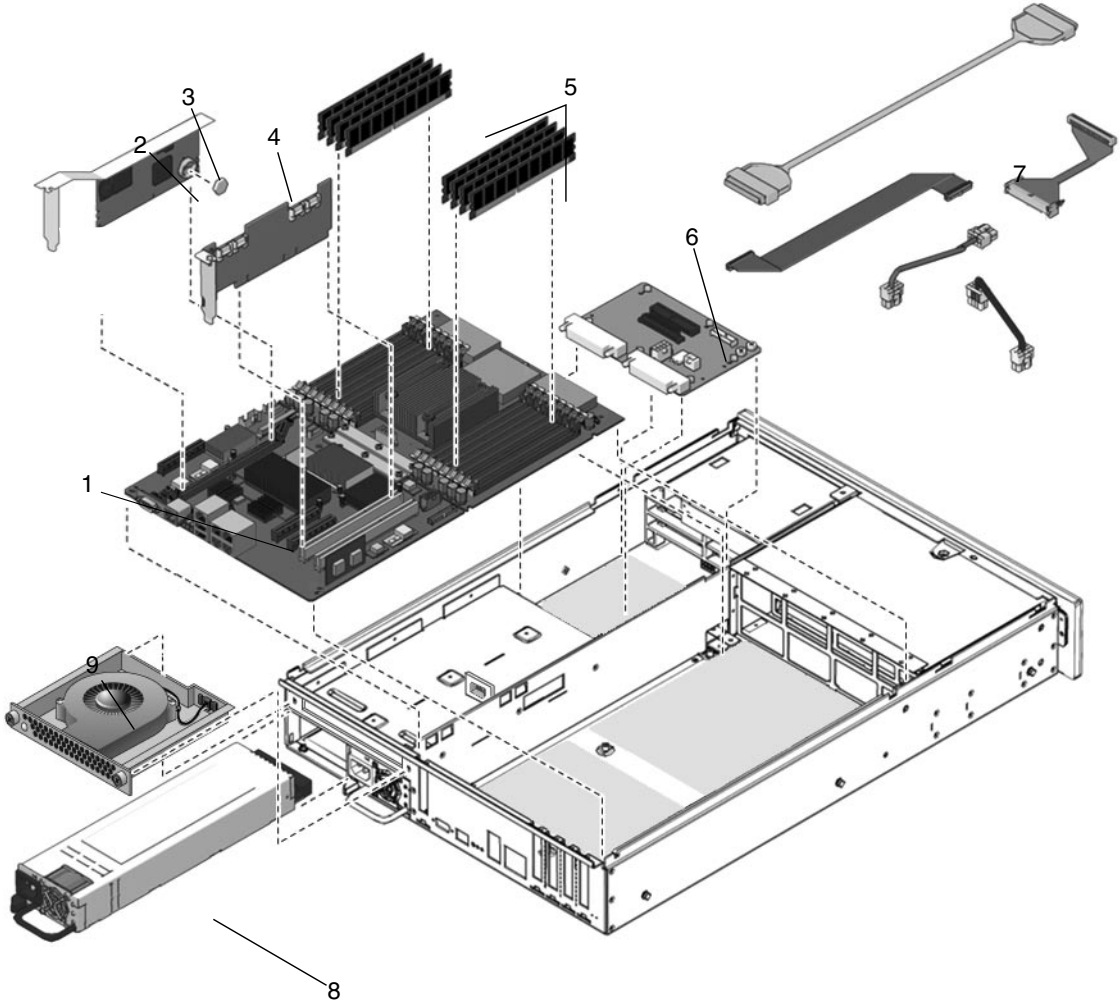

FIGURE A-1 Field-Replaceable Units (1 of 2)

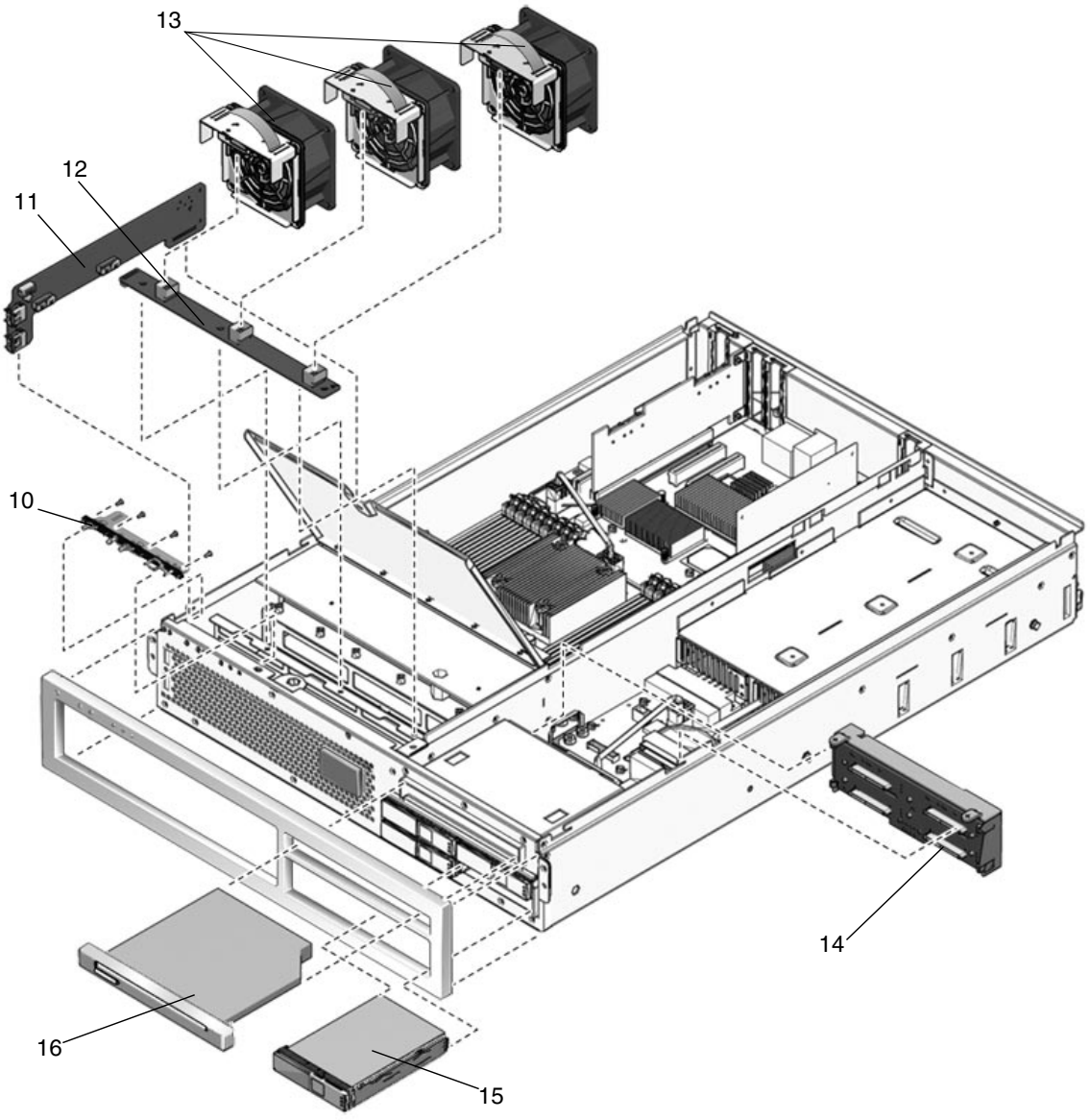

FIGURE A-2 Field-Replaceable Units (2 of 2)

TABLE A-1 Server FRU List

Item No.	FRU	Replacement Instructions	Description	FRU Name*
1	Motherboard assembly	Section 5.2.7, "Removing the Motherboard Assembly" on page 5-19	The motherboard assembly is comprised of the following boards that must be replaced as a single FRU: • CPU board – Comprises the central processing subsystem for the server, which includes the UltraSPARC T1 CPU processor, 16 DIMM connectors, the memory controllers, and supporting circuitry. • I/O board – Provides the I/O logic, including the connectors for the PCI-X and PCI-Express interfaces, Ethernet interfaces, all the power interconnections, and miscellaneous logic. Note: This assembly is provided in different configurations to accommodate the different processor models (4, 6, and 8 core).	MB IOBD
2	System controller card (OSP board)	Section 5.2.5, "Removing the System Controller Card" on page 5-17	This board implements the system controller subsystem. The SC board contains a PowerPC Extended Core, and a communications processor that controls the host power and monitors host system events (power and environmental). The board holds a socketed EEPROM for storing the system configuration, all Ethernet MAC addresses, and the host ID. This board only draws power from the 3.3V standby supply rail, which is available whenever the system is receiving AC input power, even when the system is turned off.	SC
3	System controller battery	Section 5.2.21, "Removing the Battery on the System Controller" on page 5-40	Battery.	SC/BAT
4	PCI-Express and PCI-X cards	Section 5.2.1, "Removing PCI-Express and PCI-X Cards" on page 5-9	Optional add-on cards.	PCIE0 PCIE1 PCIE2 PCIX0 PCIX1

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

Item No.	FRU	Replacement Instructions	Description	FRU Name*
5	DIMMs	Section 5.2.3, "Removing DIMMs" on page 5-12	Can be ordered in the following sizes: • 512 MB • 1 GB • 2 GB • 4 GB	See TABLE 5-1 in Chapter 5.
6	Power distribution board	Section 5.2.9, "Removing the Power Distribution Board" on page 5-27	Provides the main 12V power interconnect between the power supplies and the other boards.	PDB
7	Cable management kit	Cable replacement instructions are provided in the corresponding FRU procedures.	Includes the following: bus bars, hard disk drive cable, motherboard I/O cable, PDB-I/O cable, PDB-DVD cable, front I/O board cable	n/a
8	Power supply units (PS)	Section 4.3.1, "Removing a Power Supply" on page 4-4	The power supplies provide -3.3 Vdc standby power at 3 Amps and 12 Vdc at 25 Amps. When facing the rear of the system, PS0 is on the left and PS1 is on the right.	PS0 PS1
9	Rear blower	Section 4.4.1, "Removing the Rear Blower" on page 4-7	Blower.	FT2
10	LED board	Section 5.2.11, "Removing the LED Board" on page 5-32	Contains the push-button circuitry and LEDs that are displayed on the front bezel of the chassis.	LEDBD
11	Front I/O board	Section 5.2.15, "Removing the Front I/O Board" on page 5-35	Front I/O board.	FIOBD
12	Fan power board	Section 5.2.13, "Removing the Fan Power Board" on page 5-34	Houses the connectors and three amber LEDs for the fan assemblies.	FANBD
13	Fans	Section 4.2.1, "Removing a Fan" on page 4-2	Fans 0, 1, and 2.	FT0/FM0 FT0/FM1 FT0/FM2

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

Item No.	FRU	Replacement Instructions	Description	FRU Name*
14	SAS disk backplane	Section 5.2.19, "Removing the SAS Disk Backplane" on page 5-37	The SAS backplane board contains the Molex connector for interfacing to 2.5 SAS or S-ATA disk drives. In addition, the board contains four seven-position vertical SAS connectors that bring each of the four SAS links from the I/O board. This board contains the electronic chassis serial number.	SASBP
15	Hard drives	Section 4.5.1, "Removing a Hard Drive" on page 4-9	SFF SAS, 2.5-inch form-factor hard drives.	HDD0 HDD1 HDD2 HDD3
16	DVD drive	Section 5.2.17, "Removing the DVD Drive" on page 5-37	DVD/CD-ROM drive.	DVD

* The FRU name is used in system messages.

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