



Sun Fire™ USBRDT 5240 Uniboard Administration Guide

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Contents

Preface xi

1. Accessing the Service Processor and the System Console on the Sun Fire USBRDT 5240 Uniboard 1

Accessing the Service Processor 1

Connections With the Dongle Cable 2

- ▼ To Log In To the Service Processor Using the Serial Port 3

Activating the Network Management Port 4

- ▼ To Activate the Network Management Port 5

- ▼ To Log In To the Service Processor Using the Network Management Port 7

Accessing the System Console 8

- ▼ To Access the System Console Through a Terminal Server 8

- ▼ To Access the System Console Through a Tip Connection 9

- ▼ To Modify the `/etc/remote` File 10

- ▼ To Access the System Console Through an Alphanumeric Terminal 11

- ▼ To Access the System Console Through a Local Graphics Monitor 11

Switching Between the ILOM Prompt and the System Console 12

- ▼ To Switch Between the ILOM Prompt and the System Console 14

Reaching the OpenBoot `ok` Prompt 14

2. Managing the Sun Fire USBRDT 5240 Uniboard	15
Using the Sun Fire USBRDT 5240 Uniboard in a Sun Fire System	15
Interaction With the System Controller on a Sun Fire System	16
Supported Configurations in Sun Fire Systems	17
Enabling Power On and Power Off	18
Temperature Monitoring	19
Displaying Board Information on the Sun Fire System	19
Using a Remote Storage Device	20
RAS and Troubleshooting	20
Interpreting LEDs on the Sun Fire USBRDT 5240 Uniboard	21
Front Panel LEDs	22
DIMM Fault LEDs	25
ILOM and Board Diagnostics	25
▼ To Display System Fault Information	25
▼ To Clear a Fault	26
Resetting or Power Cycling the Board From a Sun Fire System	27
▼ To Reset the Sun Fire USBRDT 5240 Uniboard From a Sun Fire System	27
▼ To Power Cycle the Sun Fire USBRDT 5240 Uniboard from a Sun Fire System	27
Automatic System Recovery	28
Auto-Boot Options	28
Error Handling Summary	29
Reset Scenarios	30
Enabling and Disabling Automatic System Recovery	31
Obtaining Automatic System Recovery Information	32
PCI Express (PCIe) Modules and Hot Plug	32
Hard Disk Drives and Hot Plug	33
Unconfiguring and Reconfiguring Devices	33

▼ To Unconfigure a Device Manually	33
▼ To Reconfigure a Device Manually	34
3. Managing Disk Volumes	35
RAID Requirements	35
Disk Volumes	36
RAID Technology	36
Integrated Stripe Volumes (RAID 0)	37
Integrated Mirror Volumes (RAID 1)	37
Hardware RAID Operations	38
Physical Disk Slot Numbers, Physical Device Names, and Logical Device Names for Non-RAID Disks	39
▼ To Create a Hardware Mirrored Volume	39
▼ To Create a Hardware Mirrored Volume of the Default Boot Device	41
▼ To Configure and Label a Hardware RAID Volume for Use in the Solaris Operating System	42
▼ To Create a Hardware Striped Volume	45
▼ To Perform a Mirrored Disk Hot-Plug Operation	46
▼ To Perform a Nonmirrored Disk Hot-Plug Operation	47
For More Information	47
4. Logical Domains Software	49
Logical Domains Software Overview	49
For More Information	50
A. Updating the Firmware	51
▼ To Update the Firmware with the <code>load</code> Command	51
B. Mapping Device Path Names	55
Index	57

Figures

FIGURE 1-1	Separate System Console and Service Processor Channels	13
FIGURE 2-1	Front Panel Components and LEDs	23
FIGURE 3-1	Graphical Representation of Disk Striping	37
FIGURE 3-2	Graphical Representation of Disk Mirroring	38

Tables

TABLE 1-1	Directing the System Console Input and Output	8
TABLE 1-2	Ways of Accessing the <code>ok</code> Prompt	14
TABLE 2-1	Sun Fire System Configurations With the Sun Fire USBRDT 5240 Uniboard	17
TABLE 2-2	Sun Fire 6800, A152 Power Supply Example Configuration	18
TABLE 2-3	Sun Fire 15K, A141 Power Supply Example Configuration	18
TABLE 2-4	Standard LED Behaviors and Meaning	21
TABLE 2-5	System LED Behaviors and Assigned Meanings	22
TABLE 2-6	Locator LED Control	24
TABLE 2-7	Front Panel LED Behavior	24
TABLE 2-8	ILOM Property Settings for Reset Scenario	30
TABLE 2-9	Virtual Keyswitch Setting for Reset Scenario	30
TABLE 2-10	Device Identifiers and Devices	33
TABLE 3-1	Disk Slot Numbers, Logical Device Names, and Physical Device Names	39
TABLE B-1	I/O Devices	55

Preface

This manual contains system configuration and management instructions for system administrators of the Sun Fire™ USBRDT 5240 Uniboards. This document is written for experienced system administrators with working knowledge of computer networks, and advanced knowledge of the Solaris™ Operating System.

Using UNIX Commands

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

- Software documentation that you received with your system
- Solaris Operating System documentation, which is at:
<http://docs.sun.com>

Shell Prompts

Shell	Prompt
C shell	<i>machine-name%</i>
C shell superuser	<i>machine-name#</i>
Bourne shell and Korn shell	\$
Bourne shell and Korn shell superuser	#

Related Documentation

The following table lists the documentation for this product. The online documentation is available at:

<http://docs.sun.com/app/docs/prod/usbrdt.5240.brd#hic>

Application	Title	Part Number	Format	Location
Latest information	<i>Sun Fire USBRDT 5240 Uniboard Product Notes</i>	820-2451	PDF, HTML	Online
Safety information	<i>Important Safety Information for Sun Hardware Systems</i>	816-7190	Printed	Shipping kit
	<i>Sun Fire USBRDT 5240 Uniboard Safety and Compliance Manual</i>	820-2455	PDF, HTML	Online
Installation	<i>Sun Fire USBRDT 5240 Uniboard Installation Guide</i>	820-2452	PDF, HTML	Online
Integrated Lights Out Manager (ILOM)	<i>Sun Integrated Lights Out Manager 2.0 User's Guide</i>	820-1188	PDF, HTML	Online
	<i>Addendum to the Sun Integrated Lights Out Manager 2.0 User's Guide</i>	820-4198	PDF, HTML	Online
	<i>Sun Integrated Lights Out Manager 2.0 Supplement for Sun Fire USBRDT 5240 Uniboard</i>	820-3087	PDF, HTML	Online
Administration	<i>Sun Fire USBRDT 5240 Uniboard Administration Guide</i>	820-2453	PDF, HTML	Online
Service	<i>Sun Fire USBRDT 5240 Uniboard Service Manual</i>	820-2454	PDF, HTML	Online

The following table lists the documentation that is related to this product.

Application	Location
System Management Services software	http://docs.sun.com/app/docs/prod/servers.high
System Controller Application firmware	http://docs.sun.com/app/docs/prod/servers.mid
Sun Management Center software	http://docs.sun.com/app/docs/prod/sun.mgmt.ctr

Application	Location
Simple Network Management Protocol (SNMP) software	http://docs.sun.com/app/docs/prod/snmp
Logical Domains (LDoms) software	http://docs.sun.com/app/docs/prod/ldoms
Sun Fire midrange servers hardware documentation	http://docs.sun.com/app/docs/prod/servers.mid
Sun Fire high-end servers hardware documentation	http://docs.sun.com/app/docs/prod/servers.high

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Sun Fire USBRDT 5240 Uniboard Administration Guide, part number 820-2453-10.

Accessing the Service Processor and the System Console on the Sun Fire USBRDT 5240 Uniboard

Installation procedures are documented in the *Sun Fire USBRDT 5240 Uniboard Installation Guide* and the *Sun Fire USBRDT 5240 Uniboard Product Notes*.

This chapter contains the following sections:

- [“Accessing the Service Processor” on page 1](#)
- [“Accessing the System Console” on page 8](#)
- [“Switching Between the ILOM Prompt and the System Console” on page 12](#)
- [“Reaching the OpenBoot ok Prompt” on page 14](#)

Accessing the Service Processor

There are several ways to access the service processor:

- Log in to the ILOM shell through a connection to the serial management port.
Connection devices include a tip line, an alphanumeric terminal, a terminal server, or graphics monitor.
- Log in to the ILOM shell through a connection to the network management port, after that port has been activated.
- Access the ILOM shell by switching to it from the system console, when the system console is directed to the serial or network management port (the default configuration).

You can log in to the service processor at any time, regardless of system power state, as long as AC power is connected to the system and you have a way of interacting with the system. You can also access the ILOM service processor prompt (->) from the OpenBoot ok prompt, or from the Solaris # or % prompt, provided the system console is configured to be accessible through the serial management and network management ports.

The -> prompt indicates that you are interacting with the ILOM service processor directly. This prompt is the first prompt you see when you log in to the system through the serial management port or network management port, regardless of the host's power state.

Up to ten ILOM sessions can be active concurrently, one session through the serial management port and up to nine SSH® sessions through the network management port. Users of each of these sessions can issue commands at the ILOM service processor prompt (->) prompt. However, only one user at a time can access the system console with read and write permissions. The other users can only be granted read permission.

Connections With the Dongle Cable

The dongle cable provides serial, USB, and VGA connections. The dongle cable connects to the Universal Connector Port (UCP) port on the Sun Fire USBRDT 5240 Uniboard.

A serial connection is necessary in these circumstances:

- If the network has not been enabled and you are unable to use DHCP to activate the network.
- If you are changing network settings (for example, from DHCP to static) and you do not want to lose the connection to the service processor.

The current session will be disconnected if you are not on a serial connection to the service processor. You can log back in after the network is reestablished.

- If you reset (reboot) or power cycle the service processor and you do not want to lose the connection to the service processor.

The current session will be disconnected if you are not on a serial connection to the service processor, and you will not be able to see the ILOM service processor boot messages.

▼ To Log In To the Service Processor Using the Serial Port

1. Connect the serial cable from the serial management device to the dongle cable, and connect the dongle cable to the UCP port on the Sun Fire USBRDT 5240 Uniboard.
2. Ensure that the serial port on your connecting device is set to the following parameters:
 - 9600 baud
 - 8 bits
 - No parity
 - 1 stop bit
 - No handshaking
3. From the serial device, press the Return or Enter key several times to synchronize with the service processor.

If the service processor responds to the key press, the two are synchronized. For example:

```
.  
.   
.   
Starting OpenBSD Secure Shell server: sshd.  
Starting Servicetags discoverer: stdiscoverer.  
...  
SUNSP00144FB20F7D login:
```

4. Log in as `root`, with the appropriate password:

```
SUNSP00144F96D411 login: root
Password: password

Waiting for daemons to initialize...
.
Daemons ready

Sun(TM) Integrated Lights Out Manager

Version 2.0.4.0
...
->
```

The ILOM prompt is displayed.

The default user is `root` and the password is `changeme`. You should change the ILOM default system root password if you have not already done so during installation.

For detailed information about communicating with ILOM, see the *Sun Integrated Lights Out Manager 2.0 User's Guide*.

Activating the Network Management Port

The network management port is configured by default to retrieve network settings using Dynamic Host Configuration Protocol (DHCP) and allow connections using SSH. You might need to modify these settings for your network. If you are unable to use DHCP and SSH on your network, you must connect to the service processor using the serial management port to reconfigure the network management port.

You can assign the network management port a static IP address or you can configure the port to obtain an IP address using DHCP from another server. The network management port can be configured to accept connections from SSH clients.

Data centers frequently devote a separate subnet to system management. If your data center has such a configuration, connect the network management port to this subnet.

Note – The network management port is a 10/100BASE-T port. The IP address assigned to the network management port is a unique IP address, separate from the main server IP address, and is dedicated for use only with the ILOM service processor.

If you have not already done so during installation, activate the network management port now.

▼ To Activate the Network Management Port

1. Connect an Ethernet cable to the network management port on the Sun Fire USBRDT 5240 Uniboard.

2. Log in to the ILOM service processor through the serial management port.

See [“To Log In To the Service Processor Using the Serial Port”](#) on page 3.

3. At the ILOM prompt, enable network management:

```
-> set /SP/network state=enable
```

4. If you are configuring network management through DHCP, go to [Step 5](#). Otherwise:

a. Set the service processor to use a static IP address:

```
-> set /SP/network pendingipdiscovery=static
Set 'pendingipdiscovery' to 'static'
```

b. Set the IP address for the service processor:

```
-> set /SP/network pendingipaddress=IPaddr
Set 'pendingipaddress' to 'IPaddr'
```

c. Set the IP address for the subnet gateway:

```
-> set /SP/network pendingipgateway=gateway-IPaddr
Set 'pendingipgateway' to 'gateway-IPaddr'
```

d. Set the netmask for the subnet:

```
-> set /SP/network pendingipnetmask=netmask
Set 'pendingipnetmask' to 'netmask'
```

e. Go to [Step 6](#).

5. If you are configuring network management through DHCP, set the service processor to use DHCP:

```
-> set /SP/network pendingipdiscovery=dhcp
Set 'pendingipdiscovery' to 'dhcp'
```

6. Verify that the pending network parameters were set properly:

```
-> show /SP/network
/SP/network
Targets:
Properties:
    commitpending = (Cannot show property)
    dhcp_server_ip = current-address
    ipaddress = current-address
    ipdiscovery = dhcp
    ipgateway = current-address
    ipnetmask = current-netmask
    macaddress = 00:14:4F:3F:8C:AF
    pendingipaddress = new-address-you-just-typed
    pendingipdiscovery = static
    pendingipgateway = new-address-you-just-typed
    pendingipnetmask = new-netmask-you-just-typed
    state = enabled
Commands:
    cd
    set
    show
->
```

Note – The output provided here is an example. Your output will be different.

7. Save and commit the network parameters:

```
-> set /SP/network commitpending=true
Set 'commitpending' to 'true'
->
```

8. Verify the new network parameters:

```
-> show /SP/network
/SP/network
Targets:
Properties:
  commitpending = (Cannot show property)
  dhcp_server_ip = none
  ipaddress = new-address-you-just-typed
  ipdiscovery = static
  ipgateway = new-address-you-just-typed
  ipnetmask = new-netmask-you-just-typed
  macaddress = 00:14:4F:3F:8C:AF
  pendingipaddress = new-address-you-just-typed
  pendingipdiscovery = static
  pendingipgateway = new-address-you-just-typed
  pendingipnetmask = new-netmask-you-just-typed
  state = enabled
Commands:
  cd
  set
  show
->
```

▼ To Log In To the Service Processor Using the Network Management Port

To connect through the network management port, use `ssh` to connect to the IP address you specified in [“To Activate the Network Management Port”](#) on page 5.

For example:

```
ssh -l root 10.8.31.163
Password:
...
->
```

After you have verified that you can log in to the service processor through the network management port, you can disconnect the dongle.

Accessing the System Console

The system console is the facility for interacting at a low level with the board. The console displays status and error messages generated by firmware-based tests during system startup.

After those tests run and the operating system is booted, the system console displays UNIX system messages and accepts UNIX commands. If the system console is configured to be accessible from the serial management and network management ports, when you connect through one of these ports you can access either the ILOM command-line interface or the system console. There can be only one system console with read and write permissions per board.

To use the system console, you need to attach an input/output device to the system, and ensure that the system console is directed to the appropriate port on the Sun Fire USBRDT 5240 Uniboard. You do this by setting the `input-device` and `output-device` OpenBoot™ PROM configuration variables.

The system console can be redirected to the graphics frame buffer. After initial installation, you can use a local graphics monitor to access the system console using the dongle cable. You cannot use a local graphics monitor to perform initial installation, nor can you use a local graphics monitor to view power-on self-test (POST) messages.

TABLE 1-1 shows the relationship between console devices, ports, and OpenBoot PROM configuration variable settings.

TABLE 1-1 Directing the System Console Input and Output

OpenBoot PROM Variable	Sun Fire USBRDT 5240 Uniboard Port	Console Device
<code>input-device=virtual-console</code> <code>output-device=virtual-console</code>	UCP: dongle with serial	Terminal server, Tip connection, alphanumeric terminal
<code>input-device=keyboard</code> <code>output-device=screen</code>	UCP: dongle with USB keyboard/mouse and HD15/VGA connector	Graphics monitor and local keyboard
<code>input-device=virtual-console</code> <code>output-device=virtual-console</code>	Network management	Network device

▼ To Access the System Console Through a Terminal Server

You can use either `telnet` or `ssh` to connect.

1. Connect the serial cable from the serial management device to the dongle cable, and connect the dongle cable to the UCP port on the Sun Fire USBRDT 5240 Uniboard.
2. Open a terminal session on the connecting device, and type:

```
% ssh IP-address-of-terminal-server port-number
```

For example, for a Sun Fire USBRDT 5240 Uniboard connected to port 10000 on a terminal server whose IP address is 192.20.30.10, you would type:

```
% ssh 192.20.30.10 10000
```

▼ To Access the System Console Through a Tip Connection

1. Connect the serial cable from the serial management device to the dongle cable, and connect the dongle cable to the UCP port on the Sun Fire USBRDT 5240 Uniboard.
2. Ensure that the `/etc/remote` file on the other system contains an entry for `hardwire`.

Most releases of Solaris OS software shipped since 1992 contain an `/etc/remote` file with the appropriate `hardwire` entry. However, if the system is running an older version of Solaris OS software, or if the `/etc/remote` file has been modified, you might need to edit the file. See [“To Modify the `/etc/remote` File” on page 10](#) for details.

3. In a shell tool window on the other system, type:

```
% tip hardwire
```

The system responds by displaying:

```
connected
```

The shell tool is now a Tip window directed to the Sun Fire USBRDT 5240 Uniboard through the system’s serial port. This connection is established and maintained even when the board is completely powered off or just starting up.

Use a shell tool or a terminal (such as `dtterm`), rather than a command tool. Some Tip commands might not work properly in a command tool window.

▼ To Modify the /etc/remote File

Use this procedure in the following circumstances:

- If you want to connect to the system console through a Tip connection, and you are running an older version of the Solaris OS software on the other system
 - If the /etc/remote file on the other system does not contain an appropriate entry for `hardwire`
1. Log in as superuser to the system console of a system that you intend to use to establish a Tip connection to your server.
 2. Determine the release level of Solaris OS software installed on the system.
Type:

```
# uname -r
```

The system responds with a release number.

3. Take one of the following actions, depending on the number displayed.

- **If the number displayed by the `uname -r` command is 5.0 or higher:**

The Solaris OS software shipped with an appropriate entry for `hardwire` in the /etc/remote file. If you have reason to suspect that this file was altered and the `hardwire` entry modified or deleted, check the entry against the following example, and edit it as needed.

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

If you intend to use the system's serial port A rather than serial port B, edit this entry by replacing `/dev/term/b` with `/dev/term/a`.

- **If the number displayed by the `uname -r` command is less than 5.0:**

Check the /etc/remote file and add the following entry, if it does not already exist.

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

If you intend to use the system's serial port A rather than serial port B, edit this entry by replacing `/dev/ttyb` with `/dev/ttya`.

▼ To Access the System Console Through an Alphanumeric Terminal

1. Connect the serial cable from the serial management device to the dongle cable, and connect the dongle cable to the UCP port on the Sun Fire USBRDT 5240 Uniboard.
2. Connect the alphanumeric terminal's power cord to an AC outlet.
3. Set the alphanumeric terminal to receive:
 - 9600 baud
 - 8 bits
 - No parity
 - 1 stop bit
 - No handshake protocol

Refer to the documentation accompanying your terminal for information about how to configure the terminal.

You can now issue system commands and view system messages using the alphanumeric terminal. Continue with your installation or diagnostic procedure, as needed. When you are finished, type the alphanumeric terminal's escape sequence.

▼ To Access the System Console Through a Local Graphics Monitor

1. Connect the local graphics monitor video cable to the dongle cable HD15 connector, and connect the dongle cable to the UCP port on the Sun Fire USBRDT 5240 Uniboard.
2. Get to the `ok` prompt.
3. Set the OpenBoot configuration variables using your current console by typing:

```
ok setenv input-device keyboard  
ok setenv output-device screen
```

4. Make the changes effective by typing the command:

```
ok reset-all
```

The board stores the parameter changes, and boots automatically when the OpenBoot configuration variable `auto-boot?` is set to `true`.

5. At the OpenBoot prompt, type `boot -r` or at the Solaris prompt, type `reboot -- -r`.

This reboot creates the symbolic link `/dev/fb -> fbs/pfb0/`. After the boot, the window system login appears on the monitor connected to the dongle.

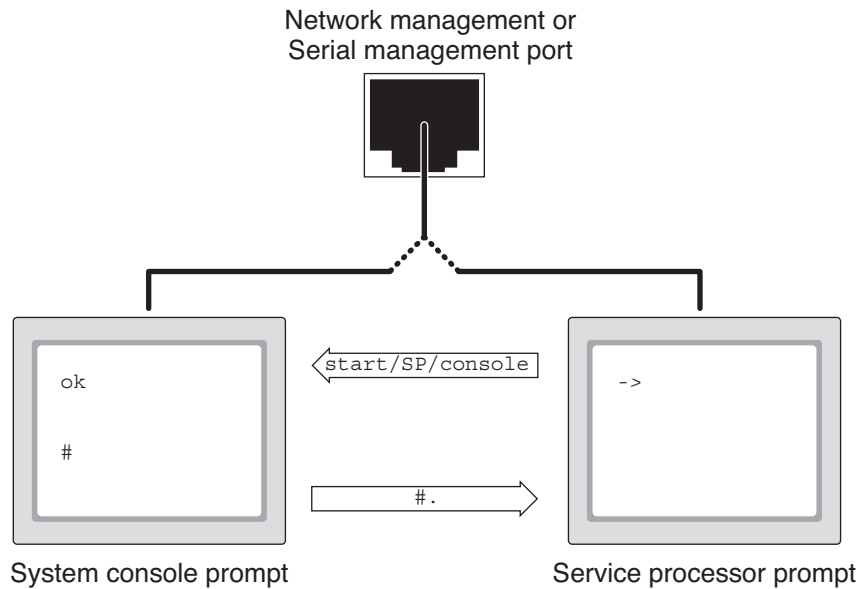
If you did not set the OpenBoot configuration variables as described in [“To Access the System Console Through a Local Graphics Monitor” on page 11](#), the symbolic link is not created and the window system will not start. You can resolve this by manually creating the link `/bin/ln -s fbs/pfb0 /dev/fb` as root and rebooting the Solaris OS.

For additional information on graphics configuration, refer to the *Sun Fire USBRDT 5240 Uniboard Service Manual*, “XVR-50 Graphics Accelerator” appendix.

Switching Between the ILOM Prompt and the System Console

The service processor has two management ports, serial and network. If the system console is directed to use the serial management and network management ports (the default configuration), these ports provide access to both the system console and the ILOM command-line interface (the ILOM service processor prompt), each on a separate channel. See [FIGURE 1-1](#).

FIGURE 1-1 Separate System Console and Service Processor Channels



You can switch between the ILOM service processor prompt and the system console at any time. However, you cannot access both at the same time from a single terminal window or shell tool.

The prompt displayed on the terminal or shell tool tells you which channel you are accessing:

- The # or % prompt indicates that you are at the system console and that the Solaris OS is running.
- The ok prompt indicates that you are at the system console and that the server is running under OpenBoot firmware control.
- The -> prompt indicates that you are at the service processor.

Note – If no text or prompt appears, it might be because no console messages were recently generated by the system. Pressing the terminal's Enter or Return key should produce a prompt.

▼ To Switch Between the ILOM Prompt and the System Console

- 1. Establish an ILOM service processor session.
- 2. To connect to the system console, at the ILOM command prompt, type:

```
-> start /SP/console
```

The `start /SP/console` command switches you to the system console.

- 3. To switch back to the `->` prompt, type the `#.` (Hash-Period) escape sequence.

```
ok #.
```

Reaching the OpenBoot ok Prompt

There are several ways to reach the `ok` prompt when the Solaris OS is running, as described in [TABLE 1-2](#).

TABLE 1-2 Ways of Accessing the `ok` Prompt

Access Method	What to Do
Graceful shutdown of the Solaris OS	From a shell or command tool window, issue an appropriate command (for example, the <code>shutdown</code> or <code>init 0</code> command) as described in Solaris system administration documentation.
ILOM commands	From the <code>-></code> prompt, type the <code>set /HOST send_break_action=break</code> command. Then issue the <code>start /SP/console</code> command.
Manual system reset	Caution: Forcing a manual system reset can result in data loss. From the <code>-></code> prompt, type: <code>-> set /HOST/bootmode script="setenv auto-boot? false"</code> Press Enter. Then type: <code>-> reset /SYS</code> <code>-> start /SP/console</code>

For more information about the OpenBoot firmware, refer to the *OpenBoot 4.x Command Reference Manual*, at:

<http://www.sun.com/documentation>

Managing the Sun Fire USBRDT 5240 Uniboard

This chapter describes managing the Sun Fire USBRDT 5240 Uniboard, and contains the following sections:

- [“Using the Sun Fire USBRDT 5240 Uniboard in a Sun Fire System” on page 15](#)
- [“Enabling Power On and Power Off” on page 18](#)
- [“Temperature Monitoring” on page 19](#)
- [“Displaying Board Information on the Sun Fire System” on page 19](#)
- [“Using a Remote Storage Device” on page 20](#)
- [“RAS and Troubleshooting” on page 20](#)

Additional information for using ILOM to manage the Sun Fire USBRDT 5240 Uniboard is in the *Sun Integrated Lights Out Manager 2.0 Supplement for Sun Fire USBRDT 5240 Uniboard* and the *Sun Integrated Lights Out Manager 2.0 User’s Guide*.

Using the Sun Fire USBRDT 5240 Uniboard in a Sun Fire System

The Sun Fire USBRDT 5240 Uniboard can be used in Sun Fire 4800 upgraded, E4900, 6800, and E6900 systems (midrange servers), and in Sun Fire 12K, 15K, E20K, and E25K systems (high-end servers).

The Sun Fire USBRDT 5240 Uniboard relies on the Sun Fire chassis for power and cooling. Otherwise, the board is independent of the chassis and the other system boards in the chassis.

The Sun Fire USBRDT 5240 Uniboard is isolated in its own domain, and cannot be assigned to another domain on a Sun Fire system. The board runs the Solaris Operating System (Solaris OS) and the Sun Integrated Lights Out Manager firmware.

Interaction With the System Controller on a Sun Fire System

Unlike the other UltraSPARC® CPU/Memory boards in a Sun Fire system, the Sun Fire USBRDT 5240 Uniboard has limited interaction with the System Controller Application (ScApp) firmware and the System Management Services (SMS) software. You cannot access the chassis system controller board through the ILOM shell on the Sun Fire USBRDT 5240 Uniboard. If you want to obtain information about the chassis, you have to log in to the Sun Fire system controller directly.

The Sun Fire system controller interacts with the Sun Fire USBRDT 5240 Uniboard in these ways:

- Calculates the available chassis power to determine whether a Sun Fire USBRDT 5240 Uniboard can be powered on. See [“Enabling Power On and Power Off” on page 18](#) for more information.
- Monitors the board’s temperature and adjusts the chassis fan speed if necessary. See [“Temperature Monitoring” on page 19](#) for more information.
- Displays board information through commands such as `showboards`. See [“Displaying Board Information on the Sun Fire System” on page 19](#) for more information.
- Allows resetting and power cycling the board from the Sun Fire system controller with a CLI command. See [“Resetting or Power Cycling the Board From a Sun Fire System” on page 27](#) for more information.

Refer to the *Sun Fire USBRDT 5240 Uniboard Product Notes* for the supported versions of SMS software and ScApp firmware.

Supported Configurations in Sun Fire Systems

The number of Sun Fire USBRDT 5240 Uniboards that can be supported in a Sun Fire system chassis depends on:

- The type of power supply in the chassis
- The number and type of other UltraSPARC III, IV, and IV+ CPU/Memory boards in the chassis

[TABLE 2-1](#) shows the maximum number of Sun Fire USBRDT 5240 Uniboards allowed in each Sun Fire system, by power supply.

TABLE 2-1 Sun Fire System Configurations With the Sun Fire USBRDT 5240 Uniboard

System	Power Supply	Maximum Number of Sun Fire USBRDT 5240 Uniboards
Sun Fire 4800 upgraded/E4900	A213	No limitation
Sun Fire 4800 upgraded/E4900	A185	No limitation
Sun Fire 6800 upgraded/E6900	A212	No limitation
Sun Fire 6800 upgraded/E6900	A184	No limitation
Sun Fire 6800	A152	4 (see TABLE 2-2)
Sun Fire 12K/E20K	A211	No limitation
Sun Fire 12K/E20K	A196	No limitation
Sun Fire 12K	A141	No limitation
Sun Fire 15K/E25K	A211	No limitation
Sun Fire 15K/E25K	A196	No limitation
Sun Fire 15K	A141	13 (see TABLE 2-3)

[TABLE 2-2](#) and [TABLE 2-3](#) show the maximum number of Sun Fire USBRDT 5240 Uniboards supported given the system power supply and number of CPU/Memory boards present. System configurations not shown in [TABLE 2-2](#) and [TABLE 2-3](#) do not have any limitations and are covered in [TABLE 2-1](#).

The Sun Fire System Controller Application (ScApp) firmware and the System Management Services (SMS) software will not allow boards to be added beyond what the power of the system will support. Further, they will protect against accidental violation of $N+1$ (enough power to withstand one power supply failure) by warning you of the violation and requiring a confirming response to continue.

TABLE 2-2 Sun Fire 6800, A152 Power Supply Example Configuration

Board Type	Number of Boards						
Current number of UltraSPARC III boards in chassis	6	5	4	3	2	1	0
Number of Sun Fire USBRDT 5240 Uniboards allowed in chassis	0	0	1	2	3	3	4

TABLE 2-3 Sun Fire 15K, A141 Power Supply Example Configuration

Board Type	Number of Boards																		
Current number of UltraSPARC III boards in chassis	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Number of Sun Fire USBRDT 5240 Uniboards allowed in chassis	0	0	1	1	2	3	4	5	5	6	7	8	8	9	10	11	12	12	13



Enabling Power On and Power Off

When a Sun Fire USBRDT 5240 Uniboard is first installed in a Sun Fire system, the board is on standby power. The board cannot be fully powered on until the Sun Fire system controller determines there is sufficient chassis power available.

When you issue the `poweron` command on a Sun Fire system for the Sun Fire USBRDT 5240 Uniboard, the main system controller performs the same system power checks as it does for the CPU/Memory boards. If powering on the Sun Fire USBRDT 5240 Uniboard would exceed the power limit of the system, a warning is issued.

If the `poweron` command is successful, the `showboards` command shows the slot's power status as `On`, and the total power available to the chassis will be reduced by the amount allocated to the Sun Fire USBRDT 5240 Uniboard. The `On` or `Off` power status for a Sun Fire USBRDT 5240 Uniboard indicates whether chassis power has been allocated, not whether the board is actually powered on or off.

Once power is allocated, you can power on and off the host on the Sun Fire USBRDT 5240 Uniboard using ILOM on the board service processor.

To power off the host on the Sun Fire USBRDT 5240 Uniboard, the board must first be powered off in ILOM. You can then issue the `poweroff` command on the Sun Fire main system controller to remove the power allocation to the board. The `showboards` command will show the slot's power status as `Off`, and the total power available to the chassis will be increased by the amount used by the Sun Fire USBRDT 5240 Uniboard. The Sun Fire USBRDT 5240 Uniboard is completely powered off. If you want to power on the board again, you have to run the `poweron` command again on the Sun Fire system.

For more information on the `poweron` and `poweroff` commands, see the `ScApp help` command and the SMS man pages.

Temperature Monitoring

Temperature threshold levels are monitored and managed on the Sun Fire USBRDT 5240 Uniboard by ILOM. Thresholds determine under what conditions ILOM will take certain actions, such as issue a warning message or power down the board if it overheats. Complete information on the Sun Fire USBRDT 5240 Uniboard sensors and thresholds is contained in the *Sun Integrated Lights Out Manager 2.0 Supplement for Sun Fire USBRDT 5240 Uniboard*.

ILOM also sets a binary normal or high temperature bit that is monitored by SMS software or ScApp firmware. The Sun Fire system controller sets the fan speeds in the chassis to normal or high based on what ILOM reports. For example, if the board temperature reaches a high warning level, ILOM communicates this condition and requests the chassis fan speed be set to high. When the board temperature drops below the high warning level, ILOM reports that the board no longer requires extra cooling.

Displaying Board Information on the Sun Fire System

For SMS and ScApp commands that show board information, such as `showboards`, the Sun Fire USBRDT 5240 Uniboard is identified as “USBRDT-5240”. This ID differentiates the board from other CPU/Memory boards in the Sun Fire system.

Certain SMS and ScApp commands are not valid with the Sun Fire USBRDT 5240 Uniboard. If you try to use these commands with the Sun Fire USBRDT 5240 Uniboard, you will receive an error message. For example, the `addboard` command is not valid with the Sun Fire USBRDT 5240 Uniboard because the board cannot be dynamically reconfigured.

Using a Remote Storage Device

The Sun Fire USBRDT 5240 Uniboard does not have an internal DVD/CD-ROM drive. However, you can set up a remote storage device to store data. Examples of remote storage devices include USB devices, such as DVD drives. Requirements to use remote storage are:

- Remote system connected to the network
- DVD/CD-ROM drive connected to the remote system
- Web browser: Internet Explorer, Mozilla, or Mozilla Fire Fox

The Sun ILOM Remote Console is a Java™ application that you launch from the ILOM web interface. When you use the Sun ILOM Remote Console, you can remotely redirect and control storage devices over the IP network. ILOM passes the storage device target information to the Solaris OS, and manages the network connection.

Refer to the *Sun Integrated Lights Out Manager 2.0 Supplement for Sun Fire USBRDT 5240 Uniboard* for instructions on configuring ILOM and the ILOM Remote Console for remote management and remote storage devices.

RAS and Troubleshooting

This section describes reliability, availability, and serviceability (RAS) features and provides troubleshooting information.

There are a variety of diagnostic tools, commands, and indicators you can use to monitor and troubleshoot a Sun Fire USBRDT 5240 Uniboard.

- **LEDs** – LEDs provide a quick visual notification of the status of the board and some of the components.
- **ILOM firmware** – In addition to providing the interface between the hardware and the Solaris OS, ILOM tracks and reports the health of key components. ILOM works with POST and Solaris Predictive Self-Healing technology to keep the system up and running even when there is a faulty component.

- **Power-on self-test (POST)** – POST performs diagnostics on system components upon system reset to ensure the integrity of those components. POST is configurable and works with ILOM to take faulty components offline if needed.
- **Solaris OS Predictive Self-Healing (PSH)** – This technology continuously monitors the health of the CPU, memory, and other components. PSH works with ILOM to take a faulty component offline if needed. Refer to the Solaris OS documentation for fault management configuration tools and `fmadm` utilities.
- **SunVTS™** – This application exercises the system, provides hardware validation, identifies possible faulty components, and provides recommendations for repair.
- **Explorer utility** – Part of the Services Tools Bundle 2.0, available on www.sun.com/download. This utility collects comprehensive data for troubleshooting.

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, the software displays the fault, logs it, passes information to ILOM where the fault is logged, and depending on the fault, one or more LEDs may be illuminated.

Interpreting LEDs on the Sun Fire USBRDT 5240 Uniboard

The behavior of LEDs on the Sun Fire USBRDT 5240 Uniboard conforms to the American National Standards Institute (ANSI) Status Indicator Standard (SIS). These standard LED behaviors are described in [TABLE 2-4](#).

TABLE 2-4 Standard LED Behaviors 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 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 2-5](#).

TABLE 2-5 System LED Behaviors and Assigned Meanings

Color	Behavior	Definition	Description
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. Example: the Locator LED.
Blue	Off	Steady state	
	Steady On	Steady state	If blue is on, a removal action can be performed on the applicable component with no adverse consequences. Example: the OK to Remove LED.
Amber	Off	Steady state	
	Slow Blink	1-Hz repeating sequence, equal intervals on and off	This indicator signals new fault conditions. Service is required. Example: the Service Required LED.
	Steady On	Steady state	The amber indicator stays on until the service action is completed and the system returns to normal function.
Green	Off	Steady state	
	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. Example: the Power/Activated 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.

Front Panel LEDs

The four system status indicator LEDs on the Sun Fire USBRDT 5240 Uniboard front panel are Power, Service Required, OK to Remove, and Locator. Each hard drive has three LEDs. Each Ethernet port has two LEDs. [FIGURE 2-1](#) shows the front panel components and the LEDs.

FIGURE 2-1 Front Panel Components and LEDs

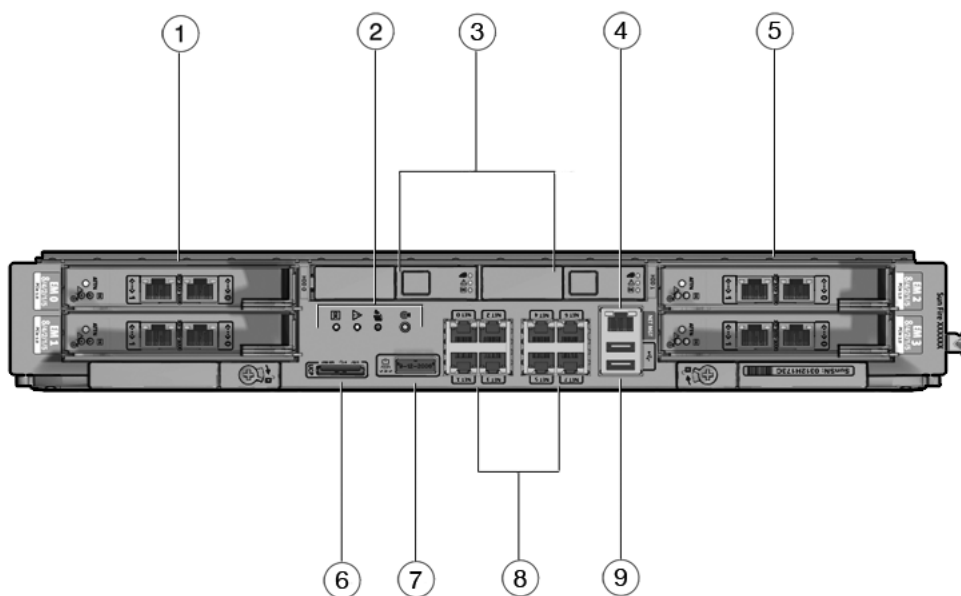


Figure Legend

Callout	Description
1	PCI Express (PCIe) hot-pluggable devices
2	System status LEDs: Power, Service Required, OK to Remove, Locator
3	Hot-pluggable hard disk drives (HDD)
4	RJ-45 (MGMT) port
5	PCI Express (PCIe) hot-pluggable devices
6	Dongle (2 USB, HD-15, RJ-45) UCP port
7	SAS port
8	8 Gbit Ethernet ports
9	2 USB ports

Front Panel LED Behavior

You can control the Locator LED from the ILOM prompt or with the Locator button on the front of the board. [TABLE 2-6](#) shows the various ways to control the LED.

TABLE 2-6 Locator LED Control

Action	LED Behavior
Turn on the Locator LED with ILOM command <code>set /SYS/LOCATE value=Fast_Blink</code>	White LED fast blink at 4 hz begins within 1 second of invoking command
Turn on the Locator LED by pressing the Locator button	White LED fast blink at 4 hz begins within 0.1 second of pressing button
Turn off the Locator LED with ILOM command <code>set /SYS/LOCATE value=off</code>	White LED fast blink at 4 hz turns off within 1 second of invoking command
Turn off the Locator LED by pressing the Locator button	White LED fast blink at 4 hz turns off within 0.1 second of pressing button
Test all front panel LEDs by pressing the Locator button for 5 seconds	All LEDs on the front of the board turn on continuously for 15 seconds

[TABLE 2-7](#) shows the Sun Fire USBRDT 5240 Uniboard front panel LED behaviors in response to certain actions.

TABLE 2-7 Front Panel LED Behavior

Action	LED Behavior
Insert board into a powered-on chassis	Green LED fast blink
Power on board with ILOM command <code>start /SYS</code>	Green LED steady on, after the Solaris OS boots
Power off board with ILOM command <code>stop /SYS</code>	Green LED slow blink during shutdown, then goes off
Put board into diagnostic mode with ILOM command <code>set /SYS keyswitch_state=diag</code>	Green, amber, and blue LEDs on for 1.5 seconds respectively, each in a repeating sequence in order. When any one of the three LEDs is on, the other two are off.
No board fault detected	Amber LED off
Board fault detected	Amber LED steady on
Prepare board to be taken out of service with ILOM command <code>set /SYS prepare_to_remove_action=true*</code>	Green LED slow blink while board is taken out of service. Once the board is safe to remove, blue LED is steady on.
Test all front panel LEDs by pressing the Locator button for 5 seconds	All LEDs on the front of the board turn on continuously for 15 seconds

* If the board can be safely removed, the blue LED will come on. If the board cannot be safely removed, for example, if the host is still powered on, ILOM will issue a message.

DIMM Fault LEDs

The dual inline memory module (DIMM) fault LEDs are located inside the top cover of the board. There are DIMM fault pushbuttons that can be pressed to illuminate a faulted DIMM LED. If a DIMM has failed, error messages are written to the ILOM console, and can be seen with the `prtdiag` command.

ILOM and Board Diagnostics

ILOM on the service processor provides the interfaces and CLI commands to control when and what diagnostics are executed, as follows:

- The enablement and mode of diagnostics (`set /HOST/diag mode`)
- The level of diagnostics (`set /HOST/diag level`) to be executed
- The verbosity (`set /HOST/diag verbosity`) of the output from the diagnostics
- When diagnostics should be executed (`set /HOST/diag trigger`)

As the Sun Fire USBRDT 5240 Uniboard does not have a physical system keyswitch, there is no front-panel mechanical override capability of the diagnostic mode as there is in some other platforms. Instead, this functionality is provided by a virtual keyswitch controlled from the service processor. Diagnostics mode, settings, and the virtual keyswitch may be set using the ILOM CLI.

▼ To Display System Fault Information

1. **Log in to the ILOM service processor.**

2. Type the following command to display a list of the faults currently on the system.

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

For example:

```
-> show /SP/faultmgmt
/SP/faultmgmt
  Targets:
    0 (/SYS/MB/CMP1/BR0/CH0/D0)

  Properties:

  Commands:
    cd
    show

->
```

You do not need ILOM Administrator permissions to use this command.

If you replace a faulty component, you must manually clear the fault status.

▼ To Clear a Fault

1. Log in to the ILOM service processor.
2. Type the following command:

```
-> set /SYS/component clear_fault_action=true
```

Setting `clear_fault_action` to `true` clears the fault at the component and all levels below it in the `/SYS` tree.

For more information, see the *Sun Integrated Lights Out Manager 2.0 Supplement for Sun Fire USBRDT 5240 Uniboard* and the *Sun Integrated Lights Out Manager 2.0 User's Guide*.

Resetting or Power Cycling the Board From a Sun Fire System

If ILOM on the Sun Fire USBRDT 5240 Uniboard service processor is in a nonresponsive state, and you are unable to recover the board through normal procedures, you can reset the service processor from the Sun Fire main system controller.

The SMS and ScApp command `resetboardsc` resets ILOM on the board service processor, but does not boot the Solaris OS.

▼ To Reset the Sun Fire USBRDT 5240 Uniboard From a Sun Fire System

1. Log into the Sun Fire main system controller as platform administrator.
2. Type the `resetboardsc` command:

```
# resetboardsc location
```

where *location* is the slot number of the board to reset.

3. To verify that the Sun Fire USBRDT 5240 Uniboard has reset, log in to the ILOM console on the board.

If the Sun Fire USBRDT 5240 Uniboard service processor is hung, and the `resetboardsc` command has not remedied the situation, the board can be power cycled from the host Sun Fire main system controller.

▼ To Power Cycle the Sun Fire USBRDT 5240 Uniboard from a Sun Fire System



Caution – Be sure to shut down the Solaris OS on the Sun Fire USBRDT 5240 Uniboard before running the `powercycle` command on the Sun Fire system. If you do not, data loss could occur.

1. Log into the Sun Fire main system controller as platform administrator.

2. Type the `powercycle` command:

```
# powercycle location
```

where *location* is the slot number of the board to power cycle.

3. To verify that the Sun Fire USBRDT 5240 Uniboard has power cycled, log in to the ILOM console on the board.

For more information on the `resetboardsc` and `powercycle` commands, see the `ScApp help` command and the SMS man pages.

Automatic System Recovery

The system provides for automatic system recovery (ASR) from failures in memory modules or PCI cards.

Automatic system recovery functionality enables the system to resume operation after experiencing certain nonfatal hardware faults or failures. When ASR is enabled, the system's firmware diagnostics automatically detect failed hardware components. An autoconfiguring capability designed into the system firmware enables the system to unconfigure failed components and to restore system operation. As long as the system is capable of operating without the failed component, the ASR features enable the system to reboot automatically, without operator intervention.

ASR is not activated until you enable it. See [“Enabling and Disabling Automatic System Recovery” on page 31](#).

Auto-Boot Options

The system firmware stores a configuration variable called `auto-boot?`, which controls whether the firmware will automatically boot the operating system after each reset. The default setting is `true`.

Normally, if a system fails power-on diagnostics, `auto-boot?` is ignored and the system does not boot unless an operator boots the system manually. An automatic boot is generally not acceptable for booting a system in a degraded state. Therefore, the server OpenBoot firmware provides a second setting, `auto-boot-on-error?`. This setting controls whether the system will attempt a degraded boot when a subsystem failure is detected. Both the `auto-boot?` and `auto-boot-on-error?` switches must be set to `true` to enable an automatic degraded boot. To set the switches, type:

```
ok setenv auto-boot? true
ok setenv auto-boot-on-error? true
```

Note – The default setting for `auto-boot-on-error?` is `false`. The system will not attempt a degraded boot unless you change this setting to `true`. In addition, the system will not attempt a degraded boot in response to any fatal nonrecoverable error, even if degraded booting is enabled. For examples of fatal nonrecoverable errors, see [“Error Handling Summary” on page 29](#).

Error Handling Summary

Error handling during the power-on sequence falls into one of the following three cases:

- If no errors are detected by POST or OpenBoot firmware, the system attempts to boot if `auto-boot?` is `true`.
- If only nonfatal errors are detected by POST or OpenBoot firmware, the system attempts to boot if `auto-boot?` is `true` and `auto-boot-on-error?` is `true`. Nonfatal errors include the following:
 - SAS subsystem failure. In this case, a working alternate path to the boot disk is required.
 - Ethernet interface failure.
 - USB interface failure.
 - Serial interface failure.
 - PCI card failure.
 - Memory failure. Given a failed DIMM, the firmware will unconfigure the entire logical bank associated with the failed module. Another nonfailing logical bank must be present in the system for the system to attempt a degraded boot.

Note – If POST or OpenBoot firmware detects a nonfatal error associated with the normal boot device, the OpenBoot firmware automatically unconfigures the failed device and tries the next-in-line boot device, as specified by the `boot-device` configuration variable.

- If a fatal error is detected by POST or OpenBoot firmware, the system does not boot regardless of the settings of `auto-boot?` or `auto-boot-on-error?`. Fatal nonrecoverable errors include the following:
 - Any CPU failed.
 - All logical memory banks failed.
 - Flash RAM cyclical redundancy check (CRC) failure.
 - Critical field-replaceable unit (FRU) PROM configuration data failure.
 - Critical system configuration card (SCC) read failure.

- Critical application-specific integrated circuit (ASIC) failure.

Reset Scenarios

Three ILOM `/HOST/diag` configuration properties, `mode`, `level`, and `trigger`, control whether the system runs firmware diagnostics in response to system reset events.

TABLE 2-8 ILOM Property Settings for Reset Scenario

Property	Value
<code>mode</code>	<code>normal</code> or <code>service</code>
<code>level</code>	<code>min</code> or <code>max</code>
<code>trigger</code>	<code>power-on-reset</code> <code>error-reset</code>

The default settings for these properties are:

- `mode = normal`
- `level = max`
- `trigger = power-on-reset error-reset`

The virtual keyswitch can be used to run full POST diagnostics without having to modify the aforementioned properties. The standard system reset protocol bypasses POST completely unless the virtual keyswitch or ILOM properties are set as follows:

TABLE 2-9 Virtual Keyswitch Setting for Reset Scenario

Keyswitch	Value
<code>/SYS keyswitch_state</code>	<code>diag</code>

If `/SYS keyswitch_state` is set to `diag`, the system runs POST at the next reset using the following preset values of diagnostic properties to provide thorough fault coverage:

- `/HOST/diag level=max`
- `/HOST/diag mode=max`
- `/HOST/diag verbosity=max`

Setting `/SYS keyswitch_state=diag` overrides the values of diagnostic properties but does not change them. Setting the `keyswitch_state` back to `normal` allows the system to resume using the `/HOST/diag` property values.

Enabling and Disabling Automatic System Recovery

The automatic system recovery (ASR) feature is not activated until you enable it. Enabling ASR requires changing configuration variables in ILOM as well as in OpenBoot firmware.

▼ To Enable Automatic System Recovery

1. At the `->` prompt, type:

```
-> set /HOST/diag mode=normal
-> set /HOST/diag level=max
-> set /HOST/diag trigger=power-on-reset error-reset
```

2. At the `ok` prompt, type:

```
ok setenv auto-boot? true
ok setenv auto-boot-on-error? true
```

3. To cause the parameter changes to take effect, type:

```
ok reset-all
```

The system permanently stores the parameter changes and boots automatically when the OpenBoot configuration variable `auto-boot?` is set to `true` (its default value).

▼ To Disable Automatic System Recovery

1. At the `ok` prompt, type:

```
ok setenv auto-boot-on-error? false
```

2. To cause the parameter changes to take effect, type:

```
ok reset-all
```

The system permanently stores the parameter change.

After you disable the ASR feature, it is not activated again until you re-enable it.

Obtaining Automatic System Recovery Information

To retrieve information about the status of system components affected by ASR, at the ILOM prompt type the command:

```
-> show /SYS/component component_state
```

For example:

```
-> show /SYS/MB/CMP0/P60 component_state

/SYS/MB/CMP0/P60
  Properties:
    component_state = Enabled

  Commands:
    cd
    show

->
```

In the `show /SYS/component component_state` command output, any devices marked disabled have been manually unconfigured using the system firmware. The command output also shows devices that have failed firmware diagnostics and have been automatically unconfigured by the system firmware.

PCI Express (PCIe) Modules and Hot Plug

There are four PCIe expansion slots on the Sun Fire USBRDT 5240 Uniboard. PCIe modules can be inserted in or removed from the board while the Solaris OS is running.

To insert or remove a PCIe module, press and hold the hot plug button on the module for a few seconds after inserting the module or before removing the module.

The `cfgadm` command can be used instead of the hot plug button for configuring or unconfiguring a PCIe module. For example, to configure `pcie0`, type `cfgadm -c configure pcie0` and to disconnect `pcie0`, type `cfgadm -c disconnect pcie0`.

Use the `cfgadm` command to verify the state of the PCIe modules.

Hard Disk Drives and Hot Plug

Before removing a hard disk drive, make sure that the drive you want to remove is unmounted.

See the *Sun Fire USBRDT 5240 Uniboard Service Manual* for instructions on removing and inserting a hard disk drive.

Unconfiguring and Reconfiguring Devices

To support a degraded boot capability, the ILOM firmware provides the `set Device_Identifier component_state=disabled` command, which enables you to unconfigure system devices manually. This command marks the specified device as *disabled*. Any device marked *disabled*, whether manually or by the system's firmware diagnostics, is removed from the system's machine description prior to the transfer of control to other layers of system firmware, such as OpenBoot PROM.

▼ To Unconfigure a Device Manually

- At the `->` prompt, type:

```
-> set Device_Identifier component_state=disabled
```

where the *Device_Identifier* is one of the device identifiers from [TABLE 2-10](#). Note that device identifiers are case sensitive.

TABLE 2-10 Device Identifiers and Devices

Device Identifiers	Devices
/SYS/MB/CMPcpu_number/Pstrand_number	CMP (0-1) CPU strand (0-63)
/SYS/MB/PCIE-IO/USB	USB port
/SYS/MB/CMPn/L2_BANKnumber	CMP (0-1) Bank (0-7)
/SYS/MB/CMPn/BR/branch_number/CHchannel_number/Ddimn_number	CMP (0-1) Branch (0-1) Channel (0-1) DIMM (0-3)
/SYS/MB/CMPn/MCUn	CMP (0-1) MCU (0-1) memory controller

For example, to disable the USB port on PCIE, you would type:

```
-> set /SYS/MB/PCIE-IO/USB component_state=disabled
Set 'component_state' to 'disabled'
```

▼ To Reconfigure a Device Manually

- At the `->` prompt, type:

```
-> set Device_Identifier component_state=enabled
```

where the *Device_Identifier* is a device identifier from [TABLE 2-10](#).

You can use the ILOM `set Device_Identifier component_state=enabled` command to reconfigure any device that you previously unconfigured with the `set Device_Identifier component_state=disabled` command.

Managing Disk Volumes

This chapter describes redundant array of independent disks (RAID) concepts, and how to configure and manage RAID disk volumes using the Sun Fire USBRDT 5240 Uniboard on-board serial attached SCSI (SAS) disk controller.

This chapter contains the following sections:

- [“RAID Requirements” on page 35](#)
- [“Disk Volumes” on page 36](#)
- [“RAID Technology” on page 36](#)
- [“Hardware RAID Operations” on page 38](#)
- [“For More Information” on page 47](#)

Note – This chapter uses the output of the `raidctl` command from the Solaris 10 5/08 OS in examples. If you are using an earlier version of the operating system, the output you see may be slightly different in format.

RAID Requirements

To configure and use RAID disk volumes on the Sun Fire USBRDT 5240 Uniboard, you must install the appropriate patches. For the latest information on patches for the Sun Fire USBRDT 5240 Uniboard, see the latest product notes for your system.

Installation procedures for patches are included in text README files that accompany the patches.

Disk Volumes

From the perspective of the on-board disk controller on the Sun Fire USBRDT 5240 Uniboard, *disk volumes* are logical disk devices comprising one or more complete physical disks.

Once you create a volume, the operating system uses and maintains the volume as if it were a single disk. By providing this logical volume management layer, the software overcomes the restrictions imposed by physical disk devices.

Note – Due to the volume initialization that occurs on the disk controller when a new volume is created, properties of the volume such as geometry and size are unknown. RAID volumes created using the hardware controller must be configured and labeled using `format(1M)` prior to use with the Solaris Operating System. See [“To Configure and Label a Hardware RAID Volume for Use in the Solaris Operating System” on page 42](#), or the `format(1M)` man page for further details.

Volume migration (relocating all RAID volume disk members from one Sun Fire USBRDT 5240 Uniboard to another) is not supported. If you must perform this operation, contact your service provider.

RAID Technology

RAID technology enables the construction of a logical volume, made up of several physical disks, in order to provide data redundancy, increased performance, or both. The Sun Fire USBRDT 5240 Uniboard on-board disk controller supports both RAID 0 and RAID 1 volumes.

This section describes the RAID configurations supported by the on-board disk controller:

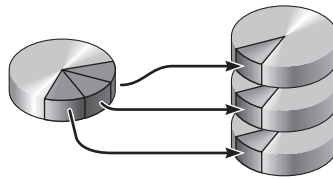
- Integrated stripe, or IS volumes (RAID 0)
- Integrated mirror, or IM volumes (RAID 1)

Integrated Stripe Volumes (RAID 0)

Integrated stripe volumes are configured by initializing the volume across two or more physical disks, and sharing the data written to the volume across each physical disk in turn, or *striping* the data across the disks.

Integrated stripe volumes provide for a logical unit (LUN) that is equal in capacity to the sum of all its member disks. For example, a three-disk IS volume configured on 72-gigabyte drives will have a capacity of 216 gigabytes.

FIGURE 3-1 Graphical Representation of Disk Striping



Caution – There is no data redundancy in an IS volume configuration. Thus, if a single disk fails, the entire volume fails, and all data is lost. If an IS volume is manually deleted, all data on the volume is lost.

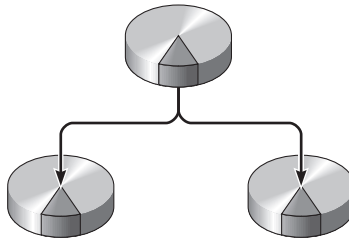
IS volumes are likely to provide better performance than IM volumes or single disks. Under certain workloads, particularly some write or mixed read-write workloads, I/O operations complete faster because the I/O operations are being handled in a round-robin fashion, with each sequential block being written to each member disk in turn.

Integrated Mirror Volumes (RAID 1)

Disk mirroring (RAID 1) is a technique that uses data redundancy (two complete copies of all data stored on two separate disks) to protect against loss of data due to disk failure. One logical volume is duplicated on two separate disks.

The Sun Fire USBRDT 5240 Uniboard has two on-board hard disk drives. The disks have the same disk capacities.

FIGURE 3-2 Graphical Representation of Disk Mirroring



Whenever the operating system needs to write to a mirrored volume, both disks are updated. The disks are maintained at all times with exactly the same information. When the operating system needs to read from the mirrored volume, the OS reads from whichever disk is more readily accessible at the moment, which can result in enhanced performance for read operations.



Caution – Creating RAID volumes using the on-board disk controller destroys all data on the member disks. The disk controller’s volume initialization procedure reserves a portion of each physical disk for metadata and other internal information used by the controller. Once the volume initialization is complete, you can configure the volume and label it using the `format(1M)` utility. You can then use the volume in the Solaris OS.

Hardware RAID Operations

On the Sun Fire USBRDT 5240 Uniboard, the SAS controller supports mirroring and striping using the Solaris OS `raidctl` utility.

A hardware RAID volume created under the `raidctl` utility behaves slightly differently than one created using volume management software. Under a software volume, each device has its own entry in the virtual device tree, and read-write operations are performed to both virtual devices. Under hardware RAID volumes, only one device appears in the device tree. Member disk devices are invisible to the operating system, and are accessed only by the SAS controller.

Physical Disk Slot Numbers, Physical Device Names, and Logical Device Names for Non-RAID Disks

To perform a disk hot-plug procedure, you must know the physical or logical device name for the drive that you want to install or remove. If your system encounters a disk error, often you can find messages about failing or failed disks in the system console. This information is also logged in the `/var/adm/messages` files.

These error messages typically refer to a failed hard drive by its physical device name or by its logical device name. In addition, some applications might report a disk slot number.

You can use [TABLE 3-1](#) to associate internal disk slot numbers with the logical and physical device names for each hard drive.

TABLE 3-1 Disk Slot Numbers, Logical Device Names, and Physical Device Names

Disk Slot Number	Logical Device Name*	Physical Device Name
Slot 0	c0t0d0	/devices/pci@500/pci@0/pci@d/scsi@0/sd@0,0
Slot 1	c0t1d0	/devices/pci@500/pci@0/pci@d/scsi@0/sd@1,0

* The logical device names might appear differently on your system, depending on the number and type of add-on disk controllers installed.

External devices connected using the onboard SAS port will follow the example (c0t2d0, and so on) given in [TABLE 3-1](#), provided they do not have their own RAID controller.

▼ To Create a Hardware Mirrored Volume

1. Verify which hard drive corresponds with which logical device name and physical device name, using the `raidctl` command:

```
# raidctl
Controller: 2
    Disk: 0.0.0
    Disk: 0.1.0
#
```

The preceding example indicates that no RAID volume exists. In another case:

```
# raidctl -l c2t0d0
```

Volume	Sub	Size	Stripe Size	Status	Cache	RAID Level
	Disk					
c2t0d0		68.3G	N/A	SYNC	OFF	RAID1
	0.0.0	68.3G		GOOD		
	0.1.0	68.3G		GOOD		

```
#
```

In this example, a single IM volume has been enabled and is synchronizing.

See the `raidctl(1M)` man page for additional details regarding volume and disk status.

Note – The logical device names might appear differently on your system, depending on the number and type of add-on disk controllers installed.

2. Type the following command:

```
# raidctl -c primary secondary
```

The creation of the RAID volume is interactive, by default. For example:

```
# raidctl -c c0t0d0 c0t1d0
Creating RAID volume c0t0d0 will destroy all data on spare space
of member disks, proceed (yes/no)? yes
...
Volume c0t0d0 is created successfully!
#
```

As an alternative, you can use the `-f` option to force the creation if you are sure of the member disks, and sure that the data on both member disks can be lost. For example:

```
# raidctl -f -c c0t0d0 c0t1d0
...
Volume c0t0d0 is created successfully!
#
```

When you create a RAID mirror, the secondary drive (in this case, `c0t1d0`) disappears from the Solaris device tree.

For more information about the `raidctl` utility, see the `raidctl(1M)` man page.

▼ To Create a Hardware Mirrored Volume of the Default Boot Device

Due to the volume initialization that occurs on the disk controller when a new volume is created, the volume must be configured and labeled using the `format(1M)` utility prior to use with the Solaris Operating System (see [“To Configure and Label a Hardware RAID Volume for Use in the Solaris Operating System” on page 42](#)). Because of this limitation, `raidctl(1M)` blocks the creation of a hardware RAID volume if any of the member disks currently have a file system mounted.

This section describes the procedure required to create a hardware RAID volume containing the default boot device. Since the boot device always has a mounted file system when booted, an alternate boot medium must be employed, and the volume created in that environment. One alternate medium is a network installation image in single-user mode (refer to the *Solaris 10 Installation Guide* for information about configuring and using network-based installations).

1. Determine which disk is the default boot device.

From the OpenBoot `ok` prompt, type the `printenv` command, and if necessary the `devalias` command, to identify the default boot device. For example:

```
ok printenv boot-device
boot-device =          disk

ok devalias disk
disk              /pci@500/pci@0/pci@d/scsi@0/disk@0,0
```

2. Type the `boot net -s` command:

```
ok boot net -s
```

3. Once the system has booted, use the `raidctl(1M)` utility to create a hardware mirrored volume, using the default boot device as the primary disk.

See [“To Create a Hardware Mirrored Volume” on page 39](#). For example:

```
# raidctl -c -r 1 c0t0d0 c0t1d0
Creating RAID volume c0t0d0 will destroy all data on spare space
of member disks, proceed (yes/no)? yes
...
Volume c0t0d0 is created successfully!
#
```

4. Install the volume with the Solaris OS using any supported method.

The hardware RAID volume `c0t0d0` appears as a disk to the Solaris installation program.

Note – The logical device names might appear differently on your system, depending on the number and type of add-on disk controllers installed.

▼ To Configure and Label a Hardware RAID Volume for Use in the Solaris Operating System

After creating a RAID volume using `raidctl`, use `format(1M)` to configure and label the volume before attempting to use it in the Solaris Operating System.

1. Start the `format` utility:

```
# format
```

The `format` utility might generate messages about corruption of the current label on the volume, which you are going to change. You can safely ignore these messages.

2. Select the disk name that represents the RAID volume that you have configured.

In this example, c2t0d0 is the logical name of the volume.

```
# format
Searching for disks...done
AVAILABLE DISK SELECTIONS:
    0. c2t0d0 <SUN72G cyl 14087 alt 2 hd 24sec 424>
       /pci@500/pci@0/pci@d/scsi@0/sd@0,0
Specify disk (enter its number): 0
selecting c2t0d0
[disk formatted]
FORMAT MENU:
    disk          - select a disk
    type          - select (define) a disk type
    partition     - select (define) a partition table
    current       - describe the current disk
    format        - format and analyze the disk
    fdisk         - run the fdisk program
    repair        - repair a defective sector
    label         - write label to the disk
    analyze       - surface analysis
    defect        - defect list management
    backup        - search for backup labels
    verify        - read and display labels
    save          - save new disk/partition definitions
    inquiry       - show vendor, product and revision
    volname       - set 8-character volume name
    !<cmd>        - execute <cmd>, then return
    quit
```

3. Type the `type` command at the `format>` prompt, then select 0 (zero) to auto-configure the volume.

For example:

```
format> type

AVAILABLE DRIVE TYPES:
    0. Auto configure
    1. Quantum ProDrive 80S
    2. Quantum ProDrive 105S
    3. CDC Wren IV 94171-344
    4. SUN0104
    5. SUN0207
    6. SUN0327
    7. SUN0340
    8. SUN0424
    9. SUN0535
   10. SUN0669
   11. SUN1.0G
   12. SUN1.05
   13. SUN1.3G
   14. SUN2.1G
   15. SUN2.9G
   16. Zip 100
   17. Zip 250
   18. Peerless 10GB
   19. SUN72G
   20. other

Specify disk type (enter its number)[19]: 0
c2t0d0: configured with capacity of 68.00GB
<LSILOGIC-LogicalVolume-3000 cyl 65533 alt 2 hd 16 sec 136>
selecting c2t0d0
[disk formatted]
format>
```

4. Use the `partition` command to partition, or *slice*, the volume according to your desired configuration.

See the `format(1M)` man page for additional details.

5. Write the new label to the disk using the `label` command.

```
format> label
Ready to label disk, continue? yes
```

6. Verify that the new label has been written by printing the disk list using the `disk` command.

```
format> disk

AVAILABLE DISK SELECTIONS:
    0. c2t0d0 <LSILOGIC-LogicalVolume-3000 cyl 65533 alt 2 hd 16 sec 136>
       /pci@500/pci@0/pci@d/scsi@0/sd@0,0
Specify disk (enter its number)[0]:
```

Note that c2t0d0 now has a type indicating it is an LSILOGIC-LogicalVolume.

7. Exit the `format` utility.

The volume can now be used for the Solaris OS.

Note – The logical device names might appear differently on your system, depending on the number and type of add-on disk controllers installed.

▼ To Create a Hardware Striped Volume

1. Verify which hard drive corresponds with which logical device name and physical device name.

See [“Disk Slot Numbers, Logical Device Names, and Physical Device Names”](#) on page 39.

To verify the current RAID configuration, type:

```
# raidctl
Controller: 2
    Disk: 0.0.0
    Disk: 0.1.0
#
```

The preceding example indicates that no RAID volume exists.

Note – The logical device names might appear differently on your system, depending on the number and type of add-on disk controllers installed.

2. Type the following command:

```
# raidctl -c -r 0 disk1 disk2
```

The creation of the RAID volume is interactive, by default. For example:

```
# raidctl -c -r 0 c0t1d0 c0t2d0
Creating RAID volume c0t1d0 will destroy all data on spare space
of member disks, proceed (yes/no)? yes
...
Volume c0t1d0 is created successfully!
#
```

When you create a RAID striped volume, the other member drives (in this case, c0t2d0) disappear from the Solaris device tree.

As an alternative, you can use the `-f` option to force the creation if you are sure of the member disks, and sure that the data on all other member disks can be lost. For example:

```
# raidctl -f -c -r 0 c0t1d0 c0t2d0
...
Volume c0t1d0 is created successfully!
#
```

To relabel the volume using the `format(1M)` utility, see [“To Configure and Label a Hardware RAID Volume for Use in the Solaris Operating System”](#) on page 42.

For more information about the `raidctl` utility, see the `raidctl(1M)` man page.

▼ To Perform a Mirrored Disk Hot-Plug Operation

1. Verify which hard drive corresponds with which logical device name and physical device name.

See [“Disk Slot Numbers, Logical Device Names, and Physical Device Names”](#) on page 39.

2. To confirm a failed disk, type the `raidctl` command.
3. Remove the hard drive, as described in your service manual.

There is no need to issue a software command to bring the drive offline when the drive has failed.

4. Install a new hard drive, as described in your service manual.

The RAID utility automatically restores the data to the disk.

5. To check the status of a RAID rebuild, type the following command:

```
# raidctl -l
```

For example:

# raidctl -l c2t0d0						
Volume		Size	Stripe	Status	Cache	RAID
	Sub		Size			Level
	Disk					

c2t0d0		68.3G	N/A	SYNC	OFF	RAID1
	0.0.0	68.3G		GOOD		
	0.1.0	68.3G		GOOD		
#						

The Status will change from SYNC to OPTIMAL when the rebuild completes.

▼ To Perform a Nonmirrored Disk Hot-Plug Operation

1. Make sure that the hard disk drive is not mounted.
2. Remove the hard disk drive, as described in the *Sun Fire USBRDT 5240 Uniboard Service Manual*.
3. Plug in the new disk drive, as described in the *Sun Fire USBRDT 5240 Uniboard Service Manual*.



For More Information

For more information on the RAID utility, see:

- the `raidctl(1M)` man page
- the *Sun LSI 106x RAID User's Guide*, part number 820-4933 at:
<http://docs.sun.com>

Logical Domains Software

The Sun Fire USBRDT 5240 Uniboard supports the Logical Domains (LDoms) 1.0.3 software that is used to create and manage logical domains. The software comprises LDoms enabling code in the Solaris 10 8/07 OS plus patches (minimum supported OS version on the Sun Fire USBRDT 5240 Uniboard), LDoms enabling in System Firmware 7.1.4, and the Logical Domains Manager, which is the command-line interface.

This chapter includes these sections:

- [“Logical Domains Software Overview” on page 49](#)
- [“For More Information” on page 50](#)

Logical Domains Software Overview

Logical Domains software enables you to allocate the system resources of your server (such as a boot environment, CPUs, memory, and I/O devices) into logical domains. By using a logical domains environment, you can increase resource usage, improve scaling, and gain greater control of security and isolation.

LDoms software enables you to create and manage as many as 128 logical domains, depending on the hardware configuration of the server on which the Logical Domains Manager has been installed. You can virtualize resources and define network, storage, and other I/O devices as services that can be shared between domains.

The current configuration of a logical domain can be stored on the service processor. Using Logical Domains Manager CLI commands, you can add a configuration, specify a configuration to be used, and list the configurations on the service processor. You can also use the ILOM `set /HOST/bootmode config=configfile`

command to specify an LDom's boot configuration. For further information about /HOST/bootmode, see the *Sun Integrated Lights Out Manager 2.0 Supplement for Sun Fire USBRDT 5240 Uniboard*.

For More Information

For more information on LDom's, see:

- *Logical Domains (LDoms) 1.0.3 Release Notes*, part number 820-4895, at <http://docs.sun.com>
- *Logical Domains (LDoms) 1.0.3 Administration Guide*, part number 820-4894, at <http://docs.sun.com>
- *Logical Domains (LDoms) 1.0.3 Man Page Guide*, part number 820-4896, at <http://docs.sun.com>

Updating the Firmware

This appendix provides instructions for updating the service processor firmware on the Sun Fire USBRDT 5240 Uniboard.

Firmware updates are contained in patches. The flash image consists of the following components:

- Service processor firmware
- OpenBoot
- POST
- Reset/config
- Sequencer
- Partition description

▼ To Update the Firmware with the `load` Command

1. **Ensure that the ILOM service processor network management port is configured.**

This configuration is required to access the new flash image over the network. See [“To Activate the Network Management Port” on page 5](#).

2. Open an SSH session to connect to the service processor.

```
% ssh root@xx.xxx.xx.x
...
Are you sure you want to continue connecting (yes/no)? yes
...
Password: password (nothing displayed)
Waiting for daemons to initialize...

Daemons ready

Sun (TM) Integrated Lights Out Manager

Version 2.x.x.x

Copyright 2008 Sun Microsystems, Inc. All rights reserved.
Use is subject to license terms.

->
```

3. Verify that the host is powered off.

If the host is not powered off, type the `stop /SYS` command.

```
-> stop /SYS
```

4. Verify that the `keyswitch_state` parameter is set to normal.

```
-> set /SYS keyswitch_state=normal
```

5. Type the `load` command.

The `load` command updates the service processor flash image and the host firmware. The `load` command requires the following information:

- IP address of a TFTP server on the network that can access the flash image
- Full path name to the flash image that the IP address can access

The command usage is as follows:

```
load [-script] -source tftp://xxx.xxx.xx.xx/pathname
```

where:

- `-script` – Does not prompt for confirmation and acts as if `yes` was specified

- `-source` – Specifies the IP address and full path name (URI) to the flash image

```
-> load -source tftp://xxx.xxx.xx.xx/pathname
```

NOTE: A firmware upgrade will cause the server and ILOM to be reset. It is recommended that a clean shutdown of the server be done prior to the upgrade procedure. An upgrade takes about 6 minutes to complete. ILOM will enter a special mode to load new firmware. No other tasks can be performed in ILOM until the firmware upgrade is complete and ILOM is reset.

Are you sure you want to load the specified file (y/n)? **y**

Do you want to preserve the configuration (y/n)? **y**

.....

Firmware update is complete.

ILOM will now be restarted with the new firmware.

```
->
```

After the flash image has been updated, the system will automatically reset.

The service processor resets, runs diagnostics, and returns to the login prompt (on the serial console), similar to [CODE EXAMPLE A-1](#).

CODE EXAMPLE A-1 Typical Boot Sequence Following Firmware Update

```
U-Boot 1.1.1 (May 23 2007 - 21:30:12)
```

```
...
```

```
POST cpu PASSED
```

```
POST ethernet PASSED
```

```
Hit any key to stop autoboot: 0
```

```
## Booting image at fe080000 ...
```

```
IP Protocols: ICMP, UDP, TCP, IGMP
```

```
Checking all file systems...
```

```
fsck 1.37 (21-Mar-2005)
```

```
Setting kernel variables ...
```

```
... done.
```

```
Mounting local filesystems...
```

```
Cleaning /tmp /var/run /var/lock.
```

```
Identifying DOC Device Type(G3/G4/H3) ...
```

```
OK
```

```
Configuring network interfaces...Internet Systems Consortium DHCP  
Client V3.0.1
```

CODE EXAMPLE A-1 Typical Boot Sequence Following Firmware Update (*Continued*)

```
Copyright 2007 Internet Systems Consortium.
All rights reserved.
For info, please visit http://www.isc.org/products/DHCP

eth0: config: auto-negotiation on, 100FDX, 100HDX, 10FDX, 10HDX.
Listening on LPF/eth0/00:14:4f:3f:8c:af
Sending on   LPF/eth0/00:14:4f:3f:8c:af
Sending on   Socket/fallback
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 6
eth0: link up, 100 Mbps Full Duplex, auto-negotiation complete.
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 15
Hostname: hostname.
Starting portmap daemon: portmap.
Initializing random number generator...done.
INIT: Entering runlevel: 3
Starting system log daemon: syslogd and klogd.
Starting periodic command scheduler: cron.
Starting IPMI Stack..... Done.
Starting OpenBSD Secure Shell server: sshd.
Starting Servicetags listener: stlistener.
Starting FRU update program: frutool.

hostname login:
```

Mapping Device Path Names

This appendix contains information on how to map device path names to physical system devices.

TABLE B-1 lists I/O devices and paths.

TABLE B-1 I/O Devices

Slot and Status	Device Path
PCI-E Switch-0	/pci@400/pci@0
NET-4	/pci@400/pci@0/pci@c/network@0,1
NET-5	/pci@400/pci@0/pci@c/network@0
NET-7	/pci@400/pci@0/pci@c/network@0,2
NET-6	/pci@400/pci@0/pci@c/network@0,3
PCI-E/PCI BRIDGE	/pci@400/pci@0/pci@1/pci@0
XVR-50 Graphics	/pci@400/pci@0/pci@1/pci@0/display@1
PEM2	/pci@400/pci@0/pci@8
PEM3	/pci@400/pci@0/pci@9
PEM0	/pci@500/pci@0/pci@8
PEM1	/pci@500/pci@0/pci@9

The command `prtdiag` lists the devices and their names. The command `cfgadm -av` lists device pathnames. For example, NET-5 appears in the `prtdiag` command output as:

===== IO Devices =====			
Slot +	Bus	Name +	Model
Status	Type	Path	

MB/NET5	PCIE	network-pciexl08e,abcd /pci@400/pci@0/pci@c/network@0	SUNW,pcie-neptune

Index

A

- addboard command, 20
- auto-boot (OpenBoot configuration variable), 28
- automatic system recovery (ASR)
 - disabling, 31
 - enabling, 31
 - obtaining recovery information, 32

C

- cfgadm command, 32, 56
- commands
 - addboard, 20
 - cfgadm, 32, 56
 - init, 14
 - load, 51
 - powercycle, 28
 - poweroff, 19
 - poweron, 18
 - prtdiag, 25, 56
 - raidctl, 39 to 47
 - reset, 14
 - resetboardsc, 27
 - set, 5, 25, 49
 - show, 6, 26
 - showboards, 18, 19
 - shutdown, 14
 - ssh, 9
 - uname, 10

- CPU/Memory board, 17

D

- device identifiers, listed, 33

- device path names, mapping, 55
- device reconfiguration, manual, 34
- device unconfiguration, manual, 33
- DHCP, 4
- diagnostics, 25
- DIMM, 25, 29
- disk configuration
 - RAID 0, 37
 - RAID 1, 37
- disk drives
 - logical device names, 39
- disk hot-plug
 - mirrored disk, 46
 - nonmirrored disk, 47
- disk slot number, 39
- disk volumes, 35
- domain, 16
- dongle cable, 2, 8
- dtterm utility, 9

E

- error handling, summary, 29
- /etc/remote file, 9, 10

F

- firmware
 - updating on service processor, 51
- format utility, 42 to 45

G

- graphics monitor, 8, 11

H

- hardware disk mirror, 38, 46
- hardware disk striping, 37
- hot-plug operation
 - hard disk drive, 33
 - nonmirrored disk drive, 47
 - on hardware disk mirror, 46
 - pcie modules, 32

I

- init command, 14
- input-device (OpenBoot configuration variable), 8

K

- keyswitch, 25, 30, 52

L

- LEDs, 21 to 25
- load command, 51
- Locator LED, 23, 24
- logical device name, 39
- Logical Domains (LDoms) software, 49

M

- manual device reconfiguration, 34
- manual device unconfiguration, 33
- manual system reset, 14

O

- OpenBoot configuration variables
 - auto-boot, 28
 - input-device, 8
 - output-device, 8
- output-device (OpenBoot configuration variable), 8

P

- parity, 3, 11
- PCIe module, 23, 32
- physical device name, 39
- power, 18
- power cycle, 27
- power supply, 17
- powercycle command, 28

- poweroff command, 19
- poweron command, 18
- prompts, explained, 13
- prtdiag command, 25, 56

R

- RAID (redundant array of independent disks), 35
- RAID 0 (striping), 37
- RAID 1 (mirroring), 37
- raidctl command, 39 to 47
- reset
 - manual system, 14
- reset command, 14
- reset ILOM, 2, 27, 30
- resetboardsc command, 27

S

- ScApp firmware, 16
- set command, 5, 25, 49
- show command, 6, 26
- showboards command, 18, 19
- shutdown command, 14
- SMS software, 16
- ssh command, 9
- storage device, 20
- Sun Fire system
 - example configurations, 17
 - high-end server, defined, 15
 - midrange server, defined, 15
- system console, 8 to 14

T

- temperature, 19
- Tip connection, 9
- troubleshooting, 20

U

- UCP port, 2
- uname command, 10