Sun Blade™ T6300 Server Module Administration Guide

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Preface

The *Sun Blade T6300 Server Module Administration Guide* is written for experienced system administrators. This guide includes general descriptive information about the Sun Blade™ T6300 server module and detailed instructions for configuring and administering the server module. To use the information in this guide, you must have working knowledge of computer network concepts and terms and advanced familiarity with the Solaris™ Operating System (Solaris OS).

How This Book Is Organized

This guide is divided into the following chapters:

- Chapter 1 describes the system console and how to access it.
- Chapter 2 describes the tools used to configure system firmware, including Sun Advanced Lights Out Manager (ALOM) CMT system controller environmental monitoring, Automatic System Recovery (ASR), and multipathing software. In addition, this chapter describes how to unconfigure and reconfigure a device manually.
- Appendix A provides a list of all OpenBoot™ configuration variables, and a short description of each.

Using UNIX Commands

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

- Software documentation that you received with your system
- Solaris OS documentation, which is at:

  http://docs.sun.com

Shell Prompts

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

Typographic Conventions

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

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

Related Documentation

The documents listed as online are available at:

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

Application	Title	Part Number	Format	Location
Late breaking news	*Sun Blade T6300 Server Module Product Notes*	820-0278	HTML and PDF	Online
Installation	*Sun Blade T6300 Server Module Installation Guide*	820-0275	HTML and PDF	Online
Service	*Sun Blade T6300 Server Module Service Manual*	820-0276	HTML and PDF	Online
Safety and compliance	*Sun Blade T6300 Server Module Safety and Compliance Manual*	820-0279	HTML and PDF	Online
ALOM	*Advanced Lights Out Management (ALOM) CMT v1.3 Guide*	819-7981	HTML and PDF	Online

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CHAPTER 1

Configuring the System Console

This chapter explains what the system console is, describes the different ways of configuring it on your server, and helps you understand its relation to the system controller.

Topics covered in this chapter include:

- "Communicating With the Server" on page 1
- "Accessing the System Controller" on page 3
- "Switching Between the ALOM System Controller and the System Console" on page 9
- "ALOM `sc>` Prompt" on page 10
- "OpenBoot `ok` Prompt" on page 12
- "System Console OpenBoot Configuration Variable Settings" on page 17

Communicating With the Server

To install your system software or to diagnose problems, you need some way to interact at a low level with the system. The *system console* is the facility for this interaction. You use the system console to view messages and issue commands. There can be only one system console per computer.

The system console must be accessed through the ALOM CMT system controller during initial system installation. After installation, you can configure the system console to accept input from and send output to different devices.

What the System Console Does

The system console displays status and error messages generated by firmware-based tests during system startup. After running those tests, you can enter special commands that affect the firmware and alter system behavior.

After the operating system is booted, the system console displays UNIX system messages and accepts UNIX commands. You can access the system console using the ALOM `console` command.

What the ALOM System Controller Console Does

The ALOM system controller displays the results of the ALOM boot diagnostics and initialization. If it receives no user input within 60 seconds, the ALOM system controller console automatically connects to the system console. To return to the ALOM system controller, type the console escape sequence **`#.`** (Hash-Period).

Using the System Console

To use the system console, you need to attach an I/O device to the server module or the chassis. Initially, you might have to configure that hardware, and load and configure appropriate software as well.

You must also ensure that the system console is directed to the appropriate port, generally, the one to which your hardware console device is attached. You do this by setting the `input-device` and `output-device` OpenBoot configuration variables.

Default System Console Connection Through the Serial Port and Network Management Ports

On your server, the system console comes preconfigured to allow input and output only by means of the ALOM CMT system controller. The ALOM CMT system controller must be accessed either through the serial port or the network management port. By default, the network management port is configured to retrieve network configuration using DHCP and to allow connections using Secure Shell (SSH).

Typically, you connect one of the following hardware devices to the serial port:

- Terminal server
- Alphanumeric terminal or similar device
- TIP line connected to another Sun computer

These constraints provide for secure access at the installation site.

Using a TIP line enables you to use windowing and operating system features on the system making the connection to your server.

- For instructions on accessing the system console through a terminal server, see "Accessing the System Console Through a Terminal Server" on page 4.
- For instructions on accessing the system console through an alphanumeric terminal, see "Accessing the System Console Through an Alphanumeric Terminal" on page 8.
- For instructions on accessing the system console through a TIP line, see "Accessing the System Console Through a TIP Connection" on page 6.

After the network management port has been assigned an IP address by a DHCP server, you can connect to the ALOM system controller using Secure Shell (SSH). As an alternative to the (default) DHCP configuration, you can configure the network management port with a static IP address and change the communication protocol from SSH to Telnet. Up to eight simultaneous connections to the system controller `sc>` prompt are available through the network management port. For more information, see "Activating the Network Management Port" on page 4.

Accessing the System Controller

This section describes ways of accessing the system controller.

Using the Serial Port

When you are accessing the ALOM system controller using a device connected to the serial port, you will see the output of the ALOM diagnostics when AC power is first applied or when ALOM resets. After the diagnostics have completed the serial port is available for login.

For more information about the ALOM system controller card, refer to the *Advanced Lights Out Management (ALOM) CMT v1.3 Guide.*

▼ To Use the Serial Port

1. **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
2. **Establish an ALOM system controller session.**

   For instructions on how to use the ALOM system controller, see the *Advanced Lights Out Management (ALOM) CMT v1.3 Guide*.

Activating the Network Management Port

The network management port is configured on the chassis to retrieve network settings using DHCP and to 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 ALOM system controller using the serial port.

Note – There is no default password when connecting to the ALOM system controller for the first time. You must assign a password during initial system configuration.

For instructions on how to activate the network management port on the chassis, refer to the *Sun Blade T6000 Chassis Installation Guide* for instructions.

Accessing the System Console Through a Terminal Server

The following procedure assumes that you are accessing the ALOM system controller by connecting a terminal server to the serial port.

▼ To Access The System Console Through a Terminal Server

1. **Complete the physical connection from the serial port to your terminal server.**

   The serial port on the server is a data terminal equipment (DTE) port. The pinouts for the serial port correspond with the pinouts for the RJ-45 ports on the serial interface breakout cable supplied by Cisco for use with the Cisco AS2511-RJ terminal server. If you use a terminal server made by another manufacturer, check that the serial port pinouts of the server match those of the terminal server you plan to use.

   - If the pinouts for the server serial ports correspond with the pinouts for the RJ-45 ports on the terminal server, you have two connection options:
     - Connect a serial interface breakout cable to the dongle cable. See "Accessing the System Controller" on page 3.
     - Connect a serial interface breakout cable to a patch panel and use a straight-through patch cable to connect the patch panel to the server.
   - If the pinouts for the serial port *do not* correspond with the pinouts for the RJ-45 ports on the terminal server, you must make a crossover cable that takes each pin on the serial port to the corresponding pin in the terminal server's serial port.

   TABLE 1-1 shows the crossovers that the cable must perform.

TABLE 1-1 Pin Crossovers for Connecting the Server to a Terminal Server

Dongle Serial Port (RJ-45 Connector) Pin	Terminal Server Serial Port Pin
Pin 1 (RTS)	Pin 1 (CTS)
Pin 2 (DTR)	Pin 2 (DSR)
Pin 3 (TXD)	Pin 3 (RXD)
Pin 4 (Signal Ground)	Pin 4 (Signal Ground)
Pin 5 (Signal Ground)	Pin 5 (Signal Ground)
Pin 6 (RXD)	Pin 6 (TXD)
Pin 7 (DSR /DCD)	Pin 7 (DTR)
Pin 8 (CTS)	Pin 8 (RTS)

2. **Open a terminal session on the connecting device, and type:**

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

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

```
% telnet 192.20.30.10 10000
```

Accessing the System Console Through a TIP Connection

Use this procedure to access the server system console by connecting the dongle serial port to the serial port of another Sun system.

▼ To Access the System Console Through a TIP Connection

1. **Connect the RJ-45 serial cable and, if required, a DB-9 or DB-25 adapter.**

   The cable and adapter connect between another server's serial port (typically TTYB) and the dongle serial port.

2. **Ensure that the `/etc/remote` file on the Sun 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 Sun 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 "Modifying the `/etc/remote` File" on page 7 for details.

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

   ```
   % tip hardwire
   ```

   The Sun system responds by displaying:

   ```
   connected
   ```

   The shell tool is now a TIP window directed to the Sun Blade T6300 server module through the Sun system's serial port. This connection is established and maintained even when the server is completely powered off or just starting up.

Note – Use a shell tool or a CDE terminal (such as `dtterm`), not a command tool. Some TIP commands might not work properly in a command tool window.

Modifying the /etc/remote File

This procedure might be necessary if you are accessing the server module using a TIP connection from a Sun system running an older version of the Solaris OS software. You might also need to perform this procedure if the /etc/remote file on the Sun system has been altered and no longer contains an appropriate hardwire entry.

Log in as superuser to the system console of a Sun system that you intend to use to establish a TIP connection to the server module.

▼ To Modify the /etc/remote File

1. **Determine the release level of Solaris OS software installed on the Sun system. Type:**

```
# uname -r
```

The system responds with a release number.

2. **Do one of the following, 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 suspect that this file was altered, and the hardwire entry modified or deleted, check the entry against the following example, and edit the file as needed.

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

Note – If you intend to use the Sun 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:
```

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

If you have redirected the system console to TTYB and want to change the system console settings back to use the serial port and network management ports, see "System Console OpenBoot Configuration Variable Settings" on page 17.

Accessing the System Console Through an Alphanumeric Terminal

Use this procedure when you access the system console by connecting the serial port of an alphanumeric terminal to the serial port of the server.

▼ To Access the System Console Through an Alphanumeric Terminal

1. **Attach one end of the serial cable to the alphanumeric terminal's serial port.**

   Use a null modem serial cable, or an RJ-45 serial cable, and null modem adapter. Connect this cable to the terminal's serial port connector.

2. **Attach the opposite end of the serial cable to the serial port on the dongle cable.**

3. **Connect the alphanumeric terminal's power cord to an AC outlet.**

4. **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 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.

   For more information about connecting to and using the ALOM system controller, refer to the *Advanced Lights Out Management (ALOM) CMT v1.3 Guide*.

Switching Between the ALOM System Controller and the System Console

If the system console is directed to the virtual-console device (its default configuration), the serial port and the network management port provide access to both the system console and the ALOM system controller (see FIGURE 1-1).

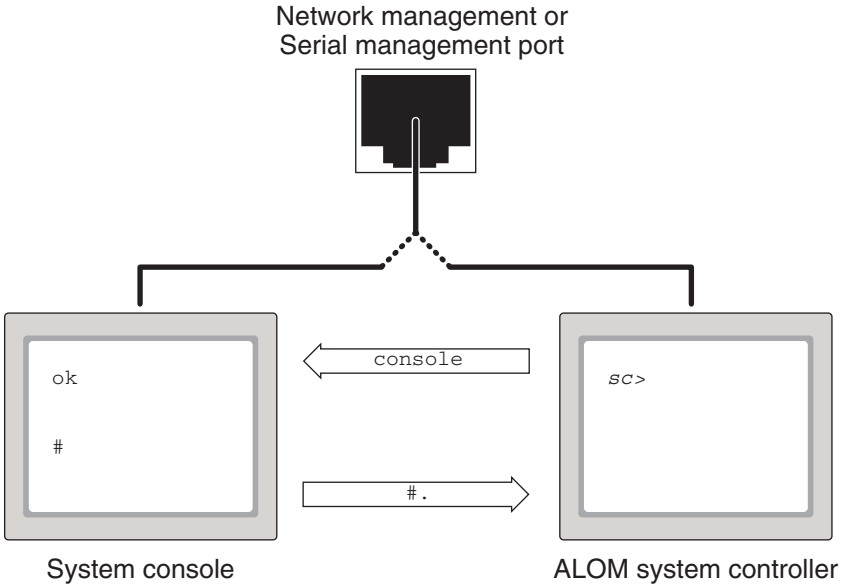

FIGURE 1-1 Switching Between ALOM System Controller and System Console

If the system console is configured to use the virtual-console device, when you connect through one of these ports you can access either the ALOM command-line interface or the system console. You can switch between the ALOM system controller and the system console at any time, but you cannot access both at the same time from a single terminal or shell tool.

The prompt displayed on the terminal or shell tool indicates 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 `sc>` prompt indicates that you are at the ALOM system controller.

Note – If no text or prompt appears, it might be that no console messages were recently generated by the system. If this happens, pressing the terminal's Enter or Return key should produce a prompt. If the ALOM session has timed out, pressing the terminal's Enter or Return key might not be effective. In that case, it might be necessary to issue the escape sequence, `#.` (Hash-Period), to return to ALOM.

To reach the system console from the ALOM system controller,

- Type the `console` command at the `sc>` prompt.

To reach the ALOM system controller from the system console,

- Type the system controller escape sequence.

  By default, the escape sequence is `#.` (Hash-Period).

For more information about communicating with the ALOM system controller and system console, see the following:

- "Communicating With the Server" on page 1
- "ALOM `sc>` Prompt" on page 10
- "OpenBoot `ok` Prompt" on page 12
- "Accessing the System Controller" on page 3
- *Advanced Lights Out Management (ALOM) CMT v1.3 Guide*

ALOM `sc>` Prompt

The ALOM system controller runs independently of the server module and regardless of system power state. When you install the server module, the ALOM system controller immediately starts up and begins monitoring the system.

You can log in to the ALOM system controller at any time, regardless of system power state, as long as you have a way of interacting with the system. The `sc>` prompt indicates that you are interacting with the ALOM system controller directly. The `sc>` prompt is the first prompt you see when you log in to the system through the serial port or network management port.

Note – When you access the ALOM system controller for the first time and you issue an administrative command, you must create a password for the default username, `admin`, for subsequent access. After this initial configuration, you will be prompted to enter a user name and password every time you access the ALOM system controller.

For more information about navigating between the system console and the ALOM system controller, see "Obtaining the `ok` Prompt" on page 15

Access Through Multiple Controller Sessions

Up to nine ALOM system controller sessions can be active concurrently, one session through the serial port and up to eight sessions through the network management port. Users of each of these sessions can issue commands at the `sc>` prompt. For more information, see the following:

- "Accessing the System Controller" on page 3
- "Activating the Network Management Port" on page 4

Note – Only one user has active control of the system console at any time. Any additional ALOM system controller sessions afford passive views of system console activity, until the active user of the system console logs out. However, the `console -f` command enables users to seize access to the system console from one another. For more information, see the *Advanced Lights Out Management (ALOM) CMT v1.3 Guide*.

Reaching the sc> Prompt

There are several ways to obtain the sc> prompt:

- You can log in directly to the ALOM system controller from a device connected to the serial port. See "Accessing the System Controller" on page 3.
- You can log in directly to the ALOM system controller using a connection through the network management port. See "Activating the Network Management Port" on page 4.
- If you have logged in to the ALOM system controller and then directed the system console to the serial port and network management ports, you can return to the prior ALOM session by typing the ALOM system controller escape sequence (#.).

OpenBoot ok Prompt

The server with the Solaris OS installed is capable of operating at different *run levels*. A synopsis of run levels follows. For a full description of run levels, refer to the Solaris system administration documentation.

Most of the time, you operate the server at run level 2 or run level 3, which are multiuser states with access to full system and network resources. Occasionally, you might operate the system at run level 1, which is a single-user administrative state. However, the lowest operational state is run level 0. At this state, it is safe to turn off power to the system.

When your server is at run level 0, the ok prompt appears. This prompt indicates that the OpenBoot PROM firmware is in control of the system.

There are a number of scenarios under which OpenBoot firmware control can occur.

- By default, before the operating system is installed the system comes up under OpenBoot firmware control.
- When the auto-boot? OpenBoot configuration variable is set to false the system boots to the ok prompt.
- When the operating system is halted the system transitions to run level 0 in an orderly way.
- When the operating system crashes the system reverts to OpenBoot firmware control.
- During the boot process, when there is a serious hardware problem that prevents the operating system from running, the system reverts to OpenBoot firmware control.

- When a serious hardware problem develops while the system is running, the operating system transitions smoothly to run level 0.
- When you deliberately place the system under firmware control in order to execute firmware-based commands.

The last of these scenarios most often concerns you as an administrator, since there will be times when you need to reach the `ok` prompt. The section "Methods to Reach the `ok` Prompt" on page 13 lists several ways. For detailed instructions, see "Obtaining the `ok` Prompt" on page 15.

Methods to Reach the `ok` Prompt

There are several ways to reach the `ok` prompt, depending on the state of the system and the means by which you are accessing the system console.

Note – These methods of reaching the `ok` prompt work only if the system console has been redirected to the appropriate port. For details, see "System Console OpenBoot Configuration Variable Settings" on page 17.

The methods are:

- Graceful shutdown
- ALOM system controller `break` and `console` command pair
- L1-A (Stop-A) keys or Break key
- Manual system reset

A discussion of each method follows. For step-by-step instructions, see "Obtaining the `ok` Prompt" on page 15.

Note – As a rule, before suspending the operating system, you should back up files, warn users of the impending shutdown, and halt the system in an orderly manner. However, it is not always possible to take such precautions, especially if the system is malfunctioning.

Graceful Shutdown

The preferred method of reaching the `ok` prompt is to shut down the operating system by issuing an appropriate command (for example, the `shutdown`, `init`, or `uadmin` command) as described in Solaris system administration documentation. You can also use the system Power button to initiate a graceful system shutdown.

Gracefully shutting down the system prevents data loss, enables you to warn users beforehand, and causes minimal disruption. You can usually perform a graceful shutdown, provided the Solaris OS is running and the hardware has not experienced serious failure.

ALOM System Controller `break` or `console` Command

Typing `break` from the `sc>` prompt forces a running server to drop into OpenBoot firmware control. If the operating system is already halted, you can use the `console` command instead of `break` to reach the `ok` prompt.

Caution – After forcing the system into OpenBoot firmware control, be aware that issuing certain OpenBoot commands (such as `probe-scsi`, `probe-scsi-all`, or `probe-ide`) might hang the system.

L1-A (Stop-A) Keys or Break Key

When it is impossible or impractical to shut down the system gracefully, you can get to the `ok` prompt by typing the L1-A (Stop-A) key sequence from a keyboard connected to the server (that is, if OpenBoot `input-device=keyboard`). If you have an alphanumeric terminal attached to the server, press the Break key.

Caution – After forcing the system into OpenBoot firmware control, be aware that issuing certain OpenBoot commands (such as `probe-scsi`, `probe-scsi-all`, or `probe-ide`) might hang the system.

Manual System Reset

This section explains how to execute a manual reset and what happens when a manual reset occurs.

Caution – Forcing a manual system reset results in loss of system state data, and should be attempted only as a last resort. After a manual system reset, all state information is lost, which inhibits troubleshooting the cause of the problem until the problem reoccurs.

Use the ALOM system controller `reset` command, or `poweron` and `poweroff` commands, to reset the server. Reaching the `ok` prompt by performing a manual system reset or by power-cycling the system should be the method of last resort.

Using these commands results in the loss of all system coherence and state information. A manual system reset could corrupt the server's file systems, although the `fsck` command usually restores them. Use this method only when nothing else works.

Caution – Accessing the `ok` prompt suspends the Solaris OS.

When you access the `ok` prompt from a functioning server, you are suspending the Solaris OS and placing the system under firmware control. Any processes that were running under the operating system are also suspended, and *the state of such processes might not be recoverable*.

After a manual system reset the system can be configured to boot automatically if the OpenBoot `auto-boot?` configuration variable is set to `true`. See "System Console OpenBoot Configuration Variable Settings" on page 17. If the server begins to boot automatically after a reset, you must abort the boot with the ALOM system controller `break` command or perform a graceful shutdown of the Solaris Operating System after the boot has completed.

The commands you run from the `ok` prompt have the potential to affect the state of the system. This means that it is not always possible to resume execution of the operating system from the point at which it was suspended. Although the `go` command will resume execution in most circumstances, in general, each time you obtain the `ok` prompt, you should expect to have to reboot the system to get back to the operating system.

For More Information About OpenBoot Firmware

For more information about the OpenBoot firmware, refer to the *OpenBoot 4.x Command Reference Manual*. You can obtain an online version of the manual at

`http://www.sun.com/documentation/`

Obtaining the `ok` Prompt

This procedure provides several ways of reaching the `ok` prompt. For details about when to use each method, see "OpenBoot `ok` Prompt" on page 12.

Caution – Forcing the server to the `ok` prompt suspends all application and operating system software. After you issue firmware commands and run firmware-based tests from the `ok` prompt, the system might not be able to resume where it left off.

If at all possible, back up system data before starting this procedure. Also exit or stop all applications and warn users of the impending loss of service. For information about the appropriate backup and shutdown procedures, see Solaris system administration documentation.

▼ To Obtain the `ok` Prompt

1. **Decide which method you need to use to reach the `ok` prompt.**

   See "OpenBoot `ok` Prompt" on page 12 for details.

2. **Follow the appropriate instructions 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 `shutdown` or `init` command) as described in Solaris system administration documentation.
L1-A (Stop-A) keys or Break key	• From a Sun keyboard connected to the dongle cable, press the Stop and A keys simultaneously.* • From an alphanumeric terminal configured to access the system console, press the Break key.
ALOM system controller `break` and `console` commands	1. From the `sc>` prompt, type the `break` command. The `break` command should put the system in a state in which the operating system software is not running and the server is under OpenBoot firmware control. 2. Issue the `console` command.
Manual system reset	• From the `sc>` prompt, type the `reset` command.

* Requires the OpenBoot configuration variable `input-device=keyboard`. For more information, see "System Console OpenBoot Configuration Variable Settings" on page 17.

System Console OpenBoot Configuration Variable Settings

Certain OpenBoot configuration variables control from where system console input is taken and to where its output is directed. The table below shows how to set these variables in order to use the serial port and network management port.

TABLE 1-3 OpenBoot Configuration Variables That Affect the System Console

OpenBoot Configuration Variable Name	Serial and Network Management Ports
`output-device`	virtual-console
`input-device`	virtual-console

Note – The `sc>` prompt and POST messages are only available through the serial management port and network management port.

In addition to the OpenBoot configuration variables described in TABLE 1-3, there are other variables that affect and determine system behavior. These variables are discussed in more detail in Appendix A.

CHAPTER 2

Managing RAS Features and System Firmware

This chapter describes how to manage reliability, availability, and serviceability (RAS) features and system firmware, including the Sun Advanced Lights Out Manager (ALOM) system controller, and Automatic System Recovery (ASR). In addition, this chapter describes how to unconfigure and reconfigure a device manually, and introduces multipathing software.

This chapter contains the following sections:

- "Interpreting System LEDs" on page 20
- "Automatic System Recovery" on page 22
- "Unconfiguring and Reconfiguring Devices" on page 27
- "Multipathing Software" on page 29

Note – This chapter does not cover detailed troubleshooting and diagnostic procedures. For information about fault isolation and diagnostic procedures, refer to the *Sun Blade T6300 Server Module Service Manual*.

Interpreting System LEDs

The behavior of LEDs on your server conforms to the American National Standards Institute (ANSI) Status Indicator Standard (SIS). These standard LED behaviors are described in TABLE 2-1.

TABLE 2-1 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 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 2-2.

TABLE 2-2 LED Behaviors With 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 (for example, the Locator LED).
Blue	Off	Steady state	
	Steady on	Steady state	If blue is on, a service action can be performed on the applicable component with no adverse consequences (for example, the OK to Remove LED).
Yellow or Amber	Off	Steady state	
	Steady on	Steady state	This indicator signals the existance of a fault condition. Service is required (for example, the Service Required LED).
Green	Off	Steady state	

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

Color	Behavior	Definition	Description
	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.

Controlling the Locator LED

You control the Locator LED from the `sc>` prompt or by the Locator button on the front of the server module.

▼ To Turn On the Locator LED From the ALOM System Controller Command Prompt

- **Type:**

```
sc> setlocator on
```

▼ To Turn Off the Locator LED From the ALOM System Controller Command Prompt

- **Type:**

```
sc> setlocator off
```

▼ To Display the State of the Locator LED From the ALOM System Controller Command Prompt

- **Type:**

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

Note – You do not need user permissions to use the `setlocator` and `showlocator` commands.

Automatic System Recovery

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.

Note – ASR is not activated until you enable it. See "Enabling and Disabling Automatic System Recovery" on page 25.

AutoBoot Options

The system firmware stores a configuration variable called `auto-boot?`, which controls whether the firmware automatically boots the operating system after each reset. The default setting for Sun platforms 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's 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 Enable an Automatic Degraded Boot

- **Set the switches by typing:**

```
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 23.

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 Diagnostics, the system attempts to boot if `auto-boot?` is `true`.
- If only nonfatal errors are detected by POST or OpenBoot Diagnostics, the system attempts to boot if `auto-boot?` is `true` and `auto-boot-on-error?` is `true`. Nonfatal errors include the following:
  - Ethernet interface failure
  - Serial interface failure
  - PCI Express card failure
  - Memory failure

    When a DIMM fails, the firmware unconfigures the entire logical bank associated with the failed server module. Another nonfailing logical bank must be present in the system for the system to attempt a degraded boot. Note that certain DIMM failures might not be diagnosable to a single DIMM. These failures are fatal, and result in both logical banks being unconfigured.

Note – If POST or OpenBoot Diagnostics detect 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 Diagnostics, 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 failure
  - Any logical memory bank failure
  - Flash RAM cyclical redundancy check (CRC) failure
  - Critical field-replaceable unit (FRU) PROM configuration data failure
  - Critical system configuration SEEPROM read failure
  - Critical application-specific integrated circuit (ASIC) failure

Reset Scenarios

Three ALOM configuration variables, `diag_mode`, `diag_level`, and `diag_trigger`, control whether the system runs firmware diagnostics in response to system reset events.

The standard system reset protocol bypasses POST completely unless the virtual keyswitch or ALOM variables are set as follows:

TABLE 2-3 Virtual Keyswitch Setting for Reset Scenario

Keyswitch	Value
virtual keyswitch	`diag`

TABLE 2-4 ALOM Variable Settings for Reset Scenario

Variable	Value	Default
`diag_mode`	`normal` or `service`	`normal`
`diag_level`	`min` or `max`	`min`
`diag_trigger`	`power-on-reset error-reset`	`power-on-reset`

Therefore, ASR is enabled by default. For instructions, see "Enabling and Disabling Automatic System Recovery" on page 25.

Automatic System Recovery User Commands

ALOM commands are available for enabling and disabling ASR and for obtaining ASR status information.

For more information, see:

- "Unconfiguring and Reconfiguring Devices" on page 27
- "To Reconfigure a Device Manually" on page 27
- "Obtaining Automatic System Recovery Information" on page 26

Enabling and Disabling Automatic System Recovery

The ASR feature is not activated until you enable it. Enabling ASR requires changing configuration variables in ALOM as well as OpenBoot firmware.

▼ To Enable Automatic System Recovery

1. **At the `sc>` prompt, type:**

```
sc> setsc diag_mode normal
sc> setsc diag_level min
sc> setsc diag_trigger power-on-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).

Note – To store parameter changes, you can also power cycle the system using the front panel Power button.

▼ 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.

Note – To store parameter changes, you can also power cycle the system using the front panel Power button.

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

Obtaining Automatic System Recovery Information

Use the following procedure to retrieve information about the status of system components affected by ASR.

▼ To Obtain ASR Information

- **At the `sc>` prompt, type:**

```
sc> showcomponent
```

In the `showcomponent` command output, any devices marked `disabled` have been manually unconfigured using the system firmware. The `showcomponent` command also lists devices that have failed firmware diagnostics and have been automatically unconfigured by the system firmware.

Unconfiguring and Reconfiguring Devices

To support a degraded boot capability, the ALOM firmware provides the `disablecomponent` command, which enables you to unconfigure system devices manually. This command flags the specified device as *disabled* by creating an entry in the ASR database.

▼ To Unconfigure a Device Manually

- **At the `sc>` prompt, type:**

```
sc> disablecomponent asr-key
```

The *asr-key* is one of the device identifiers from TABLE 2-5

Note – The device identifiers are not case-sensitive. You can type them as uppercase or lowercase characters.

TABLE 2-5 Device Identifiers and Devices

Device Identifiers	Devices
`MB/CMP`*cpu-number*`/P`*strand-number*	CPU strand (Number: 0-31)
`MB/PCIEa`	PCIe leaf A (`/pci@780`)
`MB/PCIEb`	PCIe leaf B (`/pci@7c0`)
`MB/CMP0/CH`*channel-number*`/R`*rank-number*`/D`*dimm-number*	DIMMs

▼ To Reconfigure a Device Manually

- **At the `sc>` prompt, type:**

```
sc> enablecomponent asr-key
```

where *asr-key* is any device identifier from TABLE 2-5.

Note – The device identifiers are not case-sensitive. You can type them as uppercase or lowercase characters.

You can use the ALOM `enablecomponent` command to reconfigure any device that you previously unconfigured with the `disablecomponent` command.

Displaying System Fault Information

ALOM software enables you to display current valid system faults. The `showfaults` command displays the fault ID, the faulted FRU device, and the fault message to standard output. The `showfaults` command also displays POST results.

▼ To Display System Fault Information

- **Type** `showfaults`**.**

  For example:

```
sc> showfaults
   ID FRU         Fault
    0 FT0.F2      SYS_FAN at FT0.F2 has FAILED.
```

Adding the –v option displays additional information,

```
sc> showfaults -v
   ID Time               FRU        Fault
    0   MAY 20 10:47:32 FT0.F2     SYS_FAN at FT0.F2 has FAILED.
```

For more information about the `showfaults` command, refer to the *Advanced Lights Out Management (ALOM) CMT v1.3 Guide*.

Multipathing Software

Multipathing software enables you to define and control redundant physical paths to I/O devices, such as storage devices and network interfaces. If the active path to a device becomes unavailable, the software can automatically switch to an alternate path to maintain availability. This capability is known as *automatic failover*. To take advantage of multipathing capabilities, you must configure the server with redundant hardware, such as redundant network interfaces or two host bus adapters connected to the same dual-ported storage array.

For your server, three different types of multipathing software are available:

- Solaris IP Network Multipathing software provides multipathing and load-balancing capabilities for IP network interfaces.
- VERITAS Volume Manager (VVM) software includes a feature called Dynamic Multipathing (DMP), which provides disk multipathing as well as disk load balancing to optimize I/O throughput.
- Sun StorageTek™ Traffic Manager is an architecture fully integrated within the Solaris OS (beginning with the Solaris 8 release) that enables I/O devices to be accessed through multiple host controller interfaces from a single instance of the I/O device.

For More Information on Multipathing Software

For instructions on how to configure and administer Solaris IP Network Multipathing software, consult the *IP Network Multipathing Administration Guide* provided with your specific Solaris release.

For information about VVM and its DMP feature, refer to the documentation provided with the VERITAS Volume Manager software.

For information about Sun StorageTek Traffic Manager, refer to your Solaris OS documentation.

Storing FRU Information

The `setfru` command enables you to store information on FRU PROMs. For example, you might store information identifying the server in which the FRUs have been installed.

▼ To Store Information in Available FRU PROMs

- **At the `sc>` prompt type:**

```
setfru -c data
```

APPENDIX **A**

OpenBoot Configuration Variables

TABLE A-1 describes the OpenBoot firmware configuration variables stored in non-volatile memory on the system. The OpenBoot configuration variables are printed here in the order in which they appear when you issue the `showenv` command.

TABLE A-1 OpenBoot Configuration Variables Stored on the System Processor

Variable	Possible Values	Default Value	Description
`local-mac-address?`	`true, false`	`true`	If `true`, network drivers use their own MAC address, not the server MAC address.
`fcode-debug?`	`true, false`	`false`	If `true`, includes name fields for plug-in device FCodes.
`scsi-initiator-id`	`0-15`	`7`	SCSI ID of the Serial Attached SCSI controller.
`oem-logo?`	`true, false`	`false`	If `true`, uses custom OEM logo; otherwise, use Sun logo.
`oem-banner?`	`true, false`	`false`	If `true`, uses custom OEM banner.
`ansi-terminal?`	`true, false`	`true`	If `true`, enables ANSI terminal emulation.
`screen-#columns`	`0-n`	`80`	Sets number of columns on screen.
`screen-#rows`	`0-n`	`34`	Sets number of rows on screen.
`ttya-rts-dtr-off`	`true, false`	`false`	If `true`, operating system does not assert `rts` (request-to-send) and `dtr` (data-transfer-ready) on serial management port.
`ttya-ignore-cd`	`true, false`	`true`	If `true`, operating system ignores carrier-detect on serial management port.

TABLE A-1 OpenBoot Configuration Variables Stored on the System Processor *(Continued)*

Variable	Possible Values	Default Value	Description
ttya-mode	9600,8,n,1,-	9600,8,n,1,-	Serial management port (baud rate, bits, parity, stop, handshake). The serial management port only works at the default values.
output-device	virtual-console, ttya	virtual-console	Power-on output device.
input-device	virtual-console, ttya	virtual-console	Power-on input device.
auto-boot-on-error?	true, false	false	If true, boost automatically after system error.
load-base	0-n	16384	Address.
auto-boot?	true, false	true	If true, boots automatically after power on or reset.
boot-command	*variable-name*	boot	Action following a boot command.
boot-file	*variable-name*	none	File from which to boot if diag-switch? is false.
boot-device	*variable-name*	disk net	Devices from which to boot if diag-switch? is false.
use-nvramrc?	true, false	false	If true, executes commands in NVRAMRC during server startup.
nvramrc	*variable-name*	none	Command script to execute if use-nvramrc? is true.
security-mode	none, command, full	No default	Firmware security level.
security-password	*variable-name*	No default	Firmware security password if security-mode is not none (never displayed). *Do not set this directly.*
security-#badlogins	*variable-name*	No default	Number of incorrect security password attempts.

TABLE A-1 OpenBoot Configuration Variables Stored on the System Processor *(Continued)*

Variable	Possible Values	Default Value	Description
`diag-switch?`	`true, false`	`false`	If `true`: • OpenBoot verbosity is set to maximum. • After a `boot` request, boot `diag-file` from `diag-device`. If `false`: • OpenBoot verbosity is set to minimum. • After a `boot` request, boot `boot-file` from `boot-device`.
`error-reset-recovery`	`boot, sync, none`	`boot`	Command to execute following a system reset generated by an error.
`network-boot-arguments`	[*protocol*,] [*key=value*,]	`none`	Arguments to be used by the PROM for network booting. Defaults to an empty string. Use `network-boot-arguments` to specify the boot protocol (RARP/DHCP) and a range of system knowledge to be used in the process. For further information, see the `eeprom` (1M) man page or your Solaris reference manual.

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