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# Platform Notes: Sun™ Enterprise™ 3x00, 4x00, 5x00, and 6x00 Systems

Solaris 2.6 Hardware 5/98

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Sun Microsystems, Inc.  
901 San Antonio Road  
Palo Alto, CA 94303  
U.S.A. 415-960-1300

Part No. 805-4164-10  
May 1998, Revision A

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# Preface

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This book describes software features that apply only to the Sun™ Enterprise™ 3x00, 4x00, 5x00, and 6x00 family of servers.

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## Related Documents

For detailed information on the software features described in this book, refer to the man pages for Solaris 2.6 and Solaris 2.6 Hardware: 5/98. For information on DR features, refer to the *Dynamic Reconfiguration User's Guide for Sun Enterprise Systems*.

---

## 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.
<b>AaBbCc123</b>	What you type, when contrasted with on-screen computer output.	% <b>su</b> Password:
<i>AaBbCc123</i>	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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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
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# OpenBoot 3.x Commands

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This chapter describes the OpenBoot™ 3.x commands for the Sun Enterprise 3x00, 4x00, 5x00, and 6x00 servers.

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## 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.

---

# Resetting and Power Cycling the System From a Remote Console

You can reset the system or power cycle from a 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, 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 1-1 lists 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 4.

TABLE 1-1 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.

---

# Externally Initiated Reset XIR

If a hard hang occurs on a system, use XIR to reset and get information about the system 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 level
TT	Trap type
TPC	Trap program counter
TSate	Trap state

---

# Hardware Watchdog

The Sun Enterprise xx00 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`.

---

# 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 1-2.

**TABLE 1-2** 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 PROM (CPU and I/O boards) to 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.

## `prtdiag(1M)` Options

- v lists the most recent AC Power failure, the most recent hardware fatal error information, and, if applicable, environmental status.
- l logs its output to `syslogd(1M)` only if failures or errors exist in the system.

---

# 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
<code>configuration-policy</code>	<code>component</code>	<code>component</code>

---

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 the list is reset to null, and the system is reset.

To reset the list to null, type:

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

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

## 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 indicates that memory on the CPU/Memory board that is plugged in the system slot numbers 2, 3, 4, and f will be disabled.

To reset the 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, by not including 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
<code>sbus-specific-probe</code>	1:d120

This variable controls the SBus probe order on a given list of boards. To set the probe order as 320 on an I/O board in slot 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 and Dynamic Reconfiguration

---

This chapter explains how to use the board hot-plug capability and Dynamic Reconfiguration (DR), where applicable. Hot plug is a hardware feature that allows the replacement of components while a server is running. The system cannot use the new component until the system is rebooted. The Dynamic Reconfiguration software enhancement allows replacement of SBus I/O boards without needing to reboot the server.

For command information and examples, see Chapter 1, “OpenBoot 3.x Commands.”

The board hot-plug procedures described in this chapter need to be followed by a system reboot or by a Dynamic Reconfiguration (DR) restart procedure.

---

**Note** – For Solaris 2.6 5/98, DR applies only to type 1 Sun Enterprise I/O boards. Type 1 I/O boards include SBus and SBus+ boards, which have three SBus slots. I/O boards with slots for PCI cards or graphics cards are not supported. For information on DR procedures, refer to the book, *Dynamic Reconfiguration User's Guide For Sun Enterprise 6x00/5x00/4x00/3x00 Systems*. Check with your Sun sales representative or systems engineer for information on the availability of DR.

---

The online *Dynamic Reconfiguration User's Guide for Sun Enterprise Systems* provides information about preparing your server to use DR, and instructions for performing DR operations.

---

# Disabled System Board

A system board can be 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`. 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. Verify that system precharge is OK.

Use the `prtdiag` command. For more information see Chapter 1, “System Configuration and Diagnostic Information” on page 7.

### 2. Verify that hot-plug is available.

### 3. Make sure that the board is disabled (not in use by the operating system and power light on the target board is off).

### 4. Remove the disabled board.



---

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

---

### 5. Install a new board.

### 6. To activate the board:

- For type 1 I/O boards, use DR commands.
- For other boards, 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

- ▼ If your system supports DR and you are swapping a type 1 I/O board:
  1. Use the appropriate `cfgadm` command to unconfigure the board from the system. Refer to the *Dynamic Reconfiguration User's Guide for Sun Enterprise Systems* for further information regarding this command.
  2. Remove and replace the board.
  3. To activate the board and reconfigure the board to the system, use DR commands.
- ▼ If your system does not support DR:
  1. Halt the system.
  2. Power off the system.
  3. Remove and replace the board.
  4. Reboot the system to activate the board.

---

# 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. Isolate the board from the system:

- For a type 1 I/O board, use a DR procedure to prohibit the system from using the board.
- For all other boards:
  - use the `setenv` command at the `ok` prompt or the `eeprom` command at the `#` prompt and then reboot the system.

In the examples that follow, 3 means slot 3.

```
ok setenv disabled-board-list 3
```

or

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

### 2. Remove the defective board and insert a new board.

### 3. To activate the board:

- For type 1 I/O boards, use DR commands.
- For all other boards, clear the `disabled-board-list`, and then reboot the system.

See “disabled-board-list” on page 9 for more information.

---

# Alternate Pathing

Alternate Pathing (AP) is a software enhancement that works in conjunction with DR and hot plug. AP allows you to bypass a disabled disk or network adapter, avoiding unnecessary downtime. For additional information, refer to the Solaris on Sun Enterprise Servers AnswerBook module *Sun Enterprise Servers Alternate Pathing User's Guide*.



## CPU Over-Temperature Safeguard

---

The CPU over-temperature safeguard (COS) is a Sun Enterprise xx00 platform feature for the Solaris 2.6 software environment. COS is an automatic feature available for Sun Enterprise xx00 servers with the proper firmware support. COS ensures that the temperature on any CPU/memory board *does not* exceed the safe operating range.

---

### COS Requirements

COS is *not* available if a Sun Enterprise xx00 server lacks enabling firmware. In this case, the system displays the following 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
```

When equipped with the proper firmware, the system displays the following 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)
```

- **To check the firmware revision level, use the `prtdiag -v` command.**  
The correct firmware version for COS support is 3.2.8 or later.

---

# Factors in Overheating

Many external conditions can negatively raise the CPU/memory board temperature and compound high temperature problems, including:

- Room air-conditioning set incorrectly
- Lateral cooling obstructed

Some Solaris software environment issues can also affect the CPU temperature, 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. COS operates only when the temperature of a CPU/memory board exceeds the safe operating range.

---

# COS Operation

COS functions by monitoring the temperatures of all system CPUs. Warning messages are displayed in the system console if a CPU/memory board over-temperature condition occurs. The following example indicates an over-temperature condition for CPU/memory board 0:

```
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 off-line and powers it off.

The system continues to operate with the offending CPU 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 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 CPU 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, an exit status of `-1` and an error message is returned.

If the CPU in question has returned to normal operating temperature, the console displays 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 when only one CPU/memory board with two processors is in the system, processor 1 will not go off-line due to its being the last processor in the system.

## Failure to Power off CPUs

If the attempted de-coupling of the problem CPU from the Solaris software environment fails, the temperature may continue to increase. When the temperature reaches the hard upper operational temperature limit, the system shuts down. In this case, a message similar to the following is displayed:

```
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
```