



Platform Notes: Sun™ Enterprise™ 3000, 4000, 5000, and 6000 Systems

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Preface

This book describes software features that apply only to the Sun™ Enterprise™ 3000, 4000, 5000, and 6000 family of servers. Note that the CPU over temperature feature is a new software feature in the Solaris™ 2.6 software environment.

How This Book Is Organized

This manual is divided into four chapters:

Chapter 1, “OpenBoot 3.x Commands,” provides a description of the OpenBoot 3.x commands for the Sun Enterprise family of x000 servers.

Chapter 2, “Board Hot-Plug Software Procedures,” describes how to perform board hot-plug procedures.

Chapter 3, “CPU Over Temperature Safeguard,” explains the CPU Over Temperature Safeguard (COS), which is new to the Solaris 2.6 software environment. This new feature ensures that temperature on any CPU/Memory board will not go above safe operating range.

Chapter 4, “Enabling a Hardware Timer,” describes how to enable a hardware timer that will hard-reset the system if it times out.

Related Documents

For details on the options for the software features described in this book, refer also to the man pages for Solaris 2.6 and Solaris 2.6 Hardware: 3/98.

Typographic Conventions

The following table describes the typographic conventions used in this book.

TABLE P-1 Typographic Conventions

Typeface or Symbol	Meaning	Examples
AaBbCc123	The names of commands, files, and directories; on-screen computer output.	Edit your <code>.login</code> file. Use <code>ls -a</code> 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. Command-line variable; replace with a real name or value.	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be <code>root</code> to do this. To delete a file, type <code>rm filename</code> .

Shell Prompts

The following table shows the default system prompt and superuser prompt for the C shell, Bourne shell, and Korn shell.

TABLE P-2 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	#

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Canada	1-800-873-7869	1-800-944-0661
France	0800-90-61-57	0800-90-61-58
Germany	01-30-81-61-91	01-30-81-61-92
Holland	06-022-34-45	06-022-34-46
Japan	0120-33-9096	0120-33-9097
Luxembourg	32-2-720-09-09	32-2-725-88-50
Sweden	020-79-57-26	020-79-57-27
Switzerland	0800-55-19-26	0800-55-19-27
United Kingdom	0800-89-88-88	0800-89-88-87
United States	1-800-873-7869	1-800-944-0661

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- Email:—smcc-docs@sun.com
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OpenBoot 3.x Commands

This chapter describes the OpenBoot™ 3.x commands for the Sun Enterprise 3000, 4000, 5000, and 6000 servers.

Environmental Monitoring

Use the following commands for environmental monitoring:

- `disable-environmental-monitor`
- `enable-environmental-monitor`

`disable-environmental-monitor`

Usage

`disable-environmental-monitor (--)`

Purpose

To stop monitoring power supply status, board temperatures, and board hot plug while the screen displays the `ok` prompt.

enable-environmental-monitor

Usage

enable-environmental-monitor (--)

Purpose

To start monitoring power supply status, board temperatures, and board hot plug while the screen displays the ok prompt.

Note – This command is enabled by default.

Messages Indicating Environmental Conditions

The following system messages indicate environmental conditions:

```
PROM NOTICE: Overtemp detected on board <n>.
PROM NOTICE: System has cooled down.
PROM WARNING: Board <n> is too hot.
PROM NOTICE: Insufficient power detected.
PROM NOTICE: Power supply restored.
PROM NOTICE: Board insert detected.
PROM NOTICE: Reset Initiated...
```

If a board temperature is above a predetermined temperature threshold for that board type, the OpenBoot PROM (OBP) initiates a reset. This results in POST disabling the faulty board.

If `Insufficient power detected` is not fixed in 30 seconds, then the OBP initiates a reset to enable POST to deconfigure the necessary boards.

If a board insert is detected, the OBP turns the reset flag on. This causes the `boot` command to reset the system and POST to attach the board to the system.

Externally Initiated Reset XIR

If a hard hang occurs on a system, use an XIR to reset and get information about the state at the time of the hard hang.

▼ To Initiate an XIR :

- Use either the XIR button on the clock board or the remote console XIR sequence. When an XIR occurs, memory is cleared but some CPU state is saved.

▼ To Display This XIR Information:

- Type the following command at the ok prompt immediately after the XIR:

```
ok .xir-state-all
```

The output displays the CPU state for each CPU:

```
#1 ok .xir-state-all
CPU ID#1
TL=1 TT=3
TPC=e0028688 TnPC=e0028688 TSTATE=9900001e06

CPU ID#5
TL=1 TT=3
TPC=e002755c TnPC=e0027560 TSTATE=4477001e03
```

Note – The XIR does not override the NVRAM `auto-boot?` variable.

Where:

TL	Trap label
TT	Trap type
TPC	Trap program counter
TSate	Trap state

Flash PROM Management

The following OpenBoot 3.x commands are used in flash PROM management:

- `flash-update-system`
- `prom-copy`
- `update-proms`

`flash-update-system`

Usage

```
flash-update-system ( -- )
```

Purpose

To download the default flash images on all the boards in the system.

Note – The default device used is the one pointed to by “net.”

The default image names are described in TABLE 1-1.

TABLE 1-1 Default Image Names

Board Type	Image File Name	Description
CPU board PROMs	<code>cpu.flash</code>	N/A
1	<code>io2sbus.flash</code>	Dual SBus I/O board
2	<code>io1sbus.flash</code>	Single SBus I/O board with graphics
3	<code>pci.flash</code>	Dual PCI I/O board
4	<code>io2sbus+.flash</code>	Dual SBus I/O board (SOC chip)
5	<code>io1sbus+.flash</code>	Single SBus I/O board with graphics (SOC chip)

Note – This command does not update boards in low power mode.

prom-copy

Usage

```
prom-copy ( src dst -- )
```

Purpose

To copy a flash PROM from board `src` to board `dst`. Source (`src`) and Destination (`dst`) are specified by slot number.

update-proms

Usage

```
update-proms ( -- )
```

Purpose

To synchronize the latest copy of each type of PROM on all other boards of the same type.

This command copies the latest version of each type of PROM (CPU and I/O boards) on all other boards of the same type. This results in all boards of the same type having the latest (same) PROM.

System Configuration and Diagnostic Information

To print system configuration and diagnostic information, use `prtdiag` instead of using an OpenBoot command. The diagnostic information displayed lists the failed field replaceable units (FRUs) in the system. For more information on `prtdiag`, see the `prtdiag` man page.

TOD Clock Management

This section describes the following commands related to time-of-day (TOD) clock management, which includes NVRAM:

- `copy-clock-tod-to-io-boards`
- `copy-io-board-tod-to-clock-tod`

`copy-clock-tod-to-io-boards`

Usage

```
copy-clock-tod-to-io-boards
```

Purpose

To copy the contents of the clock board NVRAM and the contents of the TOD clock to all good I/O boards in the system.

This occurs automatically if all of the following conditions are true:

- There is a functioning clock board in the system.
- Its contents match that of at least one I/O board in the system.

`copy-io-board-tod-to-clock-tod`

Usage

`copy-io-board-tod-to-clock-tod (src --)`

Purpose

To update the contents of a clock board (probably new) with the contents from one of the backup I/O board copies.

Note – This may have to be done if the clock board was replaced and the user wants to restore its original NVRAM.

Specific NVRAM Variables

This section describes the following NVRAM variables:

- `configuration-policy`
- `disabled-board-list`
- `disabled-memory-list`
- `memory-interleave`
- `sbus-probe-default`
- `sbus-specific-probe`

configuration-policy

Variable Name	Value	Default Value
configuration-policy	component	component

This variable determines the configuration policy. When a faulty component is detected, the value options are as follows:

Hardware Device	Description
Component (default)	Disable only what failed.
System	Stop the system in POST if any component failed tests.
Board	Disable the entire board that contains the failed component.

disabled-board-list

Note – The master board (the CPU board in the lowest slot) will not be disabled if it is put in the `disabled-board-list`. The operating system displays a warning as follows: `WARNING: Disabled board 0 was really active`

A valid example is:

```
ok setenv disabled-board-list 45      (disable boards in slots 4 and 5)
ok setenv disabled-board-list 7af    (disable boards in slots 7, 10, and 15)
```

This is a list of boards that are not to be used by the system. These boards are put in low power mode on the next reset and remain there until they are removed from this list on the following reset.

To reset a list to null, type:

```
ok set-default disabled-board-list
```

For a step-by-step procedure on how to disable a defective board, see “To Disable a Defective Board” in Chapter 2.

disabled-memory-list

This command lists the boards with memory on them that will not be used. This variable takes effect on the next reset or power on. For both of the above variables, the list is a sequence of any number of boards 0 through 9 and a through f.

An example follows:

```
ok setenv disabled-memory-list 234f
```

The above command means that memory on the CPU/Mem board that is plugged in the system slot numbers 2, 3, 4, and f (15 for decimal) will be disabled.

To reset a list to null, type:

```
ok set-default disabled-memory-list
```

memory-interleave

Variable Name	Value	Default Value
memory-interleave	max	max

This variable determines how the memory on various boards is to be interleaved. The default value is maximum interleaving. When it is set to “min,” no interleaving is required. This takes effect on the next reset or power on.

sbus-probe-default

Variable Name	Value
sbus-probe-default	d3120

This variable defines the SBus device probe order on an I/O board per SBus, where:

d	On-board SOC
3	On-board FEPS
0-2	SBus slots 0, 1, and 2

The device probe order on a Type 1 I/O board is as follows, since the five SBus devices are divided between two SBuses:

lo sbus	d, 1, 2
hi sbus	3,0

However, on a Type 2 I/O board, since there is only 1 SBus, the probe order is:

lo sbus	absent	(UPA/FFB Port in its place)
hi sbus	d, 3, 2, 0	(no slot 1)

To change the default probe order to 123d0, type:

```
ok setenv sbus-probe-default 123d0
```

Remember that this changes the default probe order for all boards in the system. You can also use this to skip over an SBus slot, but don't include it in the list of devices to probe. To change the probe order for a specific board, use the `sbus-specific-probe` variable.

sbus-specific-probe

Variable Name	Value
sbus-specific-probe	1:d120

This variable controls the SBus probe order on a given list of boards. To set the probe order as 320 on I/O board 4, type:

```
ok setenv sbus-specific-probe 4:320
```

The number preceding the colon (:) is the slot number; the numbers following it are the SBus device numbers in the desired probe order. All unlisted I/O boards in the system use the default probe order as defined by the `sbus-default-probe` NVRAM variable.

Multiple boards can be defined by this variable as follows:

```
ok setenv sbus-specific-probe 4:320 6:d3210 7:0123d
```


Board Hot-Plug Software Procedures

This chapter explains how to use the board hot-plug capability. For command information and examples, see Chapter 1, “OpenBoot 3.x Commands.” Also see Chapter 3, “CPU Over Temperature Safeguard.” The CPU over temperature feature ensures that the temperature on any CPU/memory board does not go above safe temperature operating range.

The board hot-plug procedures described in this chapter need to be followed by a system reboot.

The one known restriction is that you cannot detach an I/O board that has the central bit set.

Disabled System Board

A system board can become disabled (not used by the operating system) in three ways:

- A self-test detects a failure and disables the board.
- The board is disabled manually using `disabled-board-list`. In this case, the operator tells the system not to use the board. For example:

```
ok setenv disabled-board-list 72
```

The above command disables boards in slots 7 and 2. See “`disabled-board-list`” on page 8” for more information.

- The board was inserted while the operating system was running.

▼ To Swap Out a Disabled Board

1. **Make sure that the board is disabled (not in use by the operating system, power light off).**
2. **Remove the disabled board.**



Caution – If the yellow light is on, use `prtdiag` to determine the cause before installing a new board.

3. **Install a new board.**
 - a. **Verify that system precharge is OK.**
 - b. **Verify that hot-plug is available.**
4. **Reboot the system.**

Activated System Board

The system board is activated when the following three conditions are met:

- The board is in place during system startup.
- The slot has not been disabled by `disabled-board-list`.
- The board passes self-test.

▼ To Swap Out an Activated Board

1. **Halt the system.**
2. **Power off the system.**
3. **Remove and replace the board.**
4. **Reboot the system.**

Disabling Hardware

By using the `configuration-policy` command, you can disable

- **Component**—Disables only the failing component.
- **Board**—Disables the board if any component on it fails.
- **System**—Stops the system at the POST menu if there is a failure.

Examples:

```
ok setenv configuration-policy board
```

or

```
# eeprom "configuration-policy board"
```

▼ To Disable a Defective Board

If you suspect a board is defective and want to request that the system disable the board, perform the following procedure.

- 1. Prohibit the system from using the board by using the `setenv` command at the `ok` prompt or the `eeprom` command at the `#` prompt. In the examples that follow 3 equals slot 3.**

```
ok setenv disable-board-list 3
```

or

```
# eeprom "disable-board-list"=3
```

- 2. Reboot the system.**
- 3. Remove the unused board and insert a new board.**
- 4. Clear the `disabled-board-list`. See “`disabled-board-list`” on page 8 for more information.**
- 5. Reboot the system.**

Getting More Information

For additional information on Alternate Pathing, which is the ability to switch between two connections for disk and network adapters, see the *Sun Enterprise Servers Alternate Pathing User's Guide* (P/N 805-3532-10), which is part of the Solaris on Sun Enterprise Servers AnswerBook on the Supplement CD.

CPU Over Temperature Safeguard

The CPU over temperature safeguard (COS) is a new Sun Enterprise 3000, 4000, 5000, and 6000 platform safeguard feature for the Solaris 2.6 software environment. COS is an automatic feature available on the Sun Enterprise family of x000 servers. It ensures that the temperature on any CPU/memory board *does not* go above the safe operating range.

COS Requirements

COS operation requires proper firmware support. COS is *not* available if an Sun Enterprise x000 server lacks enabling firmware. In this case, the system displays these messages during the boot sequence:

```
WARNING: Firmware does not support CPU power off
WARNING: Automatic CPU shutdown on over-temperature disabled
WARNING: Firmware does not support CPU restart from power off
WARNING: The ability to restart individual CPUs is disabled
```

- **To check the firmware revision level, use the `prtdiag -v` command.**

The correct firmware version for COS support is 3.2.8 or above.

The system, when equipped with the required firmware, displays the following message during the boot sequence:

```
Board 0:  OBP  3.2.8 1997/02/27 14:00  POST 3.5.1 1997/03/05 09:34
(or equivalent for later firmware)
```

Overheating Factors

Many external forces can affect the temperature and compound the CPU high temperature problem, including:

- Room air-conditioning is incorrectly set
- Lateral cooling is obstructed

There are also some Solaris software environment issues, such as bound threads or having only one CPU/memory board in the system. These Solaris software environment issues can cause a fallback to the existing shutdown behavior.

The CPU over temperature safeguard does not affect the Solaris software environment in any way. The technology operates only during over temperature conditions.

COS Operation

COS functions by monitoring the temperatures of all system CPUs. Warning messages are displayed in the system console when the over temperature occurs. For example:

```
WARNING: CPU/Memory board 0 is warm (temperature: 73C). Please check system
cooling
NOTICE: Processor 0 powered off.
NOTICE: Processor 1 powered off.
```

The following procedure describes the steps to follow when one or more CPUs reach an over temperature condition.

Resolving an Over Temperature Condition

When the COS feature detects a CPU over temperature condition, it takes the CPU offline and powers it off.

The system continues to operate with the offending CPUs regarded as powered off. The CPUs are the chief source of heat on a CPU/Memory board; removing that heat source lowers the temperature into the normal operating range. This prevents the sudden down time to the production server.

▼ To Resolve an Over Temperature Condition

1. Verify the new state with the `psrinfo` command.

The `psrinfo` output reflects the new CPU state:

```
0          powered-off since 03/11/97 09:48:31
1          powered-off since 03/11/97 09:48:31
```

2. Without powering off the operating system, replace the defective power supply (containing cooling fans) with a working unit.

Note – If desired, you can cleanly halt the server using `/etc/halt` or `init 0` at the root or superuser prompt before replacing the defective power supply.

3. Bring the CPUs back to normal operation using the `psradm` command:

```
# psradm -n processor_id#
```

With the CPU over temperature safeguard feature, if the temperature sensor again reports an over temperature (the temperature is still out of range), then the attempt to bring the CPUs back into operation using the `psradm` command fails, and a `-1` and an error message is returned.

If the CPUs in question return to normal operating temperature, the console messages display a message similar to the following.

```
NOTICE: CPU/Memory board 0 has cooled down (temperature: 72C), system OK.
```

Failure to Offline CPUs

In some instances, the CPU power control cannot disengage the affected CPU(s) from the Solaris software environment. For example, if the high temperature condition occurs with only one CPU/memory board with two processors in the system, processor 1 will not go to off-line due to its being the last processor in the system.

Failure to Power Down CPUs

If the attempted de-coupling of the problem CPUs from the Solaris software environment fails, the temperature continues to increase. When the temperature reaches the hard upper operational temperature limit, the system shuts down. You will see a message similar to the following:

```
WARNING: CPU/Memory board 0 is very hot (temperature: 83C)
WARNING: System shutdown scheduled in 20 seconds due to over-temperature
condition on CPU/Memory board 0
WARNING: CPU/Memory board 0 still too hot (temperature: 83C). Overtemp shutdown
started
```

Enabling a Hardware Timer

This chapter explains how to do the following:

- Enable a hardware timer that will reset the system if it times out
- Display system configuration and diagnostic information
- Reset and power cycle the system from a remote console

Hardware Watchdog

The Sun Enterprise x000 family of servers provide the ability to enable a hardware timer that will hard-reset the system if it times out. To enable the use of this feature, `watchdog_enable` must be set to 1 in `/etc/system`.

History Log Option of `prtdiag(1M)`

- **To display system configuration and diagnostic information, use the `prtdiag(1M)` command.**

The `-l` option of `prtdiag(1M)` logs its output to `syslogd(1M)` only if failures or errors exist in the system.

Resetting and Power Cycling the System From a Remote Console

You can reset the system or power cycle from the remote console under these conditions:

- The console must be connected to port A on the clock board.
- The key switch must be in either the On or Diagnostic setting. If it is in the Secure or Off position, the remote key sequences and button resets are ignored.
- Security features (such as OpenBoot `security-mode`) are disabled.
- Type slowly, no faster than 0.5 seconds and no slower than 5 seconds between characters.

TABLE 4-1 lists the remote console commands, which are useful for resetting the system under general conditions. The remote `XIR` reset command is useful in software development and debugging. For a discussion of this command, see “Externally Initiated Reset XIR” on page 3 in Chapter 1.

TABLE 4-1 Remote Console Commands

Command	Keyboard Key Sequence
Remote power off/on	Return Return ~ Control-Shift-p
Remote system reset	Return Return ~ Control-Shift-r
Remote XIR (CPU) reset	Return Return ~ Control-Shift-x

Key:

Return = ASCII 0d hexadecimal

~ = ASCII 7e hexadecimal

Control-Shift-p = 10 hexadecimal

Control-Shift-r = 12 hexadecimal

Control-Shift-x = 18 hexadecimal

Note – The remote console logic circuit continues to receive power, even if you have commanded system power off.

Since the remote console logic looks for certain patterns on the `ttya` line in the hardware that can be used to reset the machine, it is important that only authorized personnel have access to the `ttya` serial port.