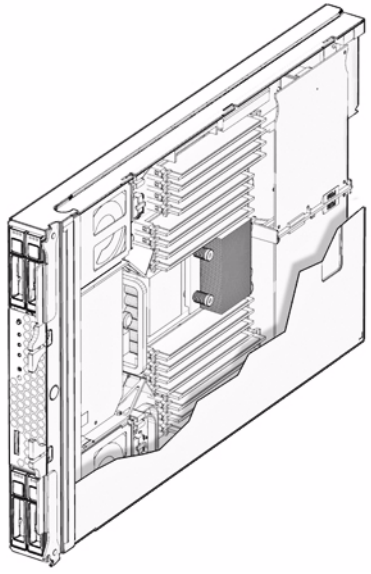
Sun BladeT6320 Server Module

Service Manual



Part No. 820-2386-12
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Contents

Preface

This service manual provides product descriptions, diagnostics information, and hardware removal and replacement procedures for Oracle's *Sun Blade T6320 Server Module*. 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, and can 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.

UNIX Commands

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

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

  `http://docs.sun.com`

Shell Prompts

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

Product Documentation

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

http://docs.sun.com/app/docs/prod/blade.t6320

To find other product documents, search on the software name or book title.

Document Title	Description
Sun Blade T6320 Server Module Product Notes, 820-2383	Important late-breaking information about the server module and related software.
Sun Blade T6320 Server Module Installation Guide, 820-2384	Basic information about installing, powering on and installing software. If you purchased hard drives with preinstalled software you can also find information here: http://www.sun.com/software/preinstall
Sun Integrated Lights Out Manager 2.0 Supplement for Sun Blade T6320 Server Modules, 820-2546	ILOM 2.0 information specific to the Sun Blade T6320 server module. Provides command comparisons of the ALOM CMT and ILOM CLI command sets.
Oracle Integrated Lights Out Manager (ILOM) 3.0 Supplement for Sun Blade T6320 Server Modules, 820-7145	ILOM 3.0 information specific to the Sun Blade T6320 server module.
Sun Blade T6320 Server Module Safety and Compliance Manual, 820-2387	Important safety information for the Sun Blade T6320 server module.
Chassis Documentation (Refer to the documents for your specific modular system chassis.)	

Document Title	Description
Integrated Lights Out Manager ILOM Administration Guides	ILOM information specific to the modular system chassis.
Modular System Product Notes	Late-breaking information about the chassis and related software.
Modular System Service Manual	Component removal and replacement procedures, diagnostics information and specifications.
Software Documentation	
Sun Integrated Lights out Manager 2.0 User's Guide, 820-1188	Advanced Lights Out Manager (ALOM) CMT software.
Configuring Jumpstart Servers to Provision Sun x86-64 Systems, 819-1962-10	Configuring JumpStart servers.
Solaris 10 8/07 Installation Guide: Network-Based Installations	Setting up network-based installations and JumpStart servers.
Sun VTS 6.4 User's Guide, 820-1669	Testing the server module, and creating custom hardware tests.
Beginner's Guide to LDoms: Understanding and Deploying Logical Domains, 820-0832	Learning about LDoms principles.
Solaris Operating System documentation	All information related to Solaris system administration commands and features. Go to http://www.docs.sun.com

Support, and Training

Sun Function	URL
Support	http://www.sun.com/support/
Training	http://www.sun.com/training/

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Sun Blade T6320 Server Module Service Manual, part number 820-2386.

CHAPTER 1

Sun Blade T6320 Server Module Product Description

This chapter provides an overview of the features of the Sun Blade T6320 server module. (A server module is also known as a "blade.")

The following topics are covered:

1.1 Component Overview

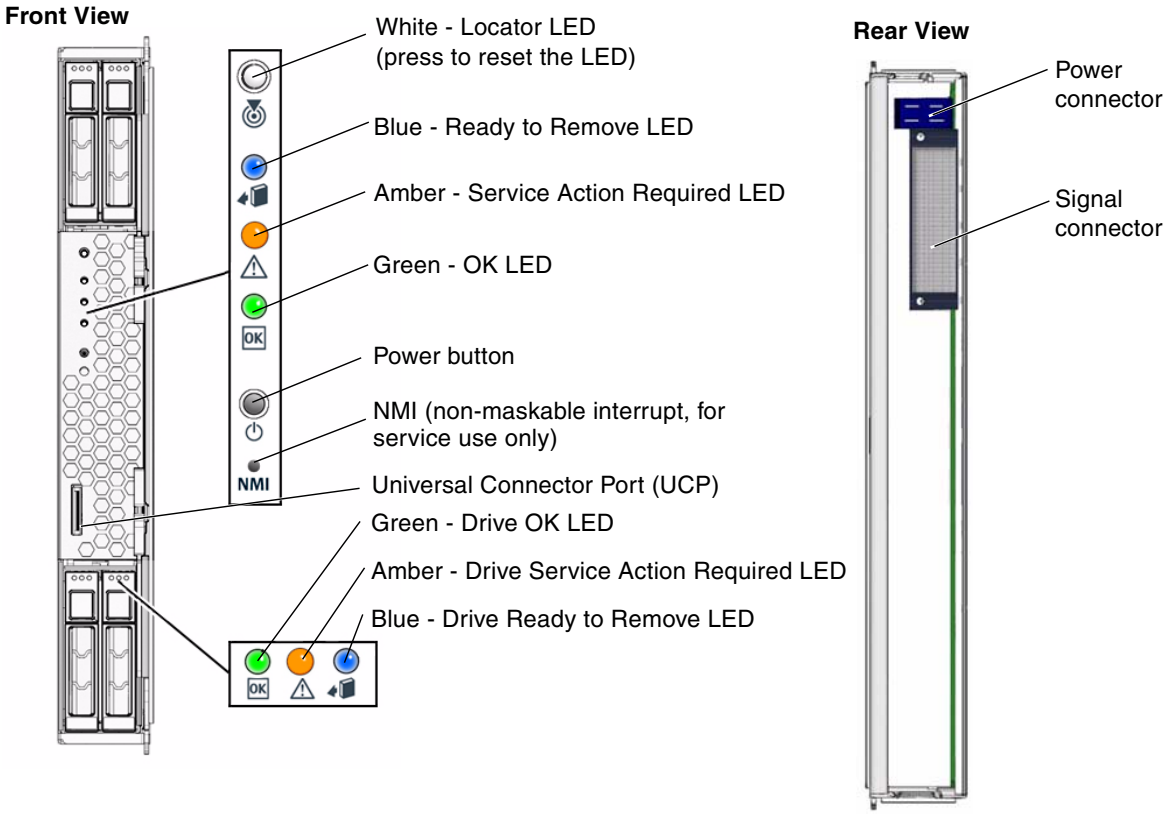
FIGURE 1-1, FIGURE 1-2 and FIGURE 1-3 show the main Sun Blade T6320 components and some basic connections to the chassis. For information about connectivity to system fans, PCI ExpressModules, Ethernet modules, and other components, see the chassis documentation at:

`http://docs.sun.com/app/docs/prod/blade.t6320`

FIGURE 1-1 Sun Blade T6320 Server Module With Chassis

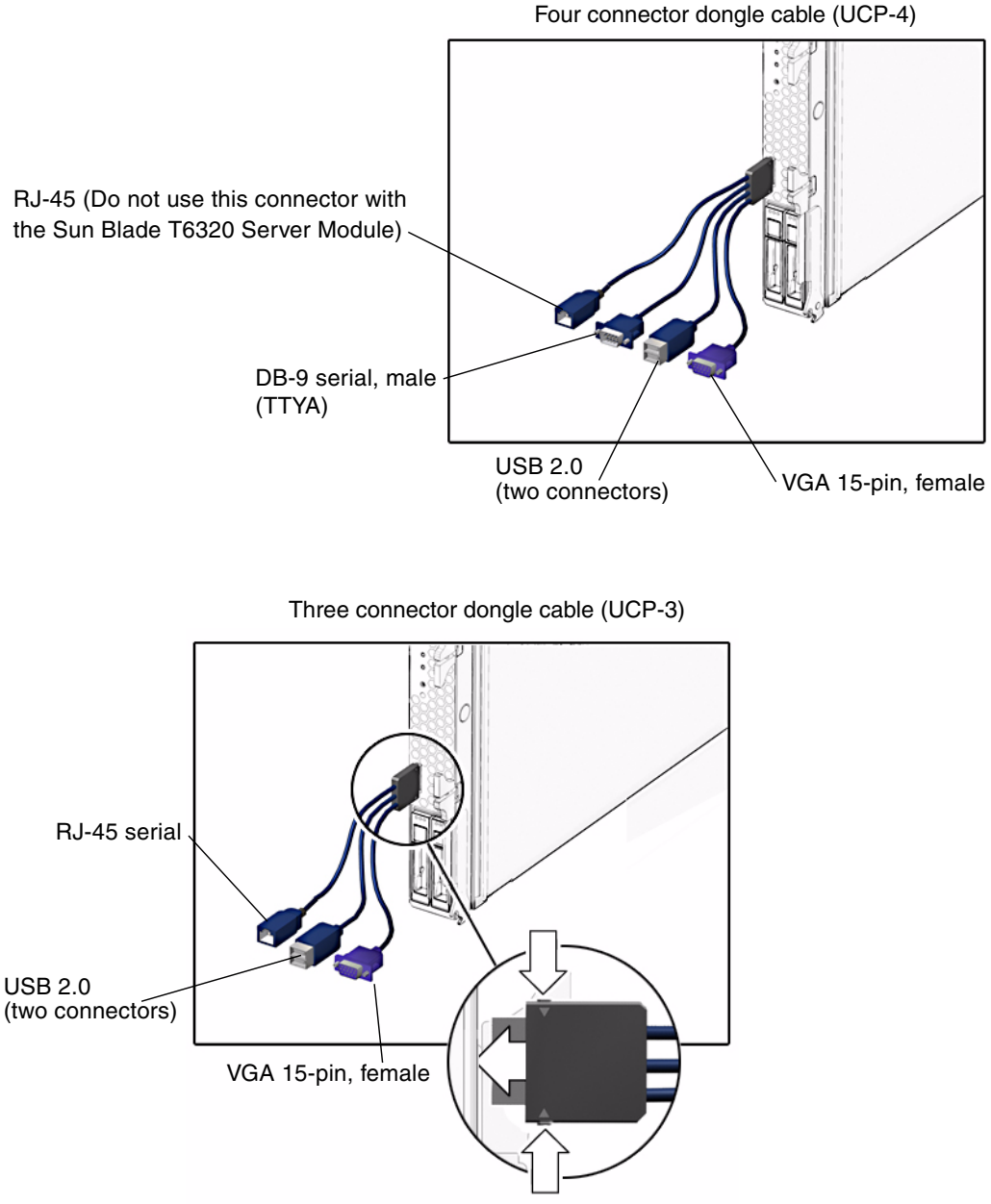
TABLE 1-1 lists the Sun Blade T6320 server module features. TABLE 1-2 lists some of chassis input-output features.

FIGURE 1-2 Front and Rear Panels



Note – For information about connecting to the server module refer to the *Sun Blade T6320 Server Module Installation Guide*, 820-2384.

FIGURE 1-3 Cable Dongle Connectors



Insert the connector straight into the server module.

Caution – Insert the connector straight into the server module. The cable dongle is for temporary connections only. The cable dongle has not been evaluated for electromagnetic compatibility (EMC). The cable dongle or server module connectors could be damaged by closing rack doors or other impacts. Remove the cable dongle during normal system operation.

Note – If you are using the older *4-cable dongle* (UCP-4), do not use the RJ-45 connector with the Sun Blade T6320 server module. Use the DB-9 connector for serial connections.

TABLE 1-1 Sun Blade T6320 Server Module Features

Feature	Description
Processor	One UltraSPARC T2 multicore processor with 4MB L2 cache. Can execute up to 64 threads.
Memory	16 slots for fully buffered DIMMs (FB-DIMM), 667 MHz: • 1 Gbyte (16 Gbyte maximum) • 2 Gbyte (32 Gbyte maximum) • 4 Gbyte (64 Gbyte maximum)
Internal hard drives	Up to four hot-pluggable 2.5-inch hard drives. • SFF SAS 73 Gbyte, 15k rpm, and 10k rpm • SFF SAS 146 Gbyte, 10k rpm (Filler panels are inserted anywhere hard drives are not installed.)
RAID Expansion Modules	RAID expansion modules (hard drive management) with RAID 0, 1 controller. Eight links, x2 SAS (3 Gb/s) or SATA (1.5 Gb/s), supporting four internal hard drives and four x2 links to midplane. See Section 1.2, "Support for RAID Storage Configurations" on page 1-10.

TABLE 1-1 Sun Blade T6320 Server Module Features *(Continued)*

Feature	Description
Universal Connector Port	One universal connector port (UCP) in the front panel. A universal cable is included with the chassis and can be purchased separately (FIGURE 1-3). The following connections are supported: • USB 2.0* • VGA video • Serial (FIGURE 1-3). • Local keyboard, video, mouse, storage support (KVMS)
Architecture	SPARC V9 architecture, ECC protected Platform group: sun4v Platform name: SUNW, Sun Blade T6320 Server Module Minimum system firmware 7.0.6 or subsequent compatible release Solaris 10 8/07 OS with appropriate patches
XVR-50 on-board graphics accelerator	• 2D 24-bit color graphics • Flexible 8- and 24-bit color application support • HD15 monitor connector for a wide range of Sun monitors • 3D support through Sun OpenGL for Solaris software

Some USB connectors are thick and may distort or damage the connector when you try to connect two USB cables. You can use a USB hub to avoid this problem.

TABLE 1-2 Interfaces With the chassis

Feature	Description
Ethernet ports	Two 10 Gb ethernet ports. Consult the chassis documentation or Network Express Module (NEM) documentation for ethernet pass-through specifications. (See FIGURE 1-5 and FIGURE A-2.)
PCI Express I/O	Two 8-lane ports connect to chassis midplane. Can support up to two 8-lane PCI ExpressModules (PCI EM). (FIGURE 1-5)
SAS/SATA	Four channels for remote storage connect from the RAID Express Module (REM) to the chassis midplane.
Remote Management	ILOM management controller on the service processor. CLI management (ssh only) and N1 system manager support. DMTF CLI and ALOM-CMT compatible CLI available through ssh. Remote console (remote KVMS) is configurable through OpenBoot PROM and ILOM.
Remote management	ILOM management controller on the service processor. CLI management (telnet, ssh) and N1 system manager support. ALOM CMT shell within the ILOM controller.
Power	Power is provided in the chassis
Cooling	Environmental controls are provided by the chassis.

For more information about chassis features and controls, refer to the service manual for your blade chassis at:
http://docs.sun.com/app/docs/prod/blade.srvr

FIGURE 1-4 Field-Replaceable Units

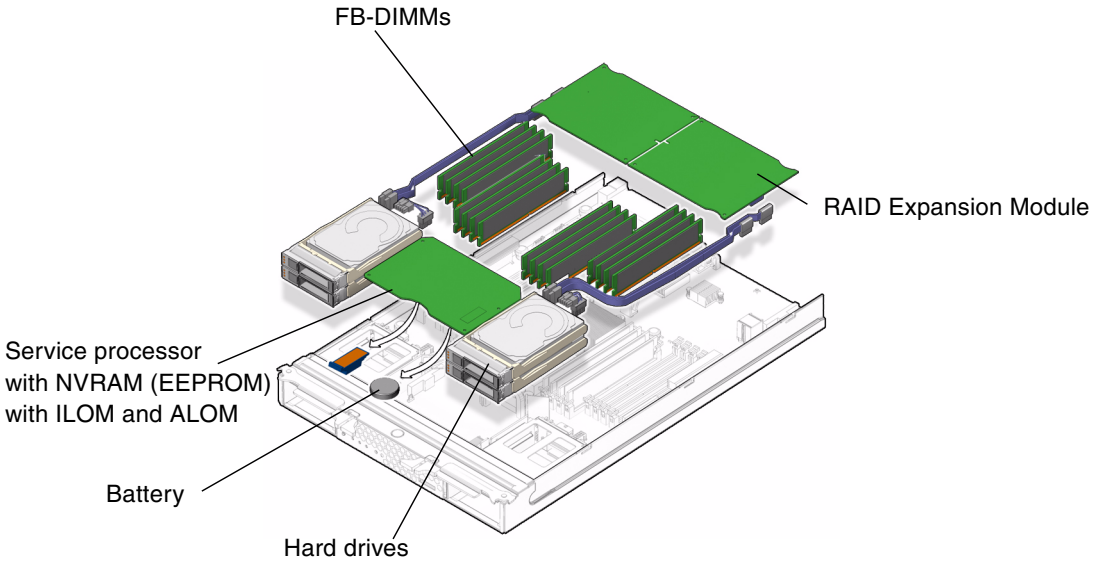


TABLE 1-3 Sun Blade T6320 Server Module FRU List

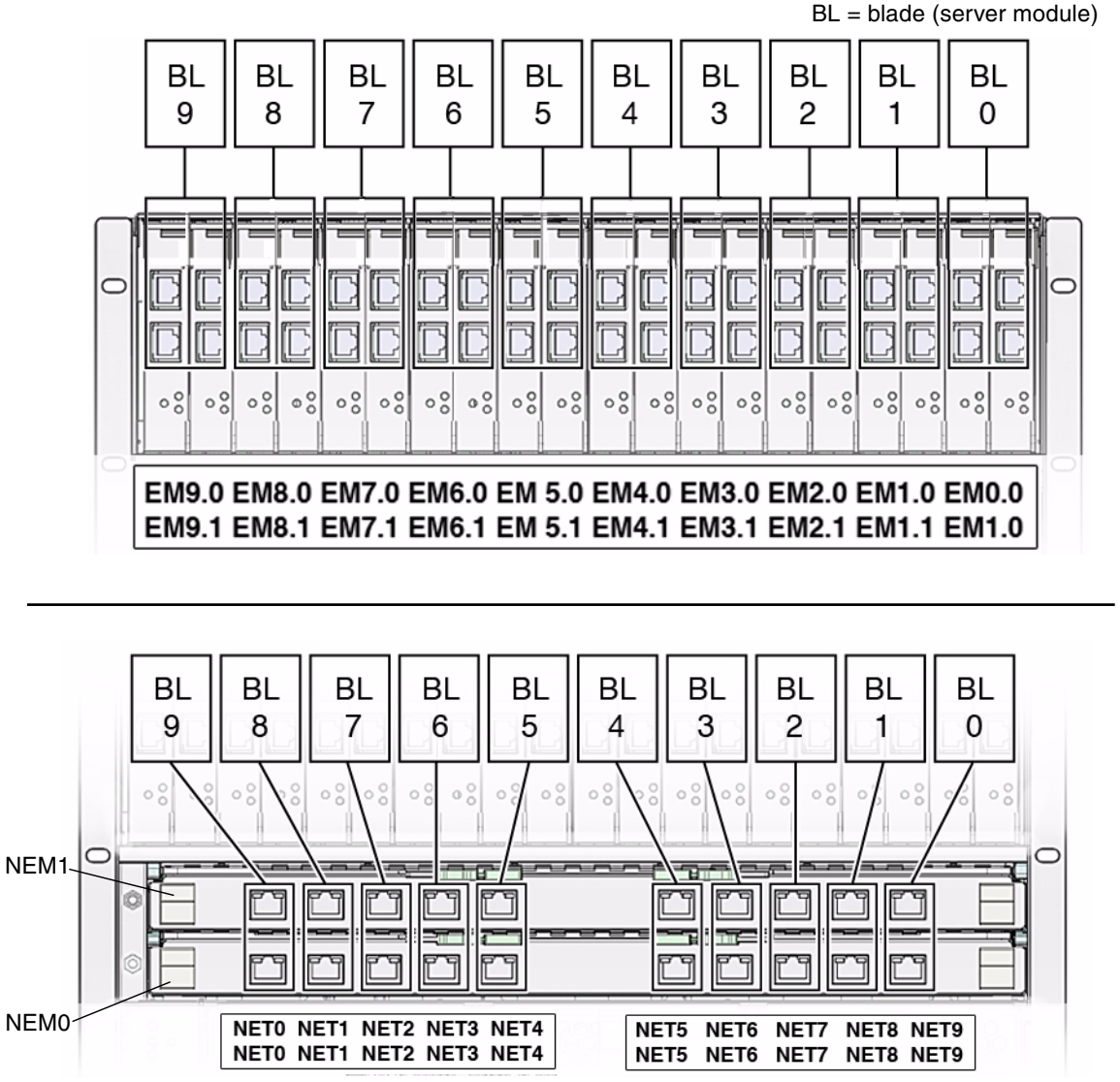
FRU	Description	FRU Name*	Replacement Instructions
Service processor card	Controls the host power and monitors host system events (power and environmental). Socketed EEPROM stores system configuration, all Ethernet MAC addresses, and the host ID.	SYS/SP	Section 4.4, "Removing and Replacing the Service Processor" on page 4-15
Service processor battery	Lithium battery	SYS/SP/BAT	Section 4.5, "Removing and Replacing the Battery on the Service Processor" on page 4-18
REMs	RAID expansion modules (Hard drive management for up to 12 hard drives)	SYS/MB/REM	Section 4.6, "Replacing or Installing the Sun Blade RAID 5 Expansion Module" on page 4-20 Section 4.6, "Replacing or Installing the Sun Blade RAID 5 Expansion Module" on page 4-20

TABLE 1-3 Sun Blade T6320 Server Module FRU List *(Continued)*

FRU	Description	FRU Name*	Replacement Instructions
FB-DIMMs	1 Gbyte, 2 Gbyte, 4 Gbyte	`SYS/MB/CMPx/BRx/CHx/Dx`	Section 4.3.1, "Removing the DIMMs" on page 4-10
Hard drive	SFF SAS, or SATA 2.5-inch hard drive in NEMO bracket	`HDD0,1,2,3`	Section 3.2.2, "Removing a Hard Drive" on page 3-2
Server Module	Enclosure with CPU, motherboard	`SYS/MB`	New server module

* The FRU name is used in system messages.

FIGURE 1-5 PCI Express and Ethernet Connections on a Sun Blade 6000 Modular System



1.1.1 Multicore Processor Information

The UltraSPARC T2 multicore processor is the basis of the Sun Blade T6320 server module. The processor has four, six, or eight UltraSPARC cores. Each core equates to a 64-bit execution pipeline capable of running eight threads. The result is that the

8-core processor handles up to 64 active threads concurrently. For more information about the UltraSPARC T2 multicore processor, go to:
http://www.sun.com/processors/UltraSPARC-T2/features.xml
http://www.sun.com/servers/wp.jsp?tab=1

1.2 Support for RAID Storage Configurations

In addition to software RAID configurations, you can set up hardware RAID 1 (mirroring) and hardware RAID 0 (striping) configurations for any pair of internal hard drives using the on-board controller, providing a high-performance solution for hard drive mirroring.

By attaching one or more external storage devices (such as the Sun Blade 6000 Disk Module) to the Sun Blade T6320 server module, you can use a RAID to configure system drive storage in a variety of different RAID levels.

As shipped, the internal hard drives are not configured for RAID. To make a disk part of a RAID array while preserving the data on the drive, add the drive to a mirrored RAID set (also known as hardware RAID Level 1).

Before configuring RAID, you must configure a RAID expansion module (REM).The Sun Blade T6340 Server Module supports two REMs, the Sun Blade RAID 5 and Sun Blade RAID 0/1 G2 Expansion Modules.

Refer to the following for RAID configuration instructions:

- *Uniform Command-Line Interface User's Guide*, 820-2145
- *Sun StorageTek RAID Manager Software User's Guide*, 820-1177
- *Sun StorageTek SAS RAID HBA Installation Guide Eight-Port, Internal HBA*
  `http://docs.sun.com/app/docs/doc/820-1847-17`
- *Sun Blade 6000 Disk Module Administration Guide*, 820-4922
  `http://docs.sun.com/app/docs/prod/blade.6000disk~blade6000dskmod`

Note – The Sun Blade 6000 Disk Module is an external storage blade that provides eight additional drives for configuring RAID and is supported for both REMs.

1.2.1 Sun Blade RAID 5 Expansion Module

The **Sun Blade RAID 5 Expansion Module** supports RAID levels 0, 1, 1E, 10, 5, or 6 with global or dedicated hot spares. When a Sun Blade RAID 5 Expansion Module is installed, SAS drives can be installed in disk slots 0 through 3. You can configure these disks as RAID 0, 1, 5, or 10.

For information on creating a bootable array, see Appendix B. For information on installing the OS on a bootable array, see Appendix C.

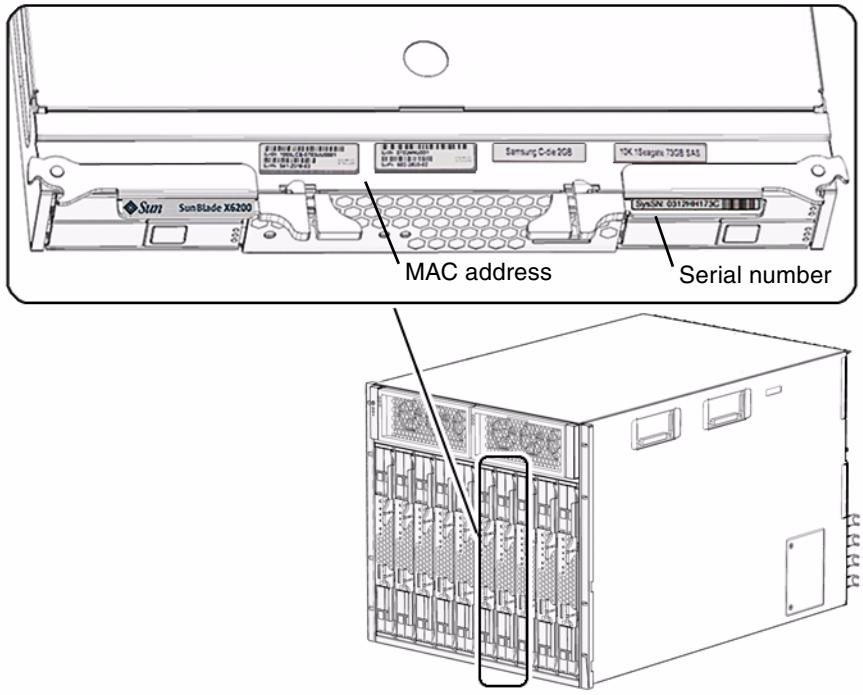
1.2.2 Sun Blade RAID 0/1 G2 Expansion Module

The **Sun Blade RAID 0/1 G2 Expansion Module** supports RAID 1 (two mirrored disks with an optional hot spare) or RAID 1E (three or more mirrored disks with one or two hot spares).

1.3 Finding the Serial Number

To obtain support for your system, you need the serial number. The serial number is located on a sticker on the front of the server module (FIGURE 1-6).

FIGURE 1-6 Serial Number and MAC Address Location



You can type the ILOM `show /SYS` command or the ALOM CMT `showplatform` command to obtain the chassis serial number. Both examples are shown below.

```
-> show /SYS

 /SYS
    Targets:
        SERVICE
        LOCATE
        ACT
        OK2RM
        SP
        MB
        MIDPLANE
        HDD0
        HDD1
        HDD2
        HDD3
        NEM0
        NEM1
        FM0... .... .... ...

    Properties:
        type = Host System
        keyswitch_state = Normal
        chassis_name = SUN BLADE 6000 MODULAR SYSTEM
        chassis_part_number = 123-4567-89
        chassis_serial_number = 0000000-0000YB005A
        chassis_manufacturer = SUN MICROSYSTEMS
        product_name = Sun Blade T6320 Server Module
        product_part_number = 541-2517-04
        product_serial_number = 1005LCB-07385R001H
        product_manufacturer = SUN MICROSYSTEMS
        fault_state = OK
        clear_fault_action = (none)
        prepare_to_remove_status = NotReady
        prepare_to_remove_action = (none)
        return_to_service_action = (none)
        power_state = On
```

ALOM CMT example:

```
sc> showplatform
SUNW, Sun Blade T6320 Server Module
Blade Serial Number: 1005LCB-07385N005L
Chassis Serial Number: 1005LCB-0709YM007M
  Slot Number: 5
Domain Status
------ ------
S0  Running
sc>
```

1.4 Additional Service Related Information

Documentation for the Sun Blade T6320 server module, and related hardware and software is listed in "Product Documentation" on page x.

The following resources are also available.

- **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://www.sunsolve.sun.com/handbook_pub/
- **Predictive Self-Healing Knowledge Database** – You can access the knowledge article corresponding to a self-healing message by taking the Sun Message Identifier (SUNW-MSG-ID) and typing it into the field on this page: http://www.sun.com/msg/

CHAPTER 2

Sun Blade T6320 Server Module Diagnostics

This chapter describes the diagnostics that are available for monitoring and troubleshooting the Sun Blade T6320 server module.

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

The following topics are covered:

2.1 Sun Blade T6320 Server Module Diagnostics Overview

There are a variety of diagnostic tools, commands, and indicators you can use to monitor and troubleshoot a Sun Blade T6320 server module.

- **LEDs** – Provide a quick visual notification of the status of the server module and some of the FRUs.
- **ILOM firmware** – This system firmware runs on the service processor. In addition to providing the interface between the hardware and the Solaris OS, ILOM tracks and reports the health of key server module components. ILOM works closely with POST and Solaris Predictive Self-Healing technology to keep the system up and running even when there is a faulty component. For more information about ILOM, see these documents:
  - *Sun Integrated Lights out Manager 2.0 User's Guide*, 820-1188
  - *Sun Integrated Lights Out Manager 2.0 Supplement for Sun Blade T6320 Server Modules, 820-2546.* And *Oracle Integrated Lights Out Manager (ILOM) 3.0 Supplement for Sun Blade T6320 Server Modules, 820-7145.* These documents describe ILOM information specific to the Sun Blade T6320 server module. It also provides command comparisons of the ALOM CMT and ILOM CLI command sets.
  - Appendix D of this service manual provides some information about using the ALOM CMT CLI.
- **Power-on self-test (POST)** – POST performs diagnostics on system components upon system reset to ensure the integrity of those components. POST is configurable and works with ILOM to take faulty components offline if needed.
- **Solaris OS Predictive Self-Healing (PSH)** – This technology continuously monitors the health of the CPU and memory, and other components. PSH works with ILOM to take a faulty component offline if needed. The Predictive Self-Healing technology enables Sun systems to accurately predict component failures and mitigate many serious problems before they occur.
- **Log files and console messages** – 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, identifies possible faulty components, and provides recommendations for repair.

The LEDs, ILOM, Solaris OS PSH, and many of the log files and console messages are integrated. For example, when the Solaris software detects a fault, it will display the fault, log it, pass information to ILOM where the fault is logged, and depending on the fault, one or more LEDs may be illuminated.

The diagnostic flowchart in FIGURE 2-1 and TABLE 2-1 describes an approach for using the server module 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.

Use this flowchart to understand what diagnostics are available to troubleshoot faulty hardware, and use TABLE 2-1 to find more information about each diagnostic in this chapter.

FIGURE 2-1 Diagnostic Flowchart

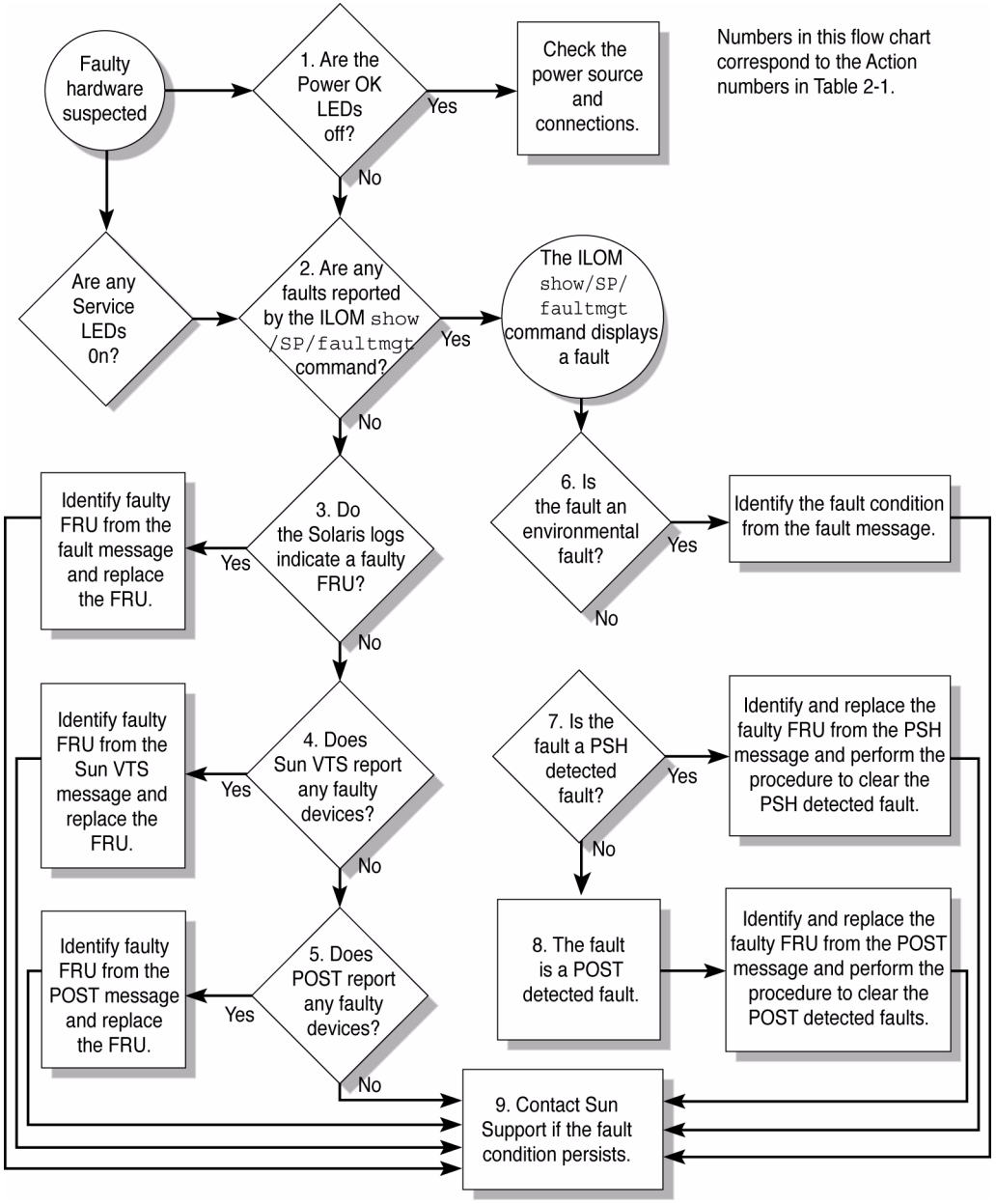


TABLE 2-1 Diagnostic Flowchart Actions

Action No.	Diagnostic Action	Resulting Action	For more information, see these sections
1.	Check the OK LED.	The OK LED is located on the front of the Sun Blade T6320 server module. If the LED is not lit, check that the blade is properly connected and the chassis has power.	Section 2.3, "Interpreting System LEDs" on page 2-12
2.	Type the ILOM `show /SP/faultmgmt` command to check for faults.	The `faultmgmt` command displays the following types of faults: • Environmental faults • Solaris Predictive Self-Healing (PSH) detected faults • POST detected faults Faulty FRUs are identified in fault messages using the FRU name. For a list of FRU names, see TABLE 1-3.	Section 2.5.3, "Displaying System Faults" on page 2-21
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 4.	Section 2.8, "Collecting Information From Solaris OS Files and Commands" on page 2-46
4.	Run the SunVTS software.	SunVTS can exercise and diagnose FRUs. To run SunVTS, the server module must be running the Solaris OS. • If SunVTS reports a faulty device replace the FRU. • If SunVTS does not report a faulty device, go to Action 5.	Section 2.10, "Exercising the System With SunVTS" on page 2-50
5.	Run POST.	POST performs basic tests of the server module components and reports faulty FRUs. • If POST indicates a faulty FRU, replace the FRU. • If POST does not indicate a faulty FRU, go to Action 9.	Section 2.6, "Running POST" on page 2-30
6.	Determine if the fault is an environmental fault.	If the fault listed by the `show /SP/faultmgmt` command displays a temperature or voltage fault, then the fault is an environmental fault. Environmental faults can be caused by faulty FRUs (chassis power supply, fan, or blower) or by environmental conditions such as high ambient temperature, or blocked airflow.	Section 2.5.3, "Displaying System Faults" on page 2-21 See the Modular System Service Manual, 820-0051.

TABLE 2-1 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 2.7, "Using the Solaris Predictive Self-Healing Feature" on page 2-41 Section 4.2, "Common Procedures for Parts Replacement" on page 4-3 Section 2.7.2, "Clearing PSH Detected Faults" on page 2-44 Section 2.7.3, "Clearing the PSH Fault From the ILOM Logs" on page 2-45
8.	Determine if the fault was detected by POST.	POST performs basic tests of the server module 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 2.6, "Running POST" on page 2-30 Section 4.2, "Common Procedures for Parts Replacement" on page 4-3 Section 2.6.4, "Clearing POST Detected Faults" on page 2-38
9.	Contact Sun for support.	The majority of hardware faults are detected by the server module diagnostics. In rare cases it is possible that a problem requires additional troubleshooting. If you are unable to determine the cause of the problem, contact Sun for support.	Sun Support information: `http://www.sun.com/support` Section 1.3, "Finding the Serial Number" on page 1-11

2.2 Memory Configuration and Fault Handling

New dual rank fully-buffered (FB) DIMMs replace the single rank FB-DIMMs. The Sun Blade T6320 server module has 16 connectors (slots) that hold Sun approved, industry standard FB-DIMMs in the following capacities:

- 1 Gbyte (maximum of 16 Gbytes)
- 2 Gbyte (maximum of 32 Gbytes)
- 4 Gbyte (maximum of 64 Gbytes)
- 8 Gbyte (maximum of 128 Gbytes)

The Sun Blade T6320 server module performs best if all 16 connectors are populated with 16 identical FB-DIMMs. This configuration also enables the system to continue operating even when a FB-DIMM fails, or if an entire channel fails.

Note – Only dual rank type DIMMs are available as an assemble to order (ATO) option.

2.2.1 FB-DIMM Configuration Guidelines

You must follow these guidelines when adding or replacing FB-DIMMs:

- Valid quantities of FB-DIMMs are 4, 8, or 16 (See FIGURE 2-2).
- All FB-DIMMs in the server *must* be the same capacity.
- All FB-DIMMs in a branch *must* have the same part number.

Note – FB-DIMMs that run on 1.5V are not supported in this server. An FB-DIMM that runs on 1.5V is sometimes noted with an *LV* on the part number label. Do not install these FB-DIMMs in this server.

When Upgrading Memory

When adding memory to the server, ensure that you follow all of the guidelines. You might need to move some of the original FB-DIMMs to ensure that all FB-DIMMs in a branch have the same part number.

When Replacing Faulty FB-DIMMs

Within each branch, ensure that the replacement FB-DIMM has the same part number as the FB-DIMM you are removing. If you are unable to obtain an FB-DIMM with the same part number, you might need to replace all FB-DIMMs in the branch to ensure that they all have the same part number.

The following table lists the supported FB-DIMMs and part numbers.

TABLE 1 Supported FB-DIMMs and Part Numbers

Description	Ordered Separately	Assembled at Factory
FB-DIMMs Supported at November 2007 Release of the Server Module		
1 GB single rank x4 FB-DIMM x 2 (2 GB FB-DIMM Memory Kit)	X4200A	4200A
2 GB single rank x4 FB-DIMM x 2 (4 GB FB-DIMM Memory Kit)	X4203A	4203A
4 GB dual rank x8 DIMM x 2 (8 GB FB-DIMM Memory Kit)	X4204A	4204A
FB-DIMMs Added at October 2008 Release of the Server Module		
1 GB dual rank x8 FB-DIMM x 2 (2 GB FB-DIMM Memory Kit)	X4200AF	4200AF
2 GB dual rank x8 FB-DIMM x 2 (4 GB FB-DIMM Memory Kit)	X4203AF	4203AF
8 GB dual rank x8 FB-DIMM x 2 (16 GB FB-DIMM Memory Kit)	X4290AF	4290AF

2.2.1.1 DIMM Installation Rules

Caution – The following FB-DIMM rules must be followed. The server module might not operate correctly if the FB-DIMM rules are not followed. Always use DIMMs that have been qualified by Sun.

FB-DIMMs must be installed in groups of four, each of the same capacity.

The following configurations are supported in the Sun Blade T6320 server module:

- Four FB-DIMMs (Group 1) Channel 0, FB-DIMM connector 0 in all branches must be populated.
- Eight FB-DIMMs (Groups 1 and 2)
- Sixteen FB-DIMMs (Groups 1, 2 and 3)

See Section 4.3.1, "Removing the DIMMs" on page 4-10 for FB-DIMM installation instructions. FIGURE 2-2 shows where to install FB-DIMMs in groups of four.

FIGURE 2-2 FB-DIMM Installation Rules

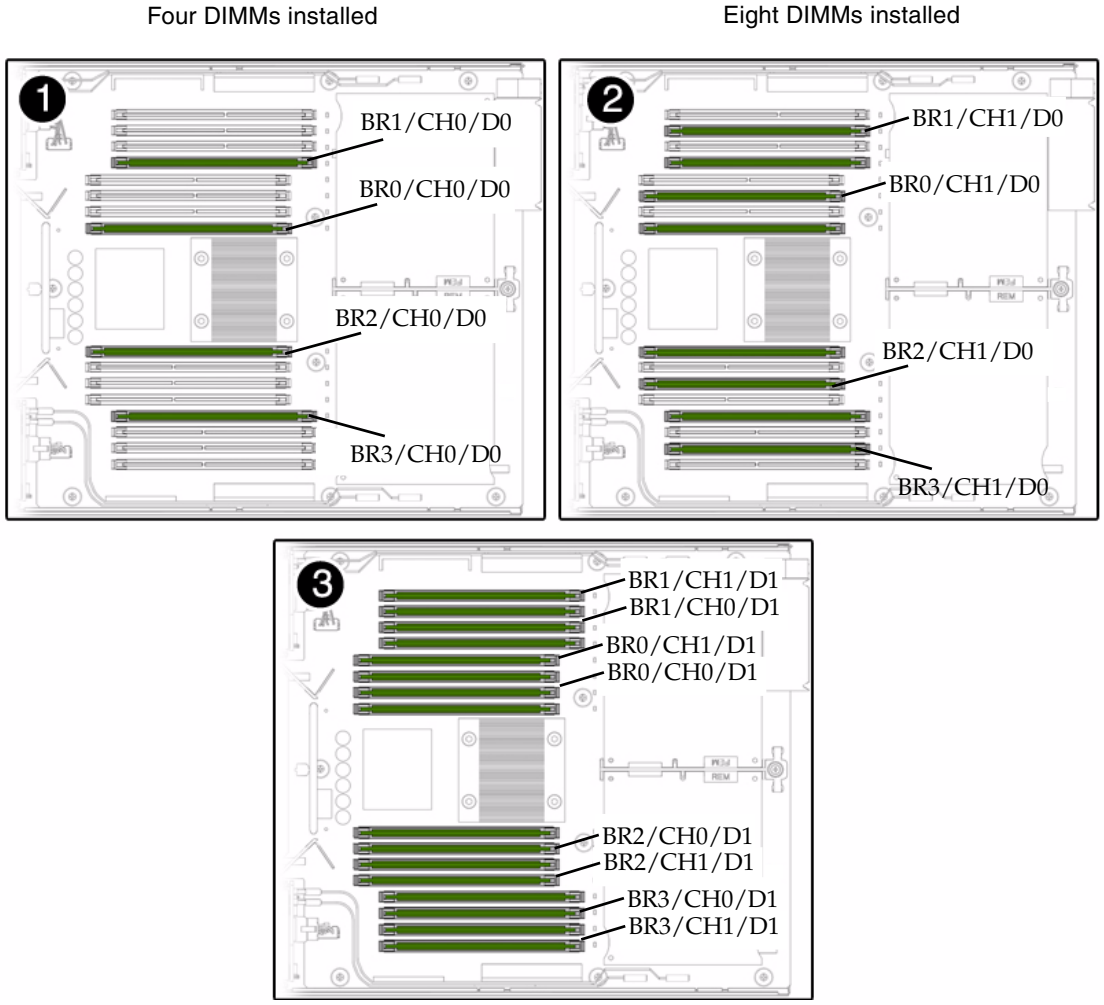
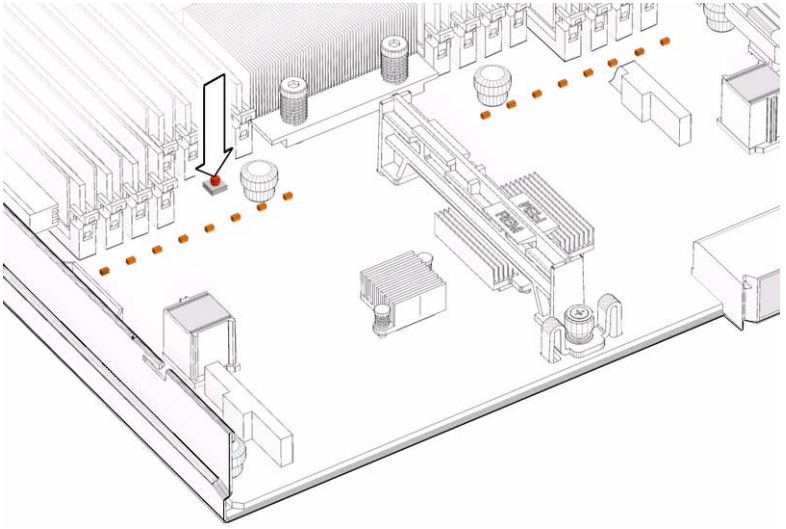


FIGURE 2-3 DIMM Locate Button and DIMM LEDs



You can also use TABLE 2-2 to identify the DIMMs you want to remove.

TABLE 2-2 FB-DIMM Configuration and Installation

Branch Name	Channel Name	FRU Name	Motherboard FB-DIMM Connector	FB-DIMM Installation Order*	FB-DIMM Pair†
Branch 0	Channel 0	/SYS/MB/CMP0/BR0/CH0/D0	J1001	1	A
		/SYS/MB/CMP0/BR0/CH0/D1	J1101	3	B
	Channel 1	/SYS/MB/CMP0/BR0/CH1/D0	J1201	2	A
		/SYS/MB/CMP0/BR0/CH1/D1	J1301	3	B
Branch 1	Channel 0	/SYS/MB/CMP0/BR1/CH0/D0	J1401	1	C
		/SYS/MB/CMP0/BR1/CH0/D1	J1501	3	D
	Channel 1	/SYS/MB/CMP0/BR1/CH1/D0	J1601	2	C
		/SYS/MB/CMP0/BR1/CH1/D1	J1701	3	D
Branch 2	Channel 0	/SYS/MB/CMP0/BR2/CH0/D0	J2001	1	E
		/SYS/MB/CMP0/BR2/CH0/D1	J2101	3	F
	Channel 1	/SYS/MB/CMP0/BR2/CH1/D0	J2201	2	E
		/SYS/MB/CMP0/BR2/CH1/D1	J2301	3	F
Branch 3	Channel 0	/SYS/MB/CMP0/BR3/CH0/D0	J2401	1	G

TABLE 2-2 FB-DIMM Configuration and Installation *(Continued)*

Branch Name	Channel Name	FRU Name	Motherboard FB-DIMM Connector	FB-DIMM Installation Order*	FB-DIMM Pair†
		/SYS/MB/CMP0/BR3/CH0/D1	J2501	3	H
	Channel 1	/SYS/MB/CMP0/BR3/CH1/D0	J2601	2	G
		/SYS/MB/CMP0/BR3/CH1/D1	J2701	3	H

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

† Fault replacement path: Each pair is addressed as a unit, and each pair must be identical.

2.2.1.2 Memory Fault Handling

The Sun Blade T6320 server module uses advanced ECC technology, also called *chipkill*, that corrects up to 4-bits in error on nibble boundaries, as long as they are all in the same DRAM. If a DRAM fails, the DIMM continues to function.

Note – The chipkill function is only supported on DIMMs that use "x4" DRAMs.

The following server module features manage memory faults independently.

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

  If a memory fault is detected, POST displays the fault with the FRU name of the faulty DIMMs, logs the fault, and disables the faulty DIMMs by placing them in the Automatic System Recovery (ASR) blacklist. For a given memory fault, POST disables half of the physical memory in the system. When this occurs, you must replace the faulty DIMMs based on the fault message and enable the disabled DIMMs with the ILOM command `set /SYS/component component_state= enabled` .

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

2.2.1.3 Troubleshooting Memory Faults

If you suspect that the server module has a memory problem, follow the flowchart (see FIGURE 2-1). Type the ILOM command: `show /SP/faultmgmt` . The `faultmgmt` command lists memory faults and lists the specific DIMMs that are associated with

the fault. Once you have identified which DIMMs to replace, see Chapter 4 for DIMM removal and replacement instructions. You must perform the instructions in that chapter to clear the faults and enable the replaced DIMMs.

2.3 Interpreting System LEDs

The Sun Blade T6320 server module has LEDs on the front panel and the hard drives. The behavior of LEDs on your server module conforms to the American National Standards Institute (ANSI) Status Indicator Standard (SIS). These standard LED behaviors are described in TABLE 2-3

2.3.1 Front Panel LEDs and Buttons

The front panel LEDs and buttons are located in the center of the server module (FIGURE 2-4, TABLE 2-3, and TABLE 2-4, and TABLE 2-5).

FIGURE 2-4 Front Panel and Hard Drive LEDs

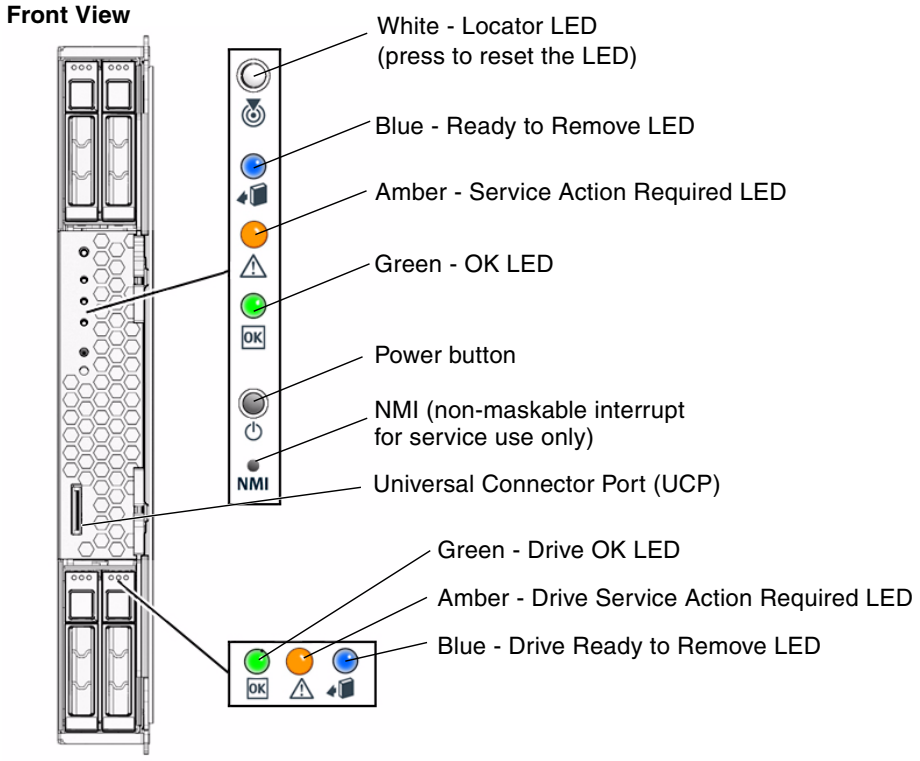


TABLE 2-3 LED Behavior and Meaning

LED Behavior	Meaning
Off	The condition represented by the color is not true.
Steady on	The condition represented by the color is true.
Standby blink	The system is functioning at a minimal level and ready to resume full function.
Slow blink	Transitory activity or new activity represented by the color that is taking place.
Fast blink	Attention is required.
Feedback flash	Activity is taking place commensurate with the flash rate (such as disk drive activity).

The LEDs have assigned meanings, described in TABLE 2-4.

TABLE 2-4 LED Behaviors With Assigned Meanings

Color	Behavior	Definition	Description, Actions, and ILOM Commands
White	Off	Steady state	
	Fast blink	4 Hz repeating sequence, equal intervals On and Off.	This indicator helps you to locate a particular enclosure, board, or subsystem (for example, the Locator LED). The LED is activated using one of the following methods: • Type the ILOM command: `set /SYS/LOCATE value=on` • Press the button to toggle the indicator on or off. This LED provides the following indications: • Off– Normal operating state. Fast blink – The server module received a signal as a result of one of the preceding methods and is indicating that the server module is active. • Type the ILOM command: `set /SYS/LOCATE value=Fast_Blink`
Blue	Off	Steady state	Steady state - If LED is off, it is not safe to remove the server module from the chassis. You must use software to take the component offline or shut down the server.
	Steady on	Steady state	If the blue LED is on, a service action can be safely performed on the component. To remove a server module (and illuminate the blue LED), type: `set /SYS/ prepare_to_remove_action=true` To remove a hard drive, use the Solaris `cfgadm` command
Amber	Off	Steady state	
	Steady on	Steady state	This indicator signals the existence of a fault condition. Service is required (for example, the Service Required LED). The ILOM `show /SP/faultmgmt` command provides details about any faults that cause this indicator to be lit. To turn off an amber LED, type: `set /SYS/return_to_service_action=True`
Green	Off	Steady state	Off – The system is unavailable. Either it has no power or ILOM is not running.

TABLE 2-4 LED Behaviors With Assigned Meanings *(Continued)*

Color	Behavior	Definition	Description, Actions, and ILOM Commands
	Standby blink	Repeating sequence consisting of a brief (0.1 sec.) on flash followed by a long off period (2.9 sec.)	The system is running at a minimum level and is ready to be quickly revived to full function (for example, the System Activity LED).
	Steady on	Steady state	Status normal; system or component functioning with no service actions required.
	Slow blink		A transitory (temporary) event is taking place for which direct proportional feedback is not needed or not feasible. ILOM is enabled but the server module is not fully powered on. Indicates that the service processor is running while the system is running at a minimum level in standby mode and ready to be returned to its normal operating state.

TABLE 2-5 Front Panel Buttons

Button	Color	Description
Power button	gray	Turns the host system on and off. Use a paper clip or other small tipped object to completely press this button.
(reset)	gray	This button does not function on the Sun Blade T6320 server module.

2.3.2 Ethernet Port LEDs

For information about Ethernet LEDs see the service manual for your modular system chassis or ethernet device at:

http://docs.sun.com/app/docs/prod/blade.6000mod

2.4 Using ILOM for Diagnosis and Repair Verification

The Sun Integrated Lights Out Manager (ILOM) is contained on firmware on the service processor in the Sun Blade T6320 server module. ILOM enables you to remotely manage and administer your server module.

Note – ILOM also contains an ALOM-CMT compatibility shell. For more information about ALOM-CMT compatibility see the *Sun Integrated Lights Out Manager 2.0 Supplement for Sun Blade T6320 Server Modules*, 820-2546. Appendix D of this service manual also provides some information about the ALOM CMT CLI.

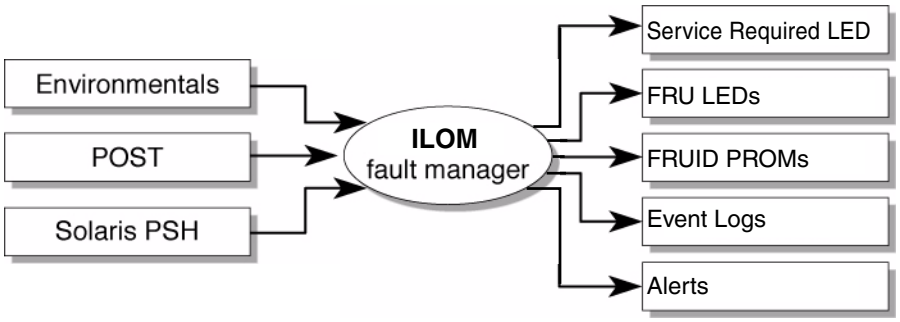
ILOM enables you to run remote diagnostics such as power-on self-test (POST), that would otherwise require physical proximity to the server module serial port. You can also configure ILOM to send email alerts of hardware failures, hardware warnings, and other events related to the server module or to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

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

Faults detected by ILOM, POST, and the Solaris Predictive Self-healing (PSH) technology are forwarded to ILOM for fault handling (FIGURE 2-5).

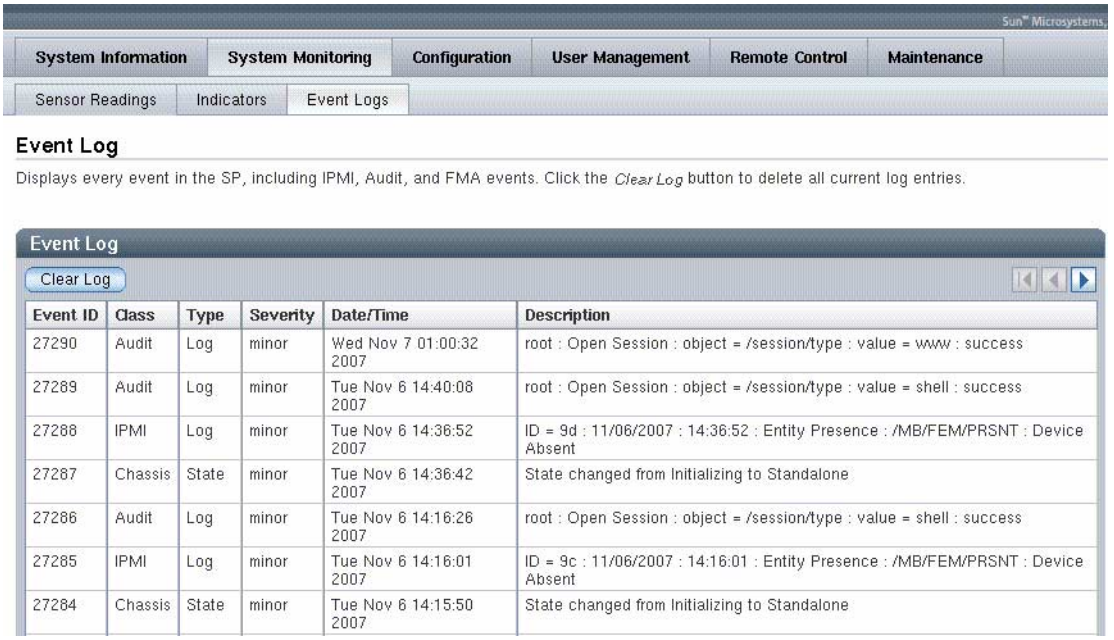
In the event of a system fault, ILOM ensures that the Service Action Required LED is lit, FRU ID PROMs are updated, the fault is logged, and alerts are displayed (faulty FRUs are identified in fault messages using the FRU name. For a list of FRU names, see TABLE 1-3).

FIGURE 2-5 ILOM Fault Management



In ILOM you can view the ILOM logs to see alerts. FIGURE 2-6 is a sample of the ILOM web interface. Using the CLI you can type the `show /SP/logs/event/list/` command.

FIGURE 2-6 Sample Event Log in ILOM Web Interface



Event ID	Class	Type	Severity	Date/Time	Description
27290	Audit	Log	minor	Wed Nov 7 01:00:32 2007	root : Open Session : object = /session/type : value = www : success
27289	Audit	Log	minor	Tue Nov 6 14:40:08 2007	root : Open Session : object = /session/type : value = shell : success
27288	IPMI	Log	minor	Tue Nov 6 14:36:52 2007	ID = 9d : 11/06/2007 : 14:36:52 : Entity Presence : /MB/FEM/PRSNT : Device Absent
27287	Chassis	State	minor	Tue Nov 6 14:36:42 2007	State changed from Initializing to Standalone
27286	Audit	Log	minor	Tue Nov 6 14:16:26 2007	root : Open Session : object = /session/type : value = shell : success
27285	IPMI	Log	minor	Tue Nov 6 14:16:01 2007	ID = 9c : 11/06/2007 : 14:16:01 : Entity Presence : /MB/FEM/PRSNT : Device Absent
27284	Chassis	State	minor	Tue Nov 6 14:15:50 2007	State changed from Initializing to Standalone

ILOM 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. ILOM extinguishes the Service Action Required LED and updates the FRU PROM.

Many environmental faults can automatically recover. For example, a temperature that is exceeding a threshold might return to normal limits, when you connect a fan. The 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.`

There are three thresholds for an environmental fault:

- Warning: ILOM issues a command to burst the fan speed.
- Soft shutdown: ILOM initiates a graceful shutdown.
- Hard shutdown: Immediate shutdown.

Environmental faults can be repaired through hot removal of the faulty FRU. The 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.`

- **Fault repair** – The fault has been repaired by human intervention. In most cases, ILOM detects the repair and extinguishes the Service Required LED. In the event that ILOM does not perform these actions, you must perform these tasks manually with the following commands:
  - `set /SYS/clear_fault_action=true` (The ALOM-CMT equivalent is `clearfault`) Clears the PSH fault logs but does not enable the component. See Section 2.7.2, "Clearing PSH Detected Faults" on page 2-44.
  - `set /SYS/`*`component`*`/component_state=enabled` (The ALOM-CMT equivalent is `enablecomponent`) Clears POST generated faults and enables the component. See Section 2.6.4, "Clearing POST Detected Faults" on page 2-38.

2.5 Using the ILOM Web Interface For Diagnostics

These instructions use the ILOM web interface. To use the command line interface (CLI), see Appendix D of this manual, or these documents:

- *Sun Integrated Lights Out Manager 2.0 Supplement for Sun Blade T6320 Server Modules*, 820-2546
- *Oracle Integrated Lights Out Manager (ILOM) 3.0 Supplement for Sun Blade T6320 Server Modules*, 820-7145

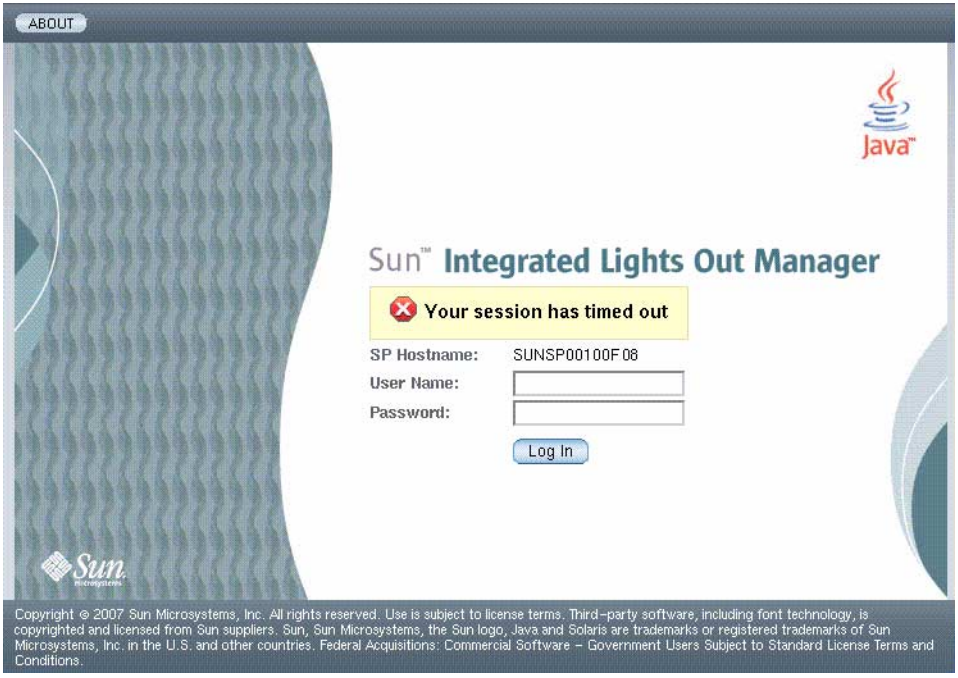
1. **Connect to the ILOM web interface by typing the IP address for the Sun Blade T6320 server module service processor in a web browser.**

   If you do not know the IP address for the server module, you can obtain the service processor IP address from the following:

   - ILOM CLI: ->**show /SP/network**
   - ALOM-CMT compatibility shell: sc> **showsc**
   - Chassis CMM ILOM: ->**show /CH/BL*x*/SP/network** (Where BL*x* is the number of the blade server module in the chassis.)

2. Type the username and password to access the diagnostics menus in the ILOM web interface. The default user name is **root**, and the default password is **changeme**

FIGURE 2-7 ILOM Login Screen



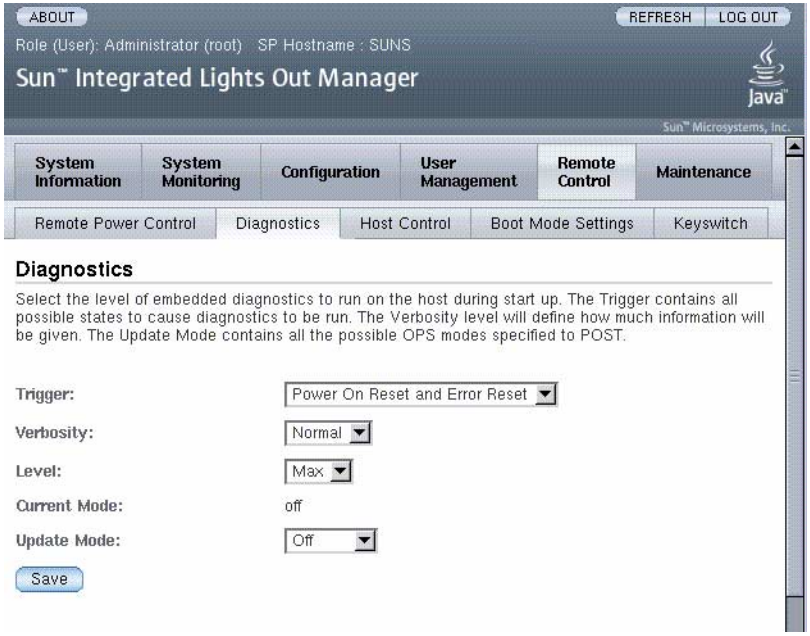
2.5.1 Changing POST Settings With the ILOM Web Interface

There are two tabs in the web interface to control the POST settings:

1. **Select the Remote Control tab and the Diagnostics tab (**FIGURE 2-8**).**
2. **Set the verbosity level, trigger, and other settings as needed.**

   TABLE 2-6 shows how different settings produce POST output.

FIGURE 2-8 Setting POST Diagnostics Levels With the ILOM Web Based Interface



3. **To set the diagnostics mode, select the Remote Control tab and the Keyswitch tab.**

2.5.2 Changing POST Settings With the ILOM CLI

1. Type the `show` command to see the current POST settings:

```
-> show /HOST/diag
/HOST/diag
  Targets
  Properties:
        level = max
        mode = normal
        trigger = power-on-reset error-reset
        verbosity = normal

  Commands:
        cd
        set
        show
```

2. Change the POST settings with the `set /HOST/diag` command.

For example:

```
-> set /HOST/diag level=min
Set 'level' to 'min'

-> set /HOST/diag mode=Normal
Set 'mode' to 'Normal'

-> set /HOST/diag verbosity=max
Set 'verbosity' to 'max'

-> set /HOST/diag trigger=power-on-reset trigger=error-reset
Set 'trigger' to 'power-on-reset'
Set 'trigger' to 'error-reset'
```

2.5.3 Displaying System Faults

ILOM displays the following faults with the web interface and CLI:

- **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.
- **POST detected faults** – Detected by the power-on self-test diagnostics.
- **PSH detected faults** – Detected by the Solaris Predictive Self-healing (PSH) technology

Use the web interface or type the `show /SP/faultmgmt` command for the following reasons:

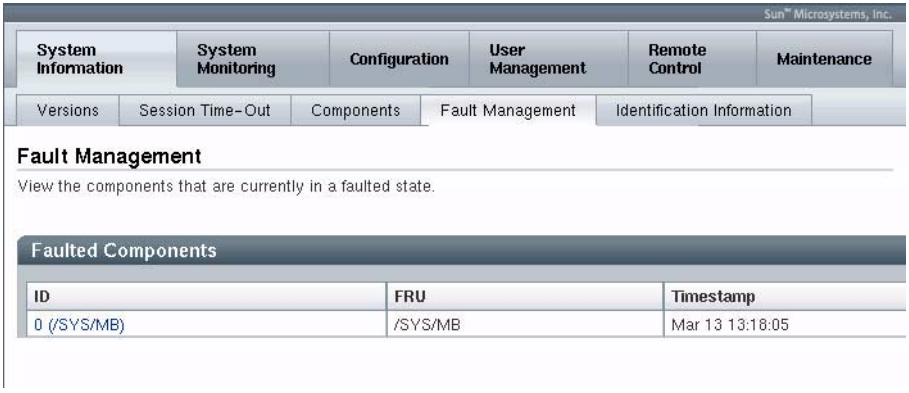
- To see if any faults have been passed to, or detected by the ILOM firmware.
- To obtain the fault message ID (SUNW-MSG-ID) for PSH detected faults.
- To verify that the replacement of a FRU has cleared the fault and not generated any additional faults.

2.5.3.1 Viewing Fault Status Using the ILOM Web Interface

In the ILOM web interface, you can view the system components currently in a fault state using the Fault Management page.

FIGURE 2-9 Fault Management Page Example

FIGURE 2-10 Faulted Component ID Window



The Fault Management page lists faulted components by ID, FRU, and TimeStamp. You can access additional information about the faulted component by clicking the faulted component ID. For example, if you clicked the faulted component ID, `0 SYS/MB/`, the following dialog window appears displaying additional details about the faulted component.

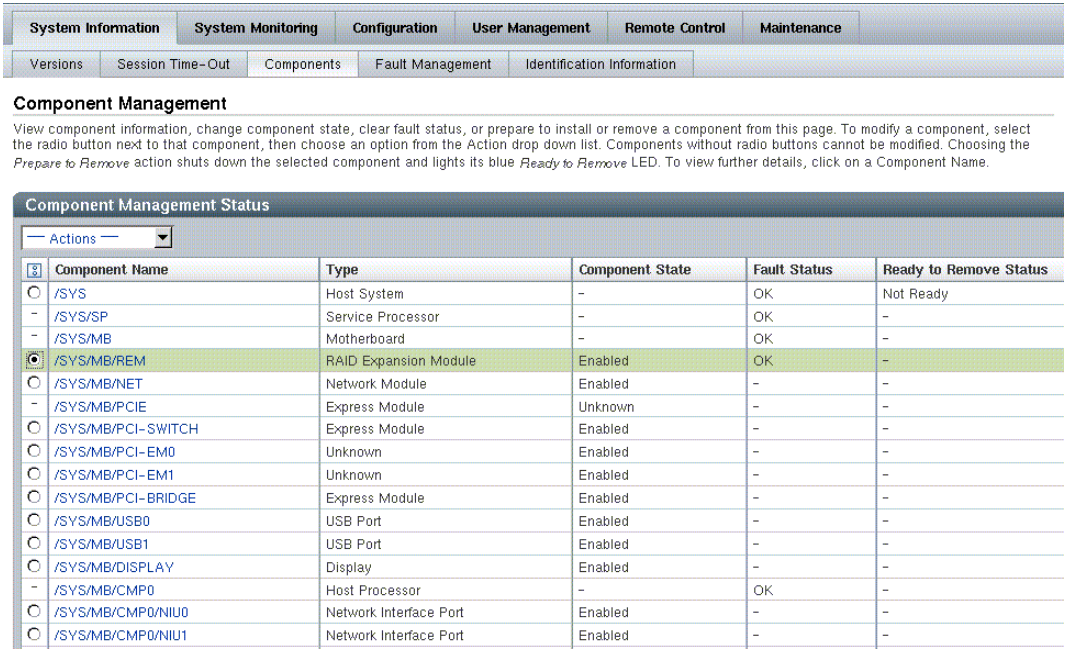
View information for faulted FRU.

0 (/SYS/MB)

Property	Value
timestamp	Mar 13 13:18:56
sp_detected_fault	/SYS/MB/FEM0 prom is unreadable or corrupted
timestamp	Mar 13 13:18:06
sp_detected_fault	/SYS/MB/CMP0/BR0/CH0/D1 Disabled by user
timestamp	Mar 13 13:18:05
sp_detected_fault	/SYS/MB/CMP0/BR0/CH0/D0 Disabled by user

Alternatively, in the ILOM web interface, you can identify the fault status of a component on the Component Management page.

FIGURE 2-11 Component Management Page - Fault Status



2.5.3.2 Viewing Fault Status Using the ILOM CLI

In the ILOM CLI, you can view the fault status of component(s) by using the `show` command. For example:

```
->show /SP/faultmgmt
```

2.5.4 Displaying the Environmental Status with the ILOM CLI

The ILOM `show` command displays a snapshot of the server module 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 `->` prompt, type the `show` command.

The output differs according to your system model and configuration.

```
-> show /SYS/MB/V_VCORE

 /SYS/MB/V_VCORE
    Targets:

    Properties:
        type = Voltage
        class = Threshold Sensor
        value = 1.224 Volts
        upper_nonrecov_threshold = 1.38 Volts
        upper_critical_threshold = 1.34 Volts
        upper_noncritical_threshold = 1.32 Volts
        lower_noncritical_threshold = 1.15 Volts
        lower_critical_threshold = 1.12 Volts
        lower_nonrecov_threshold = 1.08 Volts

    Commands:
        cd
        show
```

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

2.5.5 Displaying the Environmental Status and Sensor Readings with the ILOM Web Interface

1. **Open a web browser and type the IP address of the server module service processor in the browser.**
2. **Select the top System Monitoring tab and the lower Sensor Readings tab (**FIGURE 2-12**).**

3. **Double click on the sensor reading that you want to check (FIGURE 2-12).**

FIGURE 2-12 Obtaining Sensor Readings and Environmental Status With the ILOM Web Interface

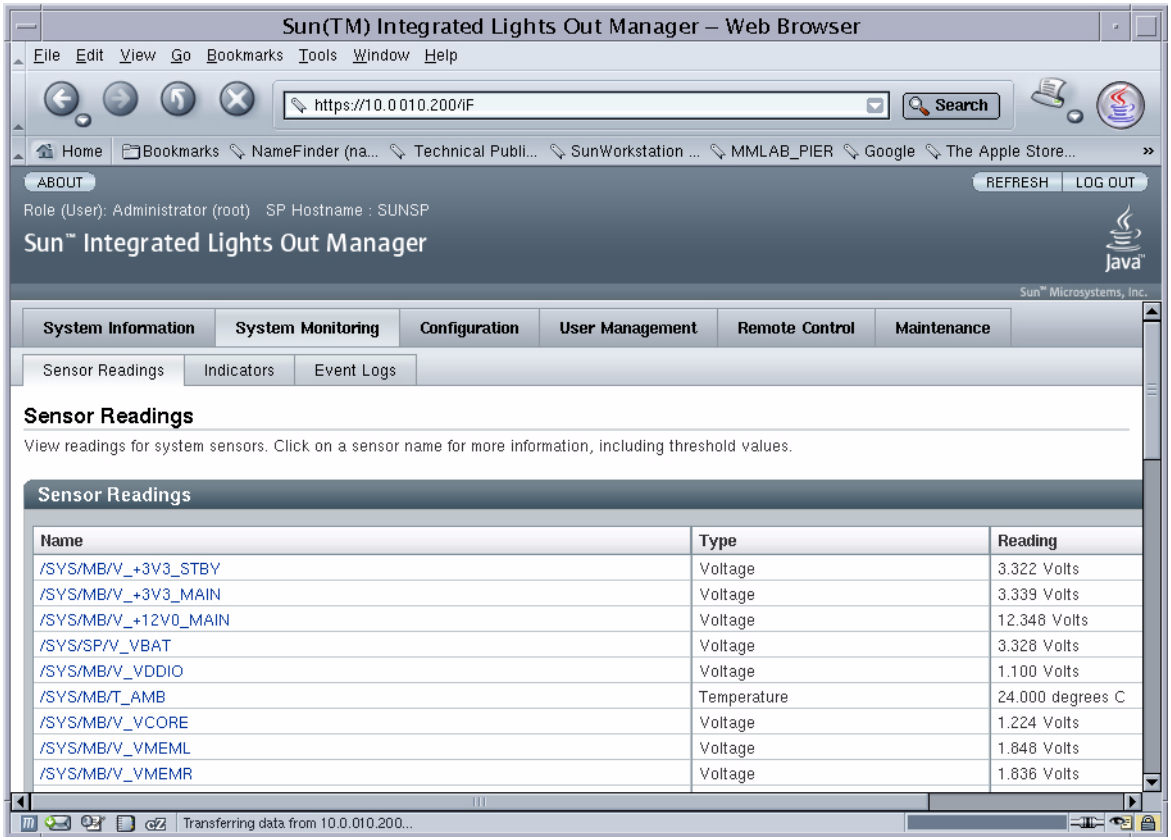
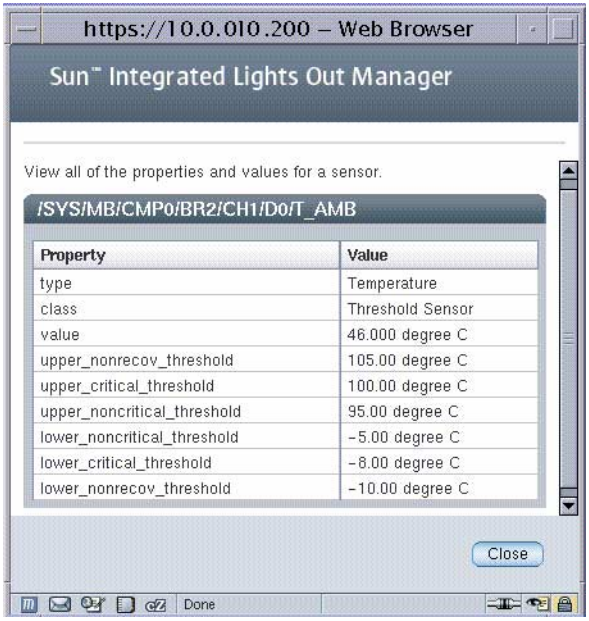


FIGURE 2-13 Sensor Reading Window for an FB-DIMM in Channel 1



2.5.6 Displaying FRU Information

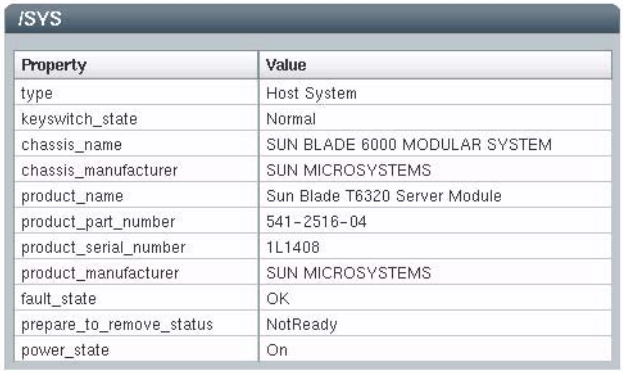
ILOM can display static FRU information such as the FRU manufacturer, serial number and some FRU status information (FIGURE 2-14).

Note – To view dynamic FRU information you must type the ALOM CMT `showfru` command. The dynamic FRU information provides more details about FRUs.

2.5.6.1 Using the ILOM Web Interface to Display FRU Information

1. **Select the System Information and Components tabs.**
2. **Click on the component to view the FRU information (FIGURE 2-14).**

FIGURE 2-14 Static FRU Information in the ILOM Web Interface



/SYS

Property	Value
type	Host System
keyswitch_state	Normal
chassis_name	SUN BLADE 6000 MODULAR SYSTEM
chassis_manufacturer	SUN MICROSYSTEMS
product_name	Sun Blade T6320 Server Module
product_part_number	541-2516-04
product_serial_number	1L1408
product_manufacturer	SUN MICROSYSTEMS
fault_state	OK
prepare_to_remove_status	NotReady
power_state	On

2.5.6.2 Using the CLI to Display FRU Information

The `show /SYS/MB` command displays static information about the FRUs in the server module. Use this command to see information about an individual FRU, or for all the FRUs.

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

  In the following example, the `show` command displays information about the motherboard (MB).

```
-> show /SYS/MB

/SYS/MB
Targets:
FEM0
REM0
SEEPROM
SCC_NVRAM
NET
SASHBA
USB0
USB1
T_AMB
CMP0
V_VMEML
V_VMEMR
V_+3V3_STBY
V_VCORE
V_+3V3_MAIN
V_VDDIO
V_+12V0_MAIN
VCORE_POK
VMEML_POK
VMEMR_POK
Properties:
type = Motherboard
fru_name = MB
fru_description = 4C,1.17GHZ N2,T6320,DIRECT-A
fru_manufacturer = Celestica
fru_version = 01_01
fru_part_number = 5407368
fru_serial_number = 1B1174
fault_state = Faulted
clear_fault_action = (none)

Commands:
cd
show
->
```

This example shows a portion of the more detailed dynamic FRU information provided by the ALOM CMT `showfru` command.

```
sc> showfru
/SYS/SP (container)
   SEGMENT: ST
      /Status_CurrentR
      /Status_CurrentR/UNIX_Timestamp32: Thu Feb 17 07:25:57 2000
      /Status_CurrentR/status:           0x00 (OK)
   SEGMENT: TH ...
... ... ...
   SEGMENT: FD
      /Customer_DataR
      /Customer_DataR/UNIX_Timestamp32: Wed Feb 16 08:41:44 GMT 2000
      /Customer_DataR/Cust_Data: QT
      /InstallationR (1 iterations)
      /InstallationR[0]
      /InstallationR[0]/UNIX_Timestamp32: Thu Feb 17 07:26:09 GMT 2000
      /InstallationR[0]/Fru_Path: /SYS/MB/REM
      /InstallationR[0]/Parent_Part_Number: 5017821
      /InstallationR[0]/Parent_Serial_Number: 5C00FV
      /InstallationR[0]/Parent_Dash_Level: 04
      /InstallationR[0]/System_Id: 1005LCB-0709YM00FV
      /InstallationR[0]/System_Tz: 0
      /InstallationR[0]/Geo_North: 0
      /InstallationR[0]/Geo_East: 0
      /InstallationR[0]/Geo_Alt: 0
      /InstallationR[0]/Geo_Location: GMT
 ... ... ...
/SYS/MB/CMP0/BR0/CH0/D0 (container)
        /SPD/Timestamp: Mon Feb 12 12:00:00 2007
        /SPD/Description: DDR2 SDRAM FB-DIMM, 4 GByte
        /SPD/Manufacture Location: ff
        /SPD/AMB Vendor: IDT
        /SPD/Vendor: Micron Technology
        /SPD/Vendor Part No:   36HTF51272F667E1D4
        /SPD/Vendor Serial No: d2174043
        /SPD/Num_Banks: 8
        /SPD/Num_Ranks: 2
        /SPD/Num_Rows: 14
        /SPD/Num_Cols: 11
        /SPD/Sdram_Width: 4
        /SunSPD/Sun_Serial_Number:   002C010707D2174043
        /SunSPD/SPD_Format_Version:  20
        /SunSPD/Sun_Part_Dash_Rev:   000-0000-00 Rev 00
        /SunSPD/Certified_Platforms: 0x00000001 (OK)
        /SunSPD/Sun_Key_Code:        0x0000
        /SunSPD/Sun_Certification:   NO
        /SunSPD/timestamp:           Thu Feb 17 07:26:20 2000
        /SunSPD/MACADDR:             00:14:4F:98:84:7A
```

```
        /SunSPD/status                0x00 (OK)
        /SunSPD/Initiator             N/A
        /SunSPD/Message:              No message
        /SunSPD/powerupdate:          Thu Feb 17 07:01:16 2000
        /SunSPD/Poweron_minutes:      1487
/SYS/MB/CMP0/BR1/CH0/D0 (container)
 ... ... ...
sc>
```

2.6 Running POST

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

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

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

Note – Devices can be manually enabled or disabled using ASR commands (see Section 2.9, "Managing Components With Automatic System Recovery Commands" on page 2-47).

2.6.1 Controlling How POST Runs

The server module 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 diag variables.

TABLE 2-6 lists the DIAG variables used to configure POST and FIGURE 2-15 shows how the variables work together.

TABLE 2-6 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 2-15. 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 is the default.
	error_reset	Runs POST if fatal errors are detected.
	all_reset	Runs POST after any reset.
diag_verbosity	none	No POST output is displayed.
	min	POST output displays functional tests with a banner and pinwheel.
	normal	POST output displays all test and informational messages.
	max	POST displays all test, informational, and some debugging messages.

*

FIGURE 2-15 Flowchart of ILOM Variables for POST Configuration

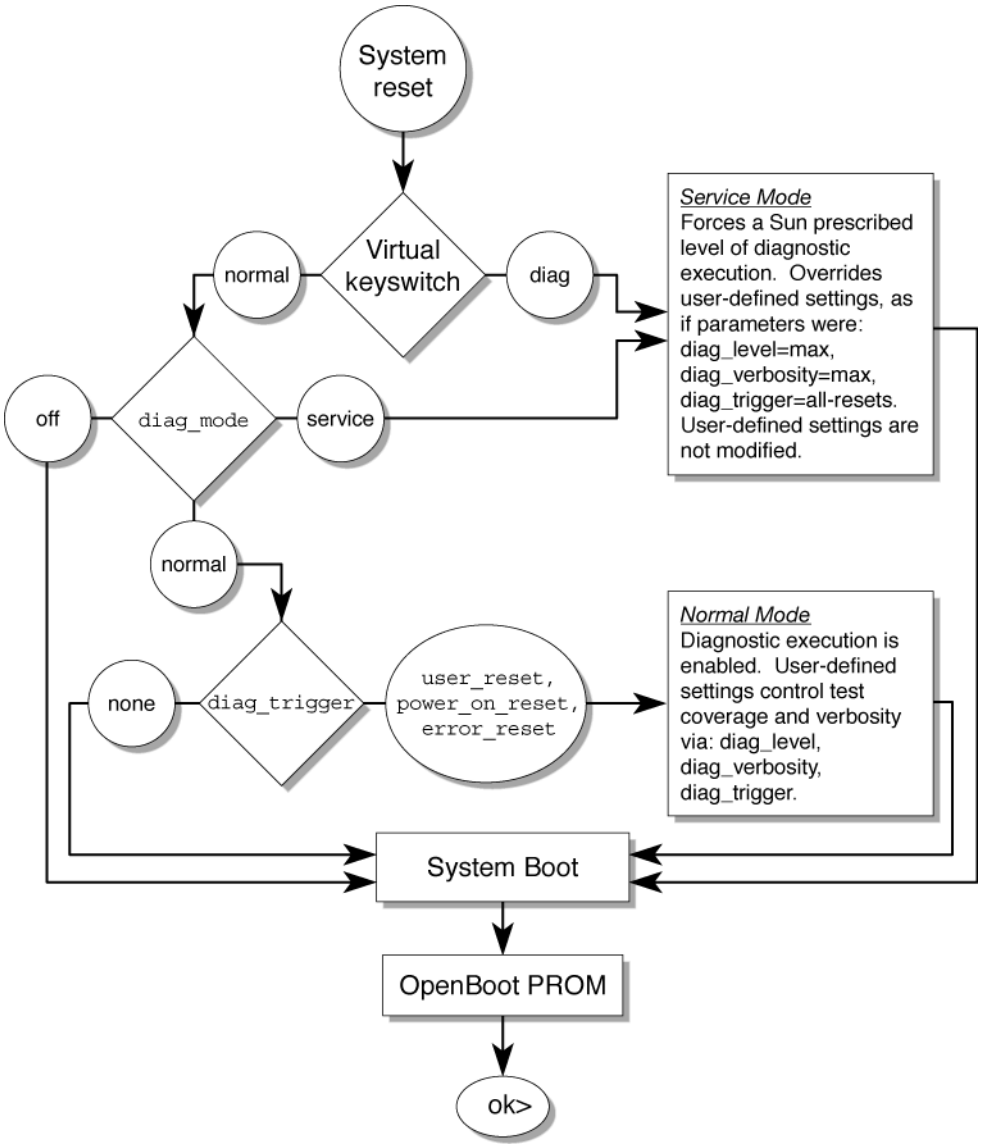


TABLE 2-7 shows typical combinations of ILOM variables and associated POST modes.

TABLE 2-7 POST Modes and Parameter Settings

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 POST variables.

2.6.2 Changing POST Parameters

You can use the web interface or the CLI to change the POST parameters.

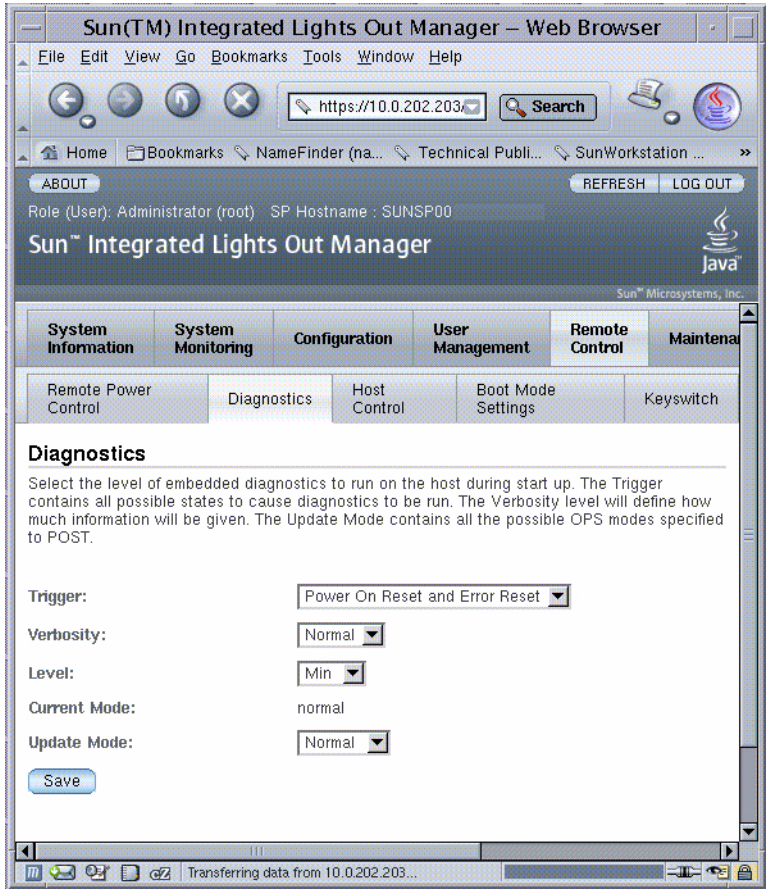
2.6.2.1 Using the Web Interface to Change POST Parameters

1. **From the ILOM web interface, select the Remote Console tab (**FIGURE 2-16**).**
2. **Select the Diagnostics Tab.**
3. **Select the POST settings that you require.**

   TABLE 2-7 describes how the POST settings will execute.
4. **Click the Save button.**

Note – If you do not have a console window open, you should open one. POST will only display output to a console window, not the web interface.

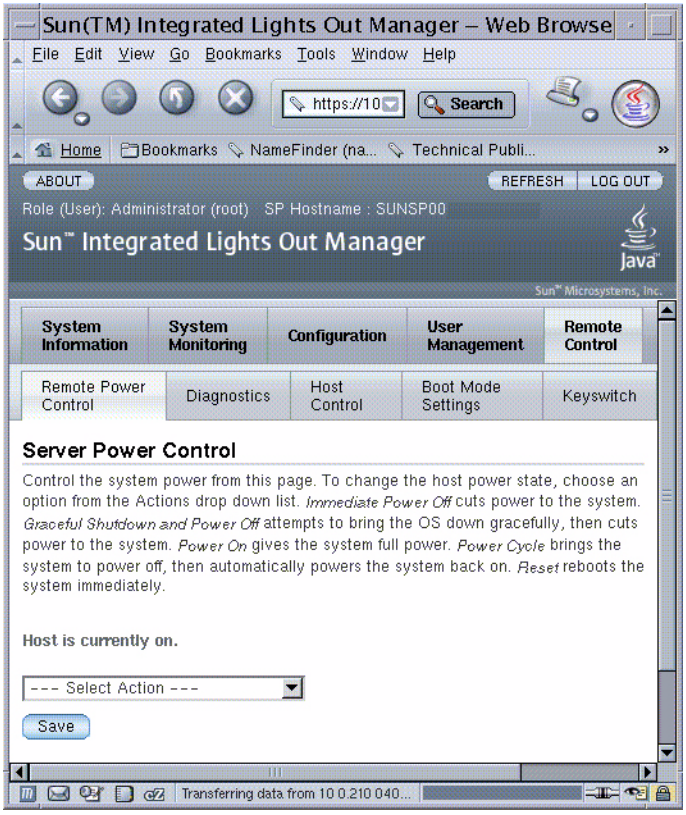
FIGURE 2-16 Setting POST Parameters With the ILOM Web Interface



5. **Select the Remote Power Control Tab.**

6. **Select a power control setting and Select Save (**FIGURE 2-17**).**

FIGURE 2-17 Changing Power Settings with the ILOM Web Interface



When you power cycle the server module, POST runs and displays output to the service processor console window:

```
{0} ok Chassis | critical: Host has been powered off
Chassis | major: Host has been powered on
2007-11-07 18:22:19.511 0:0:0>
2007-11-07 18:22:19.560 0:0:0>Sun Blade T6320 Server Module POST 4.27.4
2007/10/02 19:09

/export/delivery/delivery/4.27/4.27.4/post4.27.x/Niagara/glendale/integrated
(root)
2007-11-07 18:22:19.836 0:0:0>Copyright 2007 Sun Microsystems, Inc. All rights
reserved
2007-11-07 18:22:20.001 0:0:0>VBSC cmp 0 arg is: 00ffffff.ffff00ff
2007-11-07 18:22:20.108 0:0:0>POST enabling threads: 00ffffff.ffff00ff
2007-11-07 18:22:20.223 0:0:0>VBSC mode is: 00000000.00000001
2007-11-07 18:22:20.321 0:0:0>VBSC level is: 00000000.00000001
2007-11-07 18:22:20.421 0:0:0>VBSC selecting Normal mode, MAX Testing.
```

```
2007-11-07 18:22:20.533 0:0:0>VBSC setting verbosity level 3
2007-11-07 18:22:20.629 0:0:0>  Niagara2, Version 2.1
2007-11-07 18:22:20.714 0:0:0>  Serial Number: 0f880060.768660a8
2007-11-07 18:22:20.843 0:0:0>Basic Memory Tests.....
```

7. **Read the POST output to determine if you need to perform service actions.**

   See Section 2.6.3, "Interpreting POST Messages" on page 2-37.

2.6.2.2 Using the CLI to Change POST Parameters

1. **Verify the current post parameters with the `show` command. Type:**

```
-> show /HOST/diag

/HOST/diag
    Targets:

    Properties:
        level = min
        mode = normal
        trigger = power-on-reset error-reset
        verbosity = normal

    Commands:
        cd
        set
        show
->
```

2. **Type the `set` command to change the POST parameters.**

   TABLE 2-7 describes how the POST settings will execute. This example shows how to set the verbosity to max.

```
-> set /HOST/diag verbosity=max
Set 'verbosity' to 'max'
->
```

3. **Power cycle the server module to run POST.**

   There are several ways to initiate a reset. The following example uses the ILOM `reset` command.

```
-> reset /SYS
Are you sure you want to reset /SYS (y/n)? y
Performing hard reset on /SYS
->
```

4. **Read the POST output to determine if you need to perform service actions. See** Section 2.6.3, "Interpreting POST Messages" on page 2-37**.**

2.6.3 Interpreting POST Messages

When POST is finished running and 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 ILOM or 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.

1. **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 report for a missing PCI device:

```
0:0:0>ERROR: TEST = PIU PCI id test
0:0:0>H/W under test = MB/PCI-SWITCH
0:0:0>Repair Instructions: Replace items in order listed by 'H/W under test'
above.
0:0:0>MSG = PCI ID test device missing Cont.
               DEVICE NAME: MB/PCI-SWITCH
0:0:0>END_ERROR
```

2. **Type the `show /SPfaultmgmt` command to obtain additional fault information.**

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

For example:

```
ok #.
->
-> show /SP/faultmgmt
/SP/faultmgmt
    Targets:
        0 (/SYS/MB/CMP0/BR2/CH1/D1)

    Properties:

    Commands:
        cd
        show
```

In this example, `/SYS/MB/CMP0/BR2/CH1/D1` 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 2.9, "Managing Components With Automatic System Recovery Commands" on page 2-47.

2.6.4 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 2.9, "Managing Components With Automatic System Recovery Commands" on page 2-47).

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

2.6.4.1 Clearing Faults With the Web Interface

This procedure describes how to enable components after a POST fault has been generated. The POST fault log is not actually cleared.

1. **Select the tabs: System Information and Components tabs (FIGURE 2-18).**
2. **Select the radio button for the component that you must clear.**
3. **In the Actions menu, select: Enable Component.**

FIGURE 2-18 Enabling Components With the ILOM Web Interface

Note – The Clear Faults command in the Action menu will only clear the PSH-generated faults, and will not enable a component.

2.6.4.2 Clearing Faults With the ILOM CLI

1. **At the ILOM prompt, type the `show /SP/faultmgmt` command to identify POST detected faults.**

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

   For example:

   -> **`show /SP/faultmgmt`**

- If no fault is reported, you do not need to do anything else. Do not perform the subsequent steps.
- If a fault is detected, continue with Step 2.

2. **Type the `set component_state=enabled` command to clear the fault and remove the component from the ASR blacklist.**

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

   This example shows how to change directory to thread P32 on the CPU and enable it.

```
-> cd /SYS/MB/CMP0/P32
/SYS/MB/CMP0/P32

-> show

 /SYS/MB/CMP0/P32
    Targets:

    Properties:
        type = CPU thread
        component_state = Disabled

    Commands:
        cd
        show

-> set component_state=enabled
Set 'component_state' to 'enabled'
```

   The fault is cleared and should not show up when you type the `show /SP/faultmgmt` command. Additionally, the Service Action Required LED is no longer illuminated.

3. **Reboot the server module.**

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

4. **At the ILOM prompt, type the `show /SP/faultmgmt` command to verify that no faults are reported.**

```
-> show /SP/faultmgmt
Last POST run: THU MAR 09 16:52:44 2006
POST status: Passed all devices

No failures found in System
```

2.6.4.3 Clearing Faults Manually with ILOM

The ILOM `set /SYS/clear_fault_action=enabled` command allows you to manually clear certain types of faults without replacing a FRU. It also allows you to clear a fault if ILOM was unable to automatically detect the FRU replacement.

2.6.4.4 Clearing Hard Drive Faults

ILOM can detect hard drive replacement. However, to configure and unconfigure a hard drive, you must type the Solaris `cfgadm` command. See Section 3.2, "Hot-Plugging a Hard Drive" on page 3-1. ILOM does not handle hard drive faults. Use the Solaris message files to view hard drive faults. See Section 2.8, "Collecting Information From Solaris OS Files and Commands" on page 2-46.

2.7 Using the Solaris Predictive Self-Healing Feature

The Solaris Predictive Self-Healing (PSH) technology enables the Sun Blade T6320 server module to diagnose problems while the Solaris OS is running. Many problems can be resolved 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 system 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 Sun Blade T6320 server module components:

- UltraSPARC T2 multicore processor (CPU)
- 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 has detected a faulty component, type 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`

2.7.1 Identifying Faults With the `fmadm faulty` and `fmdump` Commands

2.7.1.1 Using the `fmadm faulty` Command

Type the `fmadm faulty` command to identify a faulty component.

1. **Type** `fmadm faulty`**.**

```
# fmdadm faulty
STATE RESOURCE /UUID
faulted cpu:///cpuid=8/serial=FAC006AE4515C47
  8856153f-6f9b-47c6-909a-b05180f53c07
```

The output shows the UUID of the related fault and provides information for clearing the fault.

2. **Use the output of this command to clear the fault as shown in** Section 2.7.2, "Clearing PSH Detected Faults" on page 2-44**.**

   If `fmadm faulty` does not identify a faulty component or if you need more detailed information, type the `fmdump` command.

2.7.1.2 Using the `fmdump` Command

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

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

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

Note – Faults detected by the Solaris PSH facility are also reported through ILOM alerts. In addition to the PSH `fmdump` command, the ILOM `show /SYS/` command also provides information about faults and displays fault UUIDs. See Section 2.5.3, "Displaying System Faults" on page 2-21.

---

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

   For example:

```
# fmdump -v
TIME         UUID                                 SUNW-MSG-ID
Apr 24 06:54:08.2005 1ce22523-1c80-6062-e61d-f3b39290ae2c
SUN4V-8000-6H
100% fault.cpu.ultraSPARCT2i2cachedata
  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`). In this example it is identified as *MB*, indicating that the motherboard requires replacement.

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

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

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

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

```
CPU errors exceeded acceptable levels

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

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

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

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

2.7.2 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 might have to clear the fault.

Note – If you are diagnosing or replacing faulty DIMMs, do not follow this procedure. Instead, perform the procedure in Section 4.3.2, "Replacing the DIMMs" on page 4-14.

---

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

2. **Type** `fmadm faulty`**:**

```
# fmdadm faulty
STATE RESOURCE /UUID
faulted cpu:///cpuid=8/serial=FAC006AE4515C47
  8856153f-6f9b-47c6-909a-b05180f53c07
```

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

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

   `fmadm repair` *UUID*

   For example:

```
# fmadm repair cpu:///cpuid=8/serial=FAC006AE4515C47
fmadm: recorded repair to cpu:///cpuid=8/serial=FAC006AE4515C47
# fmadm faulty
  STATE RESOURCE/UUID
```

Note – You can also use the FRU fault UUID instead of the Fault Management Resource Identifier (FMRI).

Typing **`fmadm faulty`** after the repair command verifies that there are no more faults.

2.7.3 Clearing the PSH Fault From the ILOM Logs

When the Solaris PSH facility detects faults, the faults are also logged by the ILOM software.

Note – If you clear the faults using Solaris PSH, you do not have to clear the faults in ILOM. If you clear the faults in ILOM, you do not also have to clear them with Solaris PSH.

Note – If you are diagnosing or replacing faulty DIMMs, do not follow this procedure. Instead, perform the procedure in Section 4.3.2, “Replacing the DIMMs” on page 4-14.

---

1. **After replacing a faulty FRU, at the ILOM prompt, type the ILOM** `-> show faults` **command to identify PSH detected faults.**

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

   For example:

   -> **`show /SP/faultmgmt`**

- If no fault is reported, you do not need to do anything else.
- If the fault is reported, continue with Step 2.

2. **Type the** `clear_fault` **command with the UUID provided in the showfaults output:**

```
-> set /SYS/component clear_fault_action=true
Clearing fault from component...
Fault cleared.
```

2.8 Collecting Information From Solaris OS Files and Commands

With the Solaris OS running on the Sun Blade T6320 server module, you have all the Solaris OS files and commands available for collecting information and for troubleshooting.

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

Type the `syslogd` command to view the most recent system message.

Use the `/var/adm/messages` file to view the system messages log file.

2.8.1 Checking the Message Buffer

1. **Log in as superuser.**

2. **Type the `syslogd` command.**

```
# syslogd
```

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

2.8.2 Viewing the System Message Log Files

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

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

1. **Log in as superuser.**

2. **Type the following command.**

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

3. **If you want to view all logged messages, type this command.**

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

2.9 Managing Components With Automatic System Recovery Commands

The Automatic System Recovery (ASR) feature enables the server module to automatically unconfigure failed components to remove them from operation until they can be replaced. In the Sun Blade T6320 server module, the following components are managed by the ASR feature:

- UltraSPARC T2 processor strands
- Memory DIMMs
- I/O bus

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

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

The ASR commands (TABLE 2-8) enable you to view and manually add or remove components from the ASR blacklist. These commands are run from the ILOM -> prompt. For information about ALOM CMT commands, see the *Sun Integrated Lights Out Manager 2.0 Supplement for Sun Blade T6320 Server Modules*, 820-2546.

TABLE 2-8 ASR Commands

ILOM Web Interface	ILOM Command	ALOM Command	Description
Select the following tabs: System Information, Components, Actions, then select the action.	`show /SYS/`*component* `component_state`	`showcomponent`*	Displays system components and their current state.
	`set /SYS/`*component* `component_state=enabled`	`enablecomponent` *asrkey*	Removes a component from the `asr-db` blacklist, where *asrkey* is the component to enable.
	`set /SYS/`*component* `component_state=disabled`	`disablecomponent` *asrkey*	Adds a component to the `asr-db` blacklist, where *asrkey* is the component to disable.
`No equivalent in ILOM`		`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. Type 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 powercycle.

2.9.1 Displaying System Components With the `show /SYS` Command

To see examples of ILOM web interface and CLI commands that show component status, see Section 2.5.4, "Displaying the Environmental Status with the ILOM CLI" on page 2-24.

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

1. At the `->` prompt, type the `show` command.

An example with no disabled components.

```
-> show /SYS/MB/USB0

 /SYS/MB/USB0
    Targets:

    Properties:
        type = USB Port
        component_state = Enabled

    Commands:
        cd
        show
->
```

An example showing a disabled component:

```
-> show /SYS/MB/USB0

 /SYS/MB/USB0
    Targets:

    Properties:
        type = USB Port
        component_state = Disabled

    Commands:
        cd
        show
```

2.10 Exercising the System With SunVTS

Sometimes a system 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.

2.10.1 Checking SunVTS Software Installation

This procedure assumes that the Solaris OS is running on the Sun Blade T6320 server module, and that you have access to the Solaris command line.

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

```
# pkginfo | grep -i vts
system      SUNWvts       SunVTS Framework
system      SUNWvtsmn     SunVTS Manufacturing package
system      SUNWvtsr      SunVTS Framework (root)
system      SUNWvtsts     SunVTS for Tests
#
```

- If SunVTS software is loaded, information about the packages is displayed.
- If SunVTS software is not loaded, no information is displayed.

TABLE 2-9 lists some SunVTS packages.

TABLE 2-9 Sample of installed SunVTS Packages

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

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

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

The SunVTS 6.4PS1 software, and subsequent compatible versions, are supported on the Sun Blade T6320 server module.

SunVTS installation instructions are described in the *Sun VTS 6.4 User's Guide*, 820-1669.

2.10.2 Exercising the System Using SunVTS Software

Before you begin, the Solaris OS must be running. You should verify that SunVTS validation test software is installed on your system. See Section 2.10.1, "Checking SunVTS Software Installation" on page 2-50.

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.

SunVTS software features both character-based and graphics-based interfaces.

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 *Sun VTS 6.4 User's Guide.*

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 6.4 Test Reference Manual for SPARC Platforms*
- *Sun VTS 6.4 User's Guide*

2.10.3 Steps for 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.**

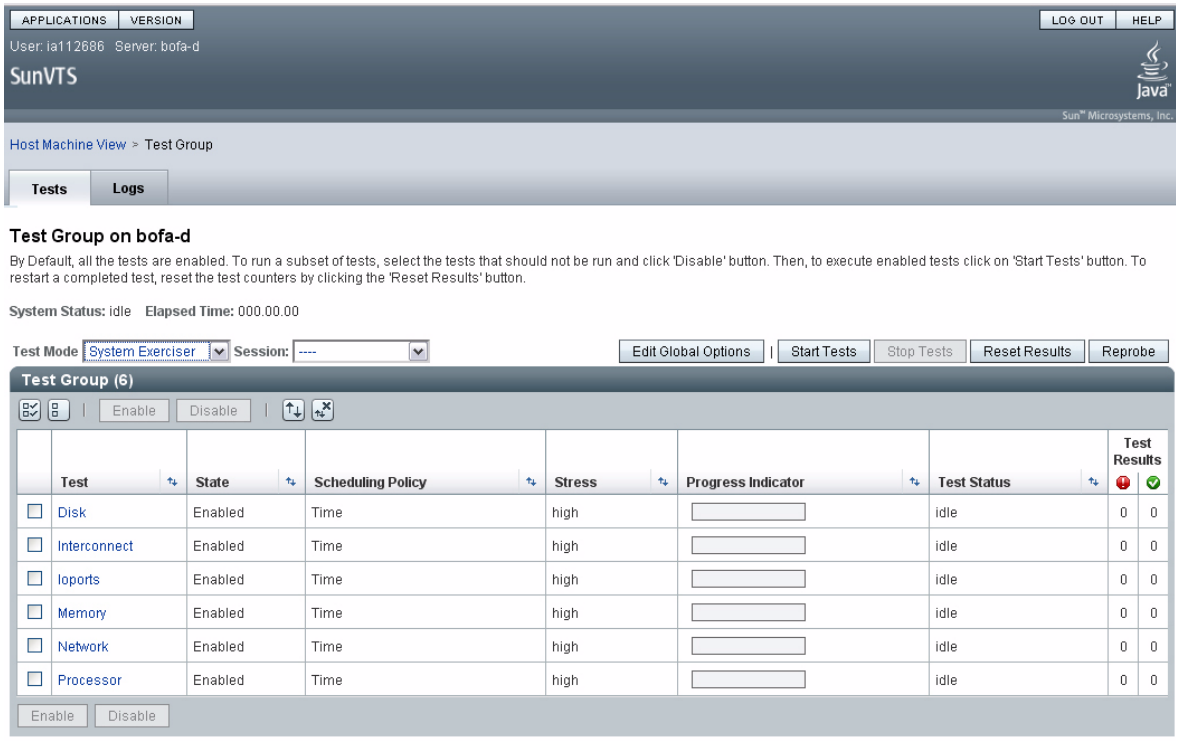
   Type a command such as `rlogin` or `telnet`.

4. **Start SunVTS software.**

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

   As SunVTS starts, it prompts you to choose between using CLI, BI, or tty interfaces. A representative SunVTS BI is displayed below (FIGURE 2-19).

FIGURE 2-19 SunVTS BI



5. **(Optional) Select the test category you want to run.**

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

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

   TABLE 2-10 lists tests that are especially useful to run on this server.

TABLE 2-10 Useful SunVTS Tests to Run on This Server

Category	SunVTS Tests	FRUs Exercised by Tests
CPU	`mptest`	CPU and motherboard
Graphics	`pfbtest, graphicstest`—*indirectly*: `systest`	DIMMs, CPU motherboard
Processor	`cmttest, cputest, fputest, iutest, l1dcachetest, dtlbtest,` and `l2sramtest`—*indirectly*: `mptest`, and `systest`	DIMMs, CPU motherboard
Disk	`disktest`	Disks, cables, disk backplane
`Environment`	`hsclbtest, cryptotest`	Crypto engine (CPU), SP <-->, host communication channels (motherboard)
Network	`nettest, netlbtest, xnetlbtest`	Network interface, network cable, CPU motherboard
Memory	`pmemtest, vmemtest, ramtest`	DIMMs, motherboard
I/O ports	`usbtest, iobustest`	Motherboard, service processor (Host to service processor interface)

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

   You can customize test categories by right-clicking on the name of the test.

7. **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/sunvts/logs`) – A directory containing the log files.

2.11 Resetting the Password to the Factory Default

The procedure for resetting the ILOM root password to the factory default (`changeme`) requires installation of a jumper on the service processor. This procedure should be performed by a technician, a service professional, or a system administrator who services and repairs computer systems. This person should meet the criteria described in the preface of the *Sun Blade T6320 Server Module Service Manual*.

2.11.1 To Reset the Root Password to the Factory Default

1. **Remove the server module from the modular system chassis.**

   Prepare for removal using ILOM or ALOM CMT commands and ensure that the blue OK to Remove LED is lit, indicating that it is safe to remove the blade.

2. **Open the server module and install a standard jumper on the two pins at location J0600.**

3. **Close the server module, install it in the modular system chassis, and boot the server module.**

   Refer to the *Sun Blade T6320 Server Module Installation Guide*, 820-2384, for instructions.

   The ILOM root password is now reset to the factory default (`changeme`).

4. **Change the root password.**

   Refer to the *Sun Blade T6320 Server Module Installation Guide,* 820-2384 for instructions.

5. **Remove the server module from the modular system chassis and remove the jumper.**

   As in Step 1, prepare for removal using ILOM or ALOM CMT commands and ensure that the blue OK to Remove LED is lit, indicating that it is safe to remove the blade.

6. **Close the server module, install it in the modular system chassis, and boot the server module.**

   Refer to the *Sun Blade T6320 Server Module Installation Guide*, 820-2384 for instructions.

CHAPTER 3

Replacing Hot-Swappable and Hot-Pluggable Components

This chapter describes how to remove and replace the hot-swappable and hot-pluggable field-replaceable units (FRUs) in the Sun Blade T6320 server module.

The following topics are covered:

3.1 Hot-Pluggable Hard Drives

Hot-pluggable devices are those devices that can be removed and installed while the system is running, but you must perform administrative tasks first. The Sun Blade T6320 server module hard drives can be hot-swappable (depending on how they are configured).

For information about a hot-swappable or hot-pluggable PCI ExpressModule (PCI EM) or network express module (NEM), see the service manual for your modular system chassis.

3.2 Hot-Plugging a Hard Drive

The hard drives in the Sun Blade T6320 server module are hot-pluggable, but this capability depends on how the hard drives are configured.

3.2.1 Rules for Hot-Plugging

To safely remove a hard drive, you must:

- Prevent any applications from accessing the hard drive.
- Remove the logical software links.

Hard drives cannot be hot-plugged if:

- 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 module.

If your drive falls into these conditions, you must shut the system down before you replace the hard drive. See Section 4.2.2, "Shutting Down the System" on page 4-3.

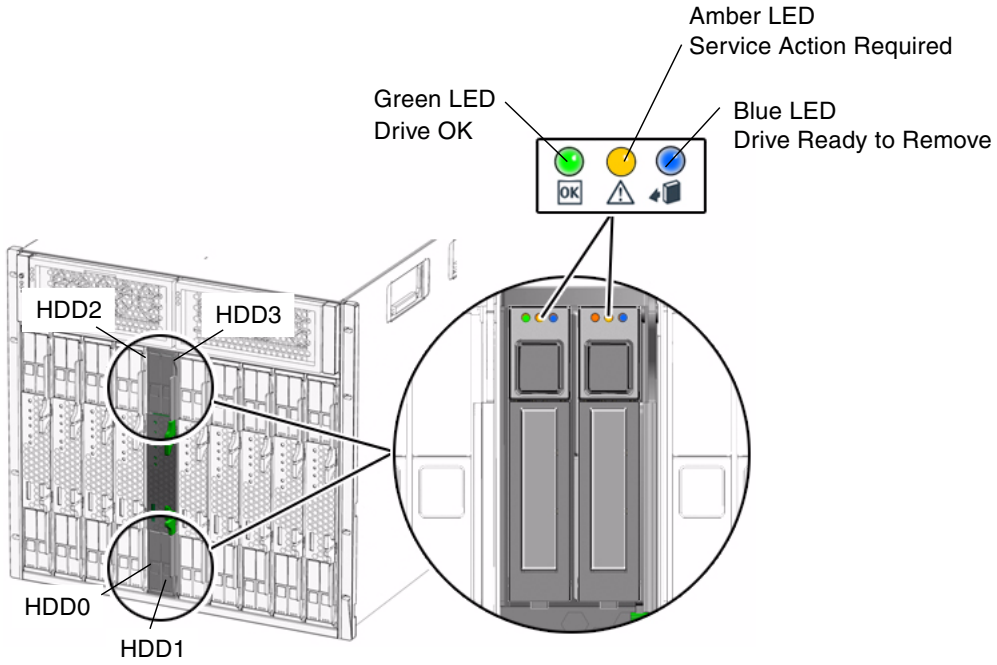
3.2.2 Removing a Hard Drive

1. **Identify the physical location of the hard drive that you want to replace (FIGURE 3-2).**
2. **Type the Solaris OS commands required to stop using the hard drive.**

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

   One command that you may use to take the drive offline is `cfgadm`. For more information see the Solaris `cfgadm` man page.
3. **Verify that the blue Drive Ready to Remove LED is illuminated on the front of the hard drive.**

FIGURE 3-1 Hard Drive Locations and LEDs

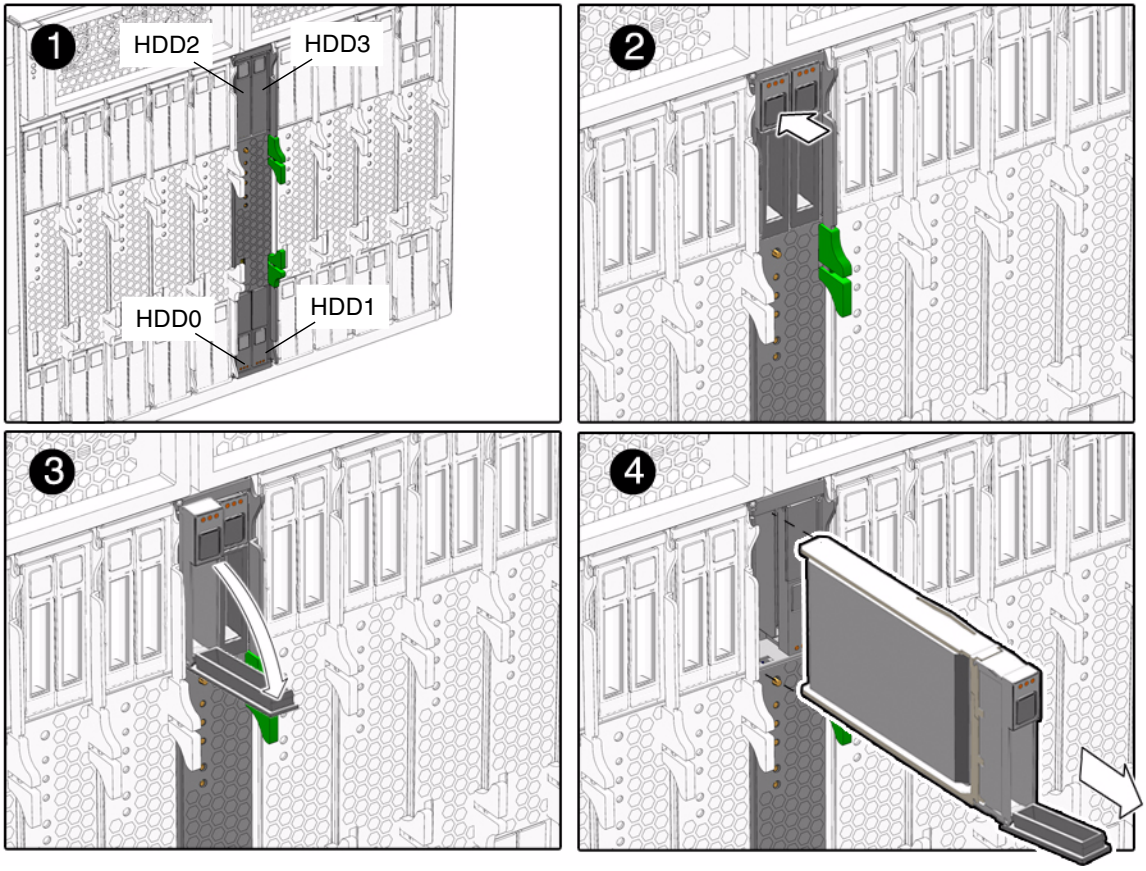


4. **Push the latch release button (**FIGURE 3-2**).**

Caution – The latch is not an ejector. The latch can be damaged if you bend it too much. Handle the hard drive carefully: the hard drive printed circuit board is not covered.

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

FIGURE 3-2 Hard Drive Locations, Release Button, and Latch



3.2.3 Replacing a Hard Drive or Installing a New Hard Drive

The hard drive is physically addressed to the slot in which it is installed.

Note – If you removed a hard drive, ensure that you install the replacement drive in the same slot.

---

1. **If necessary, remove the hard drive filler panel.**
2. **Slide the drive into the bay until it is fully seated (**FIGURE 3-2.**).**

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.

- You can use the Solaris command `cfgadm -al` to list all disks in the device tree, including 'unconfigured' disks.
- If the disk is not in the list, such as with a newly installed disk, you can use `devfsadm` to configure it into the tree. See the `devfsadm` man page for details.

3.3 Adding PCI ExpressModules

The PCI ExpressModules (PCI EMs) plug into the chassis. To verify installation and to set up the PCI EMs see:

- The service manual for your modular system chassis.
- *Sun Integrated Lights Out Manager 2.0 Supplement for Sun Blade T6320 Server Modules*, 820-2546

CHAPTER 4

Replacing Cold-Swappable Components

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

The following topics are covered:

4.1 Safety Information

This section describes important safety information you need to know prior to removing or installing parts in the Sun Blade T6320 server module.

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 or 821-1590.
- Ensure that the voltage and frequency of your power source match the voltage and frequency inscribed on the equipment s electrical rating label.
- Follow the electrostatic discharge safety practices as described in this section.

4.1.1 Safety Symbols

The following symbols might appear in this manual, 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.

4.1.2 Electrostatic Discharge Safety

Electrostatic discharge (ESD) sensitive devices, such as the motherboard, 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.

4.1.2.1 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 module 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 module. Following this practice equalizes the electrical potentials between you and the server module.

4.1.2.2 Using an Antistatic Mat

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

4.2 Common Procedures for Parts Replacement

Before you can remove and replace internal components, you must perform the procedures in this section.

4.2.1 Required Tools

You can service the Sun Blade T6320 server module with the following tools:

- Antistatic wrist strap
- Antistatic mat

4.2.2 Shutting Down the System

Performing a graceful shutdown ensures that all of your data is saved and that the system is ready for restart. This section describes procedures for using the ILOM CLI and the ILOM web interface to shut down the system.

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

TABLE 4-1 `Poweroff` Command Equivalents

ILOM Web Interface Tabs	ILOM CLI	ALOM-CMT Compatibility Shell	Server Module Power Button
Remote Control, Remote Power Control, Select Action	-> **`stop /sys`** -> **`stop -script /sys`**	sc> **`poweroff -y`**	Use a paper clip to press the power button for a graceful shutdown.

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. For more information, refer to:

- *Sun Integrated Lights Out Manager 2.0 Supplement for Sun Blade T6320 Server Modules*, 820-2546. And the *Oracle Integrated Lights Out Manager (ILOM) 3.0 Supplement for Sun Blade T6320 Server Modules, 820-7145.* These documents describe ILOM information specific to the Sun Blade T6320 server module. It also provides command comparisons of the ALOM CMT and ILOM CLI command sets.
- Appendix D of this service manual also provides some information about ILOM.

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 using the `shutdown (1M)` command.**

5. **Use either the ILOM web interface, or the ILOM CLI, to finish the shut down sequence as described in the following sections.**

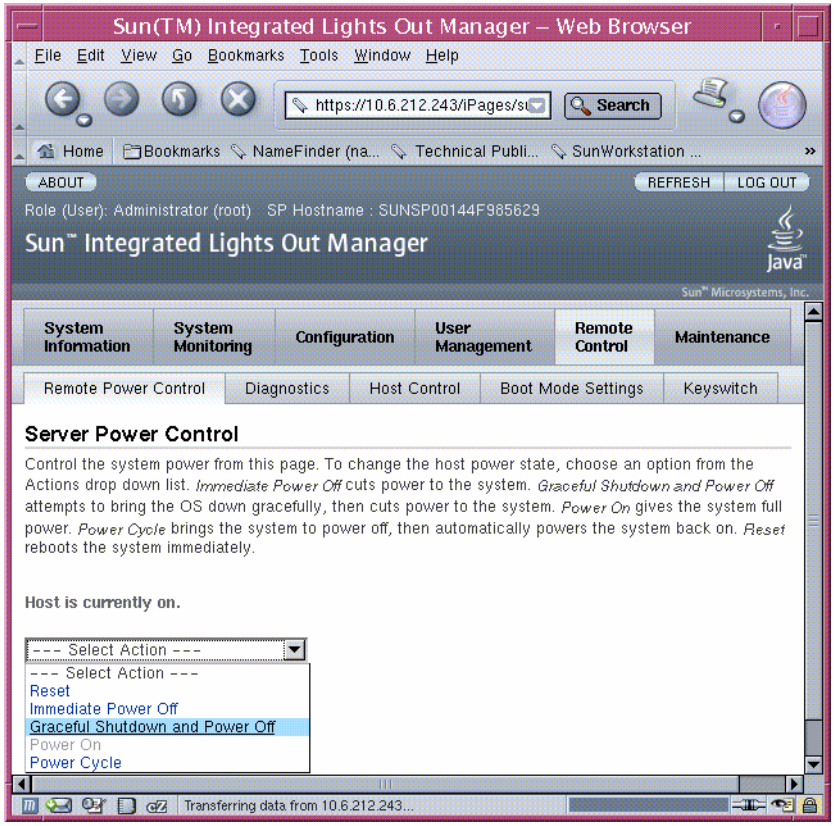
   You can also press the power button on the front of the server module to initiate a graceful shutdown.

4.2.3 Using the ILOM Web Interface to Shut Down the Server Module

1. **From the ILOM web interface, select the tabs: Remote Control, Remote Power Control (FIGURE 4-1).**

In the Select Action menu, choose a shutdown option.

FIGURE 4-1 Powering Off the Server Module with the ILOM Web Interface



4.2.4 Using the ILOM CLI to Shut Down the Server Module

1. **Switch from the system (host) console to the ILOM -> prompt by typing the #. (Hash-Period) key sequence.**

2. **At the ILOM** `->` **prompt, type the** `set /SYS/PS0 prepare_to_remove_action=true` **command and type** `y` **to confirm.**

   ILOM CLI, ILOM web interface, and ALOM-CMT command equivalents are shown in TABLE 4-1.

```
-> set /SYS/ prepare_to_remove_action=true
Are you sure you want to stop /SYS (y/n)? y
Stopping /SYS
```

   The blue blade ok2 remove LED is illuminated.

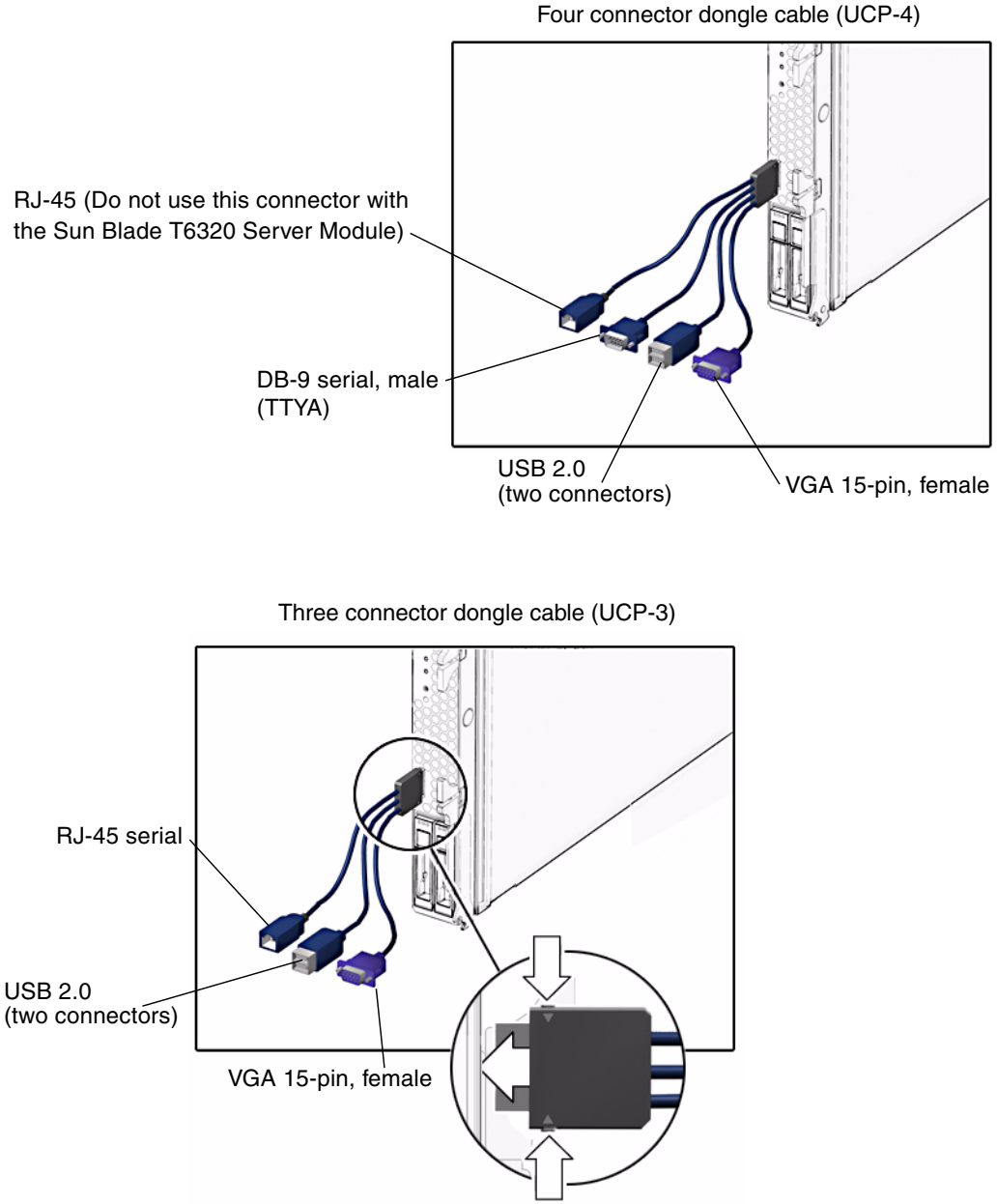
   The top white LED is the Locator LED. You can also set the white locator LED to blink:

```
-> set /SYS/LOCATE value=fast_blink
```

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

3. **If a cable is connected to the front of the server module, disconnect it.**

FIGURE 4-2 Disconnecting the Cable Dongle

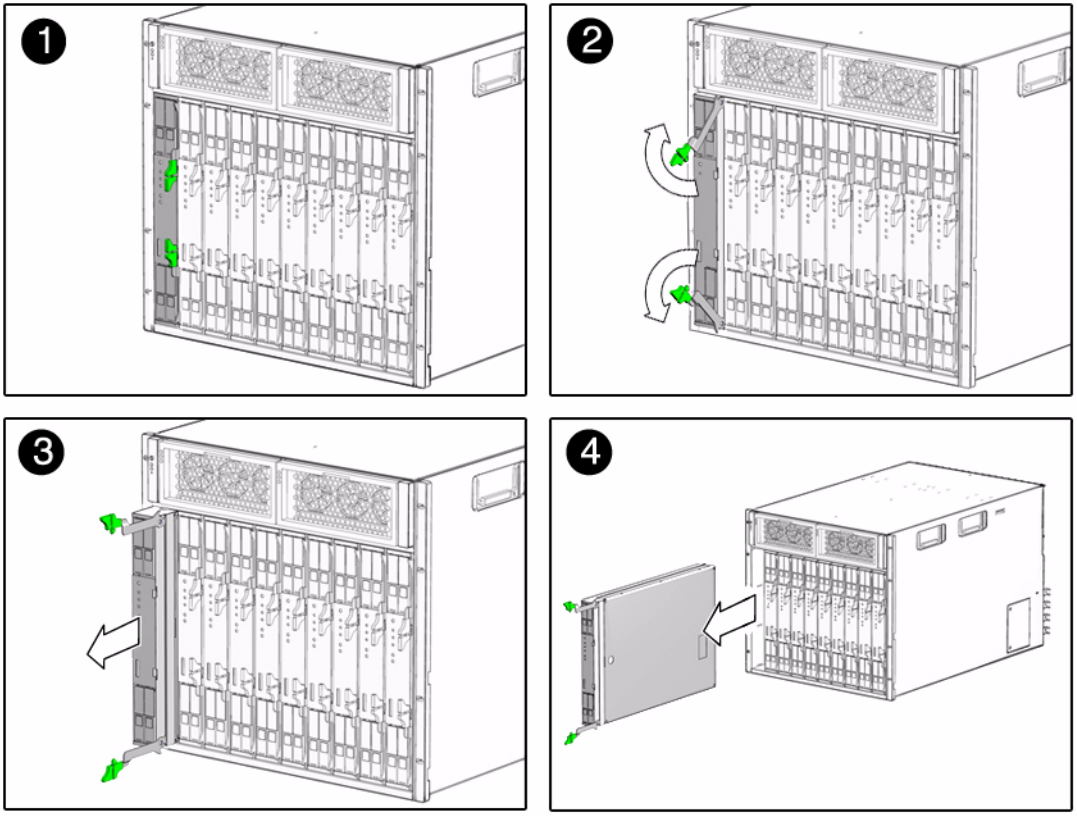


Caution – The cable dongle is for temporary connections only. The cable dongle has not been evaluated for electromagnetic compatibility (EMC). The cable dongle or server module connectors could be damaged by rack doors or other impacts. Remove the cable dongle during normal system operation.

Note – If you are using the older *4-cable dongle* (UCP-4), do not use the RJ-45 connector with the Sun Blade T6320 server module. Use the DB-9 connector for serial connections.

4. **Open the ejector levers (**FIGURE 4-3**).**

FIGURE 4-3 Removing the Sun Blade T6320 Server Module From the Chassis

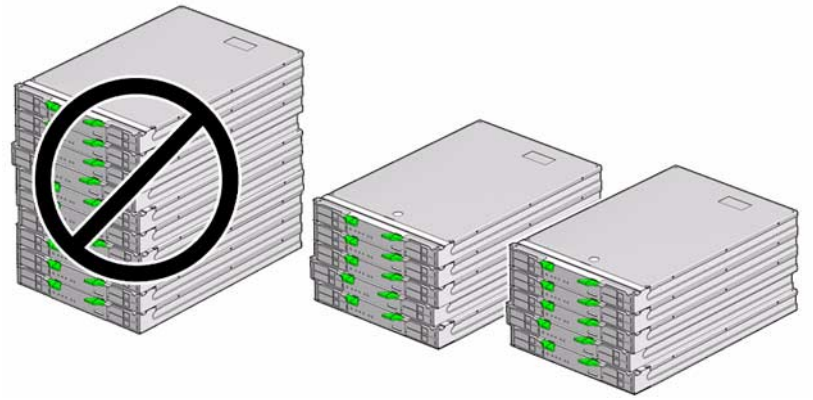


5. **While pinching the release latches, slowly pull the server module forward until the slide rails latch.**

Caution – Hold the server module firmly so that you do not drop it. The server module weighs approximately 16 pounds (7.3 kg).

Caution – Do not stack server modules higher than five units tall. They might fall and cause damage or injury.

FIGURE 4-4 Stack Five Server Modules or Fewer

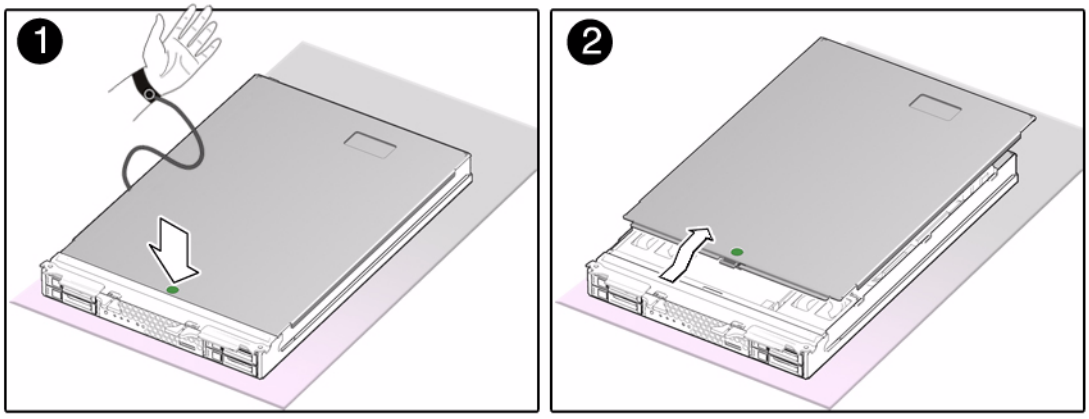


6. Set the server module on an antistatic mat.

7. Attach an antistatic wrist strap.

When servicing or removing server module components, attach an antistatic strap to your wrist and then to a metal area on the chassis.

FIGURE 4-5 Antistatic Mat and Wrist Strap



8. **While pressing the top cover release button, slide the cover toward the rear of the server module about an inch (2.5 mm).**
9. **Lift the cover off the chassis.**

4.3 Removing and Replacing DIMMs

This section describes how to remove and replace DIMMs.

4.3.1 Removing the DIMMs

LEDs indicate if a DIMM requires replacement.

- If the system is still powered on and installed in the chassis, see Section 2.2, "Memory Configuration and Fault Handling" on page 2-7 to determine if a DIMM requires replacement.
- If the server module is powered off, you can remove the server module from the chassis. Pressing the DIMM Locate button illuminates and LED next to the faulty DIMMs (FIGURE 4-6).

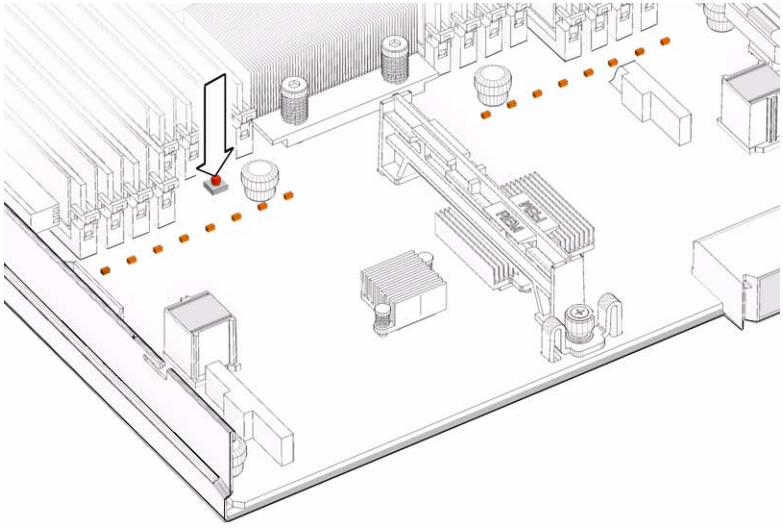
Caution – Ensure that you follow antistatic practices as described in Section 4.1.2, "Electrostatic Discharge Safety" on page 4-2.

1. **Perform the procedures described in** Section 4.2, "Common Procedures for Parts Replacement" on page 4-3**.**

2. **Locate the DIMMs that you want to replace (**FIGURE 4-7**).**

   The server module has a DIMM locate button on the motherboard. Press the DIMM locate button to illuminate the LEDs of the bad DIMMs.

FIGURE 4-6 DIMM Locate Button and DIMM LEDs



You can also use FIGURE 4-7 and TABLE 4-2 to identify the DIMMs that you want to remove.

FIGURE 4-7 DIMM Installation Rules

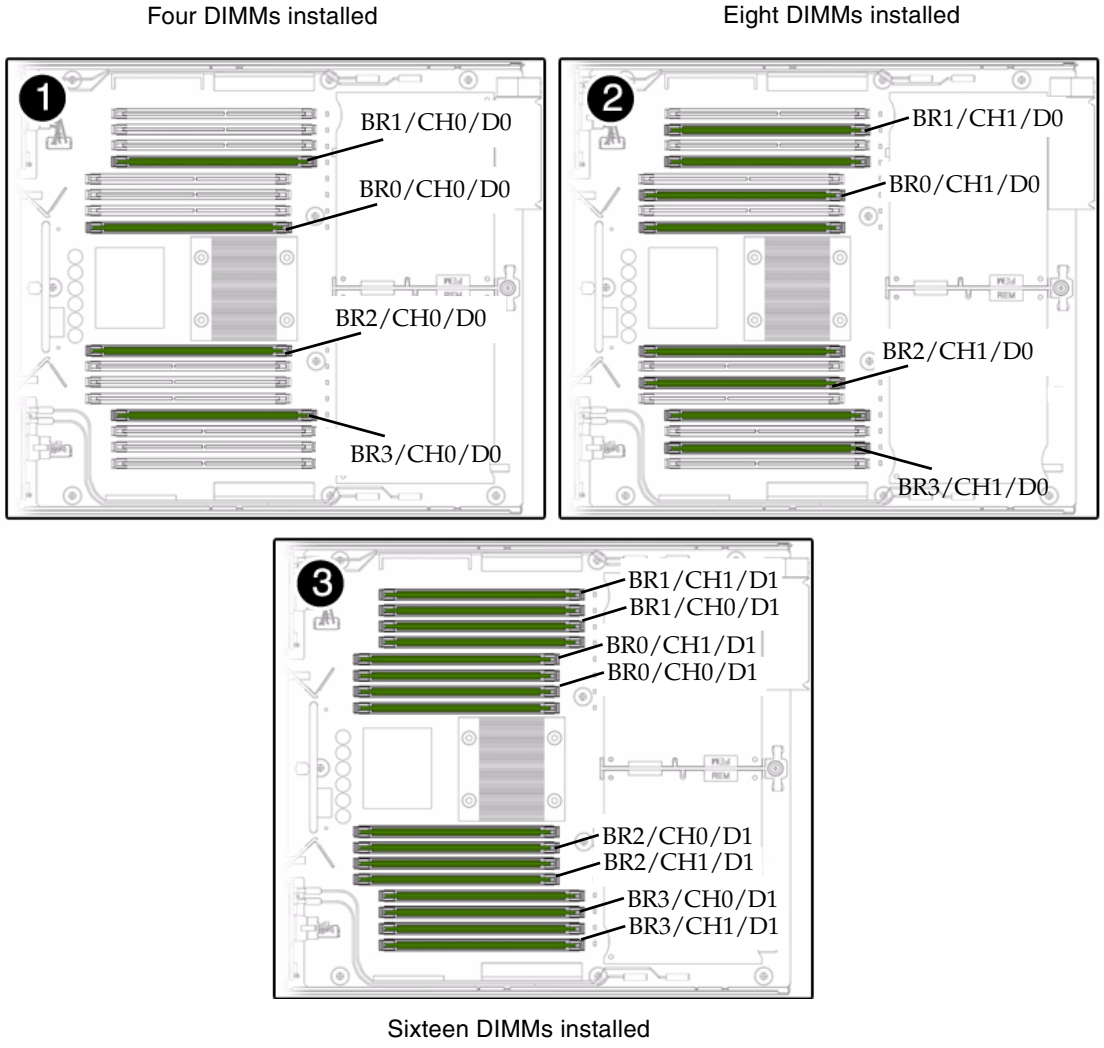


TABLE 4-2 FB-DIMM Configuration

Branch Name	Channel Name	FRU Name	Motherboard FB-DIMM Connector	FB-DIMM Installation Order*	FB-DIMM Pair†
Branch 0	Channel 0	/SYS/MB/CMP0/BR0/CH0/D0	J1001	1	A
		/SYS/MB/CMP0/BR0/CH0/D1	J1101	3	B

TABLE 4-2 FB-DIMM Configuration

Branch Name	Channel Name	FRU Name	Motherboard FB-DIMM Connector	FB-DIMM Installation Order*	FB-DIMM Pair†
	Channel 1	/SYS/MB/CMP0/BR0/CH1/D0	J1201	2	A
		/SYS/MB/CMP0/BR0/CH1/D1	J1301	3	B
Branch 1	Channel 0	/SYS/MB/CMP0/BR1/CH0/D0	J1401	1	C
		/SYS/MB/CMP0/BR1/CH0/D1	J1501	3	D
	Channel 1	/SYS/MB/CMP0/BR1/CH1/D0	J1601	2	C
		/SYS/MB/CMP0/BR1/CH1/D1	J1701	3	D
Branch 2	Channel 0	/SYS/MB/CMP0/BR2/CH0/D0	J2001	1	E
		/SYS/MB/CMP0/BR2/CH0/D1	J2101	3	F
	Channel 1	/SYS/MB/CMP0/BR2/CH1/D0	J2201	2	E
		/SYS/MB/CMP0/BR2/CH1/D1	J2301	3	F
Branch 3	Channel 0	/SYS/MB/CMP0/BR3/CH0/D0	J2401	1	G
		/SYS/MB/CMP0/BR3/CH0/D1	J2501	3	H
	Channel 1	/SYS/MB/CMP0/BR3/CH1/D0	J2601	2	G
		/SYS/MB/CMP0/BR3/CH1/D1	J2701	3	H

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

† Fault replacement path: Each pair is addressed as a unit, and each pair must be identical.

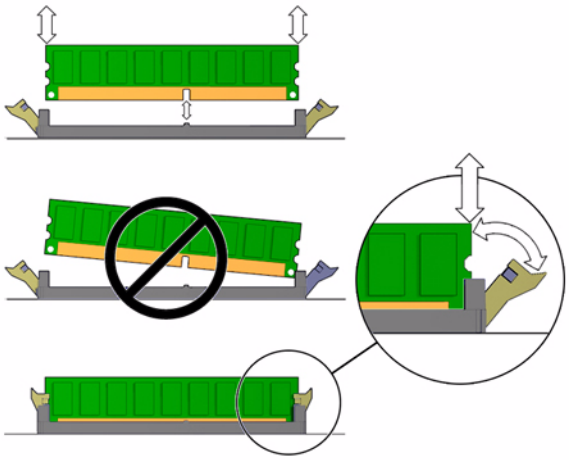
Note – FB-DIMM names in ILOM messages are displayed with the full name, such as `/SYS/MB/CMP0/BR0/CH0/D0`.

---

3. **Note the DIMM locations so that 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.**

FIGURE 4-8 Removing DIMMs



5. **Grasp the top corners of the faulty DIMM and remove it from the system.**
6. **Place DIMMs on an antistatic mat.**

4.3.2 Replacing the DIMMs

See Section 2.2.1, "FB-DIMM Configuration Guidelines" on page 2-7 for complete memory configuration and installation rules.

Caution – The DIMM rules must be followed. The server module might not operate correctly if the DIMM rules are not followed. Always use DIMMs that have been qualified by Sun.

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

   Align the DIMM notch with the key in the connector.

   a. **Push each DIMM into a connector until the ejector tabs lock the DIMM in place.**

   b. **Perform the procedures described in** Section 4.8, "Finishing Component Replacement" on page 4-28**.**

4.3.2.1 Verifying DIMM Installation

Clear the previous faults and enable the DIMMs. See Section 2.6.4, "Clearing POST Detected Faults" on page 2-38.

4.4 Removing and Replacing the Service Processor

The service processor controls the host power and monitors host system events (power and environmental). The service processor holds a battery and a socketed EEPROM for storing the system configuration, all Ethernet MAC addresses, and the host ID.

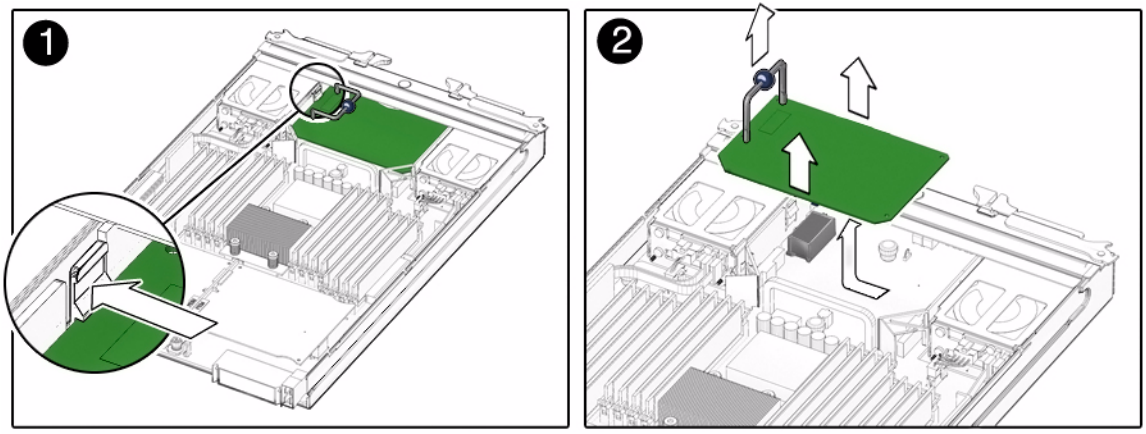
Caution – Handle the components carefully to avoid damage.

4.4.1 Removing the Service Processor

Caution – The service processor card can be hot. To avoid injury, handle it carefully.

1. **Perform the procedures described in** Section 4.2, "Common Procedures for Parts Replacement" on page 4-3**.**
2. **Pull back the plastic retaining tab and lift up on handle of the service processor card to release it from the bracket (**FIGURE 4-10**).**

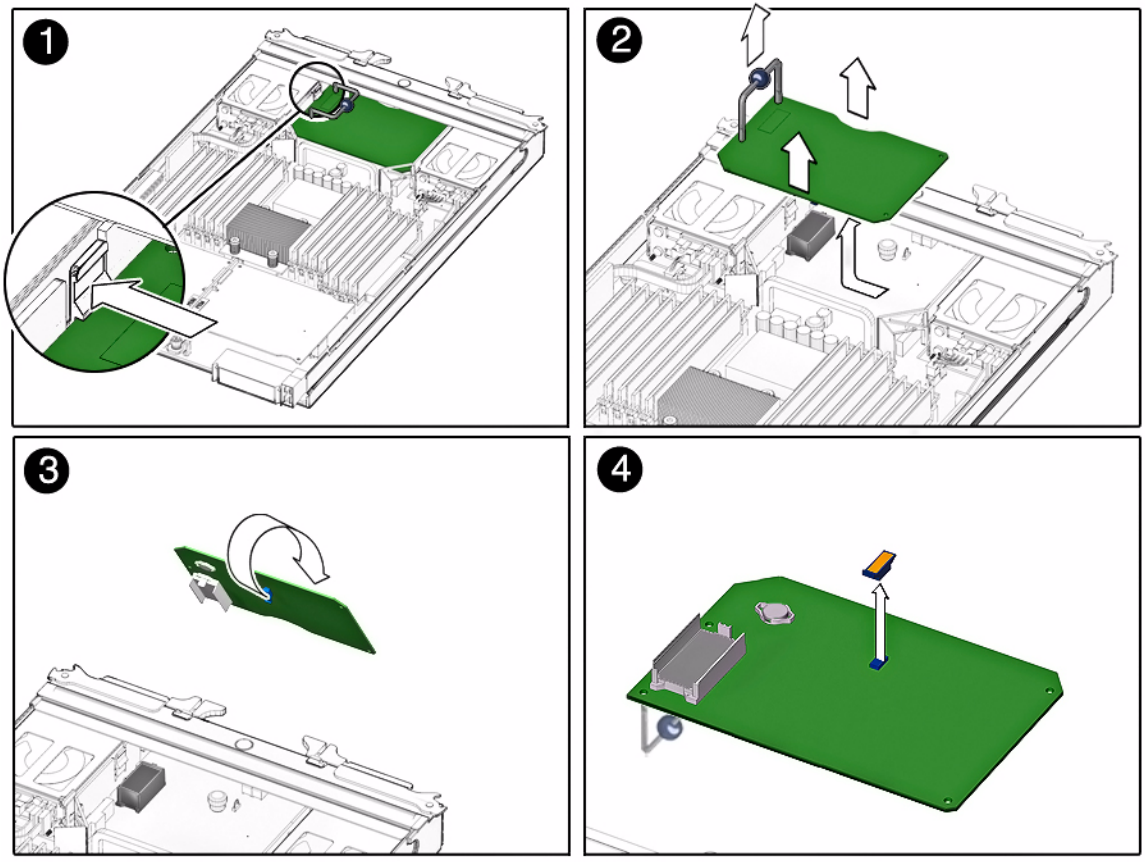
FIGURE 4-9 Removing the Service Processor



3. **Grasp the top corners of the service processor and pull it out of the bracket.**
4. **Place the service processor card on an antistatic mat.**
5. **Remove the system configuration PROM (NVRAM) (**FIGURE 4-10**) from the service processor card and place the PROM on an antistatic mat.**

   The service processor contains the persistent storage for the system host ID and Ethernet MAC addresses. The service processor also contains the ILOM configuration including the IP addresses and ILOM user accounts, if configured. This information will be lost unless the system configuration PROM (NVRAM) is removed and installed in the replacement service processor. The PROM does not hold the fault data, and the fault data will no longer be accessible when the service processor is replaced.

FIGURE 4-10 Removing the System Configuration PROM (NVRAM)



4.4.2 Replacing the Service Processor

1. **Remove the replacement service processor from the package and place it on an antistatic mat.**
2. **Install the system configuration PROM (NVRAM) that you removed from the faulty service processor.**

   The PROM is keyed to ensure proper orientation.
3. **Insert the service processor edge into the bracket and carefully align the service processor so that each of its contacts is centered on a socket pin.**
4. **Push firmly and evenly between the handle edges, until the service processor is firmly seated in the connector socket.**

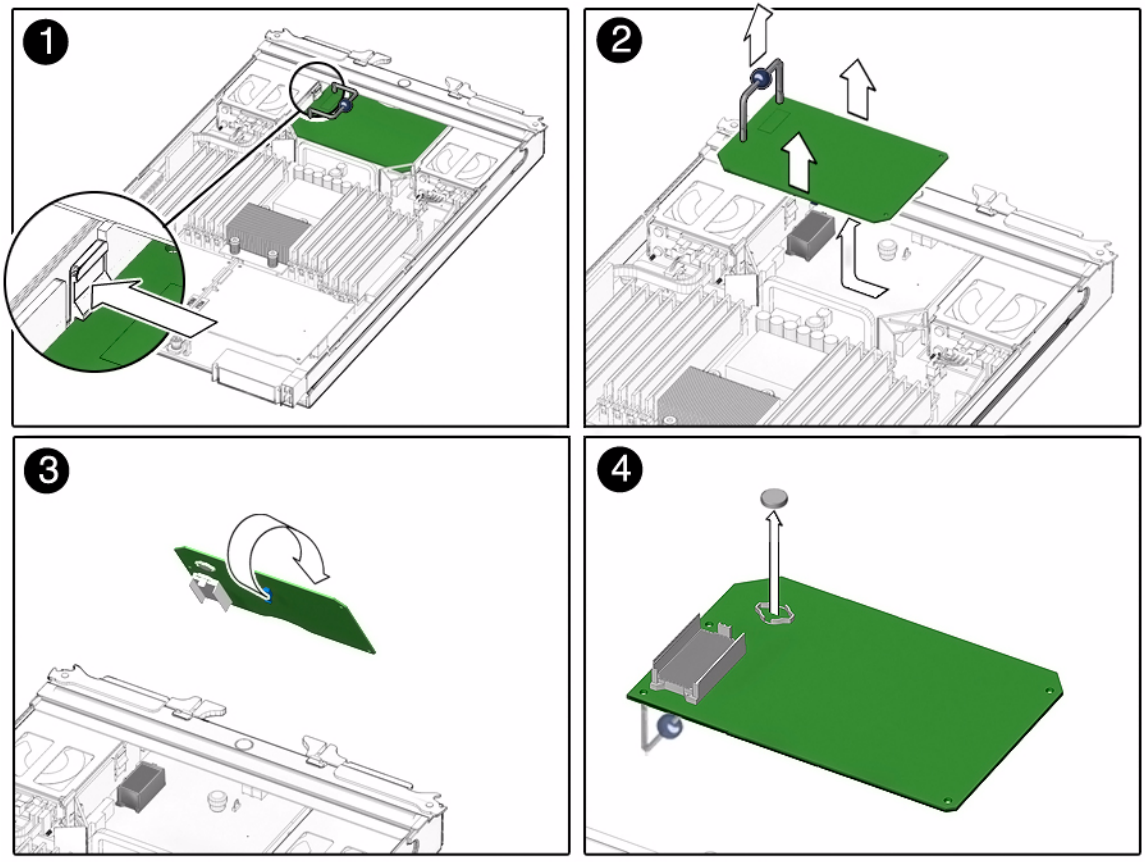
5. **Perform the procedures described in** Section 4.8, "Finishing Component Replacement" on page 4-28**.**

4.5 Removing and Replacing the Battery on the Service Processor

Caution – Handle the components carefully to avoid damage.

1. **Perform the procedures described in** Section 4.2, "Common Procedures for Parts Replacement" on page 4-3**.**
2. **To remove the service processor from the chassis, pull back the plastic tab and lift the handle (**Section 4.4, "Removing and Replacing the Service Processor" on page 4-15**).**
3. **Place the service processor on an antistatic mat.**
4. **Carefully remove the battery (**FIGURE 4-11**) from the service processor.**

FIGURE 4-11 Removing the Battery From the Service Processor



4.5.1 Replacing the Battery on the Service Processor

1. **Remove the replacement battery from the package.**
2. **Press the new battery into the service processor (FIGURE 4-11) with the positive side (+) facing upward (away from the card).**
3. **Place the edge of the service processor in between the tabs on the plastic bracket and carefully align the connectors.**
4. **Press between the handle edges until the service processor is seated in the connector.**
5. **Perform the procedures described in** Section 4.8, "Finishing Component Replacement" on page 4-28**.**

6. **Before you poweron the host system, type the ILOM** `set /SP/clock datetime` **command to set the day and time.**

   For details about this command, refer to the *Sun Integrated Lights out Manager 2.0 User's Guide*, 820-1188.

```
->set /SP/clock datetime=10
Set 'datetime' to '102421532007.30'
-> show
/SP/clock
  Targets
  Properties:
      datetime = Wed Oct 24, 21:53:38 2007
      usentpserver = disabled
...
```

4.6 Replacing or Installing the Sun Blade RAID 5 Expansion Module

Note – Depending on how you ordered your server, the Sun Blade RAID 5 Expansion Module ships preinstalled in your server or as an option shipped separately. If your Sun Blade RAID 5 Expansion Module was shipped separately, see Section 4.6.1, "Installing the RAID 5 Expansion Module" on page 4-21.

Note – Avoid excess strain on the REM edges. Lift as close to the connector as possible.

▼ Removing the RAID 5 Expansion Module

If you have a previously installed REM, save the configuration before removing it. Refer to the *Sun Blade 6000 Disk Module Service Manual*, 820-1703 and the *Sun Blade 6000 Disk Module Administration Guide* 820-4922
`http://docs.sun.com/app/docs/prod/blade.6000disk~blade6000dskmod`

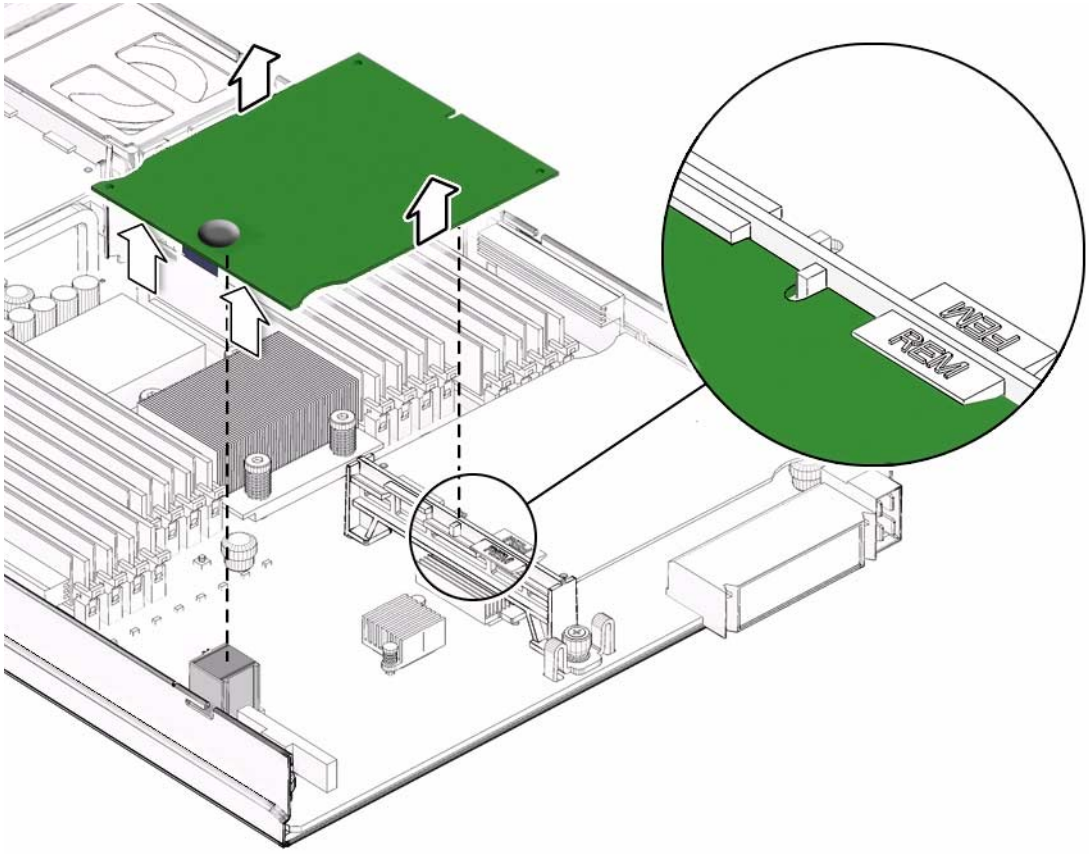
Also refer to the *Sun Adaptec RAID User's Guide*, 820-4708 for instructions on using the Java GUI to save the configuration of the existing REM.

1. **Place your fingers under the RAID expansion module (REM), with each finger close top the connector (**FIGURE 4-12**).**

2. **Lift the card free from the connector.**

3. **Lift the REM free from the gray plastic standoff.**

FIGURE 4-12 Removing the RAID Expansion Module

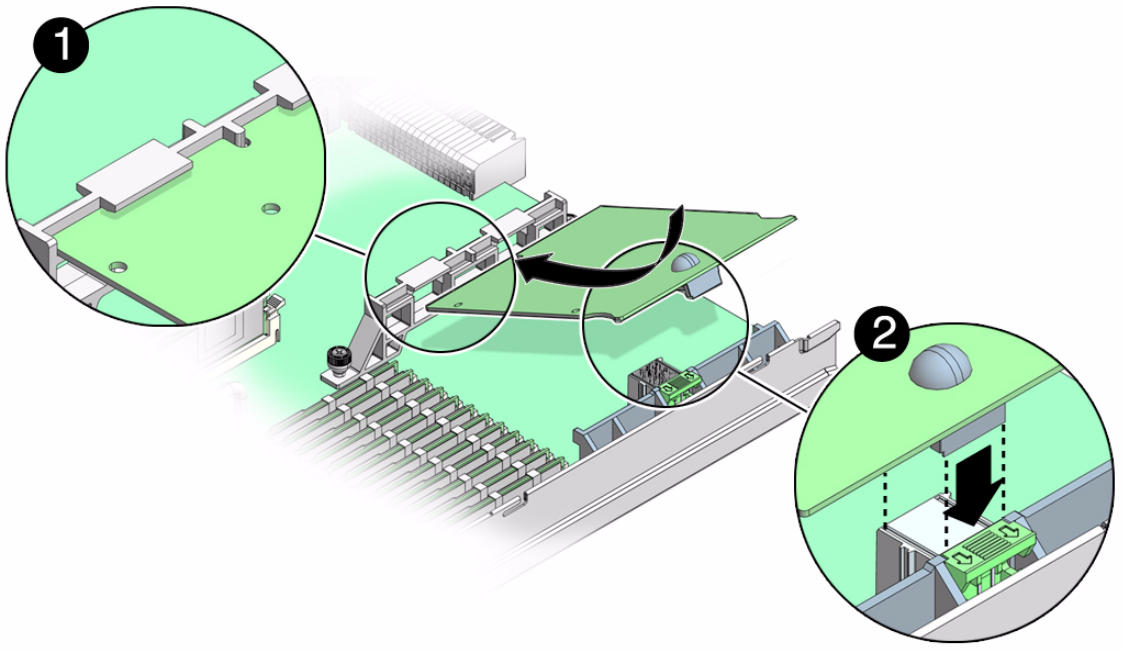


4.6.1 Installing the RAID 5 Expansion Module

1. **Place the card under the tabs of the gray plastic standoff (**FIGURE 4-13**).**

2. **Press on the rubber button on the top of the card until the connector engages with the connector on the motherboard (**FIGURE 4-13**).**

FIGURE 4-13 Replacing the RAID 5 Expansion Module



▼ Verifying the RAID 5 Expansion Module Installation

Note – Check all SAS cables to ensure that they are securely attached and are not damaged or pinched anywhere along the length of cable.

---

1. **Power-up the computer and storage systems.**
   a. **Ensure that all hard disk drives are securely installed.**
   b. **Connect all power cords securely and plug them into the proper power sources.**
   c. **Power-on the disk drive enclosure, and verify that all available HDD status indicators are normal for the storage enclosure(s) that they are in.**
   d. **Power-on the computer system.**

2. **Enter the Open Boot Prompt (OBP) and use the `show-disks` command to list the current devices.**

   In the following example, the HBA is the first device that is listed.

```
{0} ok show-disks
a) /pci@500/pci@0/pci@9/scsi@0/disk
b) /pci@500/pci@0/pci@2/pci@0/usb@0,2/storage@5/disk
c) /pci@500/pci@0/pci@2/pci@0/usb@0,2/storage@1/disk
```

Note – Device paths might vary from this example, depending on which SPARC system you are using and into which PCI-E slot the card is plugged.

3. **Use the `select` command to select the device node for the HBA, and follow the on-screen instructions by pressing Enter when prompted.**

Note – When you run this command, omit `/disk` from the HBA device path, as shown in the following example.

```
{0} ok select /pci@500/pci@0/pci@9/scsi@0
Waiting for AAC Controller to start: . . Started
```

4. **To display additional configuration information, list the device properties by using the `.properties` command.**

```
{0} ok .properties
firmware-version          15825
assigned-addresses        82e70010 00000000 50000000 00000000 00200000
                         82e70030 00000000 50200000 00000000 00080000
compatible                pciex9005,285.108e.7aac.9
                         pciex9005,285.108e.7aac
                         pciex9005,285.9
                         pciex9005,285
                         pciexclass,010400
                         pciexclass,0104
model                     AAC,285
reg                       00e70000 00000000 00000000 00000000 00000000
                         03e70010 00000000 00000000 00000000 00200000
version                   0.00.01
wide                      00000010
device_type               scsi-2
name                      scsi
fcode-rom-offset          00011800
interrupts                00000001
cache-line-size           00000010
class-code                00010400
subsystem-id              00007aac
subsystem-vendor-id       0000108e
```

5. **Return to the `root` node by using the `unselect-dev` command.**

```
 {0} ok unselect-dev
```

Note – At this point, there are no volumes created and the output from a `probe-scsi-all` command will not display any drives.

If no errors or issues are discovered, continue to "Creating a Bootable Array With the RAID 5 Expansion Module" on page 25 to complete the installation process. If any issues are discovered, correct them and retest the HBA before continuing.

4.6.2 Configuring the RAID 5 Expansion Module

For details, see Appendix B and Appendix C.

4.6.3 Creating a Bootable Array With the RAID 5 Expansion Module

If you are installing an operating system onto a bootable array, see Appendix B.

4.6.4 Additional Information

For more information, refer to the following documents at:
`http://docs.sun.com/app/docs/coll/dsk-cntrl`

- *Uniform Command-Line Interface User's Guide*, 820-2145
- *Sun StorageTek RAID Manager Software User's* Guide, 820-1177
- *Sun StorageTek RAID Manager Software Release Notes*, 820-2755

For Sun RAID controller drivers, firmware, and utilities including Sun StorageTek RAID Manager for SPARC (8/4/2008) Version 5.50, go to:
`http://support.intel.com/support/motherboards/server/sunraid/`

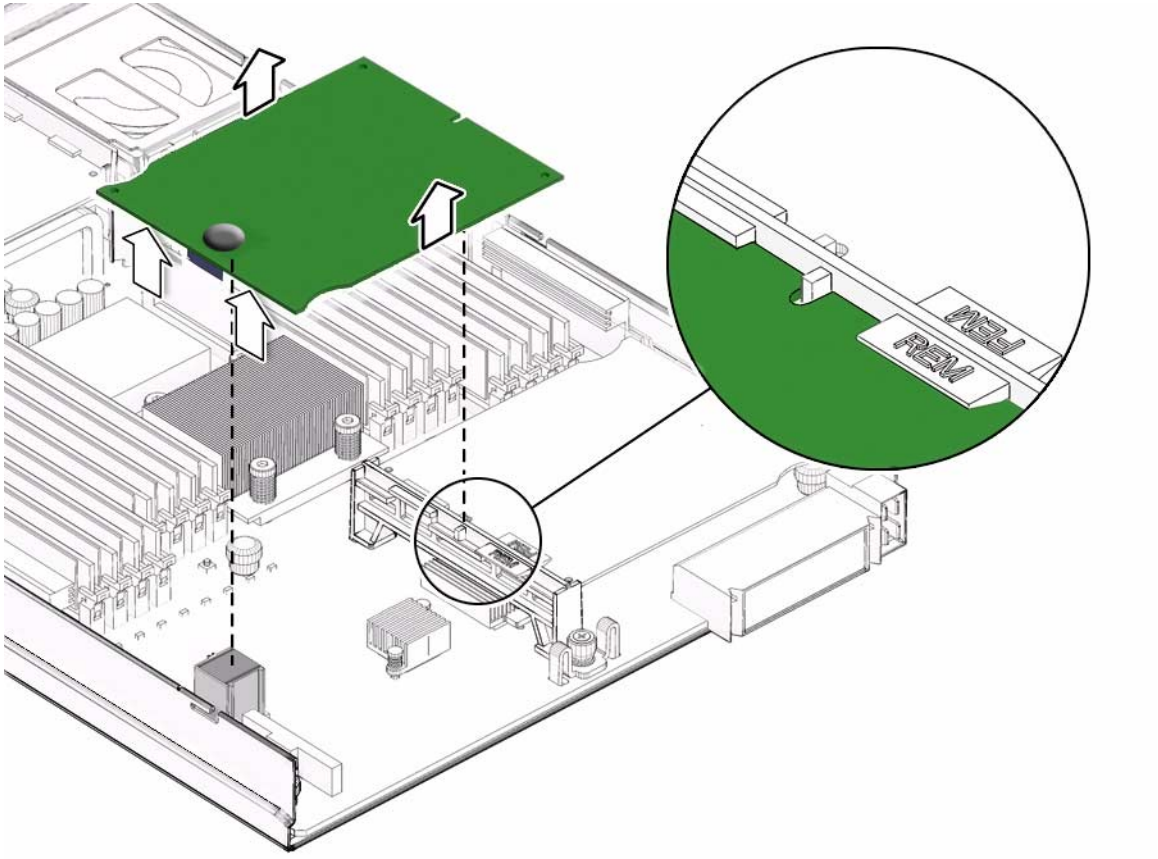
4.7 Removing and Replacing the Sun Blade G2 RAID 0/1 Expansion Module

Caution – Avoid excess strain on the REM edges. Lift as close to the connector as possible.

▼ Removing the RAID 0/1 Expansion Module

1. **Place your fingers under the RAID expansion module (REM), with each finger close top the connector (**FIGURE 4-14**).**
2. **Lift the card free from the connector.**
3. **Lift the REM free from the gray plastic standoff.**

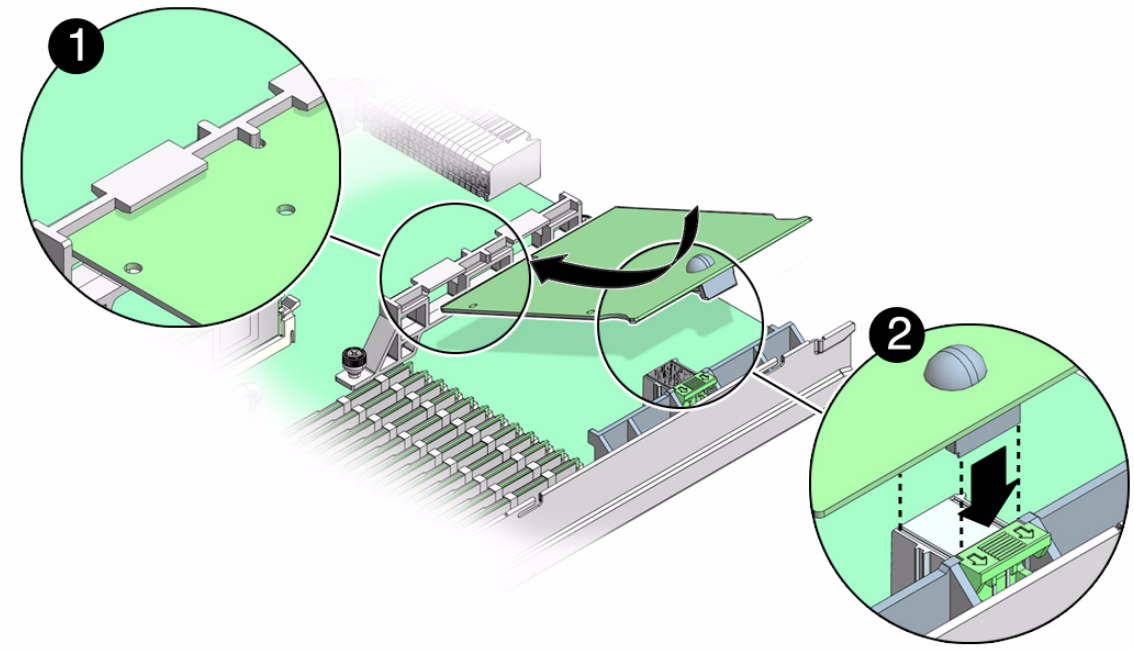
FIGURE 4-14 Removing the RAID Expansion Module



4.7.1 Replacing the RAID 0/1 Expansion Module

1. **Place the card under the tabs of the gray plastic standoff (FIGURE 4-15).**
2. **Press on the rubber button on the top of the card until the connector engages with the connector on the motherboard (FIGURE 4-15).**

FIGURE 4-15 Replacing the RAID 0/1 Expansion Module



4.7.2 Verifying the RAID 0/1 Expansion Module Installation

Refer to the *Sun Blade G2 RAID 0/1 Expansion Module Installation Guide* (820-5448) for details.

Note – Check all SAS cables to ensure that they are securely attached and are not damaged or pinched anywhere along the length of cable.

4.8 Finishing Component Replacement

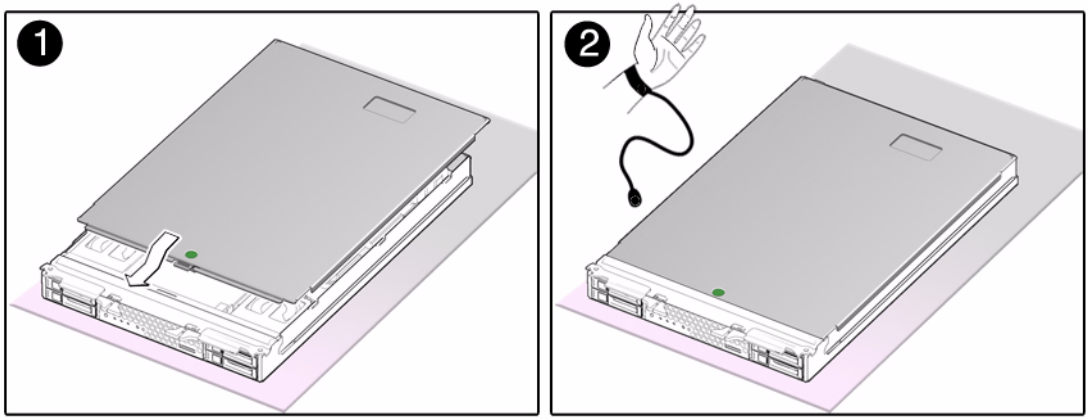
4.8.1 Replacing the Cover

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

   Set the cover down so that it hangs over the rear of the server module by about an inch (2.5 mm).

2. **Slide the cover forward until it latches into place (**FIGURE 4-16**).**

FIGURE 4-16 Replacing the Cover



4.8.2 Reinstalling the Server Module in the Chassis

Caution – Hold the server module firmly so that you do not drop it. The server module weighs approximately 17 pounds (7.7 kg).

1. **Turn the server module over so that the ejector levers are on the right side (**FIGURE 4-17**).**

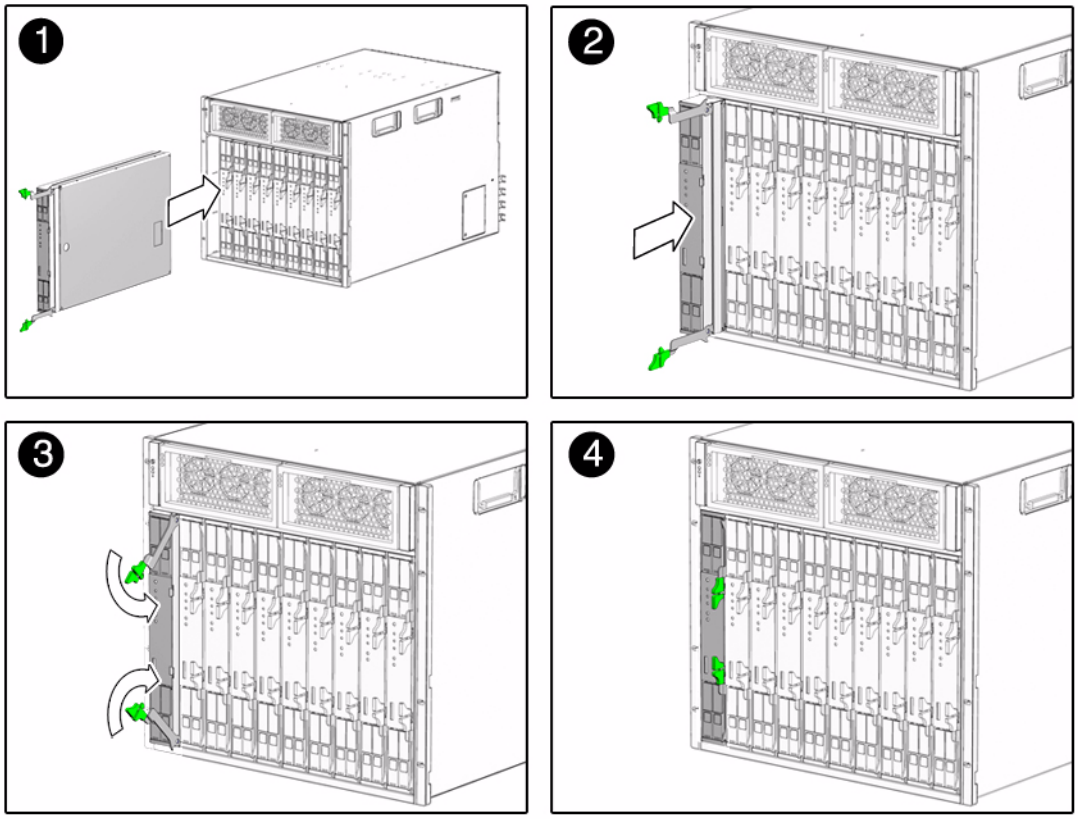
2. **Push the server module into the chassis.**

3. **Close the latches.**

- The server module powers on with 3.3v standby power.
- The ILOM software boots.

You can either press the Power button to fully power on the server module, type the ILOM command `start /SYS`, command, or use the ALOM-CMT `poweron` command.

FIGURE 4-17 Inserting the Server Module in the Chassis



APPENDIX **A**

Specifications

This appendix discusses the various specifications of the Sun Blade T6320 server module. Topics covered are:

If you need specifications for the modular system chassis, see the chassis documentation.

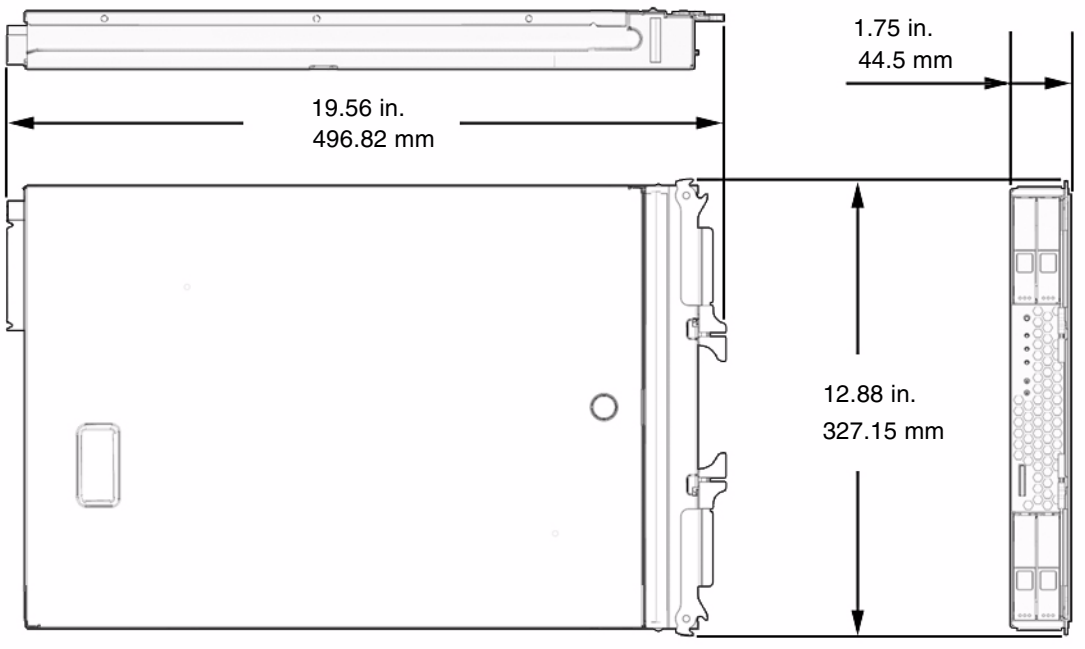
A.1 Physical Specifications

TABLE A-1 Exterior Dimensions

Depth	Width	Height	Weight
19.56 in. 496.82mm	12.88 in. 327.15 mm	1.75 in. 44.5 mm	17.1 lbs (fully configured) 7.77 kg

If the server module is placed in an enclosure, ensure that there is adequate airflow from front to rear.

FIGURE A-1 Server Module Dimensions



A.1.1 System Environmental Specifications

▼ Operating Temperature and Altitude

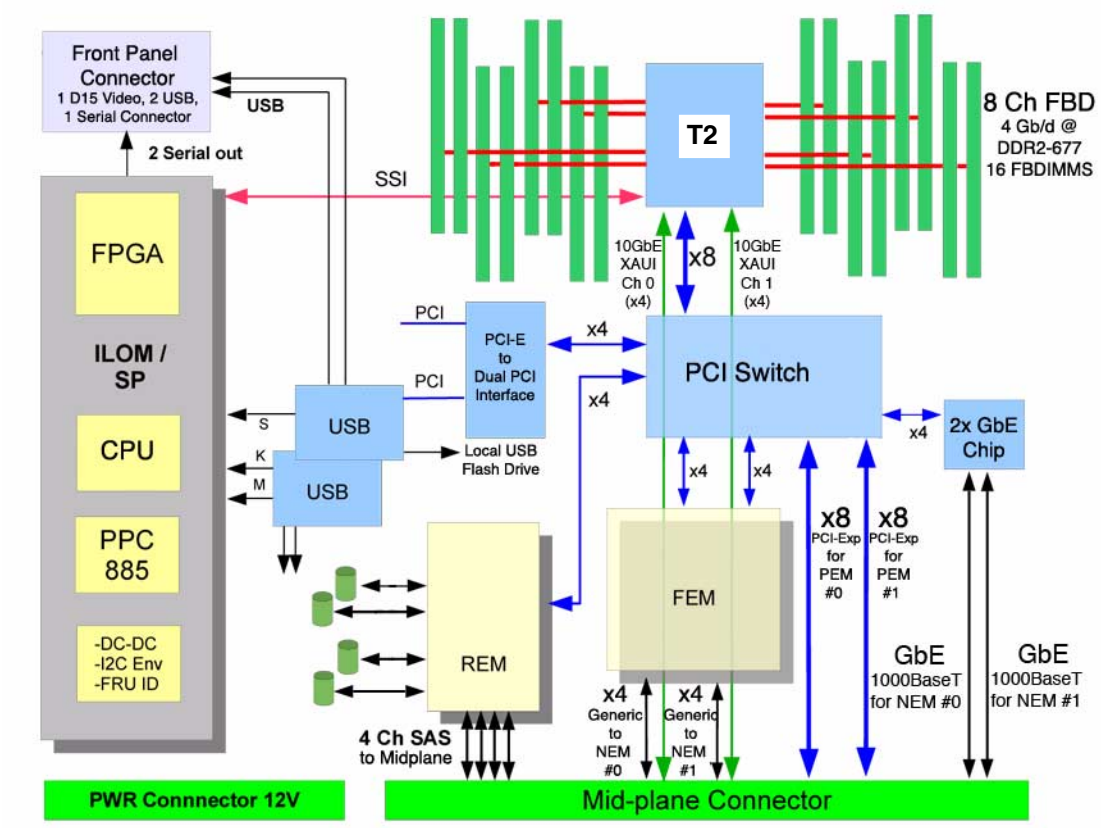
- Max Temperature at sea level: 35° C
- Max Temperature at 10,000ft: 29° C
- Maximum altitude: 10,000 ft.

▼ Non-Operating Temperature and Altitude

- Temperature: -40° C to 60° C
- Maximum altitude: 40,000 ft.

A.2 Motherboard Block Diagram

FIGURE A-2 Motherboard Block Diagram



APPENDIX **B**

Creating a Bootable Array With the Sun Blade RAID 5 Expansion Module

As an installation option, you can choose to create a bootable array (bootable logical drive) and then install the Solaris operating system and the HBA driver onto that array (logical drive). This chapter describes how to set the Sun Blade T6320 to be the boot controller, and how to create a bootable array on a SPARC system.

Note – This appendix assumes that you are experienced with Solaris network installs.

Topics include:

B.1 About Creating a Bootable Array on a SPARC System

These instructions describe how to use the Sun Blade RAID 5 Expansion Module to create boot disks for a SPARC system that will run the Solaris 10 OS with a network install server. Instructions for creating a bootable array with just the Live CD and no install server are also included. Creating a bootable array using an install server is suggested for larger sites.

The `SUNWaac` driver, which is required by Solaris to communicate with logical drives created on the Sun Blade RAID 5 Expansion Module, is not present on the install image. Because of this, you must manually add the driver. Manually adding the `SUNWaac` driver is necessary only if you want to boot directly off logical drives that are presented by the Sun Blade RAID 5 Expansion Module. Disks attached through a REM must be presented as logical volumes. They cannot be accessed directly.

B.2 Creating a Bootable Array Task Map

To create a bootable array for a SPARC system that will be running the Solaris 10 OS, do the following:

1. **Install and connect the HBA and disk drives.**

   See "Replacing or Installing the Sun Blade RAID 5 Expansion Module" on page 20.

2. **Obtain the Live CD from the HBA ship kit or go to:** `http://support.intel.com/support/go/sunraid.htm`**.**

3. **To create a bootable array using just the REM and Live CD (no install server), go to** "To Create a Logical Drive Without a Network Install Server" on page 8**.**

   To create a bootable array using the REM, Live CD, and install server (suggested for larger sites), continue with Step 4.

4. **Install and configure a network install server, as described in** *Solaris 10 Installation Guide: Network Based Installations.*

   You can obtain this document by performing a search at:

   `http://docs.sun.com`

5. **Obtain the following packages from the Live CD or from** `http://support.intel.com/support/go/sunraid.htm`**, and copy them into a working directory on the install server:**

- **SUNWaac**
- **StorMan**
- **SUNWgccruntime**

Note – When you copy these packages to a working directory, ensure that you use the recursive copy command (`cp -r`). The packages are structured in a directory/file system format, so you need to copy the entire contents.

---

6. **Modify two locations on the network install server:**
   - **The miniroot** - The directory on the install server that is mounted as the `root` directory on client machines during the client machines' installation process. See "Modifying the Miniroot Directory On the Install Server" on page 3.
   - **The product installation directory** - The directory on the network install server in which all other Solaris products will be installed during the network install. See "Modifying the Product Installation Directory on the Install Server" on page 5.
7. **Build a logical drive on which to install the Solaris 10 5/08 OS.**

   See "Building a Logical Drive On Which to Install the Solaris OS" on page 6.

B.3 Modifying the Miniroot Directory On the Install Server

The *miniroot* is the Solaris image mounted on / during a network installation, and is used to provide a Solaris environment to run installation programs within.

To enable configuration of logical drives on the Sun StorageTek SAS RAID Internal HBA card and to enable booting via the logical drives, you must add three packages to the miniroot directory:

- **SUNWaac** - The `SUNWaac` driver, which is required by the Solaris 10 5/08 OS to access logical drives.
- **SUNWgccruntime** - The `gcc` runtime libraries, which are required by the command-line interface and the Sun StorageTek RAID Manager graphical user interface (GUI).
- **StorMan** - The Sun StorageTek SAS RAID Internal HBA utilities package, which contains the command-line interface and Sun StorageTek RAID Manager GUI.

For information about obtaining these packages, see "Creating a Bootable Array Task Map" on page 2.

▼ To Modify the Miniroot Directory

The examples in this procedure use *install_dir_path* to refer to the location where the network install image is located. This is the same directory path that you use with the `setup_install_server` command, as described in the *Solaris 10 Installation Guide: Network Based Installations*.

1. **If the install server is running a version of the Solaris OS prior to Solaris 10 5/08, update the server with the appropriate Solaris patch:**
   - **Solaris 10** - patch 137321 (SPARC) or 137322 (x64)
   - **Solaris 9** - patch 137477 (SPARC) or 137478 (x64)

   You can download the patches from `http://www.sunsolve.com`. You must install the patch because the `SUNWgccruntime` package, which is one of the required packages on the miniroot directory, requires the presence of the `p7zip` compression program on the install server. This compression program is included in the Solaris 10 5/08 OS and in the patches described in this step.

2. **Obtain the required packages, as described in** "Creating a Bootable Array Task Map" on page 2**.**

3. **As a `root` user, log into a SPARC architecture host (install server) from which you can run the `pkgadd` commands.**

Note – Make sure that the host on which you run the `pkgadd` commands is a SPARC architecture host (as opposed to x64). The packages are designed for the SPARC architecture and might not install correctly from an x64 system.

---

4. **If you are installing the packages directly from the Live CD from the HBA ship kit, mount the Live CD and use the `cd` command to change to the Live CD directory.**

```
# cd /cdrom/raid_live/s0/Raid_card
```

5. **Use the `pkgadd -R` command to install the `SUNWaac`, `SUNWgccruntime`, and `StorMan` packages in the *install_dir_path*`/Solaris_10/Tools/Boot` directory.**

Note – In the following example, the `-R` flag is directing the `pkgadd` command to use an alternate `root` so that the packages will be installed correctly onto the miniroot image. When you substitute your own directory path for *install_dir_path*, be sure to begin with a `/` to provide an absolute path name. Also note that `-d.` (dash d dot) syntax before the package names.

```
# pkgadd -R install_dir_path/Solaris_10/Tools/Boot -d. SUNWaac
# pkgadd -R install_dir_path/Solaris_10/Tools/Boot -d. SUNWgccruntime
# pkgadd -R install_dir_path/Solaris_10/Tools/Boot -d. StorMan
```

B.4 Modifying the Product Installation Directory on the Install Server

The *product installation directory* is the directory into which all other Solaris products will be installed during the network install. On the network install server, the directory is *install_dir_path*/Solaris_10/Product.

You must place a copy of the SUNWaac package in this product installation directory. Doing so enables you to add the SUNWaac driver to the client machine after other Solaris packages have been installed. Without the SUNWaac driver, logical drives, including boot drives, will not be accessible to the operating system, and booting the newly installed machine will fail.

▼ To Modify the Product Installation Directory

1. **Obtain the SUNWaac package, as described in** "Creating a Bootable Array Task Map" on page 2**.**

2. **Use the cp -r command to copy the SUNWaac package from the working directory to the *install_dir_path*/Solaris_10/Product directory on the install server.**

```
# cp -r SUNWaac install_dir_path/Solaris_10/Product
```

The cp command places the package on a network-mounted directory that will be available to the install client. However, the command does not install the package. Installing the package is a manual step that you will perform after the installation of other Solaris software.

B.5 Building a Logical Drive On Which to Install the Solaris OS

Before you can install the Solaris OS, you need to build the logical drive (array) on which to install it. This section contains the following subsections:

Note – The following procedures provide basic examples of the command-line interface (CLI). For detailed information about using the CLI, see the *Uniform Command-Line Interface User's Guide,* located at:
`http://docs.sun.com/app/docs/prod/stortek.raid.hba`

▼ To Create a Logical Drive Using a Network Install Server

1. **Ensure that the physical drives are cabled to the internal Sun StorageTek SAS RAID HBA.**

2. **From the system console, boot over the network into single user mode.**

```
ok boot net -s
```

3. **At the system prompt, access the command-line interface (CLI), and use the `./arcconf GETCONFIG` command to print a list of the complete configuration of card 1 on the system.**

   In the following example, note that the CLI is located in the `/opt/StorMan` directory, and the name of the CLI is `aarconf`. All commands must start with `./` unless you have altered the path to include `/opt/StorMan` in it.

```
# cd /opt/StorMan
# ./arcconf GETCONFIG 1
```

Note – Ignore any “failing to write to log files” messages that might be displayed after running the command. The command will run successfully and will provide a list of physical disks, card status, and logical disks. The list might be long if you have many physical disks.

4. **Create a logical drive on the REM, using RAID 5 and all space on disks 0,2 0,3 and 0,4, run the** `CREATE` **command as shown in the following example.**

```
# ./arcconf CREATE 1 LOGICALDRIVE MAX 5 0 2 0 3 0 4
```

Note – After using the `CREATE` command, you will see error messages like the one shown in the next example. This is because you are working on a read-only file system and certain links cannot be created. However, if the last message says “Command completed successfully”, the logical drive is created.

```
Creating logical device: Device 2
  devfsadm: mkdir failed for /dev 0x1ed: Read-only file system
  WARNING: /pci@7c0/pci@0/pci@8/scsi@0/sd@2,0 (sd2):
          Corrupt label; wrong magic number

  devfsadm: inst_sync failed for /etc/path_to_inst.117: Read-only file system
  devfsadm: WARNING: failed to update /etc/path_to_inst

  Command completed successfully.
```

5. **Perform the necessary tasks to configure the drive. Such tasks might include the following:**
   - Labeling the drive
   - Partitioning the drive
   - Preparing a file system
   - Installing data from backups or recovering data from RAID capabilities
   - Bringing the drive online

   These tasks are covered in the Solaris OS administration documentation. For additional drive verification, use SunVTS. Refer to the SunVTS and Solaris documentation at `http://docs.sun.com` for details.

▼ To Create a Logical Drive Without a Network Install Server

Note – This procedure is supported on Oracle's Sun Blade T6320 Server Modules released after July 2009. For Sun Blade T6320 Server Modules released before July 2009, an external CDROM device with a USB connection is required.

---

1. **Using ILOM, obtain the IP address of the system console from the blade server:**

```
sc> shownetwork
SC network configuration is:
IP Address: 10.6.214.63
Gateway address: 10.6.214.1
Netmask: 255.255.255.0
Ethernet Address: 00:14:4F:E5:AD:6B
```

2. **Type the IP address in the browser interface and select the Remote Control tab and the Launch Redirection option.**

3. **Insert the Live CD in the blade server you are working on, then select Devices/CDROM.**

4. **Insert the path to your CDROM drive.**

5. **On the host system, type the following from the OpenBoot PROM prompt and follow the directions:**

```
ok boot cdrom
```

6. **At the system prompt, access the command-line interface (CLI), and use the** `./arcconf GETCONFIG` **command to print a list of the complete configuration of card 1 on the system.**

   In the following example, note that the CLI is located in the `/opt/StorMan` directory, and the name of the CLI is `aarconf`. All commands must start with `./` unless you have altered the path to include `/opt/StorMan` in it.

```
# cd /opt/StorMan
# ./arcconf GETCONFIG 1
```

Note – Ignore any "failing to write to log files" messages that might be displayed after running the command. The command will run successfully and will provide a list of physical disks, card status, and logical disks. The list might be long if you have many physical disks.

---

7. **Create a logical drive on the REM, using RAID 5 and all space on disks 0,2 0,3 and 0,4.**

   Run the `CREATE` command as shown in the following example.

```
# ./arcconf CREATE 1 LOGICALDRIVE MAX 5 0 2 0 3 0 4
```

Note – After using the `CREATE` command, you will see error messages like the one shown in the next example. This is because you are working on a read-only file system and certain links cannot be created. However, if the last message says "Command completed successfully", the logical drive is created.

```
Creating logical device: Device 2
  devfsadm: mkdir failed for /dev 0x1ed: Read-only file system
  WARNING: /pci@7c0/pci@0/pci@8/scsi@0/sd@2,0 (sd2):
          Corrupt label; wrong magic number

  devfsadm: inst_sync failed for /etc/path_to_inst.117: Read-only file system
  devfsadm: WARNING: failed to update /etc/path_to_inst

  Command completed successfully.
```

8. **To label the logical drive, see** "To Label the Newly Created Logical Drive" on page 10**.**

▼ To Delete a Logical Drive on the REM

You might need to free up some space in order to create the logical drive on which the Solaris OS will be installed. You can do so by deleting existing logical drives.

Caution – Using the command in this procedure will destroy all data on the specified logical drive. Be very careful when using this command to prevent unintentional data loss.

- **To delete a logical drive on the REM, use the** `DELETE` *card-number* `LOGICALDRIVE` *drive-number* **command.**

  In this example, *x* is the number of the logical drive that you want to delete.

```
# ./arcconf DELETE 1 LOGICALDRIVE x
```

▼ To Label the Newly Created Logical Drive

Before the Solaris OS can install software onto the newly created logical drive, you must label the drive.

1. **Use the** `./arcconf GETCONFIG` *card-number* `LD` **command to display the logical drives on the REM.**

```
# ./arcconf GETCONFIG 1 LD
```

2. **Use the** `devfsadm` **command to find the newly created drive and load its drivers.**

```
# devfsadm
```

3. **To label the newly created drive, use the** `format` **command and select the logical drive.**

   You can distinguish the logical REM drives in the output by looking at the vendor/product ID string. The Sun StorageTek SAS RAID HBA card is displayed as "Sun-STKRAID." The last part of the string will display "EXT" (for external) or "INT" (for internal), depending on the type of card you have.

```
# format
Searching for disks...done


AVAILABLE DISK SELECTIONS:
       0. c0t0d0 <SUN72G cyl 14087 alt 2 hd 24 sec 424>
          /pci@780/pci@0/pci@9/scsi@0/sd@0,0
       1. c0t1d0 <SUN72G cyl 14087 alt 2 hd 24 sec 424>
          /pci@780/pci@0/pci@9/scsi@0/sd@1,0
       2. c2t0d0 <Sun-STKRAIDINT-V1.0 cyl 17818 alt 2 hd 255 sec 63>
          /pci@7c0/pci@0/pci@8/scsi@0/sd@0,0
       3. c2t1d0 <Sun-STKRAIDINT-V1.0 cyl 8907 alt 2 hd 255 sec 63>
          /pci@7c0/pci@0/pci@8/scsi@0/sd@1,0
Specify disk (enter its number): 2
```

4. **When the** `format` **process displays the** `Disk not labeled. Label it now?` **prompt, type** `y` **and press Enter.**

5. **Exit the `format` process by typing `quit` and pressing Enter.**

   You now have a labeled logical drive.

6. **Use the `init 0` command, switch to the `ok` prompt, and use the `boot net` command to reboot the system for normal network-based installation.**

```
# init 0
  # syncing file systems... done
  Program terminated
  r)eboot, o)k prompt, h)alt?o
  ok boot net
```

B.6 Next Steps

Install the Solaris OS and the HBA driver onto the bootable array, as described in Appendix C.

B.6.1 Additional Information

For more information, refer to the following documents at:
`http://docs.sun.com/app/docs/coll/dsk-cntrl`

- *Uniform Command-Line Interface User's Guide*, 820-2145
- *Sun StorageTek RAID Manager Software User's* Guide, 820-1177
- *Sun StorageTek RAID Manager Software Release Notes*, 820-2755
- *Sun StorageTek SAS RAID HBA Installation Guide Eight-Port, Internal HBA*
  `http://docs.sun.com/app/docs/doc/820-1847-17`

For Sun RAID controller drivers, firmware, and utilities including Sun StorageTek RAID Manager for SPARC (8/4/2008) Version 5.50, go to:
`http://support.intel.com/support/motherboards/server/sunraid/`

APPENDIX **C**

Installing the Solaris OS and the RAID 5 Expansion Module Driver

If you chose to create a bootable array as part of your installation (see Appendix B), you can install the Solaris operating system (OS) and the REM driver on that bootable array.

This appendix explains how to install the Solaris OS onto a bootable array (logical drive) and then install the REM driver on the array (logical drive).

Note – This appendix assumes you are experienced with Solaris network installs.

Topics include:

C.1 Preparing to Install the Solaris OS

Before you begin, prepare to install the Solaris operating system.

▼ To Prepare to Install the Solaris OS

- **Complete the procedures in** Appendix B**.**

Note – For up-to-date Sun StorageTek SAS RAID HBA support, go to http://support.intel.com/support/go/sunraid.htm.

C.2 Installing the RAID 5 Expansion Module Driver With the Solaris OS

This section contains the following subsection:

▼ To Install the RAID 5 Expansion Module Driver With the Solaris OS

1. **Obtain the Solaris 10 5/08 OS and perform a normal network installation, as described in the** *Solaris 10 Installation Guide: Network-Based Installations***, until you encounter the prompt,** `Reboot After Installation?`**.**

Note – Do NOT select `Auto Reboot` at this point in the network installation process.

2. **Specify that you want to perform a Manual Reboot.**

   Specifying a manual reboot provides you with the opportunity to install the HBA driver after all other Solaris software is in place. Without this driver, subsequent reboots will fail.

Note – If you accidentally choose `Auto Reboot`, you can still install the HBA driver prior to reboot. From an `ok` prompt, you can use the `boot net -s` command to boot from the network into single-user mode and then install the driver.

3. **Use the** `df` **command to verify the following:**
   - The product install directory is mounted on `/cdrom` from the network install server.

- The logical drive onto which you need to place the driver package is mounted on `/a`.

`/a` is the standard Solaris mount point for the disk on which the OS is being installed.

4. **If the product install directory and the logical drive are not mounted, manually mount them.**

Note – With this example, you must substitute the correct host names, directory paths, and device paths in your environment.

```
# mount /dev/dsk/c2t0d0s0 /a (for the logical drive)
# mount install_host:install_dir_path /cdrom (for the install server products)
```

5. **Apply the HBA driver package,** `SUNWaac`**.**

```
# cd /cdrom/Solaris_10/Product
# pkgadd -R /a -d. SUNWaac
```

6. **Apply any patches that are specifically required for the system.**

7. **Reboot the system.**

```
# reboot
```

The system will now be able to see, and boot from, the logical drive on which you installed the Solaris OS.

Note – You might want to keep the network install server intact for re-installing or for emergency recovery, because as of Solaris 10 5/08, the `SUNWaac` driver is not included on standard Solaris install media. Using the `boot net -s` command from the `ok` prompt enables you to perform maintenance on the system, while a Solaris CD will not let you do so. You might also want to install the `StorMan` package on a running system. This enables you to have access to the GUI and command-line interface for the Sun StorageTek SAS RAID Internal HBA card, to configure or monitor disks.

C.3 Next Steps

You can optionally install and use the Sun StorageTek RAID Manager GUI to create arrays on the disk enclosure. See the *Sun StorageTek RAID Manager User's Guide* at:
http://docs.sun.com/app/docs/prod/stortek.raid.hba

C.3.1 Additional Information

For more information, refer to the following documents at:
http://docs.sun.com/app/docs/coll/dsk-cntrl

- *Uniform Command-Line Interface User's Guide*, 820-2145
- *Sun StorageTek RAID Manager Software User's* Guide, 820-1177
- *Sun StorageTek RAID Manager Software Release Notes*, 820-2755
- *Sun StorageTek SAS RAID HBA Installation Guide Eight-Port, Internal HBA*
  http://docs.sun.com/app/docs/doc/820-1847-17

For Sun RAID controller drivers, firmware, and utilities including Sun StorageTek RAID Manager for SPARC (8/4/2008) Version 5.50, go to:
http://support.intel.com/support/motherboards/server/sunraid/

APPENDIX **D**

XVR-50 Graphics Accelerator

This appendix discusses the XVR-50 Graphics Accelerator Topics covered are:

D.1 Features

The XVR-50 graphics accelerator is a 24-bit on-board PCI-based graphics frame buffer. The XVR-50 graphics accelerator offers the following features:

- 2D 24-bit color graphics
- Flexible 8-bit and 24-bit color application support
- HD15 monitor connector for a wide range of Sun monitors
- 3D support through Sun OpenGL for Solaris software

D.2 Video Formats

TABLE D-1 lists the monitor video formats supported by the XVR-50 graphics accelerator.

- **To get a list of available screen resolutions for your display device, type:**

```
host% fbconfig -res \?
```

If you have selected a resolution where support for this resolution cannot be verified, `fbconfig` displays the following output:

```
SUNWpfb_config: Cannot verify that selected resolution is a supported
video resolution for this monitor
```

TABLE D-1 lists video formats supported by the HD15 port.

TABLE D-1 XVR-50 Graphics Accelerator HD15 Video Formats

Display Resolution	Vertical Refresh Rate	Sync Standard	Aspect Ratio Format
1600 x 1200	60 Hz	VESA	4:3
1600 x 1000	66, 76 Hz	Sun	16:10
1440 x 900	60 Hz	VESA	16:10
1440 x 900	76 Hz	Sun	16:10
1280 x 1024	60, 75, 85 Hz	VESA	5:4
1280 x 1024	67, 76 Hz	Sun	5:4
1280 x 800	76 Hz	Sun	16:10
1152 x 900	66, 76 Hz	Sun	5:4
1152 x 864	75 Hz	VESA	4:3
1024 x 768	60, 70, 75, 85 Hz	VESA	4:3
800 x 600	56, 60, 72, 75 Hz	VESA	4:3
720 x 400	85 Hz	VESA	9:5
640 x 480	60, 72, 75 Hz	VESA	4:3

Note – The XVR-50 graphics accelerator video composite sync is an XOR composite sync.

Note – Not all resolutions are supported by all monitors. Using resolutions that are not supported by the monitor may damage the monitor. Please refer to your monitor manuals for supported resolutions.

The default resolution is dictated either by EDID information from the connected monitor or by the console resolution that is set (see TABLE D-1). When no monitor is connected to supply EDID information, the default resolution is 1024 x 768 @ 75 Hz.

D.3 Sun OpenGL for Solaris Software

The Sun OpenGL 1.5 for Solaris software supports the XVR-50 graphics accelerator through software implementation.

D.4 Man Pages

The XVR-50 graphics accelerator man pages describe how you can query and set frame buffer attributes such as screen resolutions and visual configurations.

Use the `fbconfig(1M)` man page for configuring all Sun graphics accelerators. `SUNWpfb_config(1M)` contains XVR-50 device-specific configuration information. To get a list of all graphics devices on your system, type:

```
host% fbconfig -list
```

This example shows a list of graphics devices displayed:

```
  Device-Filename              Specific Config Program
  ---------------              -----------------------
  /dev/fbs/pfb0                SUNWpfb_config
```

Type the `fbconfig -help` option to display the attributes and parameters information of the man page.

```
host% fbconfig -dev pfb0 -help
```

- **To access the `fbconfig` man page, type:**

```
host% man fbconfig
```

- **To access the XVR-50 graphics accelerator man page, type:**

```
host% man SUNWpfb_config
```

D.5 Optional Video Output

The default system uses a resolution suggested by the monitor as long as the monitor is connected to power and connected to the XVR-50 video port. This is the default the system uses if no `fbconfig` commands have been given, or after entering `fbconfig -dev pfb0 -defaults`.

To manually set up a video output resolution, do the following:

1. Set the desired screen resolution. For example, type:

```
host% fbconfig -dev pfb0 -res 1280x1024x60
```

2. Log out, then log in.

To find all possible XVR-50 graphics accelerator resolutions, type:

```
host% fbconfig -dev pfb0 -res \?
```

D.6 Default Color Depth

1. Set or reset the default color depth.

To set 8 or 24 as the default color depth, type `/usr/sbin/svccfg`.

```
/usr/sbin/svccfg -s x11-server setprop options/default_depth=8
/usr/sbin/svccfg -s x11-server setprop options/default_depth=24
```

The default color depth is 24.

2. Log out and then log back in for the change to take effect.

D.7 Checking Device Configuration

Type `fbconfig` to check the X window system (`-propt`) and XVR-50 graphics accelerator (`-prconf`) device configuration values.

The `fbconfig -propt` option displays the values of all options (for the specified device) saved in the `OWconfig` file (see below for an example). These are the values the X window system will use the next time it starts on that device:

```
host% fbconfig -dev pfb0 -propt

-- Graphics Configuration for /dev/fbs/pfb0 ---

OWconfig: machine
Video Mode: not set

Screen Information:
        Fake8 Rendering: Disable
        Gamma Correction: Disable
```

`fbconfig -prconf` option displays the current XVR-50 graphics accelerator device configuration (see below for an example). If certain values differ from those displayed in `-propt`, it is because those values have been configured since the X window system started.

```
host% fbconfig -dev pfb0 -prconf

--- Hardware Configuration for /dev/fb ---

Type: XVR-50
ASIC: version 0x515e            REV: version 0x3000002


Monitor/Resolution Information:
        Monitor Manufacturer: SUN
        Product code: 1431
        Serial #: 0
        Manufacture date: 2006, week 24
        Monitor dimensions: 34x27 cm
        Monitor preferred resolution: SUNW_STD_1280x1024x60
        Separate sync supported: yes
        Composite sync supported: yes
        Gamma: 2.20
        EDID:  Version 1, Revision 3
        Supported resolutions: SUNW_STD_1280x1024x60,
          VESA_STD_1280x1024x60, VESA_STD_1280x1024x75,
          SUNW_STD_1152x900x66, VESA_STD_1024x768x75,
          VESA_STD_720x400x70, VESA_STD_640x480x60, VESA_STD_640x480x67,
          VESA_STD_640x480x72, VESA_STD_640x480x75, VESA_STD_800x600x56,
          VESA_STD_800x600x60, VESA_STD_800x600x72, VESA_STD_800x600x75,
          VESA_STD_832x624x75, VESA_STD_1024x768x70,
         VESA_STD_1024x768x75, VESA_STD_1280x1024x75, APPLE_1152x870x75,
          1152x870x75
        Current resolution setting: 1280x1024x60
        Current depth: 24

Depth Information:
        Possible depths: 8, 24
```

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