



Sun Enterprise™ 3500 System Reference Manual

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Preface

The *Sun Enterprise™ 3500 System Reference Manual* is for the qualified service-trained maintenance provider.

UNIX Commands

This document may not contain information on basic UNIX® commands and procedures such as shutting down the system, booting the system, and configuring devices.

See one or more of the following for this information:

- *Solaris Operating Environment Handbook for SMCC Peripherals*, which contains Solaris™ 2.x software commands
- AnswerBook2™ online documentation for the Solaris operating environment software environment
- Other software documentation that you received with your system

Typographic Conventions

TABLE P-1 Typographic Conventions

Typeface	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:
<i>AaBbCc123</i>	Book titles, new words or terms, words to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . These are called <i>class</i> options. You <i>must</i> be superuser to do this.
	Command-line variable; replace with a real name or value	To delete a file, type <code>rm filename</code> .

Shell Prompts

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	#

Related Documentation

TABLE P-3 Related Documentation

Application	Title	Part Number
Installation	<i>Sun Enterprise 3500 System Installation Manual</i>	805-2629
Software	<i>SMCC SPARC Hardware Platform Guide</i>	802-5341
	<i>Sun Management Center User's Guide</i>	802-5355
	<i>Dynamic Reconfiguration User's Guide for Sun Enterprise Systems</i>	805-3530
Options	<i>Sun Enterprise Expansion Cabinet Installation and Service Manual</i>	805-4009
	<i>Sun Enterprise 6/5/4/3x00 Systems Board Installation Guide</i>	805-4007
	<i>4 Mbyte UltraSPARC II Installation Guide</i>	805-1150
	<i>Sun Enterprise xx00 Systems CPU Module Installation for 400-MHz 8-Mbyte CPU Module</i>	806-0960
	<i>Sun Enterprise xx00 Systems CPU Module Installation for 464-MHz 8-Mbyte CPU Module</i>	816-1994
	<i>Sun Enterprise 6/5/4/3x00 Systems DIMM Installation Guide</i>	802-5032
	<i>SBus+ and Graphics+ I/O Boards (100 MB/sec Fibre Channels) for Sun Enterprise 6/5/4/3x00 Systems</i>	805-2704
	<i>PCI+ I/O Board Installation and Component Replacement for Sun Enterprise 6/5/4/3x00 Systems</i>	805-1372
	<i>Sun Enterprise Peripheral Power Supply/AC Installation Guide</i>	802-5033
	<i>Sun Enterprise 3500 Fiber Cable Organizer Installation Guide</i>	805-4010
	<i>Sun Enterprise 3500 Interface Board Installation Guide</i>	805-4011
	<i>Sun Enterprise 3500 Auxiliary Peripheral Power Supply Installation Guide</i>	805-4012
	<i>Sun Enterprise Power/Cooling Module (PCM) Installation Guide</i>	802-6244
<i>Sun Enterprise 6x00/5x00/4x00/3x00 Capacity-on-Demand (COD) Building Blocks User's Guide</i>	806-4592	
	<i>Rackmount Placement Matrix web site at docs.sun.com</i>	

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A broad selection of Sun system documentation is located at the following web site:

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Notes, Cautions, and Warnings

Read the safety agency compliance statements in Appendix H, “Compliance Statements,” before performing installation or service procedures on any Sun Microsystems products.



Caution – This equipment contains lethal voltage. Accidental contact with centerplane, card cage, and drive areas can result in serious injury or death.



Caution – Improper handling by unqualified personnel can cause serious damage to this equipment. Unqualified personnel who tamper with this equipment may be held liable for any resultant damage to the equipment.

Individuals who remove any outer panels or open covers to access this equipment must observe all safety precautions and ensure compliance with skill level requirements, certification, and all applicable local and national laws.

Procedures contained in this document must be performed by qualified service-trained maintenance providers.

Note – Before you begin, carefully read each of the procedures in this manual. If you have not performed similar operations on comparable equipment, *do not attempt* to perform these procedures.

For system compliance class and conformity information, refer to Appendix A, “Regulatory Agency Compliance Statements,” in the system installation guide that came with your Enterprise system.

Product Overview

1.1 Standard Features

The Sun Enterprise 3500 system enclosure contains a 5-slot chassis and two built-in disk banks that hold up to eight FC-AL (Fibre Channel-Arbitrated Loop) disk drives.

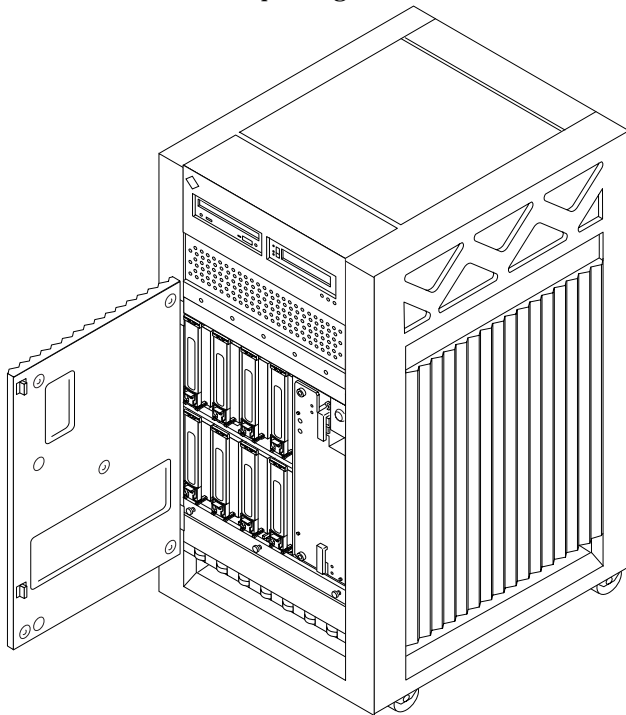


FIGURE 1-1 Enterprise 3500 System

The minimum configuration for the server is:

- Power/cooling module (PCM) or PCM filler panels
- Fan tray
- Clock+ board
- CPU/Memory+ board
- UltraSPARC™ II module
- Main memory
- I/O+ board
- Board filler panels for any unpopulated board slots
- Interface board (IB) or IB filler panel
- Peripheral power supply with EnAC power sequencer
- Auxiliary peripheral power supply or thermal protection module
- Media tray for removable media, including DVD-ROM drive

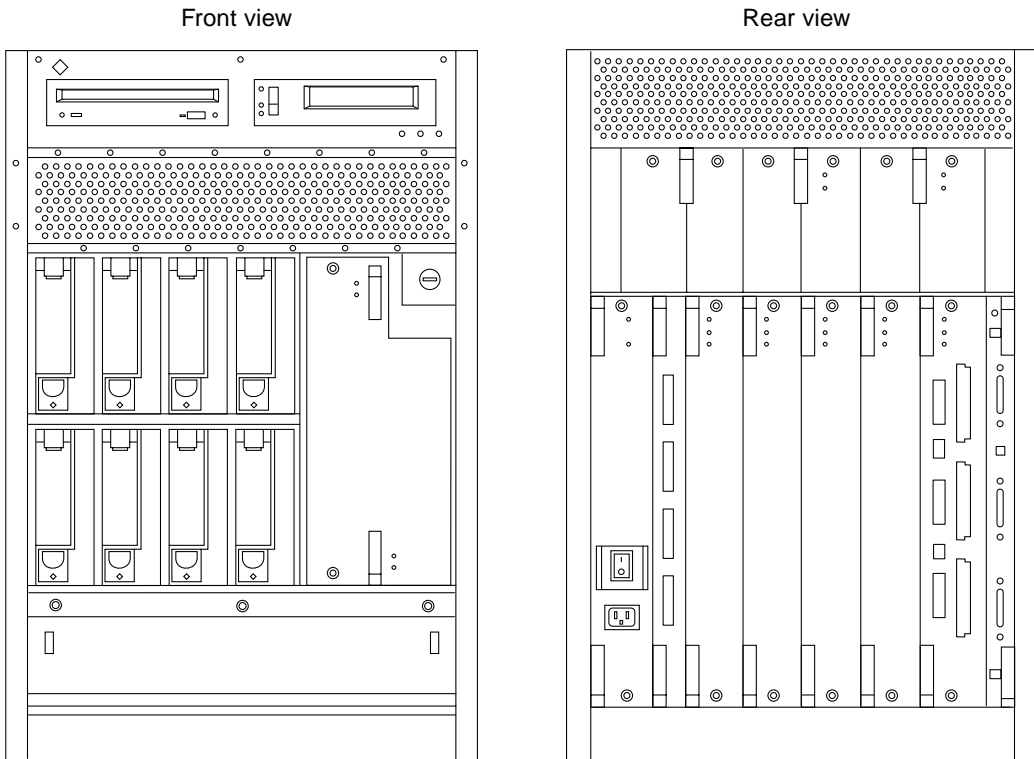


FIGURE 1-2 Enterprise 3500 Components

Note – System components are identified in Appendix F “Illustrated Parts Breakdown.” See FIGURE F-1 on page F-4 and FIGURE F-2 on page F-5.

1.2 Internal Options

TABLE 1-1 Internal Options for the Enterprise 3500 System

Option	Quantity	Comments
CPU/Memory+ boards, SBus+ I/O boards, Graphics+ I/O boards, PCI+ I/O boards	5 <i>total</i> per system	Each slot can accept four types of boards: CPU/Memory+ board, SBus+ I/O board, Graphics+ I/O board, and PCI+ I/O board. Combinations can vary. Since slot 1 connects to the onboard SCSI devices, however, this slot should be reserved for the first I/O+ board. One system board becomes the system master automatically. Jumper changes are not needed.
UltraSPARC II modules	8 per system	0-2 modules on each CPU/Memory+ board.
Memory modules	0, 8, or 16 DIMMs per CPU/Memory+ board	DIMM sizes are 8, 32,128, or 256 Mbyte DRAM. Do not mix sizes within the same bank. Add 8 DIMMs at a time. Install DIMMs in all bank 0 sockets first on each CPU/Memory+ board, from the lowest slot to the highest. Once bank 0 is full, install remaining DIMMs in bank 1 sockets in the same order.
SBus cards	12 per system	0-3 cards per SBus+ I/O board, 0-2 cards per Graphics+ I/O board.
Graphics (UPA) cards	4 per system	1 card per Graphics+ I/O board.
PCI cards	Dependent upon card type, consult your customer representative	0-2 cards per PCI+ I/O board.
Media tray	DVD-ROM drive and optional tape drive	Media tray takes removable-media drives only. One DVD-10 is standard equipment per system. One optional tape drive is supported in the media tray.
Interface board	1 per system	4 GBIC slots on the interface board.
Disk drives	8 internal disk bays	Top bank can hold 4 disk drives; bottom bank can hold 4 disk drives. Install disks in bottom bank first, from left to right, starting with bay 0 (the farthest bay to the left as you face the front of the system is bay 0. <i>Note: Reserve bay 0 for boot disk</i>). Also install disks in top bank from left to right.

Safety Precautions and Tools Requirements

2.1 Safety Precautions

For your protection, observe the following safety precautions when setting up your equipment:

- Follow all cautions, warnings, and instructions marked on the equipment.
- Never push objects of any kind through openings in the equipment as the objects might touch dangerous voltage points or short out components that could result in fire or electric shock.
- Refer servicing of equipment to qualified personnel.

To protect both yourself and the equipment, observe the following precautions:

TABLE 2-1 Safety Precautions

Item	Problem	Precaution
Wrist or foot strap	ESD	Wear a conductive wrist strap or foot strap when handling printed circuit boards.
ESD mat	ESD	An approved ESD mat provides protection from static damage when used with a wrist strap or foot strap. The mat also cushions and protects small parts that are attached to printed circuit boards.
Cover panels	System damage and overheating	Re-install all cabinet cover panels after performing any service work on the system.
Card cage slot filler panels	System damage and overheating	Make sure all empty board slots have a filler panel installed.

2.2 Symbols

The following symbols mean:



HAZARDOUS VOLTAGES — To reduce the risk of electrical shock and danger, follow the instructions accompanying this symbol.



RISK OF INJURY OR EQUIPMENT DAMAGE — To reduce the risk, follow the instructions accompanying this symbol.



HOT SURFACE — Avoid contact. Surface may cause injury if touched.



ALTERNATING CURRENT OR VOLTAGE



ON



OFF



STAND-BY — The system is in Standby mode and the operating system is halted. The circuit breaker can be turned off.



DIAGNOSTICS — System is powered on. If system is rebooted, POST will display extended diagnostic messages.



RUNNING (on a board or control panel) — System board is operating normally.



LOCKED — On a board, this means the captive screw is in the locked position. On a system panel, this means the system is running in secure mode and will not respond to commands from the console. The key can be removed.

FIGURE 2-1 Symbols, Part 1







	UNLOCKED — On a board, the 1/4-turn access screw is in the unlocked position.
	COMPONENT POWER — The board is receiving DC power.
	SERVICE NEEDED — The system has detected a hardware failure.
	PROTECTIVE EARTH — Earth ground
	CHASSIS GROUND — Frame or chassis ground
	FUSE — Replace ONLY with fuse of the same type and rating.

FIGURE 2-2 Symbols, Part 2

2.3 System Precautions

Ensure that the voltage and frequency of the power outlet to be used matches the electrical rating labels on the equipment.

Wear antistatic wrist straps when handling any magnetic storage devices, CPU/Memory+ boards, or other printed circuit boards.

Use only properly grounded power outlets as described in Section 1.2, “Preparing the Electrical Circuits,” in the *Sun Enterprise 3500 System Installation Guide*, part number 805-2629.



Caution – DO NOT make mechanical or electrical modifications to the cabinet. Sun Microsystems™ is not responsible for regulatory compliance of modified cabinets.



Caution – The chassis AC power cord must remain plugged in to ensure a proper ground.

2.4 Tools Required

This list represents the minimum of tools and test equipment you will need:

- Screwdriver, Phillips No. 2
- Screwdriver, Phillips No. 1
- DIP/IC extraction tool
- ESD mat
- Grounding wrist strap
- Needlenose pliers
- Hex driver, 3/32
- Torque screwdriver (supplied with the system)

CPU/Memory+ Boards and Components

To protect both yourself and the equipment, make sure you follow the precautions in Chapter 2 “Safety Precautions and Tools Requirements.”

This chapter contains the following topics:

- Section 3.1 “Handling Boards and Assemblies” on page 3-2
- Section 3.3 “Hot-Plug Feature” on page 3-4
- Section 3.4 “Dynamic Reconfiguration for Hot-Pluggable System Boards” on page 3-4
- Section 3.5 “CPU/Memory+ Boards” on page 3-5
 - Section 3.5.1 “Removing a Board” on page 3-5
 - Section 3.5.2 “Installing a Board” on page 3-7
 - Section 3.5.3 “UltraSPARC II Modules” on page 3-10
 - Section 3.5.5 “Memory Modules (DIMMs)” on page 3-15

For your protection, also observe the following safety precautions when setting up your equipment:

- Follow all cautions, warnings, and instructions marked on the equipment.
- Never push objects of any kind through openings in the equipment as they may touch dangerous voltage points or short out components that could result in fire or electric shock.
- Refer servicing of equipment to qualified personnel.

3.1 Handling Boards and Assemblies



Caution – The chassis AC power cord must remain connected to ensure a proper ground.



Caution – The CPU/Memory+ boards, their modules, and cards have surface-mount components that can be broken by flexing the boards.

To minimize the amount of board flexing, observe the following precautions:

- Transport the board in an antistatic bag.
- When removing the board from an antistatic bag, keep the board vertical until you lay it on the Sun antistatic mat.
- Hold the board only by the edges near the middle of the board, where the board stiffener is located. Do not hold the board *only* at the ends.
- Do not place the board on a hard surface. Use a cushioned antistatic mat. The board connectors and components have very thin pins that bend easily.
- Do not use an oscilloscope probe on the components. The soldered pins are easily damaged or shorted by the probe point.
- Be careful of small parts located on the component side of the board.



Caution – The heatsinks on the board can be damaged by incorrect handling. Do not touch the heatsinks while installing or removing the board. Hold the board only by the edges. If a heatsink is loose or broken, obtain a replacement board.



Caution – The heatsinks on the board can be damaged by improper packaging. When storing or shipping the board, ensure that the heatsinks have sufficient protection.

Note – New system boards have square heatsinks, as depicted in this manual. All boards prior to August 1999 have round heatsinks.

3.2 Filler Panels

All empty board slots in Enterprise 3500 systems must have a filler panel installed for cooling purposes and for EMI protection. Filler panels are inserted into a board slot with the springfingers facing to the right (FIGURE 3-1).

- To remove the filler panel from the card cage, unfasten the captive screws at the top and bottom of the panel.

Grasp the handles to pull the filler panel out.

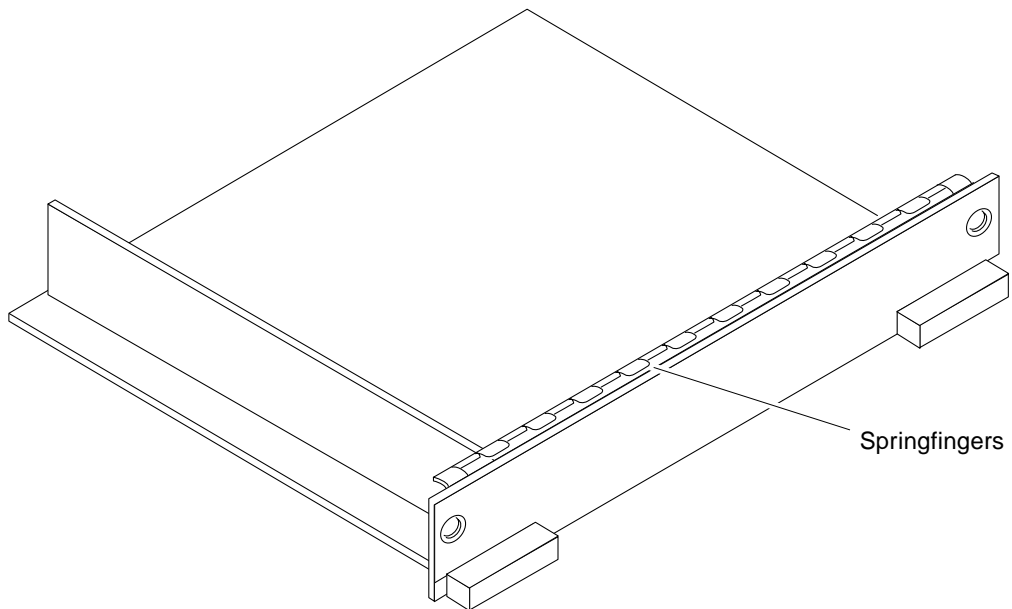


FIGURE 3-1 Filler Panel

3.3 Hot-Plug Feature

The hot-plug feature enables you to insert a new board into a powered-on system, despite the system being “live,” or being supplied with electrical power. When the hot-plug feature is used to add a board to a powered-on system, the system does not use the new board until the system is rebooted.

Sun Enterprise Systems have extensive error detection mechanisms that detect failed components (I/O boards, CPU Memory boards, CPUs, memory) during Power on Self Test (POST). When a failed component or system board is detected, POST will put that board into lower-power mode and reconfigure the systems so that failed boards are no longer accessible.



Caution – The peripheral power supply provides the precharge voltages required for hot-plug. Do not attempt hot-plug of a system component if the power supply is inoperative. Use `prtdiag(1M)` to determine the status of the peripheral power supply.



Caution – If the message: NOTICE: Hot Plug not supported in this system is displayed during boot, do NOT attempt hot-plug in this system or damage to the hardware will occur.

3.4 Dynamic Reconfiguration for Hot-Pluggable System Boards

If the dynamic reconfiguration feature is enabled in the operating environment, service providers can install, remove, or replace a hot-pluggable system board without powering down the system. For the Solaris 2.6, Solaris 7, and Solaris 8 Operating Environments, dynamic reconfiguration applies to specific types of boards in the Sun Enterprise 3x00. For instructions, refer to the *Sun Enterprise 6x00, 5x00, 4x00, and 3x00 Systems Dynamic Reconfiguration User's Guide* included in the online AnswerBook2 for your Solaris Operating Environment or refer to the docs.sun.com web site for more information on dynamic reconfiguration.

3.5 CPU/Memory+ Boards

Each CPU/Memory+ board supports up to two UltraSPARC II modules and 16 DIMM slots for memory.

The CPU/Memory+ board includes an Address Controller (AC+), 8 bit-sliced Data Controllers (DC+s), a Bootbus Controller (BC), on-board devices (including a flash PROM, and SRAM), two CPU processor slots, and slots for two memory banks of 8 DIMMs each.

3.5.1 Removing a Board



Caution – Remove a board from a powered-on system only after the ASR software has disabled that board, otherwise, the operating system should be halted and the system powered off prior to board removal. See Chapter 11 “Powering Off and On,” and then Section 3.5.1.2 “Removing a Board From a Powered-Off System.”

3.5.1.1 Removing a Board From a Powered-On System

1. Ensure that the board has been disabled. See Section 3.3 “Hot-Plug Feature.”

Once disabled, one of two results occurs:

- The three LEDs on the board are not lit (board has no power).
- The outer two green LEDs are not lit and the middle yellow LED is lit (board in low power mode).

2. Use a Phillips No. 1 screwdriver to mechanically release the board from the system card cage.

Insert the screwdriver into each quarter-turn access slot (the slots are located on the left and right sides of the board front panel) and then turn a quarter turn so that the arrow points to the unlocked position (FIGURE 3-2).

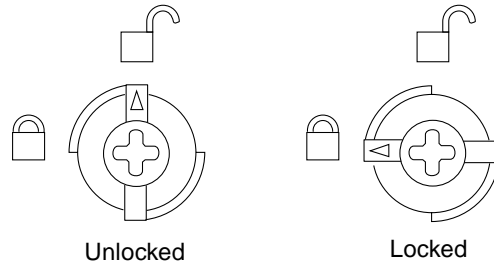


FIGURE 3-2 Unlocking and Locking Quarter-Turn Access Slots

3. Pull the ends of both extraction levers outward simultaneously to unseat the board centerplane connector from the centerplane receptacles (FIGURE 3-3).

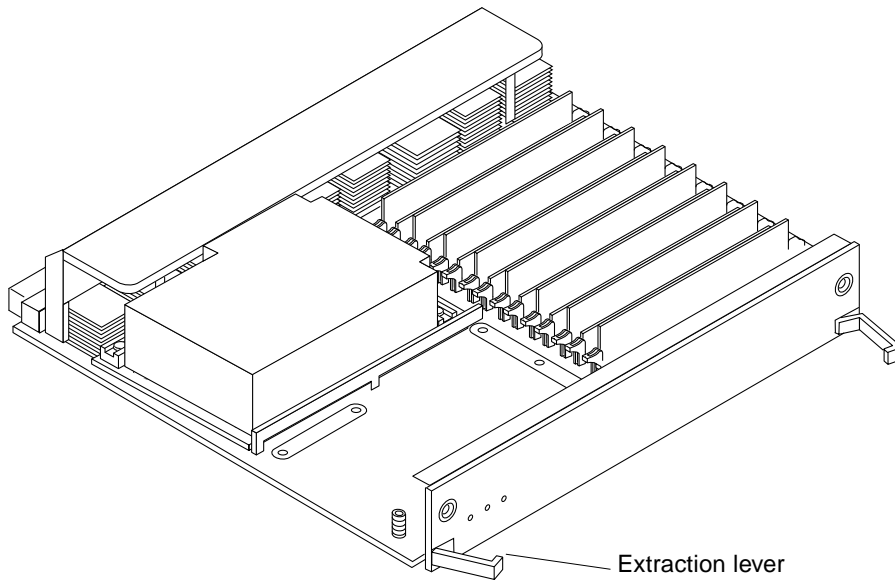


FIGURE 3-3 CPU/Memory+ Board



Caution – If a board is not immediately replaced, a filler panel must be installed in the board’s place to prevent overheating. See Section 3.2 “Filler Panels.”

3.5.1.2 Removing a Board From a Powered-Off System

1. Use a Phillips No. 1 screwdriver to mechanically release the board from the system card cage.

Insert the screwdriver into each quarter-turn access slot (the slots are located on the left and right sides of the board front panel) and then turn a quarter turn so that the arrow points to the unlocked position. See FIGURE 3-2 on page 3-6.

2. Pull the ends of both extraction levers outward simultaneously to unseat the board from the centerplane receptacles (FIGURE 3-3).
3. If a board is not immediately replaced, a filler panel must be installed in the board's place to prevent overheating.

See Section 3.2 "Filler Panels."

3.5.2 Installing a Board

Note – For new and existing Sun Enterprise 6x00, 5x00, 4x00, and 3x00 Systems that have been configured to support dynamic reconfiguration, the system board can be enabled into the current system using dynamic reconfiguration commands without rebooting.

For more information, refer to the *Sun Enterprise 6x00, 5x00, 4x00, and 3x00 Systems Dynamic Reconfiguration User's Guide* or refer to the docs.sun.com web site for more information on dynamic reconfiguration.

3.5.2.1 Board Slot Selection

Logically there is no difference between the board slots, and each slot can accept any board type. However, since the lowest numbered board slot (slot 1) is the only slot connected to the onboard SCSI devices, this slot is usually reserved for the first I/O+ board (FIGURE 3-4).

Note – Board slot numbers are marked on the chassis.

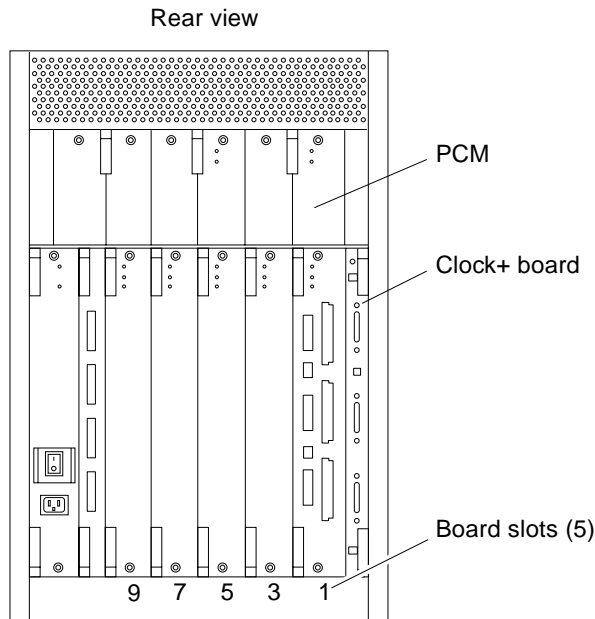


FIGURE 3-4 Board Slot Locations

3.5.2.2 Cooling and Power Issues

There should be one power/cooling module (PCM) for every two boards to adhere to cooling and power requirements. The PCMs must be installed adjacent to populated board slots to ensure the fan in the PCM can cool the respective boards.

Note – All empty slots must have a filler panel installed to ensure proper cooling and for EMI protection. See Section 3.2 “Filler Panels.”

3.5.2.3 Powered-On or Powered-Off System

1. **Carefully insert the board in the proper slot in the card cage, component side to the right, ensuring that the board does not slip out of the top and bottom card guides.**

All empty slots must have a filler panel installed.

2. **Ensure that both extraction levers are in the outward position as you slide the board toward the centerplane receptacles.**

The board will not seat fully unless the levers are in this starting position. See FIGURE 3-3 on page 3-6 for positioning of the levers.



Caution – DO NOT FORCE any board into a slot; it can cause damage to the board and system. The board should insert and seat smoothly. If it binds, remove the board and inspect the card cage slot for any obvious obstructions. Also inspect both the board and the centerplane for bent pins or other damage.

3. **Push the board into the card cage, then simultaneously press both extraction levers to seat the board on the centerplane.**

Pushing both levers simultaneously avoids twisting the board and bending the connector pins, and mates the board centerplane connector to the matching receptacle on the centerplane. Do not press on board front panel to seat it—doing so will damage the connector pins.

4. **Mechanically lock the board to the system chassis by inserting a Phillips No. 1 screwdriver into each quarter-turn access slot and then turning to the locked position.**

See FIGURE 3-2 on page 3-6.

5. **Once the board is installed, when the system is powered on, a message similar to the following will be displayed on the monitor:**

Example depicts screen output when a new CPU/Memory+ board has been hot-plugged into slot 5 of an operating Enterprise system:

```
NOTICE: CPU Board Hotplugged into Slot 5
NOTICE: Board 5 is ready to remove
```

Additionally, any subsequent `prtdiag(1M)` output would include information for board slot 5. Again, note that the system will not use the new board until the system is rebooted.

Note – For new and existing Sun Enterprise 6x00, 5x00, 4x00, and 3x00 Systems that have been configured to support dynamic reconfiguration, the system board can be enabled into the current system using dynamic reconfiguration commands without rebooting.

6. **Reboot the system now or schedule a later time to reboot when system disruption will be minimized.**

3.5.3 UltraSPARC II Modules

Each CPU/Memory+ board has four connectors for UltraSPARC II modules (up to two modules per board, two connectors per module). For each module, there is a connector with 144 pins and a connector with 288 pins (FIGURE 3-5).

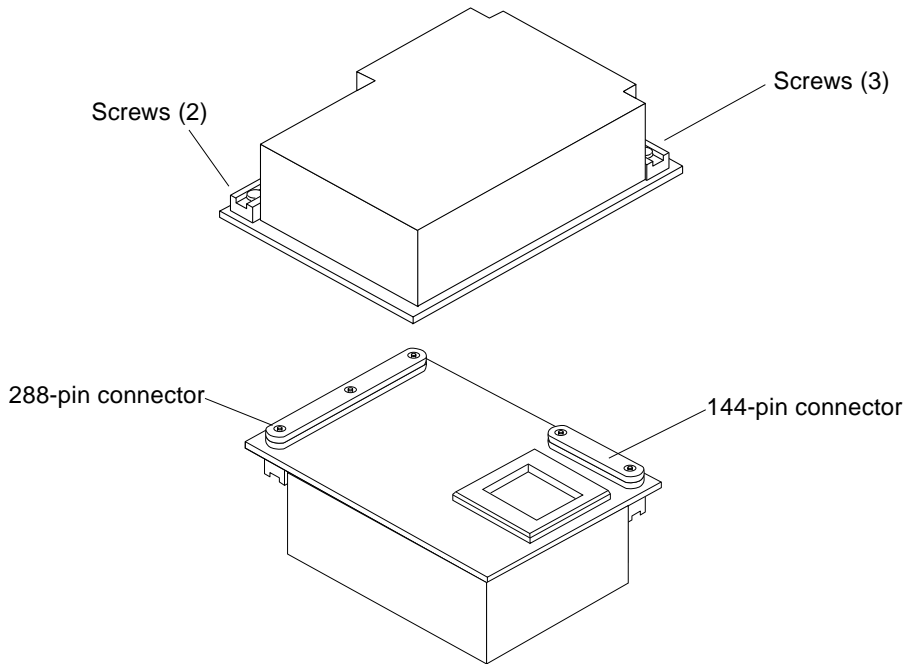


FIGURE 3-5 UltraSPARC II Module Connector Detail

CPU Module Cover

CPU modules are now shipped with CPU module installation instructions and the screw tightening sequence on the cover.

3.5.4 Handling Precautions

The following precautions should be exercised when handling UltraSPARC II modules:

- UltraSPARC II modules are static-sensitive and an antistatic wrist strap field kit must be used when handling the modules.

- Always handle the modules by the edges and not by the smaller black heat sinks that break easily if handled improperly.
- Do not handle the modules by touching the gold pins on the compression connectors. Natural oils on the hands cause these connectors to oxidize and corrode over a period of time, resulting in the need for module cleaning or replacement.

3.5.4.1 Removing a Module

Each module is locked to the main board with a single standoff and is connected to the main board by two connectors. The pins within the connectors are compressed to the corresponding board pin receptacles by a metal compression bar which, when secured with screws, compresses the module connector pins to the board receptacle pins (FIGURE 3-6).

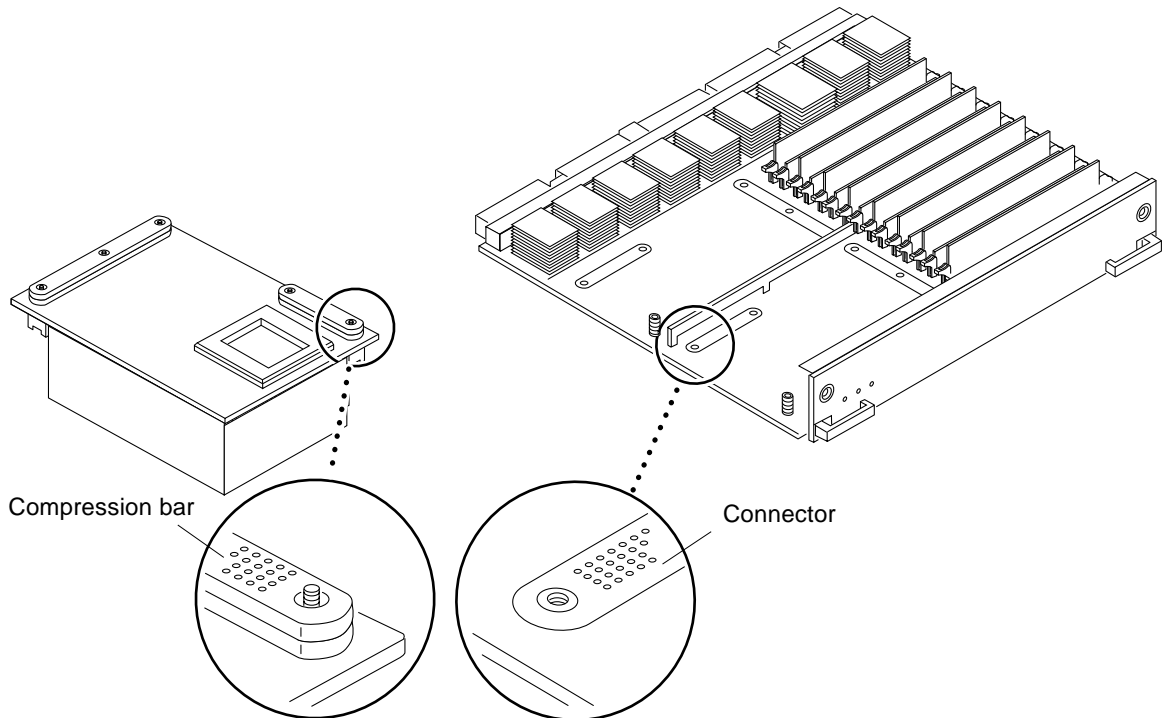


FIGURE 3-6 UltraSPARC II Module Connector Detail

1. Use the procedures in Section 3.5.1 “Removing a Board,” to remove the applicable CPU/Memory+ board.



Hot Surface – The heatsinks on the UltraSPARC II modules may be hot. Use caution when removing or installing UltraSPARC II modules and avoid contact.

2. Use a 3/32 hex driver to loosen all screws from each of the compression bars. Two screws for the 144-pin connector, three screws for the 288-pin connector (FIGURE 3-5).
3. Lift the module straight up off the board mating surface and the single standoff that locks the module to the board (FIGURE 3-7).

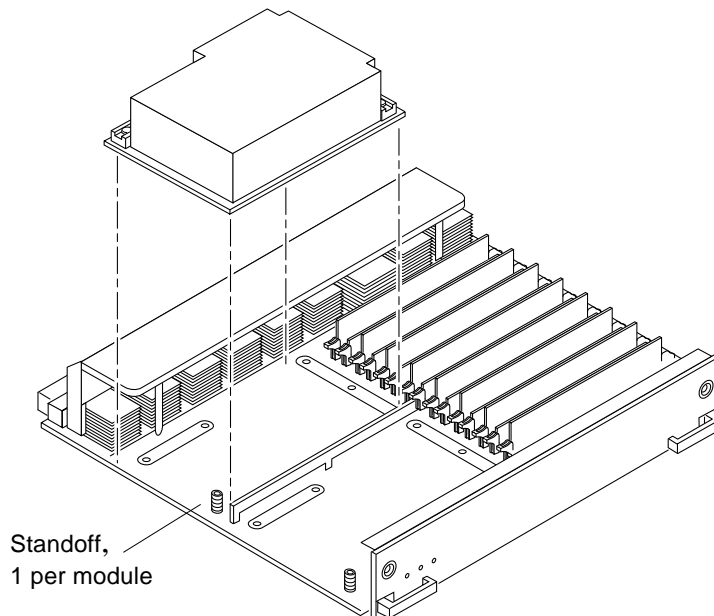


FIGURE 3-7 UltraSPARC II Module Removal and Replacement

4. Place the module in an antistatic bag.

3.5.4.2 Installing a Module

To maximize performance when installing UltraSPARC II modules on a CPU/Memory+ board, use all CPU 0 connectors on the lowest numbered slot to the highest numbered slot. After this, if there are modules remaining, use the CPU 1 connectors in the same order.

Note – Screws on the UltraSPARC II modules must be tightened to 6 inch-pounds. The torque screwdriver that came with your system is set to this specification.

- 1. Take the UltraSPARC II module out of the protective packaging and inspect for dust on the connectors.**

If necessary, clean the connectors with a dry, stiff toothbrush.

- 2. Remove the applicable CPU/Memory+ board as indicated in Section 3.5.1 “Removing a Board.”**
- 3. Inspect the board module mating surface and connectors. If they require cleaning, use a dry, stiff toothbrush to remove debris.**

Note – There are miniature silver alignment pins on the compression connectors which, when the module is properly seated, align with related receptacles on the mating surfaces of the CPU/Memory+ board. In addition, there is a gold standoff mounted on the CPU/Memory+ board opposite the module’s smaller board connector. This acts as a standoff for the module as well as an alignment pin.

- 4. Holding the module by the edges, align the module over the two board receptacles (use the single standoff and the alignment pins on the module compression connector as a guide). See FIGURE 3-6 and FIGURE 3-7.**
- 5. Rest the module on the board standoff, aligning the compression connectors with the screws.**

Firmly but gently press the module straight down until the standoff post snaps into place and the module connectors are fully seated.
- 6. Using the torque screwdriver provided with your system, tighten the screws in three steps:**
 - a. Tighten each screw in the sequence shown in figure 3-8 until it reaches the metal plate.**

b. Tighten each screw an additional 1/2 turn in the sequence shown (FIGURE 3-8).

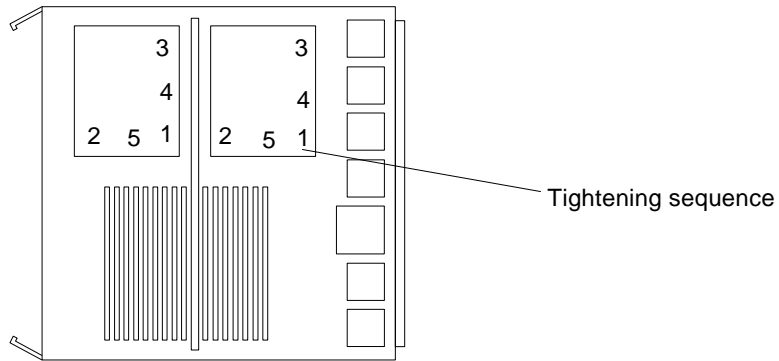


FIGURE 3-8 CPU Module Torque Tightening Sequence

c. Tighten the five screws in the same sequence.



Caution – Do not over torque or under torque the screws. Excessive force can warp the connector. Insufficient force can cause an incomplete electrical connection.

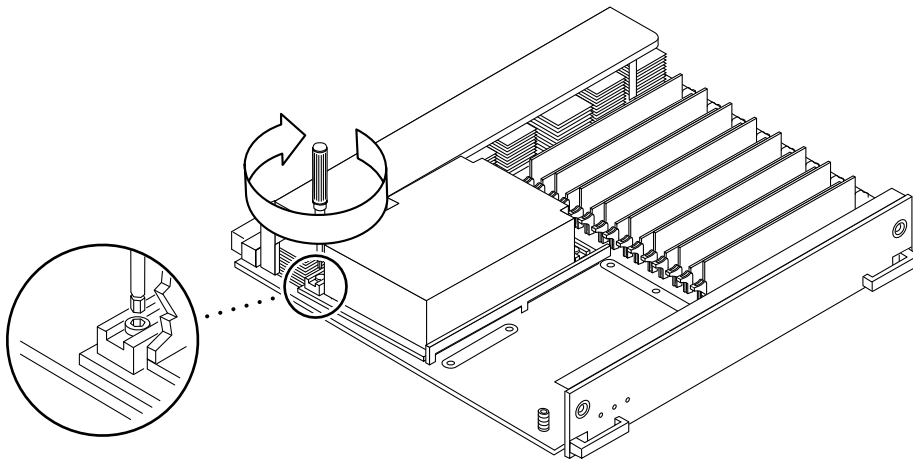


FIGURE 3-9 Tightening Compression Bar Screws

7. Use the procedures in Section 3.5.2 “Installing a Board,” to replace the applicable CPU/Memory+ board.

3.5.5 Memory Modules (DIMMs)

The CPU/Memory+ board has 16 DIMM sockets, which are divided into two banks of 8 DIMMs each, bank 0 and bank 1. All DIMMs within a bank must be the same size. Bank 0 and bank 1 DIMMs occupy alternate slot locations; bank 0 DIMMs are in the even numbered slots, and bank 1 DIMMs are in odd numbered slots (FIGURE 3-10).

There are two types of DIMM sizes available for use: 128 Mbyte and 256 Mbyte.

Memory DRAM component of 8-bit wide is not supported.

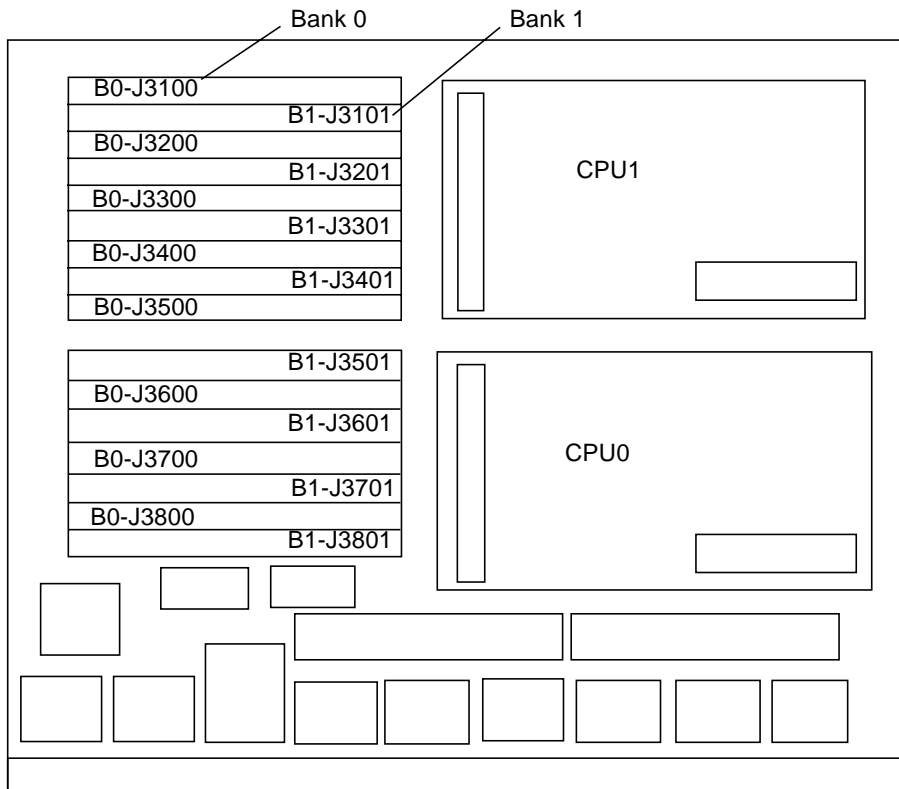


FIGURE 3-10 Layout of CPU/Memory+ Board

Currently, for Solaris 2.5.1 Operating Environments, configurations are limited to a maximum total memory of 56 Gbyte, configurations that exceed 56 Gbyte for this version are not supported. Solaris 2.6 Operating Environments, together with patch

105181-xx, support a maximum configuration of 60 Gbyte. There is no limitation for systems running Solaris 7 or 8 Operating Environments (maximum achievable configuration is 60 Gbyte).

For the Solaris 2.5.1 operating environments, the `/usr/platform/sun4u/sbin/prtdiag` command displays erroneous memory capacity information. Solaris patch 104595-09 is available (at <http://sunsolve.sun.com>) to correct this problem.

3.5.5.1 Removing a Memory Module

1. Remove the CPU/Memory+ board from which the DIMM is to be removed. See Section 3.5.1 “Removing a Board.”
2. Attach a wrist strap and place an antistatic surface next to the system.
3. Locate the slot for the DIMM you need to replace (FIGURE 3-10).
4. Eject the faulty DIMM by pressing down on the ejection levers on both sides of the DIMM connector (FIGURE 3-11).

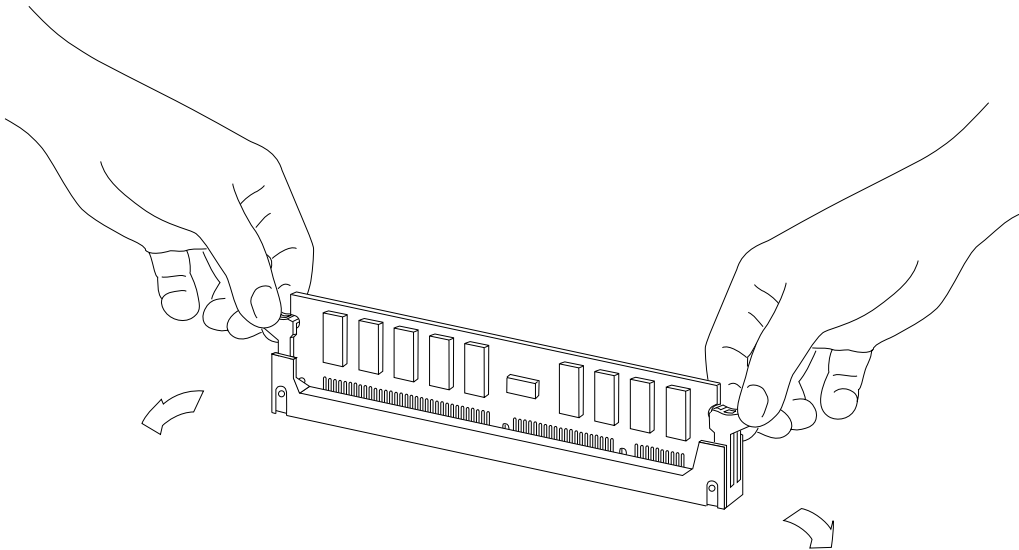


FIGURE 3-11 Ejecting a DIMM

5. Holding the DIMM by its edges, remove it from the slot and place it on an antistatic surface.

3.5.5.2 Installing a Memory Module

Requirements

- The 2 Gbyte memory option (256 MByte DIMMs) require that the system flash PROM software be 3.2.29 or compatible versions *before* installing memory modules.
- Currently, for Solaris 2.5.1 operating environments, configurations are limited to a maximum total memory of 56 Gbyte, configurations that exceed 56GByte for this version are not supported. Solaris 2.6 operating environments, together with patch 105181-xx support a maximum configuration of 60 Gbyte. There is no limitation for systems running Solaris 7 or 8 Operating Environments (maximum achievable configuration is 60 Gbyte).
- *Do not mix different densities (128 or 256 Mbytes) in a bank.*

For Solaris 2.5.1 Operating Environments the `/usr/platform/sbin/prtdiag` command displays erroneous memory capacity information. Use software patch 104595-09 (available at <http://sunsolve.sun.com>) to correct this problem.

All banks must have the same size DIMMs. However, DIMMs from different manufacturers are interchangeable in a single bank if the DIMMs all have the same capacity and speed. Sort the DIMMs into banks of eight using the same size DIMMs.

Maximizing Performance

The following guidelines will result in optimal memory interleaving across boards for performance. These guidelines are for optimal performance and are not requirements for a functional system. The guidelines apply to systems with no DIMMs installed and when adding DIMMs to a system. If you are adding DIMMs, you may need to move some DIMMs to meet the guidelines.

1. **Install one bank on each board before installing the second bank on any board.**
It does not matter whether the first bank is bank 0 or bank 1.
2. **Begin with the largest density banks first (256-Mbyte DIMMs) and finish with the smallest banks (128-Mbyte DIMMs).**
3. **If there is remaining memory, start filling the second banks on the boards in the same order as the first banks.**

Installation

1. **Place the CPU/Memory+ board on which the DIMM is to be installed on an antistatic mat.**

2. **Carefully remove the new DIMM from its protective packaging and place it on an antistatic surface.**

The bag that the DIMM is packed in makes a good antistatic surface.

3. **Press down on the ejector levers at both ends of the DIMM connector slot that will receive the new DIMM (FIGURE 3-12).**

The connector slot will not accept the DIMM unless the levers are in the insert position.

4. **Align the DIMM with the slot.**

Hold the DIMM by its edges and orient it so that the two notches at the bottom of the DIMM line up with the two tabs in the DIMM connector (FIGURE 3-12).

5. **Place your thumbs on the top edge of the DIMM and push the DIMM firmly into its connector.**

6. **Lock the DIMM in place by pushing both ejector levers into the upright position.**

7. **Install the CPU/Memory+ board and detach the wrist strap.**

See Section 3.5.2 “Installing a Board.”

8. **As you reboot the system, watch for the system banner to verify that the new memory is recognized by the system.**

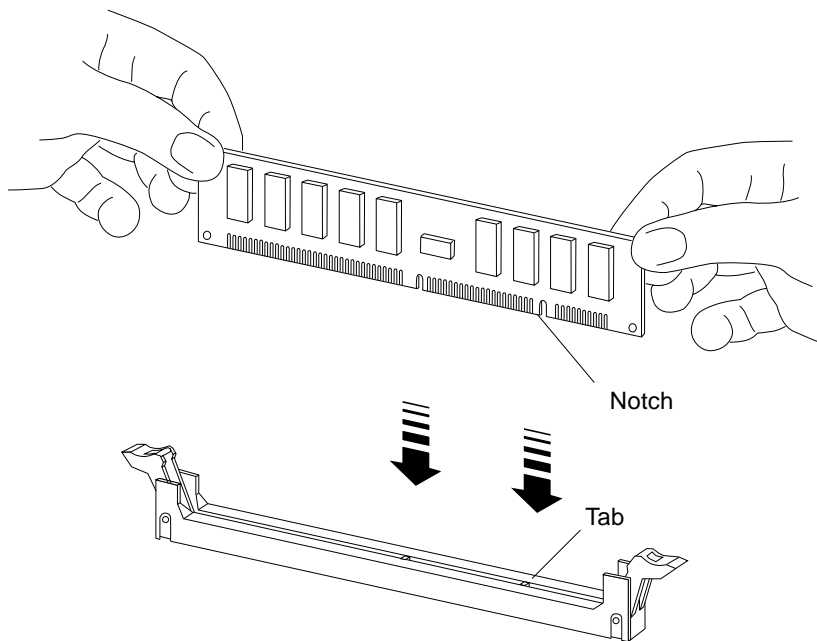


FIGURE 3-12 Orienting a DIMM

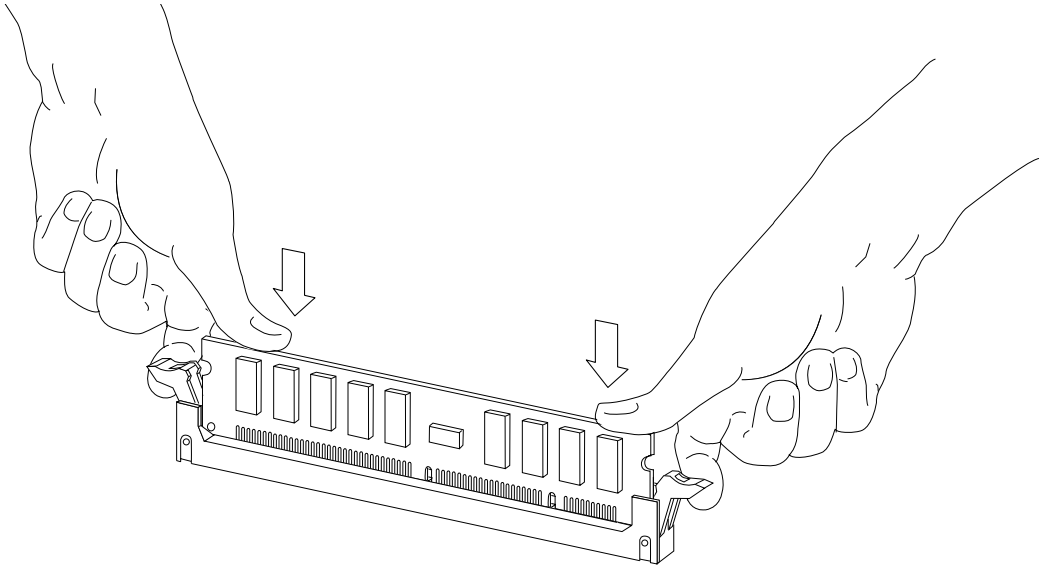


FIGURE 3-13 Installing a DIMM

I/O+ Boards and Components

To protect both yourself and the equipment, make sure you follow the precautions in Chapter 2 “Safety Precautions and Tools Requirements.”

This chapter contains the following topics:

- Section 4.1 “Handling Boards and Assemblies” on page 4-2
- Section 4.2 “Filler Panels” on page 4-3
- Section 4.3 “SCSI Termination” on page 4-4
- Section 4.4 “Hot-Plug Feature” on page 4-4
- Section 4.5 “Dynamic Reconfiguration for Hot-Pluggable System Boards” on page 4-5
- Section 4.6 “I/O+ Boards” on page 4-5
 - Section 4.6.2 “Removing a Board” on page 4-8
 - Section 4.6.3 “Installing a Board” on page 4-11
 - Section 4.6.4 “SBus Cards” on page 4-13
 - Section 4.6.5 “Graphics (UPA) Cards” on page 4-18
 - Section 4.6.6 “GBICs” on page 4-21
 - Section 4.6.7 “PCI Cards” on page 4-24

For your protection, also observe the following safety precautions when setting up your equipment:

- Follow all cautions, warnings, and instructions marked on the equipment.
- Never push objects of any kind through openings in the equipment as they may touch dangerous voltage points or short out components that could result in fire or electric shock.
- Refer servicing of equipment to qualified personnel.

4.1 Handling Boards and Assemblies



Caution – The chassis AC power cord must remain connected to ensure a proper ground.



Caution – The I/O+ boards, their modules, and cards have surface-mount components that can be broken by flexing the boards.

To minimize the amount of board flexing, observe the following precautions:

- Transport the board in an antistatic bag.
- When removing the board from an antistatic bag, keep the board vertical until you lay it on the Sun antistatic mat.
- Hold the board only by the edges near the middle of the board, where the board stiffener is located. Do not hold the board *only* at the ends.
- Do not place the board on a hard surface. Use a cushioned antistatic mat. The board connectors and components have very thin pins that bend easily.
- Do not use an oscilloscope probe on the components. The soldered pins are easily damaged or shorted by the probe point.
- Be careful of small parts located on the component side of the board.



Caution – The heatsinks on the board can be damaged by incorrect handling. Do not touch the heatsinks while installing or removing the board. Hold the board only by the edges. If a heatsink is loose or broken, obtain a replacement board.



Caution – The heatsinks on the board can be damaged by improper packaging. When storing or shipping the board, ensure that the heatsinks have sufficient protection.

Note – New system boards have square heatsinks, as depicted in this manual. All boards prior to August 1999 have round heatsinks.

Note – For slot restrictions in the Sun Enterprise 6500/5500/4500 Systems, refer to the [systems.corp/sunfire/configs](http://systems.corp.sunfire/configs) website.

4.2 Filler Panels

All empty board slots in Enterprise 3500 systems must have a filler panel installed for cooling purposes and for EMI protection. Filler panels are inserted into a board slot with the springfingers facing to the right (FIGURE 4-1).

- To remove the filler panel from the card cage, unfasten the captive screws at the top and bottom of the panel.

Grasp the handles to pull the filler panel out.

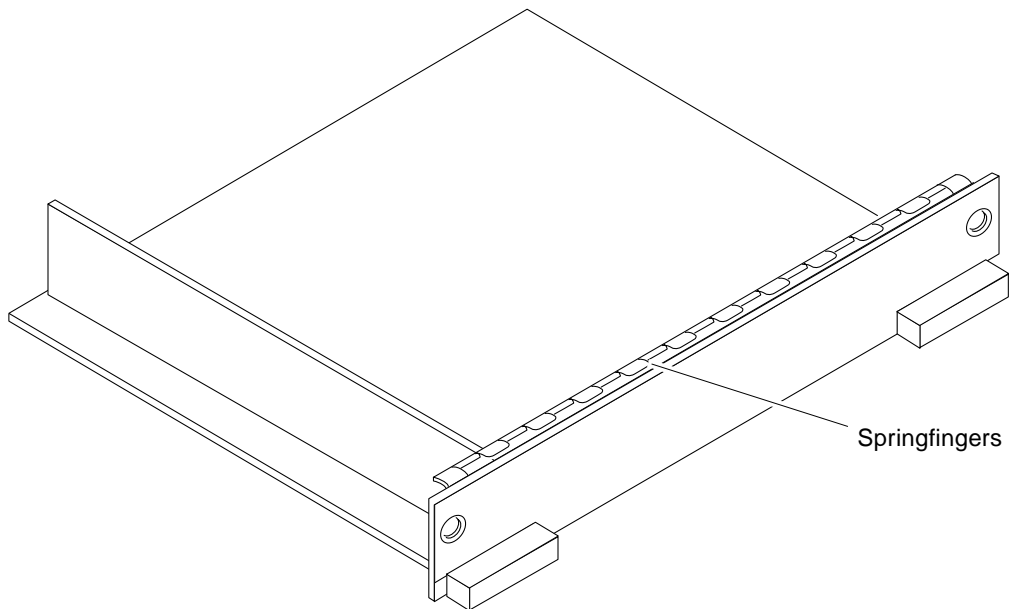


FIGURE 4-1 Filler Panel

4.3 SCSI Termination

The I/O+ board in slot 1 controls the internal media tray devices. Therefore, the external SCSI connector on the I/O+ board in slot 1 of a system must be terminated with a single-ended SCSI terminator (FIGURE 4-2).

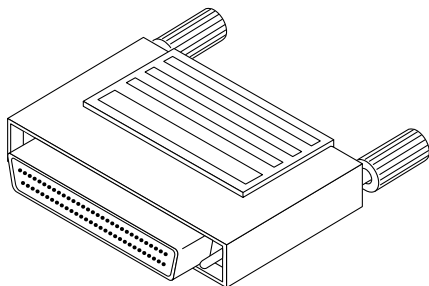


FIGURE 4-2 SCSI Terminator

4.4 Hot-Plug Feature

The hot-plug feature enables you to insert a new board into a powered-on system, despite the system being “live,” or being supplied with electrical power. When the hot-plug feature is used to add a board to a powered-on system, the system will not use the new board until the system is rebooted.

Sun Enterprise Systems have extensive error detection mechanisms that detect failed components (I/O boards, CPU Memory boards, CPUs, memory) during Power on Self Test (POST). When a failed component or system board is detected, POST will put that board into lower-power mode and reconfigure the systems so that failed boards are no longer accessible.



Caution – If the message: NOTICE: Hot Plug not supported in this system is displayed during boot, do NOT attempt hot-plug in this system or damage to the hardware will occur.

4.5 Dynamic Reconfiguration for Hot-Pluggable System Boards

If the dynamic reconfiguration feature is enabled in the operating environment, service providers can install, remove, or replace a hot-pluggable system board without powering down the system. For the Solaris 2.6, Solaris 7, and Solaris 8 Operating Environments, dynamic reconfiguration applies to specific types of boards in the Sun Enterprise 3x00. For instructions, refer to the *Sun Enterprise 6x00, 5x00, 4x00, and 3x00 Systems Dynamic Reconfiguration User's Guide* included in the online AnswerBook2 for your Solaris Operating Environment or refer to the docs.sun.com web site for more information on dynamic reconfiguration.

4.6 I/O+ Boards

Enterprise 3500 systems support three types of I/O+ boards: SBus+ I/O board with 100 MByte/second Fibre Channel, Graphics+ I/O board with 100 MByte/second Fibre Channel, and PCI+ I/O board. Each board has three LEDs that provide board status codes (FIGURE 4-3 through FIGURE 4-5).

4.6.1 GBIC

Each SBus+ and Graphics+ I/O board provides mounting for two GBIC interfaces. A GBIC (Gigabit Interface Converter) is a hot-pluggable unit that converts any of the standard Fibre Channel connectors and signaling technologies. The GBIC Fibre Channel referred to in this manual is 100 Mbytes.

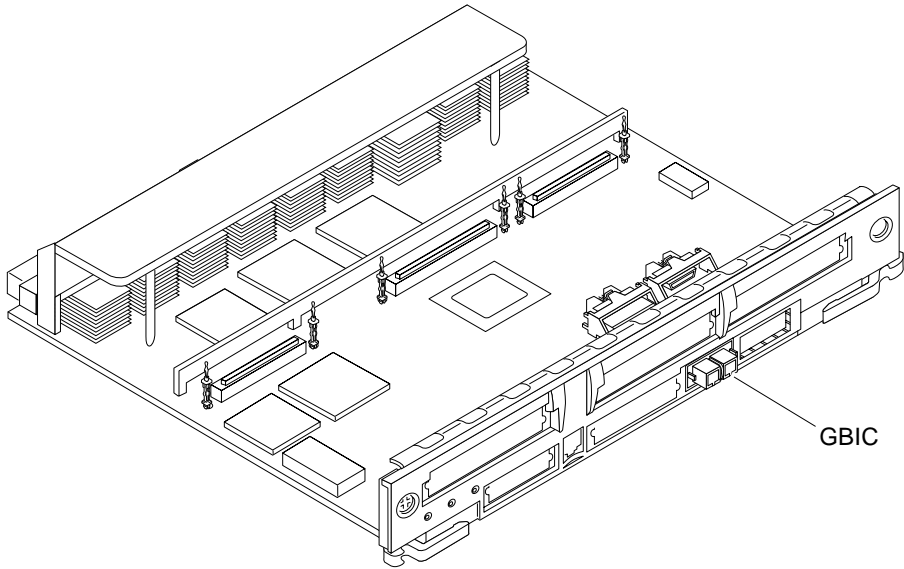


FIGURE 4-3 SBus+ I/O Board With 100 MByte/second Fibre Channel

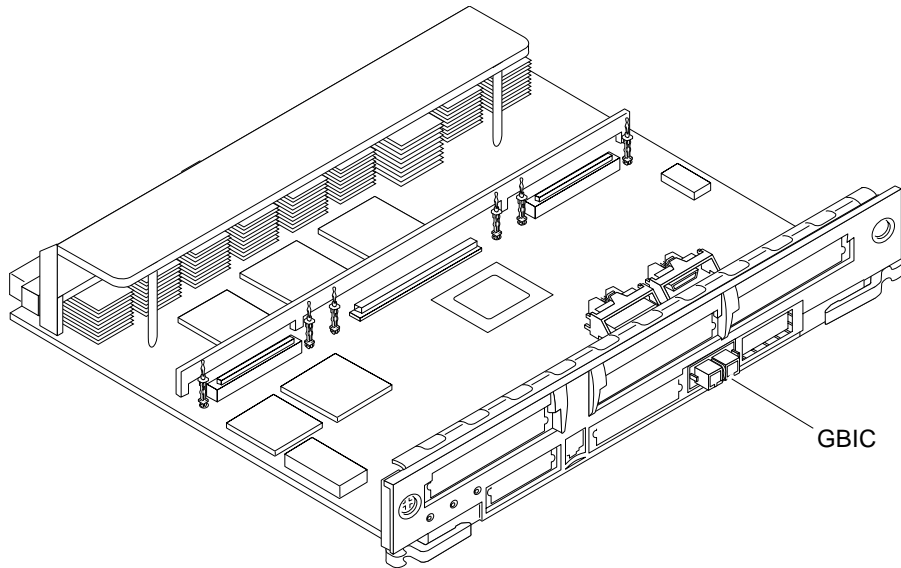


FIGURE 4-4 Graphics+ I/O Board With 100 MByte/second Fibre Channel

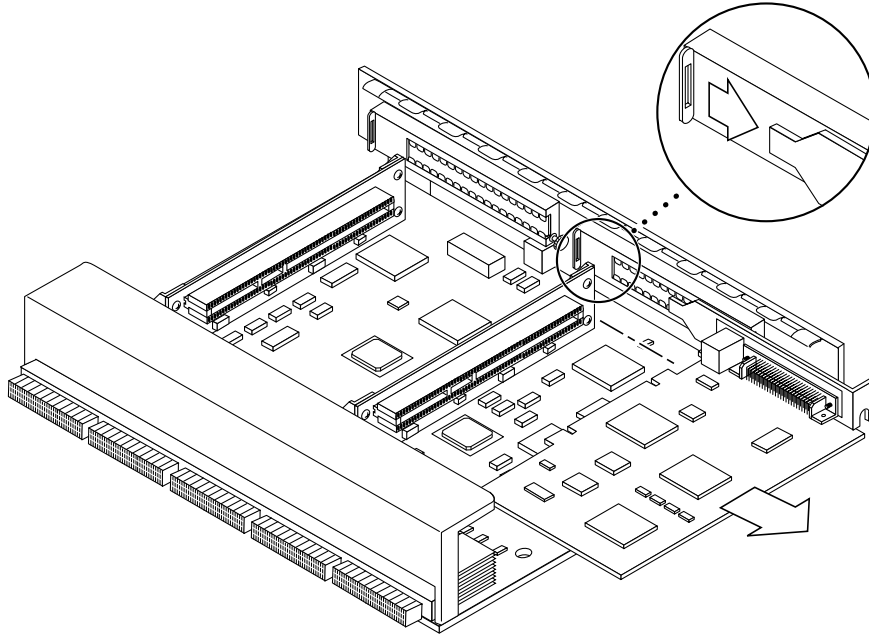


FIGURE 4-5 PCI+ I/O Board

The SBus+ I/O board with 100 MByte/second Fibre Channel includes two SYSIO ASICs that provide two SBuses:

- One for two plug-in SBus cards and two GBIC (100 MByte/second Fibre Channel) interfaces
- One for one plug-in SBus card and the onboard devices (10/100 Mbit TPE and single-ended Fast/Wide SCSI).

Note – SBus connector slots 1 and 2 on the SBus+ I/O board can accommodate a double-wide SBus card.

The Graphics+ I/O board with 100 MByte/second Fibre Channel includes one SYSIO ASIC that provides a single SBus for two plug-in SBus cards, two GBIC (100 MByte/second Fibre Channel) interfaces, and the onboard devices (10/100 Mbit TPE and Single-ended Fast/Wide SCSI).

The PCI+ I/O board has two PCI bus connectors:

- Each connector can accommodate a PCI riser card.
- Each riser card accommodates one PCI short card.

In addition, onboard devices on the PCI+ I/O board provide Fast Ethernet (10/100 Mbit) and Fast Wide SCSI interfacing.

4.6.2 Removing a Board

Note – It is not necessary to remove an I/O+ board from the card cage to remove and replace GBICs. A GBIC may be removed and replaced “live” (without removing power from the system or board). However, the necessary software precautions must be taken whenever the I/O path to a particular disk is to be interrupted; halt all I/O activity to the disk affected by the replacement of a GBIC. To replace a GBIC or fiber optic cable, proceed to Section 4.6.6 “GBICs” on page 4-21.”

4.6.2.1 Removing a Board From a Powered-On System



Caution – A board should be removed from a powered-on system only after the ASR software has disabled that board, otherwise, the operating system should be halted and the system powered off prior to board removal. See Chapter 11 “Powering Off and On” and then Section 4.6.2.2 “Removing a Board From a Powered-Off System.”

1. Ensure that the board has been disabled. See Section 4.4 “Hot-Plug Feature.”

Once disabled, one of two results occurs:

- The three LEDs on the board are not lit (board has no power).
- The outer two green LEDs are not lit and the middle yellow LED is lit (board is in low power mode).

2. Unfasten any cable connectors from the front panel and set them aside.

Label cables to identify them for reconnection later.

3. Use a Phillips No. 1 screwdriver to mechanically release the board from the system card cage.

Insert the screwdriver into each quarter-turn access slot (the slots are located on the left and right sides of the board front panel) and then turn a quarter turn so that the arrow points to the unlocked position (FIGURE 4-6).

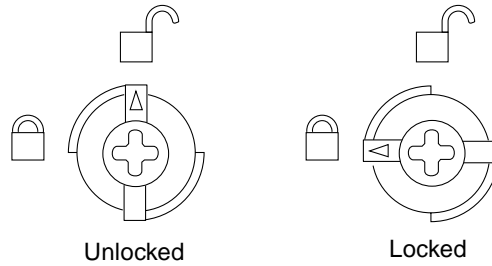


FIGURE 4-6 Unlocking and Locking Quarter-Turn Access Slots

4. Pull the ends of both extraction levers outward simultaneously to unseat the board centerplane connector from the centerplane receptacles (FIGURE 4-7).

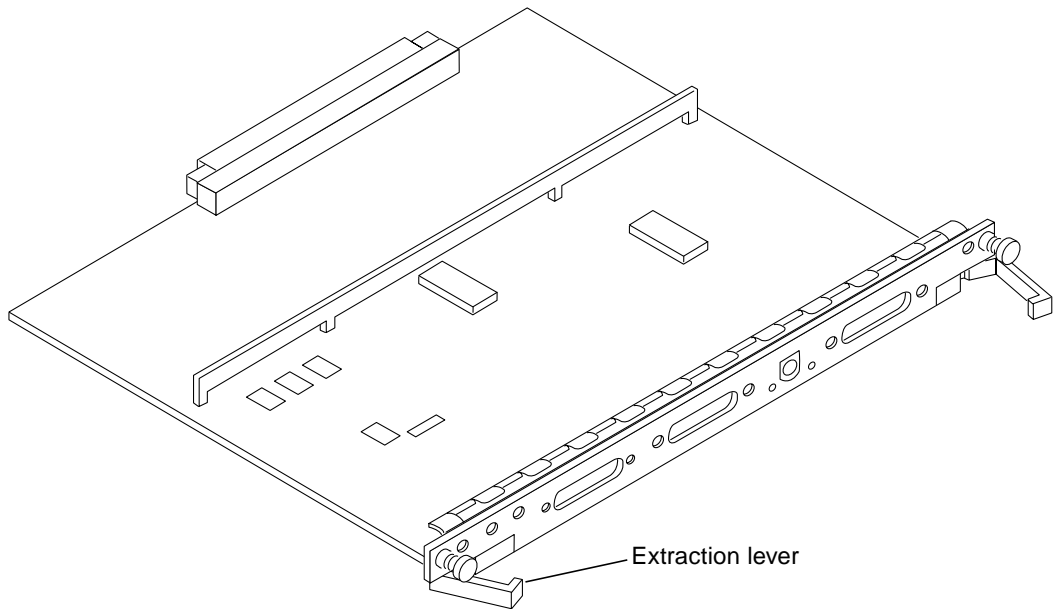


FIGURE 4-7 Extraction Lever in Extract Position



Caution – If a board is not immediately replaced, a filler panel must be installed in the board’s place to prevent overheating. See Section 4.2 “Filler Panels.”

4.6.2.2 Removing a Board From a Powered-Off System

1. **Use a Phillips No. 1 screwdriver to mechanically release the board from the system card cage.**

Insert the screwdriver into each quarter-turn access slot (the slots are located on the left and right sides of the board front panel) and then turn one-quarter turn so that the arrow points to the unlocked position (FIGURE 4-6).

2. **Unfasten any cable connectors from the front panel and set them aside.**

Label cables to identify them for reconnection later.

3. **Pull the ends of both extraction levers outward simultaneously to unseat the board from the centerplane receptacles (FIGURE 4-7).**



Caution – If a board is not immediately replaced, a filler panel must be installed in the board's place. See Section 4.2 "Filler Panels."

4.6.3 Installing a Board

4.6.3.1 Board Slot Selection

Logically there is no difference between the board slots, and each slot can accept any board type. However, since the lowest numbered board slot (slot 1) is the only slot connected to the onboard SCSI devices, this slot is usually reserved for the first I/O+ board. Board slot numbers are marked on the chassis (FIGURE 4-8).

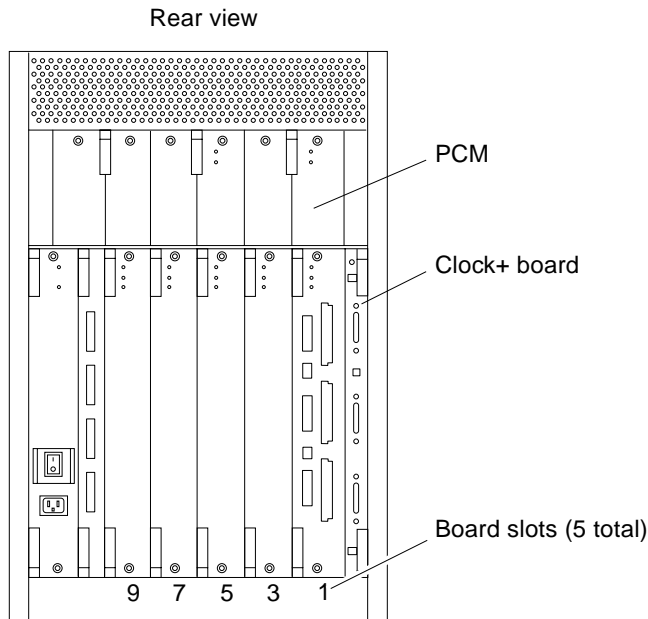


FIGURE 4-8 Board Slot Locations

4.6.3.2 Cooling and Power Issues

There should be one power/cooling module (PCM) for every two boards to adhere to cooling and power requirements. The PCMs must be installed adjacent to populated board slots to ensure the fan in the PCM can cool the respective boards.

Note – All empty board slots must have a filler panel installed to ensure proper cooling and for EMI protection.

4.6.3.3 Powered-On or Powered-Off System

1. **Carefully insert the board (component side to the right) in the proper slot in the card cage, ensuring that the board does not slip out of the top and bottom card guides.**

All empty slots must have a filler panel installed.

2. **Ensure that both extraction levers are in the insert position (arrow pointing outward), and that the quarter-turn access slots are unlocked (arrow indicates unlocked position) as you slide the board toward the centerplane receptacles.**

The board will not seat fully unless the levers are in this starting position and the access slots are unlocked. See FIGURE 4-6, and FIGURE 4-7 on page 4-9.



Caution – DO NOT FORCE any board into a slot; this can cause damage to the board and system. The board should insert and seat smoothly. If it binds, remove the board and inspect the card cage slot for any obvious obstructions. Also inspect both the board and the centerplane for bent pins or other damage.

3. **Push the board into the card cage, then simultaneously press both extraction levers to seat the board on the centerplane.**

Pushing both levers simultaneously avoids twisting the board and bending the connector pins, and mates the board centerplane connector to the matching receptacle on the centerplane. Do not press on board front panel to seat it—doing so will damage the connector pins.

4. **Mechanically lock the board to the system chassis by inserting a Phillips No. 1 screwdriver into each quarter-turn access slot and then turning to the locked position. See FIGURE 4-6 on page 4-9.**

5. **Replace or connect all necessary cables to the front of the board.**

Note – The I/O+ board in slot 1 controls the internal media tray devices. Therefore, the external SCSI connector on the I/O+ board in slot 1 of a system must be terminated with a SCSI terminator. See FIGURE 4-2 on page 4-4.

6. **Terminate the board SCSI out connector if required. See “Note” above.**

7. Once the board is installed, when the system is powered on, a message similar to the following will be displayed on the monitor:

Example depicts screen output when a new I/O+ board has been hot-plugged into slot 3 of an operating Enterprise 3500 system:

```
NOTICE: I/O Board Hotplugged into Slot 3
NOTICE: Board 3 is ready to remove
```

Additionally, any subsequent `prtdiag(1M)` output would include information for board slot 3. Again, note that the system will not use the new board until the system is rebooted.

8. Reboot the system now or schedule a later time to reboot when system disruption will be minimized.

4.6.4 SBus Cards

There are three SBus card locations on the SBus+ I/O board; the Graphics+ I/O board has two.

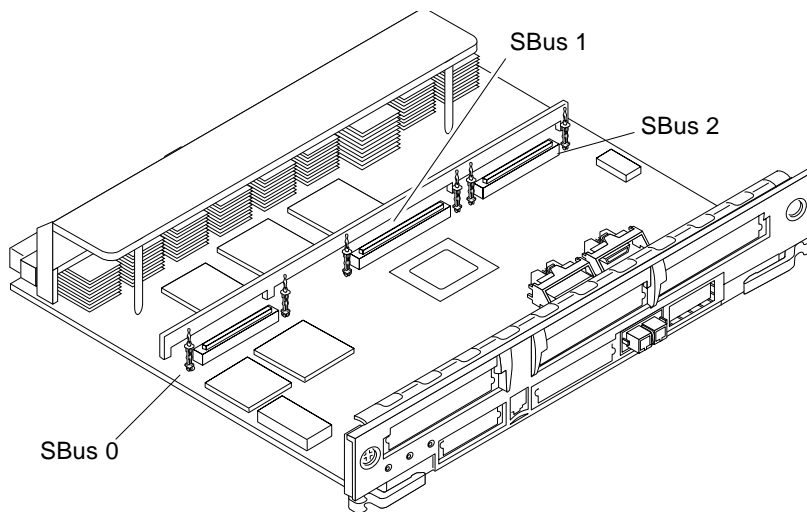


FIGURE 4-9 SBus+ I/O Board SBus Slots

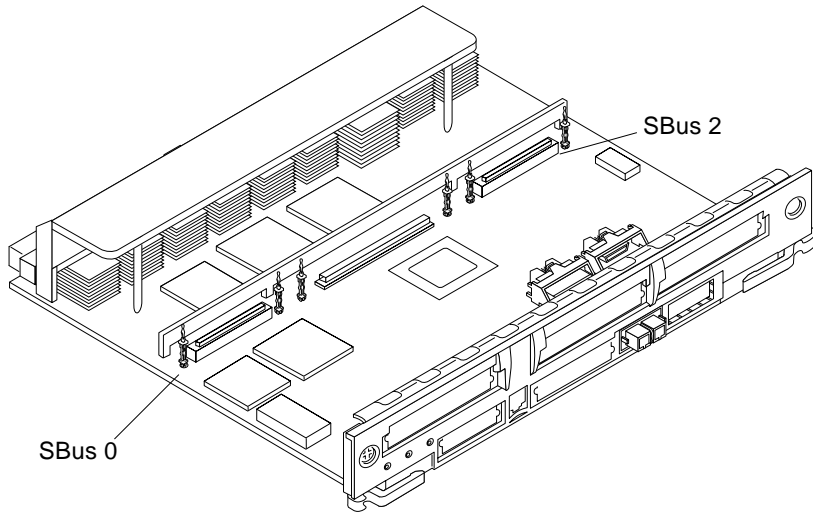


FIGURE 4-10 Graphics+ I/O Board SBus Slots

4.6.4.1 Nylon Standoffs

Nylon standoffs lock the SBus cards to the I/O+ boards (FIGURE 4-11).

- To unlock a standoff, pull up the tip insert.
- To lock a standoff, first ensure that the module or card rests on the standoff flange, then press down the tip insert.

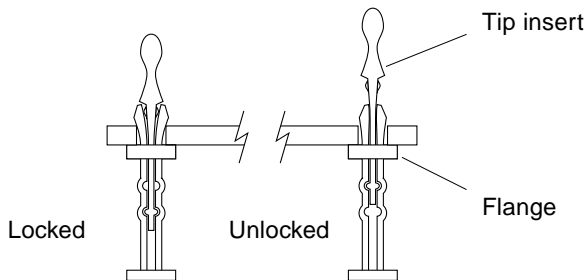


FIGURE 4-11 Locking and Unlocking Standoffs

4.6.4.2 Removing an SBus Card

1. Use the procedures in Section 4.6.2 “Removing a Board,” to remove the applicable I/O+ board.
2. Locate the card to be removed.
See FIGURE 4-10 on page 4-14.
3. Remove the two screws that secure the SBus card to the I/O+ board front panel.
Save the screws for installation of a replacement SBus card or a filler panel.
4. Unlock the SBus card by pulling up the tips of the two standoffs.
See FIGURE 4-11 on page 4-14.
5. Hold the card by the edges near the connector and gently rock the card back and forth to loosen it from the socket.

You may have to remove the SBus cards or the graphics (UPA) card next to this card in order to have enough room to hold onto the SBus card being removed.



Caution – The connector housing may break if the SBus card is tilted too far.

6. Lift the SBus card from the socket at an angle while guiding the face plate out from the back panel opening (FIGURE 4-12).

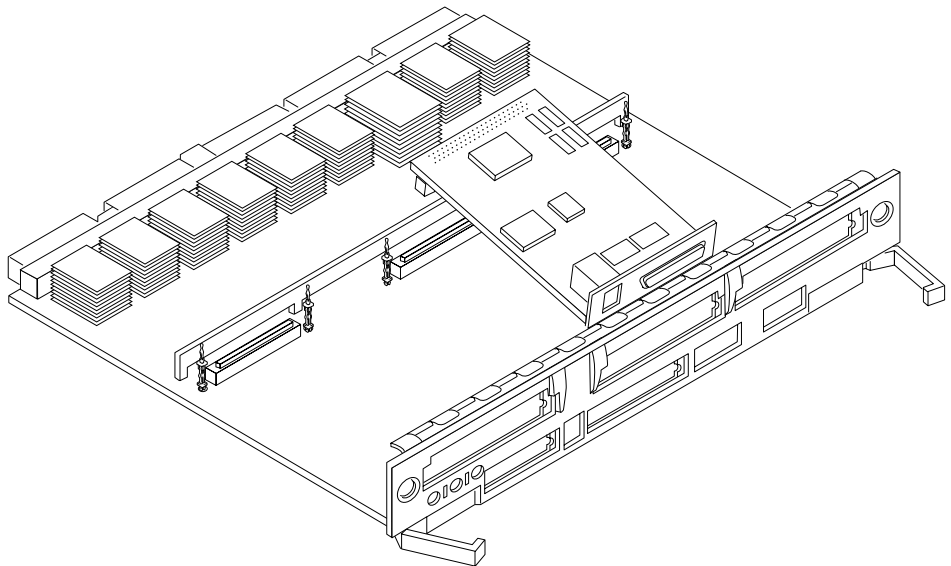


FIGURE 4-12 Removing or Installing an SBus Card

7. Place the SBus card in an antistatic bag.
8. If the SBus card is not immediately replaced, install a filler panel (part number 340-2305) on the I/O+ board back panel opening. To secure the filler panel, use the screws that were removed in Step 3.



Caution – Be sure to install the filler panel right-side up. Installing it upside down creates a gap at the top edge of the SBus slot opening that can impair system cooling and regulatory compliance.

9. Replace the I/O+ board. Use the procedures in Section 4.6.3 “Installing a Board.”

4.6.4.3 Installing an SBus Card

▼ Removing Adapter and Card Retainer

Note – If the new SBus card does not have an adapter plate or the Link Integrity Test feature, proceed to the installation procedures starting with Step 5..

1. Attach a wrist strap and take the SBus card out of the protective packaging. Place the SBus card on an antistatic mat.
2. Remove the adapter bracket from the SBus card rear panel (FIGURE 4-13).

Remove the two screws securing the adapter to the card rear panel (the adapter bracket and the screws are not needed for this installation).

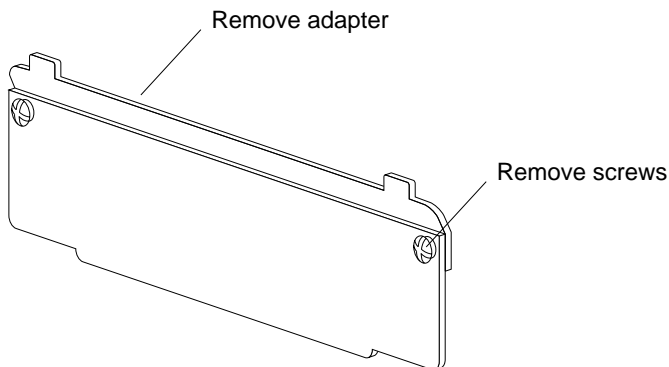


FIGURE 4-13 SBus Card Rear Panel With Adapter

3. Remove the black plastic card retainer shipped with the card (FIGURE 4-14).

Spread the ends of the retainer apart to remove it from the card (the retainer is not needed for this installation).

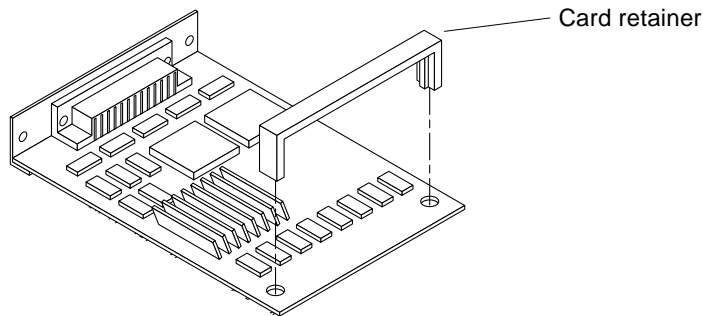


FIGURE 4-14 Card Retainer

4. Run the link integrity test.

Refer to the OpenBoot™ PROM watchnet command.

5. Use the procedures in Section 4.6.2 “Removing a Board,” to remove the applicable SBus+ or Graphics+ I/O board.

6. Locate the SBus connector that the card is to be installed in.

See FIGURE 4-9 on page 4-13 or FIGURE 4-10 on page 4-14.

7. If a filler panel covers the front panel SBus slot, remove the two screws and detach the filler panel.

Retain the screws to attach the SBus card to the back panel, unless the card has a wide connector, or set of connectors.

8. Unlock the tip inserts of the two standoffs for the SBus slot (FIGURE 4-11 on page 4-14).

9. Attach a wrist strap and take the SBus card out of the protective packaging.

Inspect the pins in the connector to make sure they are not bent.

10. Guide the SBus card face plate under the springfinger and against the rear face of the I/O+ board front panel.

The I/O connectors of the SBus card should be visible through the opening in the I/O+ board front panel.

11. Hold the card by the edges nearest the SBus connector and place the card over the two standoffs.

12. Hold the SBus card by the edges near the connector and firmly but gently press the card down until the connector is fully seated.

To align the connector and socket, push the card toward the I/O+ board front panel.



Caution – Do not rock the card onto the socket; the plastic connector housing may break.

13. Press each corner of the SBus card to ensure that it rests on the collar of the standoff.
14. Press down on the tip insert of each standoff to lock the card in place.
15. Replace and tighten the back panel screws to secure the SBus card to the I/O+ board front panel.
16. Replace the I/O+ board using the procedures described in Section 4.6.3 “Installing a Board.”

4.6.5 Graphics (UPA) Cards

The Graphics+ I/O board contains a single connector that accommodates graphics (UPA) cards (FIGURE 4-15).

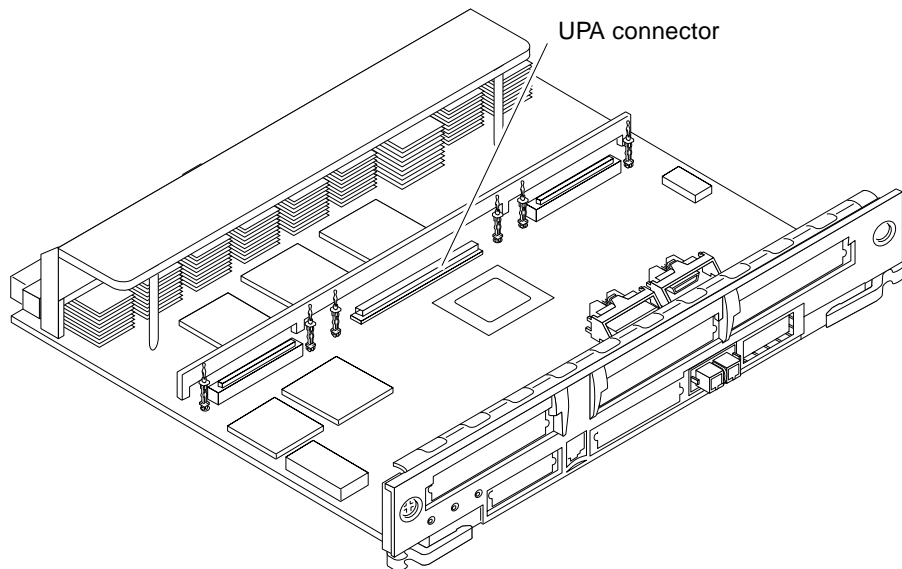


FIGURE 4-15 Graphics (UPA) Card Connector Location

4.6.5.1 Removing a Graphics (UPA) Card

1. Use the procedures in Section 4.6.2 “Removing a Board,” to remove the applicable Graphics+ I/O board.
2. Locate the card (FIGURE 4-15).
3. Remove the two screws that secure the card to the I/O board front panel.
Save the screws for installation of a replacement card or a filler panel.
4. Unlock the card by pulling up the tips of the two standoffs.
See FIGURE 4-11 on page 4-14.
5. Hold the card by the edges near the connector and gently rock the card back and forth to loosen it from the socket.
You may need to remove the SBus cards next to this card in order to have enough room to hold onto the graphics (UPA) card being removed.



Caution – The connector housing may break if the card is tilted too far.

6. Lift the card from the socket at an angle while guiding the face plate out from the front panel opening (FIGURE 4-16).

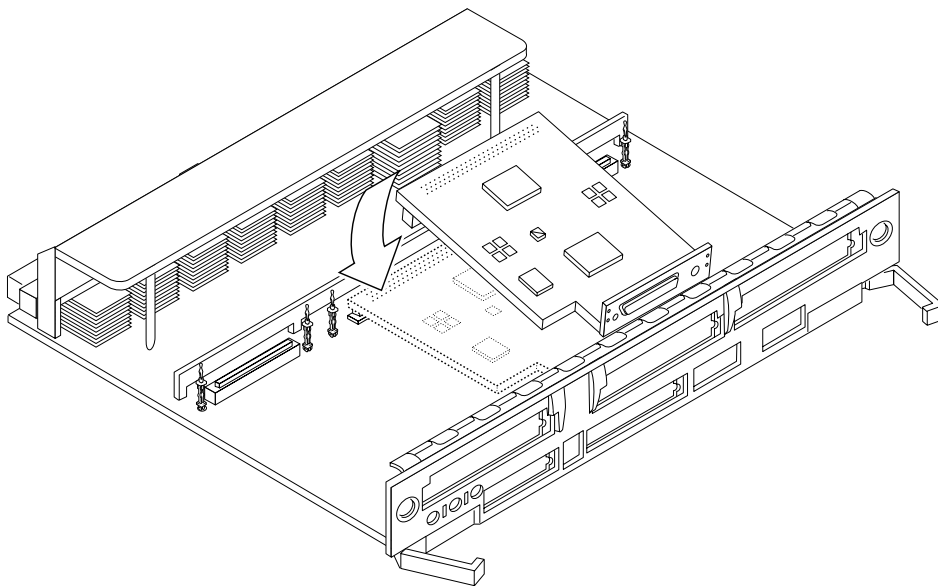


FIGURE 4-16 Removing or Installing a Graphics (UPA) Card

7. Place the card in an antistatic bag.
8. If the graphics (UPA) card is not immediately replaced, install a filler panel (part number 340-2305) on the Graphics+ I/O board front panel opening.

To secure the filler panel, use the screws that were removed in Step 3.



Caution – Be sure to install the filler panel right-side up. Installing it upside down creates a gap at the top edge of the card slot opening that can impair system cooling and FCC regulatory compliance.

9. Use the procedures in Section 4.6.3 “Installing a Board,” to replace the Graphics+ I/O board.

4.6.5.2 Installing a Graphics (UPA) Card

1. Use the procedures described in Section 4.6.2 “Removing a Board,” to remove the applicable Graphics+ I/O board.
2. Attach a wrist strap and take the graphics (UPA) card out of the protective packaging and place the card on an antistatic mat.
Inspect the pins in the connector to make sure they are not bent.
3. Remove the adapter bracket from the rear panel of the card.
See FIGURE 4-13 on page 4-16. Remove the two screws securing the adapter to the card rear panel (the adapter bracket and the screws are not needed for this installation).
4. Remove the black plastic card retainer shipped with the card.
See FIGURE 4-14 on page 4-17. Spread the ends of the retainer apart to remove it from the card (the retainer is not needed for this installation).
5. Locate the graphics (UPA) connector for the card.
See FIGURE 4-15 on page 4-18.
6. If a filler panel covers the Graphics+ I/O board front panel slot for the graphics (UPA) card, remove the two screws and detach the filler panel.
Retain the screws to attach the graphics (UPA) card to the front panel, unless the card has a wide connector, or set of connectors.
7. Unlock the tip inserts for the two standoffs for the graphics (UPA) connector slot.
See FIGURE 4-11 on page 4-14.

8. Hold the card at an angle as depicted in FIGURE 4-16 on page 4-19. Guide the card face plate under the springfingers and against the rear face of the Graphics+ I/O board front panel.

The I/O connectors of the card should be visible through the opening in the Graphics+ I/O board front panel once the card is properly positioned.

9. Hold the card by the edges nearest the graphics (UPA) connector and place the card over the two standoffs.
10. Hold the card by the edges near the connector and firmly but gently press the card down until the connector is fully seated.

To align the connector and socket, push the card toward the Graphics+ I/O board front panel.



Caution – Do not rock the card onto the socket; the plastic connector housing may break.

11. Press each corner of the card to ensure that it rests on the collar of the standoff.
12. Press down on the tip insert of each standoff to lock the card in place.
13. Replace and tighten the front panel screws to secure the card to the Graphics+ I/O board front panel.
See FIGURE 4-12 on page 4-15
14. Use the procedures in Section 4.6.3 “Installing a Board,” to replace the Graphics+ I/O board.

4.6.6 GBICs

Each SBus+ and Graphics+ I/O board has two onboard connectors; each connector accommodates one GBIC (100 MByte/second Fibre Channel).

4.6.6.1 Removing a GBIC

1. Locate the GBIC to be removed (FIGURE 4-17 or FIGURE 4-18).

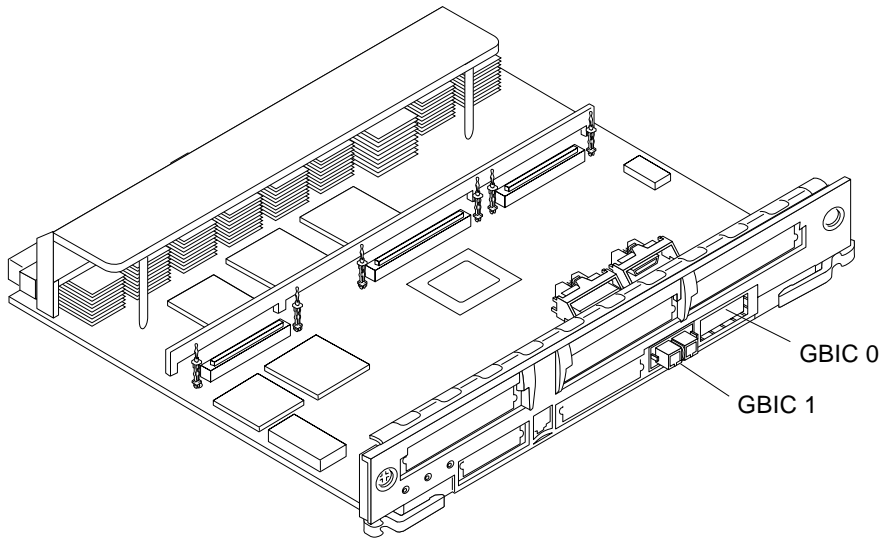


FIGURE 4-17 SBus+ I/O Board GBIC Connector Locations

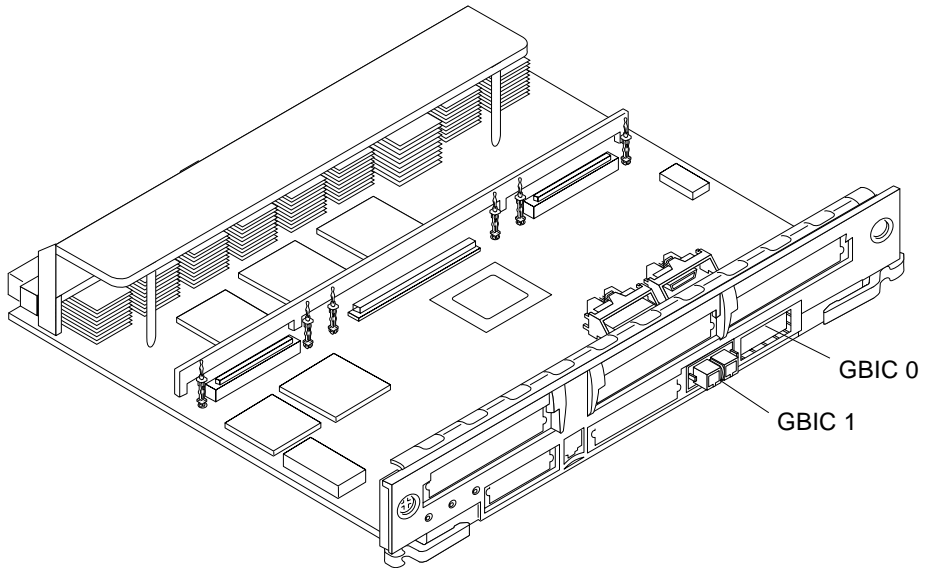


FIGURE 4-18 Graphics+ I/O Board GBIC Connector Locations

2. Remove the GBIC from the I/O+ board by compressing the locking tabs located on either side of the card and pulling straight out from the opening in the I/O+ board panel (FIGURE 4-19).

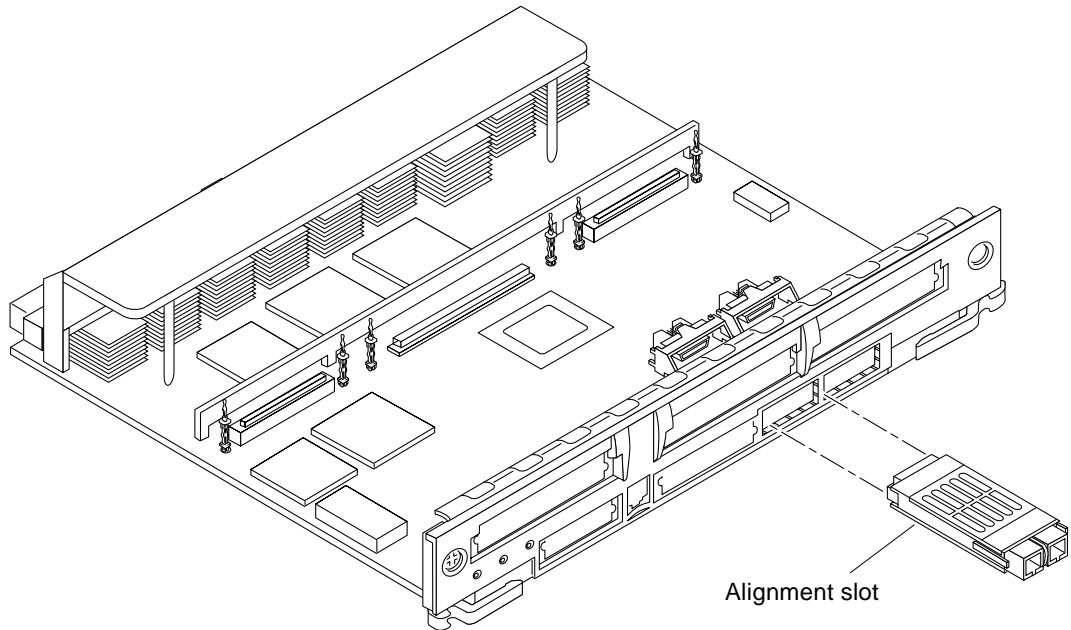


FIGURE 4-19 Removing or Installing a GBIC

4.6.6.2 Installing a GBIC

1. Locate the GBIC slot for installation (FIGURE 4-17 or FIGURE 4-18).
2. Ensure correct orientation for insertion.
The alignment slots are on the bottom of the GBIC (FIGURE 4-19).
3. Insert the GBIC into the I/O+ board panel slot and then push in to firmly seat the card.
An audible click indicates the GBIC is properly seated to the onboard connector.

4.6.7 PCI Cards

Each PCI+ board can accommodate two PCI (short) cards. The PCI cards are plugged into receptacles on corresponding riser cards that are mounted on the PCI+ I/O board. The riser cards can be one of two voltage types, either 5.0V or 3.3V (66 MHz-capable).

The voltage rating of a PCI card must match the rating of the riser card and connector on the board. The PCI bus connectors of PCI cards can be one of three possible types, those that can be used with 5.0V or 3.3V (66 MHz-capable) connector receptacles only, and those that can be used with either voltage type.

Sun PCI+ I/O boards are shipped with two 5.0V riser cards (installed) and two 3.3V (66 MHz-capable) riser cards (not installed). If you are switching to a 3.3V (66 MHz-capable) PCI card, you must replace the existing 5.0V riser card with the 3.3V (66 MHz-capable) riser card. See Section 4.6.7.3 “Replacing Riser Cards” on page 4-29.

4.6.7.1 Removing a PCI Card

1. Use the procedures in Section 4.6.2 “Removing a Board,” to remove the applicable I/O+ board.

Note – Some PCI cards may not utilize the standoffs provided for mounting.

2. On the noncomponent side of the I/O+ board, loosen the locking standoff for the corresponding PCI card that is to be removed (FIGURE 4-20).

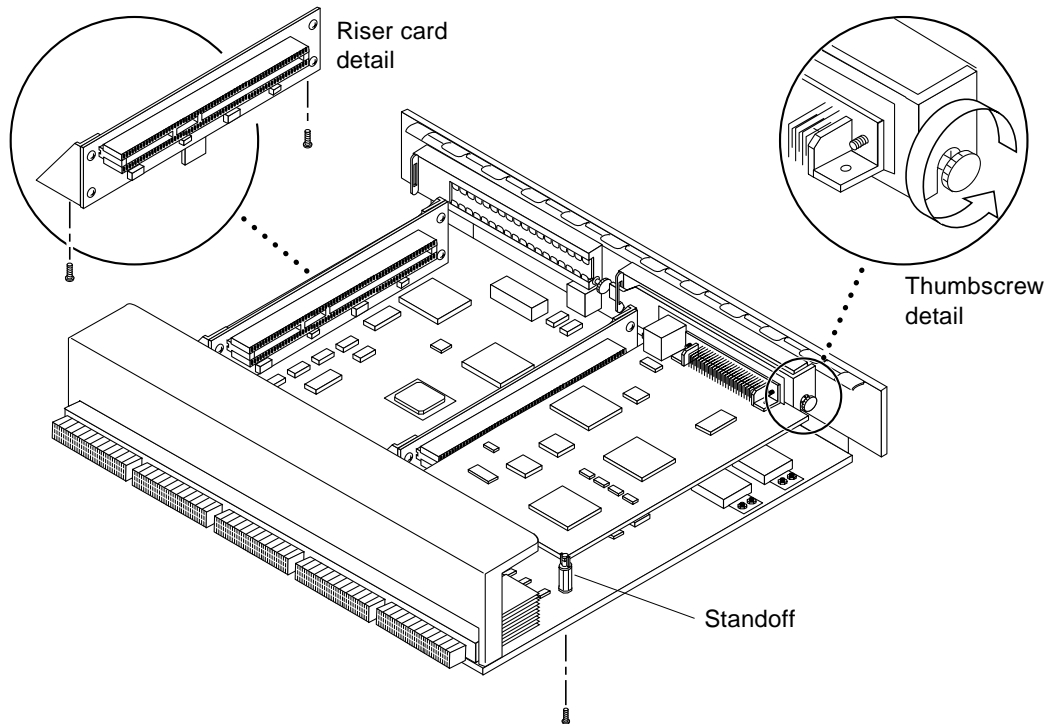


FIGURE 4-20 PCI and Riser Card Removal

3. Loosen and then remove the thumbscrew on the component side of the I/O+ board next to the external PCI card connector (FIGURE 4-20).
4. Refer to FIGURE 4-21 while removing the card as follows:
 - a. Grasp the card to be removed with your index fingers on either side of the card where it mates with the connector on the riser card (thumbs against the connector).
 - b. Loosen the card from the PCI bus connector and the catch mechanism by firmly pushing with your thumbs against the PCI bus connector, while grasping the card edge with the index fingers of both hands.

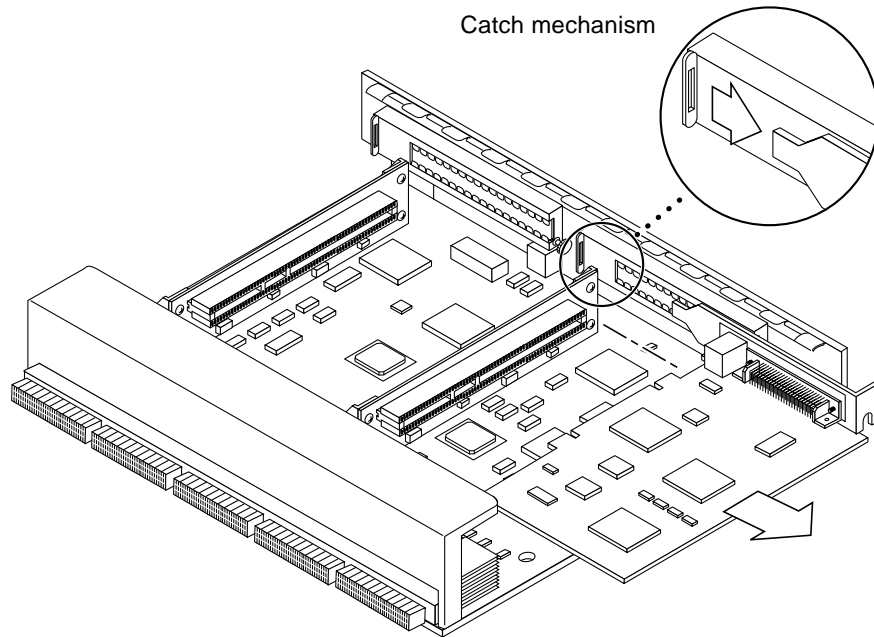


FIGURE 4-21 PCI Card Removal

5. Once the card is free of the PCI bus connector and the metal catch mechanism, remove the card from the I/O board (FIGURE 4-21).

4.6.7.2 Replacing or Installing a PCI Card

1. Ensure that the voltage type of the PCI card you are replacing or installing matches the voltage type of the riser card, either 5.0V or 3.3V (66 MHz-capable).
2. Verify that the JTAG test jumper is removed/disabled (FIGURE 4-22).

Note – PCI+ I/O boards purchased from Sun Microsystems are shipped with the JTAG test jumper disabled or removed on both of the 5.0V riser cards installed on the board.

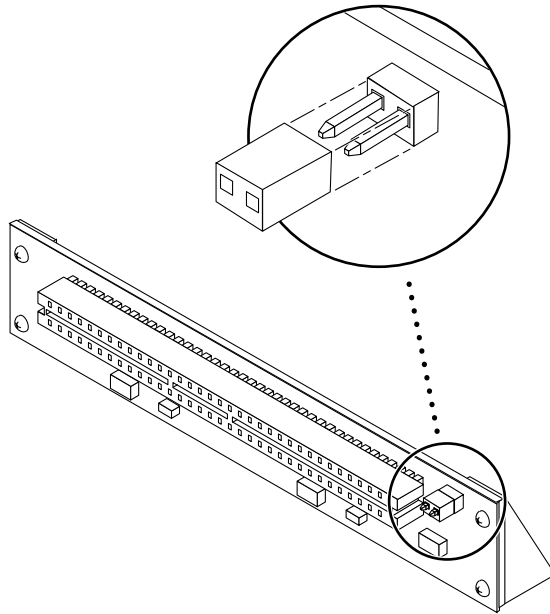


FIGURE 4-22 JTAG Test Jumper

- 3. Align the PCI card so that the PCI bus connector mates with the PCI+ I/O board PCI bus connector, making sure that the external connector end of the card is retained on one side by the opening in the metal catch mechanism and the opposite end is properly aligned to accept the locking thumbscrew (FIGURE 4-23).**

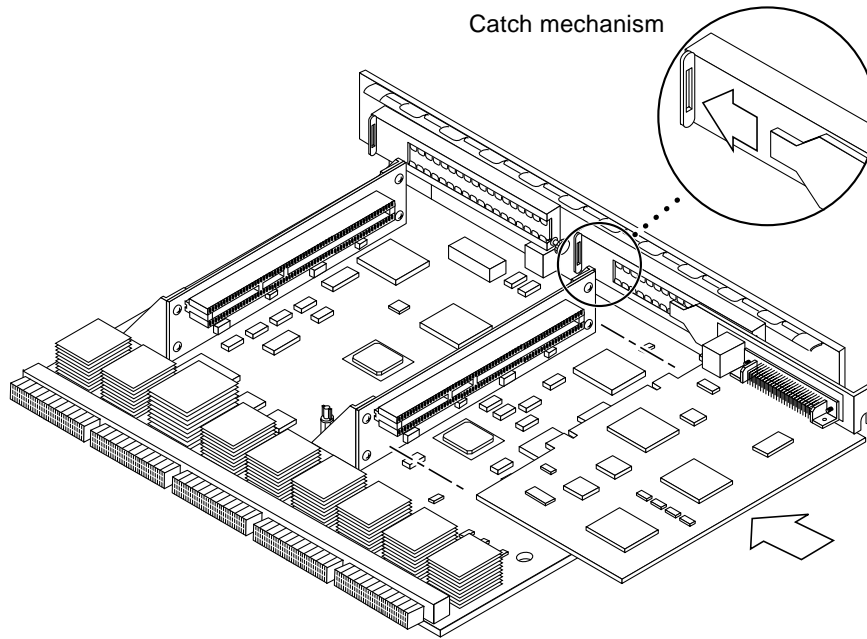


FIGURE 4-23 PCI Card Installation/Replacement

4. Once the card is properly positioned (as described in Step 3) and seated properly to the PCI+ board PCI Bus connector, tighten the locking thumbscrew.

Note – Some PCI cards may not utilize the nylon standoffs provided for mounting.

5. Ensure that the standoff is positioned to capture the edge of the PCI card, and then tighten the screw securing the standoff.
6. Use the procedures in the Section 4.6.3 “Installing a Board” on page 4-11, to replace the PCI+ I/O board.

4.6.7.3 Replacing Riser Cards

1. Use the procedures in Section 4.6.2 “Removing a Board” on page 4-8 to remove the applicable I/O+ board.
2. If a PCI card is already installed in the slot designated for replacement of the riser card, remove the card as indicated in Section 4.6.7.1 “Removing a PCI Card” on page 4-24.
If there is no PCI card presently installed, proceed to Step 3.
3. Remove two screws securing the existing riser card to the PCI+ I/O board (FIGURE 4-20 on page 4-25) and remove the riser card.
4. Secure the new riser card onto the PCI+ I/O board using the two screws removed in Step 3.
5. If a PCI card was removed in Step 2, replace the card as indicated in the Section 4.6.7.2 “Replacing or Installing a PCI Card” on page 4-26.

4.6.7.4 Verifying Installation

After the PCI+ I/O board and any PCI cards are installed, *and before booting the system*, verify installation by performing the following tasks. Refer to the *Solaris 2.x Handbook for SMCC Peripherals* manual or your Solaris documentation for detailed instructions.

1. **Power on the system, and when the banner appears, press the Stop-A keys to interrupt the boot process and get the `ok` prompt.**
2. **Use the `show-devs` command to list the system devices.**

You should see entries (similar to the entries in the example on the next page) for the PCI+ I/O board that you installed.

In the example, a PCI+ I/O board with two SunSwift™ PCI adapter cards has been installed in I/O+ board slot 1 of a Sun Enterprise 3500 system. To find the device path for your specific device, refer to the documentation that came with your PCI card.

If you do not see your new device(s) listed, make sure the PCI+ I/O board and any PCI cards are properly seated, and reinstall the board or cards, if necessary.

Also verify that the JTAG Test Jumper on the PCI card is disabled or removed.

See Section 4.6.7.2 “Replacing or Installing a PCI Card.”

```

ok show-devs
.
.
.
/pci@3,2000/pci@2
/pci@3,2000/pci@2/SUNW,isptwo@4 (identifies adapter SCSI interface)
/pci@3,2000/pci@2/SUNW,hme@0,1 (identifies adapter Ethernet interface)
/pci@3,2000/pci@2/pci108e,1000@0
/pci@3,2000/pci@2/SUNW,isptwo@4/st
/pci@3,2000/pci@2/SUNW,isptwo@4/sd
/pci@3,3500/SUNW,isptwo@3 (identifies board SCSI interface)
.
.
.
/pci@2,2000/pci@2
/pci@2,2000/pci@2/SUNW,isptwo@4 (identifies adapter SCSI interface)
/pci@2,2000/pci@2/SUNW,hme@0,1 (identifies adapter Ethernet interface)
/pci@2,2000/pci@2/pci108e,1000@0
/pci@2,2000/pci@2/SUNW,isptwo@4/st
/pci@2,2000/pci@2/SUNW,isptwo@4/sd
/pci@2,3500/SUNW,hme@1,1 (identifies board Ethernet interface)

```

4.6.7.5 Booting From a PCI+ I/O Board

For customers booting from a PCI+ I/O Board, the following procedure must be completed in order to set up an `nvalias` command. Refer to the *OpenBoot 3.x Command Reference Manual* for more information.

- 1. Use the `show-devs` command to check the board path:**

You should see entries for the PCI+ I/O boards.

Note – Use the `format` command at the operating system level to find the complete path.

```
ok show-devs
.
.
.
/pci@b,4000/SUNW,isptwo@3/sd@3,0
/pci@3,2000/pci@2
/pci@3,2000/pci@2/SUNW,isptwo@4 (identifies adapter SCSI
interface)
/pci@3,2000/pci@2/SUNW,hme@0,1 (identifies adapter Ethernet
interface)
/pci@3,2000/pci@2/pci108e,1000@0
/pci@3,2000/pci@2/SUNW,isptwo@4/st
/pci@3,2000/pci@2/SUNW,isptwo@4/sd
/pci@3,4500/SUNW,isptwo@3 (identifies motherboard SCSI interface)
.
.
.
```

2. Use the `printenv` command to check the original environment before an `nvalias` is created:

```
ok printenv
Variable Name          Value                               Default Value

boot
auto-boot?             false                               true
watchdog-reboot?      false                               false
diag-file
diag-device            disk diskbrd diskisp dis ...     disk diskbrd
diskisp dis ..
.
boot-file              kadb
boot-device            /sbus@e,0/SUNW,soc@d,100 ...     disk diskbrd
diskisp dis .
diag-switch?          true                                true
use-nvramrc?          false                               false
nvramrc
```

3. Use the following commands to create the alias for (pcidisk):

```
ok setenv diag-switch? false
diag-switch? =          false
ok setenv use-nvramrc? true
use-nvramrc?=          true
ok nvalias (pcidisk) /pci@b,4000/SUNW,isptwo@3/sd@3,0
ok setenv boot-device (pcidisk)

boot-device = (pcidisk)
ok reset
```

4. Use the printenv command to verify the changed environment.

```
ok printenv

boot-command           boot                boot
auto-boot?             false            true
watchdog-reboot?      false            false
diag-file
diag-device            disk diskbrd diskisp dis ...  disk diskbrd
diskisp dis ...
boot-file              kadb
boot-device            (pcidisk) disk diskbrd dis ...

local-mac-address?    false            false
ansi-terminal?        true             true
screen-#columns       80               80
screen-#rows          34               34
silent-mode?          false            false
use-nvramrc?          true             false
nvramrc                devalias (pcidisk) /pci@b,4000/SUNW...
```

5. Use the `devalias` command to verify that the new alias (`pcidisk`) is on the list.

```
ok devalias

disksoc                /sbus@2,0/SUNW,soc@d,10000/
SUNW,pln@a0000000,752d81/SUN
W,ssd@0,0
(pcidisk)              /pci@b,4000/SUNW,isptwo@3
disk                   /sbus@3,0/SUNW,fas@3,8800000/sd@0,0
diskbrd                /sbus@3,0/SUNW,fas@3,8800000/sd@a,0
diskisp                /sbus@3,0/QLGC,isp@0,10000/sd@0,0
net                    /sbus@3,0/SUNW,hme@3,8c00000

ok boot
Resetting...
Software Power ON
Clock board TOD does not match TOD on any IO board.
screen not found.
Can't open input device.
Keyboard not present. Using ttya for input and output.
Clock board TOD does not match TOD on any IO board.

8-slot Sun Enterprise 4000/5000, No Keyboard
OpenBoot 3.2.27 Build_07, 768 MB memory installed, Serial
#8513781.
Copyright 2000 Sun Microsystems, Inc. All rights reserved
Ethernet address 8:0:20:81:e8:f5, Host ID: 8081e8f5.

Rebooting with command: boot
Boot device: (pcidisk) File and args:
```

4.6.7.6 Flash PROM

The Sun Enterprise 3500 system I/O+ board uses flash PROMs. Flash PROMs may be reprogrammed and can be updated to the latest firmware code. Refer to the *Sun Enterprise 6x00/5x00/4x00/3x00 System Flash PROM Programming Guide* for this procedure.

4.6.7.7 Diagnostics Testing

For PCI+ I/O board PCI card diagnostics testing, refer to the SunVTS User's Guide supported by your Solaris release. Also, refer to the documentation that came with your PCI card for further diagnostic testing.

Clock+ Board

To protect both yourself and the equipment, make sure you follow precautions in Chapter 2 “Safety Precautions and Tools Requirements.”

This chapter contains the following topics:

- Section 5.1 “Handling Boards and Assemblies” on page 5-2
- Section 5.2 “Clock+ Board” on page 5-2
 - Section 5.2.5 “Removing a Clock+ Board” on page 5-4
 - Section 5.2.6 “Installing a Clock+ Board” on page 5-5

For your protection, also observe the following safety precautions when setting up your equipment:

- Follow all cautions, warnings, and instructions marked on the equipment.
- Never push objects of any kind through openings in the equipment as they may touch dangerous voltage points or short out components that could result in fire or electric shock.
- Refer servicing of equipment to qualified personnel.

5.1 Handling Boards and Assemblies



Caution – The chassis AC power cord must remain connected to ensure a proper ground.



Caution – The clock+ board and its modules have surface-mount components that can be broken by flexing the board.

To minimize the amount of board flexing, observe the following precautions:

- Transport the board in an antistatic bag.
- Hold the board only by the edges near the middle of the board, where the board stiffener is located. Do not hold the board *only* at the ends.
- When removing the board from an antistatic bag, keep the board vertical until you lay it on the Sun ESD mat.
- Do not place the board on a hard surface. Use a cushioned antistatic mat. The board connectors and components have very thin pins that bend easily.
- Do not use an oscilloscope probe on the components. The soldered pins are easily damaged or shorted by the probe point.

5.2 Clock+ Board

There is one clock+ board for each Enterprise 3500 system (FIGURE 5-1). The clock+ board provides:

- Programmable system and processor clock
- Serial, keyboard, and mouse ports for the console
- NVRAM, which includes a centralized time-of-day (TOD) chip
- Centralized reset logic
- Status and control of power supplies

The clock+ board consists of the following subsystems:

- ConsoleBus
- Clocks
- Reset logic
- JTAG
- Centerplane connector signals

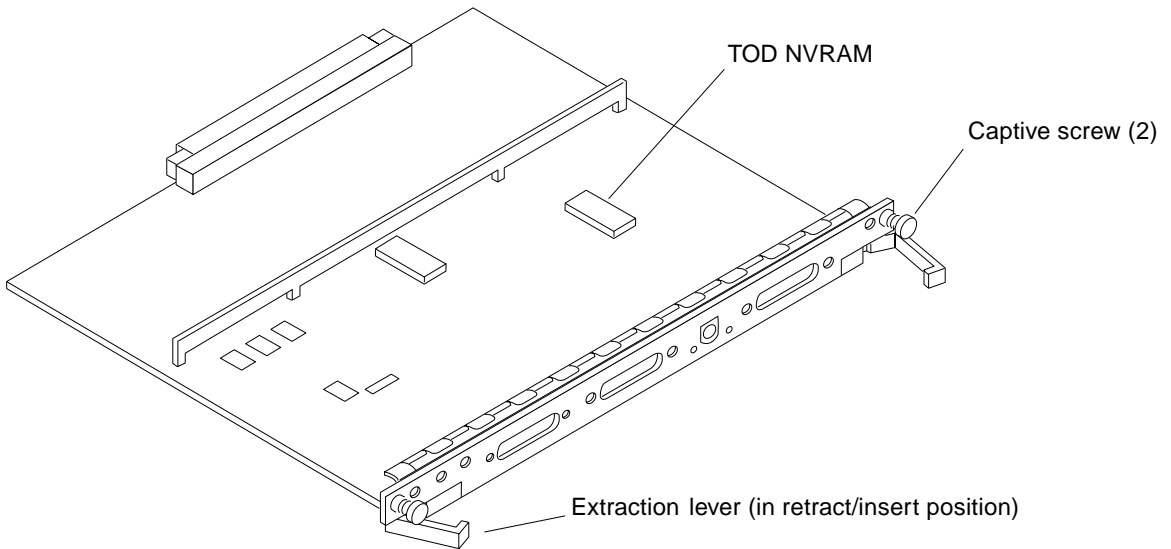


FIGURE 5-1 Clock+ Board

5.2.1 OBP Version

For the Sun Enterprise 6500/5500/4500/3500 series, you must install OpenBoot PROM code 3.2.24 or compatible versions when upgrading the clock+ board.

5.2.2 ConsoleBus

The ConsoleBus provides system boards access to global system control and status as well as to the keyboard, mouse, and serial ports. In addition, there is a NVRAM/TOD chip that maintains the date and time and 8 Kbytes of data when the power to the system is shut off.

The state of physical hardware conditions is maintained in registers on the clock+ board. Each of these registers has inputs generated from other subsystems on the clock+ board, from other boards, or from the power supplies in the system. Some clock+ board registers are reserved for controlling various states of the machine.

The ConsoleBus also provides a serial port interface and a keyboard/mouse interface. The primary purpose of the serial port interface is to provide POST messages during power on. The serial port can be used as a console for systems without a keyboard and display, and for standard serial peripheral hook-ups such as modems and printers.

5.2.3 Clocks

The clock subsystem generates the clocks for the entire system. The base clock is synthesized and then divided into various frequencies. The base clocks are then “fanned-out” and driven to the centerplane by an array of driver chips. Two processor clocks and one system clock go to each of the board slots on the centerplane.

5.2.4 Reset logic

The reset logic consists of four subcircuits for controlling the system reset and error state:

- Manual reset
- System reset
- XIR
- System error

5.2.5 Removing a Clock+ Board

The clock+ board slot is located in the system rear, to the right of the board slots (FIGURE 5-2).



Caution – The clock+ board is not hot pluggable. Do not remove the clock+ board until the system has been halted and powered off.

You must halt the operating system before turning off the system power. See Chapter 11 “Powering Off and On” for this procedure.



Caution – To avoid damaging internal circuits, do not disconnect or connect any cable while power is applied to the system.

1. **Halt the operating system and turn off the system power. See Chapter 11 “Powering Off and On,” for this procedure.**
2. **Unfasten cable connectors from the board front panel and set them aside.**
Label cables to identify them for reconnection later.
3. **Loosen the two captive screws securing the board to the system card cage.**

4. Pull the ends of both extraction levers outward simultaneously to unseat the board from the centerplane receptacles.

See FIGURE 5-1 on page 5-3 to position the extraction levers.

5.2.6 Installing a Clock+ Board

The clock+ board slot is located in the system rear, to the right of the board slots (FIGURE 5-2).

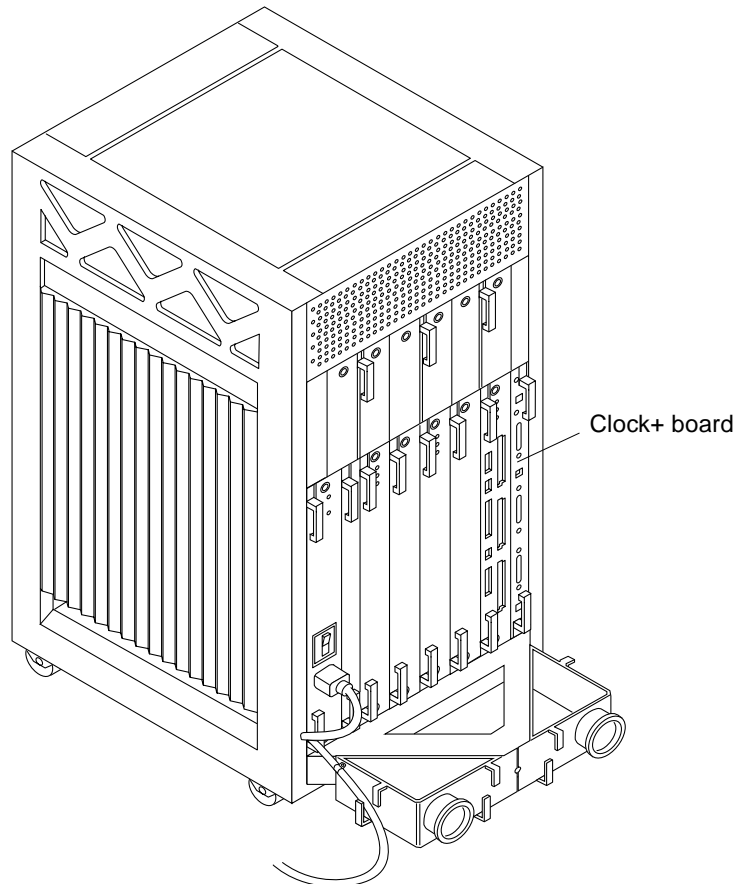


FIGURE 5-2 Clock+ Board Location

Note – If you are replacing the clock+ board, the TOD NVRAM from the old board must be removed and placed on the new board. Note also that if a system is replaced, then the TOD NVRAM on the clock+ board must also be changed.

1. **Carefully insert the board in the proper slot in the card cage, ensuring that the board does not slip out of the top and bottom card guides.**

The component side of the board must face to the right.

2. **Ensure that both extraction levers are in the outward position as you slide the board toward the centerplane connectors.**

See FIGURE 5-1 on page 5-3 to position the extraction levers. The board will not seat fully unless the levers are in this starting position.



Caution – DO NOT FORCE any board into a slot; this can cause damage to the board and system. The board should insert and seat smoothly. If it binds, remove the board and inspect the card cage slot for any obvious obstructions. Also inspect both the board and the centerplane for bent pins or other damage.

3. **Use the extraction levers to seat the board.**

Simultaneously swing both levers into the locked position. Do not press on board to seat it; doing so will damage the connector pins.

4. **Secure the board to the chassis using the two captive screws, one on each side.**

See FIGURE 5-1 on page 5-3.

5. **Connect any applicable interface cables to the system board back panel.**
6. **Turn on system power. See Chapter 11 “Powering Off and On,” for this procedure.**
7. **Boot the system.**

Interface Board

To protect both yourself and the equipment, make sure you follow precautions in Chapter 2 “Safety Precautions and Tools Requirements.”

This chapter contains the following topics:

- Section 6.1 “Handling Boards and Assemblies” on page 6-2
- Section 6.2 “Filler Panels” on page 6-2
- Section 6.3 “Interface Board” on page 6-3
 - Section 6.3.1 “Removing an Interface Board” on page 6-5
 - Section 6.3.2 “Installing an Interface Board” on page 6-6
 - Section 6.3.3 “Removing a GBIC” on page 6-6
 - Section 6.3.4 “Installing a GBIC” on page 6-7

For your protection, also observe the following safety precautions when setting up your equipment:

- Follow all cautions, warnings, and instructions marked on the equipment.
- Never push objects of any kind through openings in the equipment as they may touch dangerous voltage points or short out components that could result in fire or electric shock.
- Refer servicing of equipment to qualified personnel.

6.1 Handling Boards and Assemblies



Caution – The chassis AC power cord must remain connected to ensure a proper ground.



Caution – The interface board and its modules have surface-mount components that can be broken by flexing the board.

To minimize the amount of board flexing, observe the following precautions:

- Transport the board in an antistatic bag.
- Hold the board only by the edges near the middle of the board, where the board stiffener is located. Do not hold the board *only* at the ends.
- When removing the board from an antistatic bag, keep the board vertical until you lay it on the Sun ESD mat.
- Do not place the board on a hard surface. Use a cushioned antistatic mat. The board connectors and components have very thin pins that bend easily.
- Do not use an oscilloscope probe on the components. The soldered pins are easily damaged or shorted by the probe point.

6.2 Filler Panels

All empty board slots in Enterprise 3500 systems must have a filler panel installed for cooling purposes and for EMI protection. Filler panels are inserted into a board slot with the springfingers facing to the right.

- **To remove the interface board filler panel from the card cage, unfasten the captive screws at the top and bottom of the panel.**

Grasp the handles to pull the filler panel out.

6.3 Interface Board

Each Enterprise 3500 system has a slot for one interface board (IB). The IB, which is optional, is installed in the rear of the system, adjacent to the peripheral power supply/AC (FIGURE 6-1).

Note – Enterprise 3500 systems must have either an IB or a filler panel installed in the IB slot.

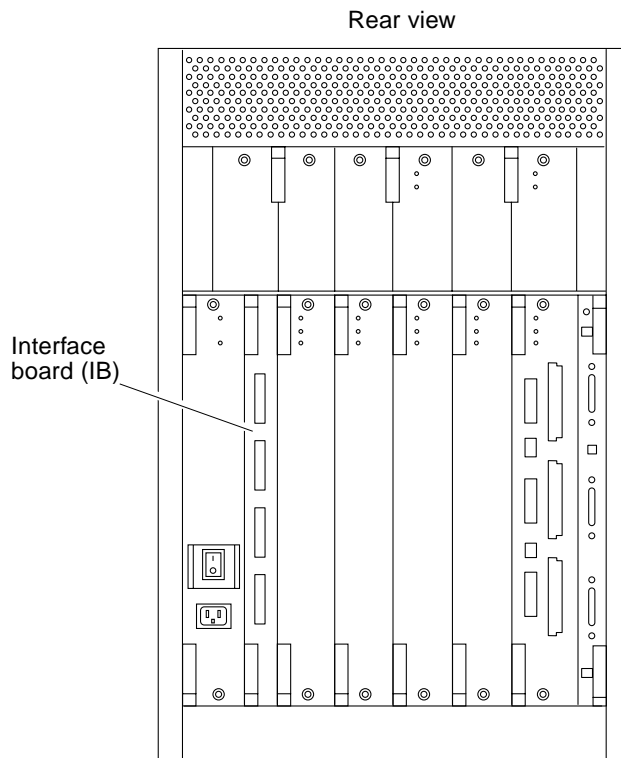


FIGURE 6-1 Interface Board Location

The interface board provides mounting for four GBICs (FIGURE 6-2) together with associated circuitry. A GBIC (Gigabit Interface Converter) is a hot-pluggable unit that converts any of the standard Fibre Channel connectors and signaling technologies. Within this manual, the GBIC Fibre Channel is 100 Mbytes.

Essentially, the interface board receives, reclocks, and provides bypass services for four independent FC-AL ports. The interface board, together with interconnecting fiber optic cabling, provides four independent FC-AL loops between the host I/O+ board and the internal fiber optic disks.

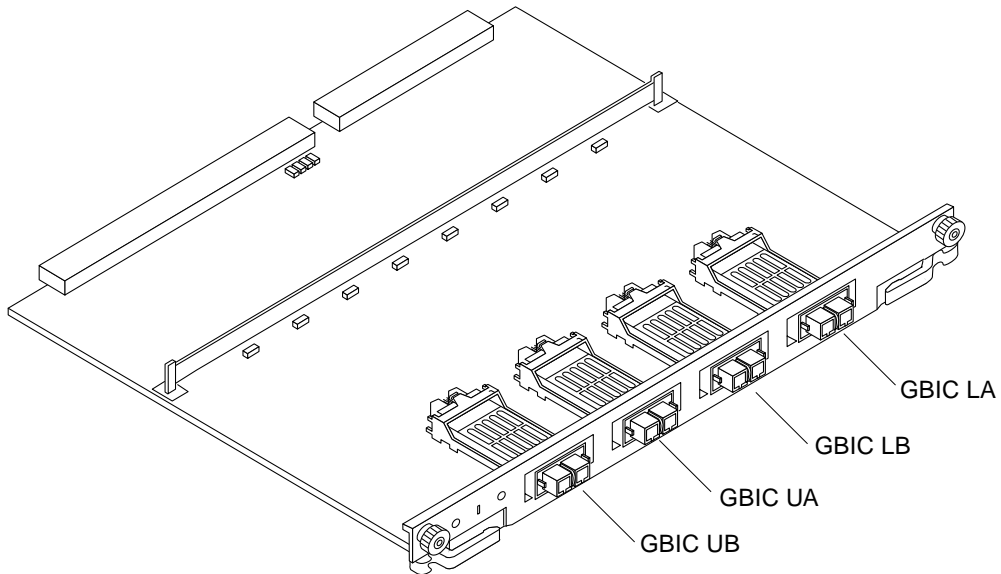


FIGURE 6-2 Interface Board

TABLE 6-1 GBIC Controllers for Disk Drive Ports

Disk Drives	Drive Port	GBIC Name and Location
0, 1, 2, 3	A	GBIC LA (Lower bank)
0, 1, 2, 3	B	GBIC LB (Lower bank)
4, 5, 6, 7	A	GBIC UA (Upper bank)
4, 5, 6, 7	B	GBIC UB (Upper bank)

6.3.1 Removing an Interface Board

Note – It is not necessary to remove the interface board from the card cage to remove and replace GBICs. A GBIC may be removed and replaced “live” (without removing power from the system or board). However, the necessary software precautions must be taken whenever the I/O path to a particular disk is to be interrupted; halt all I/O activity to the disk affected by the replacement of a GBIC. To replace a GBIC or fiber optic cable, proceed to Section 6.3.3 “Removing a GBIC.”

1. **Unfasten any fiber optic cables from the board front panel and set them aside (FIGURE 6-3).**

Label cables to identify them for reconnecting.

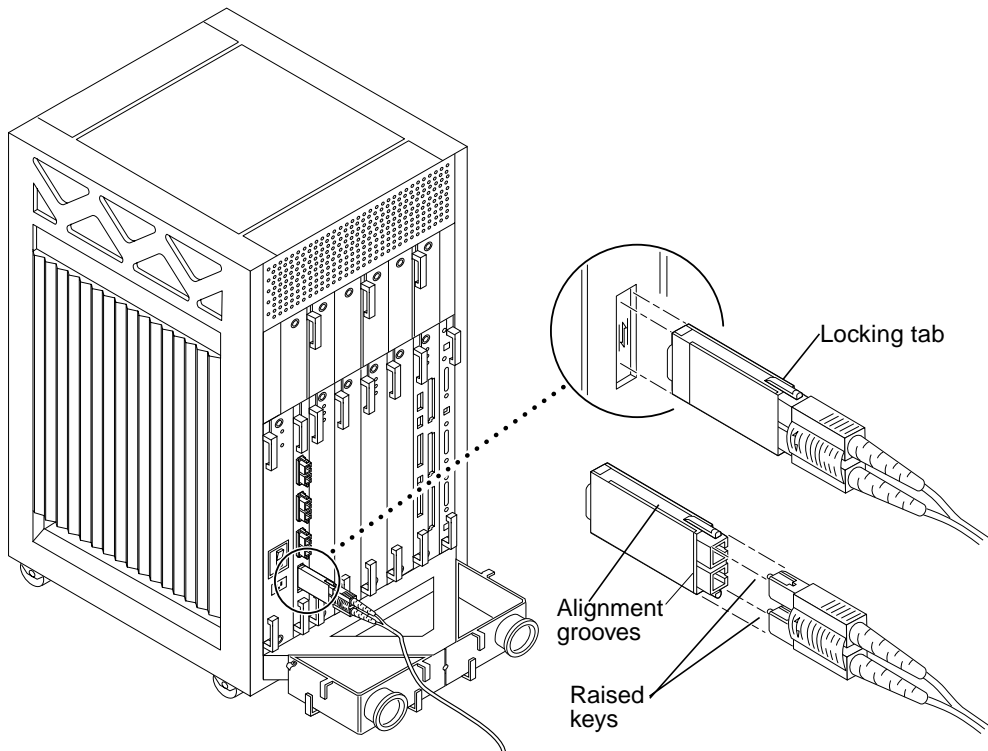


FIGURE 6-3 Removal of Fiber Optic Cable and GBIC

2. **Loosen the two captive screws securing the board to the system card cage.**

3. Pull the ends of both extraction levers outward simultaneously to unseat the board from the centerplane receptacles.

6.3.2 Installing an Interface Board

1. Carefully insert the board in the proper slot in the card cage, ensuring that the board does not slip out of the top and bottom card guides.

The component side of the board must face to the right.

2. Ensure that both extraction levers are in the outward position as you slide the board toward the centerplane connectors.

The board will not seat fully unless the levers are in this starting position.



Caution – DO NOT FORCE any board into a slot; this can cause damage to the board and system. The board should insert and seat smoothly. If it binds, remove the board and inspect the card cage slot for any obvious obstructions. Also inspect both the board and the centerplane for bent pins or other damage.

3. Use the extraction levers to seat the board.

Simultaneously swing both levers into the locked position. Do not press on board to seat it; doing so will damage the connector pins.

4. Secure the board to the chassis using the two captive screws.
5. Reconnect any fiber optic cables to the board front panel.

6.3.3 Removing a GBIC

Note – It is not necessary to remove the interface board from the card cage to remove and replace GBICs. A GBIC may be removed and replaced “live” (without removing power from the system or board). However, the necessary software precautions must be taken whenever the I/O path to a particular disk is to be interrupted; halt all I/O activity to the disk affected by the replacement of a GBIC.

To remove a GBIC, first remove the fiber optic cable as shown in FIGURE 6-3. Then compress the two locking tabs while pulling the GBIC straight out as depicted in FIGURE 6-3.

6.3.4 Installing a GBIC

Note – It is not necessary to remove the interface board from the card cage to remove and replace GBICs. A GBIC may be removed and replaced “live” (without removing power from the system or board). However, the necessary software precautions must be taken whenever the I/O path to a particular disk is to be interrupted; halt all I/O activity to the disk affected by the replacement of a GBIC.

Ensure that the orientation of the alignment groove is correct (FIGURE 6-3) and then reinsert the GBIC into the proper slot. Reconnect the fiber optic cable as depicted in FIGURE 6-3 (keys on cable matching notches on the GBIC).

Power Supplies

This chapter describes the power supplies and environmental sensing and reporting in Sun Enterprise 3500 systems.

This chapter contains the following topics:

- Section 7.1 “Power Supply Types” on page 7-2
- Section 7.2 “Safety Precautions” on page 7-3
- Section 7.3 “Distribution” on page 7-3
- Section 7.4 “Peripheral Power Supplies” on page 7-3
 - Section 7.4.1 “Peripheral Power Supply LEDs” on page 7-4
 - Section 7.4.2 “Replacing the Peripheral Power Supply/AC (PPS 0)” on page 7-5
 - Section 7.4.3 “Replacing the Thermal Protection Module or Auxiliary Peripheral Power Supply (PPS1)” on page 7-7
- Section 7.5 “Power/Cooling Module (PCM)” on page 7-11
 - Section 7.5.3 “Troubleshooting a PCM” on page 7-12
 - Section 7.5.4 “Replacing a PCM” on page 7-13

7.1 Power Supply Types

There are three types of power supplies:

- Peripheral power supply/AC input (PPS/AC [PPS 0])
- Optional auxiliary peripheral power supply (PPS [PPS 1])
- Power/cooling module (PCM)



Caution – A thermal protection module or an auxiliary peripheral power supply (PPS1) *must be installed* in the front PPS1 slot *at all times* to ensure the maximum operating temperature is not exceeded.

Both the auxiliary peripheral power supply (PPS 1) and the PCM are hot-pluggable. This feature enables you to physically remove the failed component despite its being “live,” or being supplied with electrical power. In addition, both may be inserted into a running system.

The PPS/AC (PPS 0) is not hot-pluggable because it incorporates an AC cord and circuit breaker for system input power.

Note – A functioning PPS/AC (PPS 0) provides electrical precharge that is required for the hot plug of PCMs. The hot-plug replacement of the PPS (PPS 1) does not require electrical precharge. Use the `prtdiag (1M)` command to determine if electrical precharge is available.

TABLE 7-1 lists the power supply voltages, their uses, and the power supplies that generate them.

TABLE 7-1 Power Supply Summary

Voltage	Supply	Use
2.0V	PCM	Centerplane termination
3.3V	PCM	CPU/Memory+ board, I/O+ board, Clock+ board UltraSPARC II module (SRAMs, SDBs, CPU I/O)
5V	PCM	SBus Card, Clock+ board UltraSPARC II module power (via DC/DC converter)
5V	PPS/AC, PPS	Peripherals (DVD drive, tape drive)
12V	PPS/AC, PPS	Peripherals (DVD drive, tape drive)

7.2 Safety Precautions

To protect both yourself and the equipment, any servicing of equipment should be performed by qualified personnel. Observe the precautions in TABLE 7-2.

TABLE 7-2 Safety Precautions

Item	Problem	Precaution
Wrist or foot strap	ESD	Wear a conductive wrist strap or foot strap when handling power supplies.
ESD mat	ESD	An approved ESD mat provides protection from static damage when used with a wrist strap or foot strap.
Cover panels	System damage and overheating	Re-install all cabinet cover panels after performing any service work on the system.
SBus slot covers	System damage and overheating	Install SBus slot covers in all unused SBus slots.

7.3 Distribution

In the Enterprise 3500 system, there is at least one peripheral power supply and a PCM slot for each pair of board slots. There is a single alternating current (AC) power cord for the whole system. AC is then distributed to each of the PCMs within the chassis. The software monitors the status of the AC power source. Current sharing between power supplies provides redundant power.

7.4 Peripheral Power Supplies

The PPS/AC (PPS 0) in FIGURE 7-1 and the auxiliary PPS (PPS 1) in FIGURE 7-2 provide power to the peripheral subsystems, the remote console, and the drives.

Note – Either a thermal protection module (FIGURE 7-2) or an auxiliary peripheral power supply must be installed in the PPS1 slot whenever a system is powered-on.

Both the PPS/AC (PPS 0) and auxiliary PPS (PPS 1) incorporate current sharing to operate in redundant and parallel operations. The peripheral power supply/AC input provides three precharge outputs (3.3V, 5V, and 12V) to enable hot-plug installation of system boards or PCMs into an active centerplane.

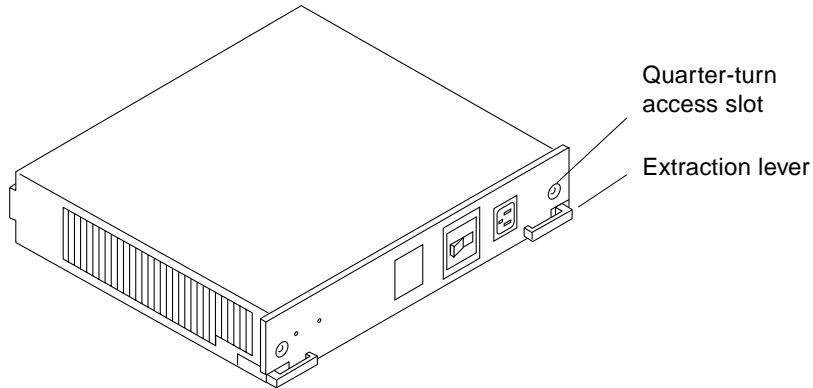


FIGURE 7-1 Peripheral Power Supply/AC Input

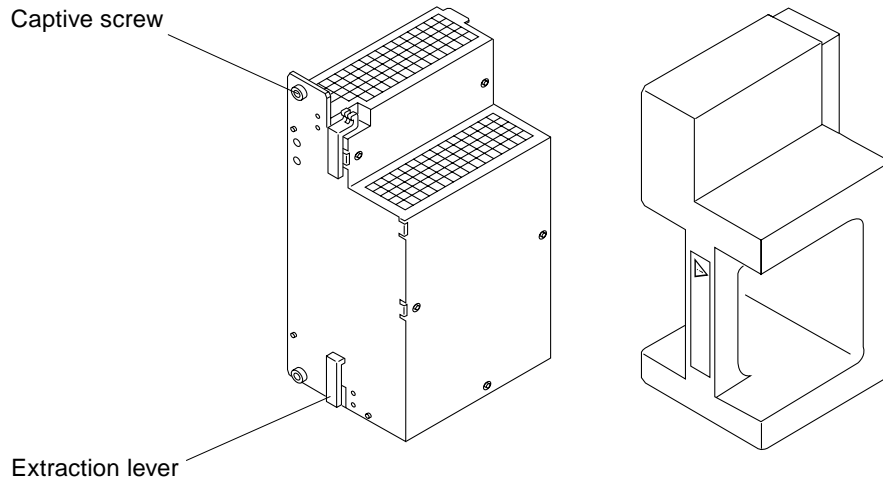


FIGURE 7-2 Auxiliary Peripheral Power Supply (PPS1) and Thermal Protection Module

7.4.1 Peripheral Power Supply LEDs

A green LED is lit on the power supply when it is operational. When a peripheral power supply fails, a yellow LED is lit on the power supply.

See Chapter 10 “Flow Diagrams for Troubleshooting,” for more information.

7.4.2 Replacing the Peripheral Power Supply/AC (PPS 0)

1. **Completely power off the Enterprise 3500 system.**
See the power off instructions in Chapter 11 “Powering Off and On.”
2. **Disconnect the AC power cord from the power inlet.**
3. **Release the power supply from the system chassis by inserting a Phillips No. 1 screwdriver into each quarter-turn access slot and then turning to the unlocked position (FIGURE 7-3).**

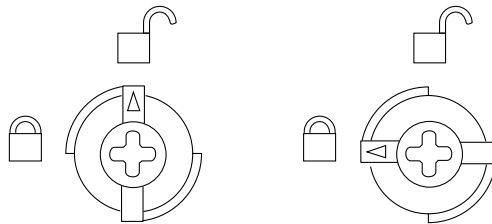


FIGURE 7-3 Unlocking and Locking Quarter-turn Access Slots

4. **Pull the ends of the extraction levers outward to release the power supply from the centerplane.**
5. **Pull out the power supply (FIGURE 7-4).**

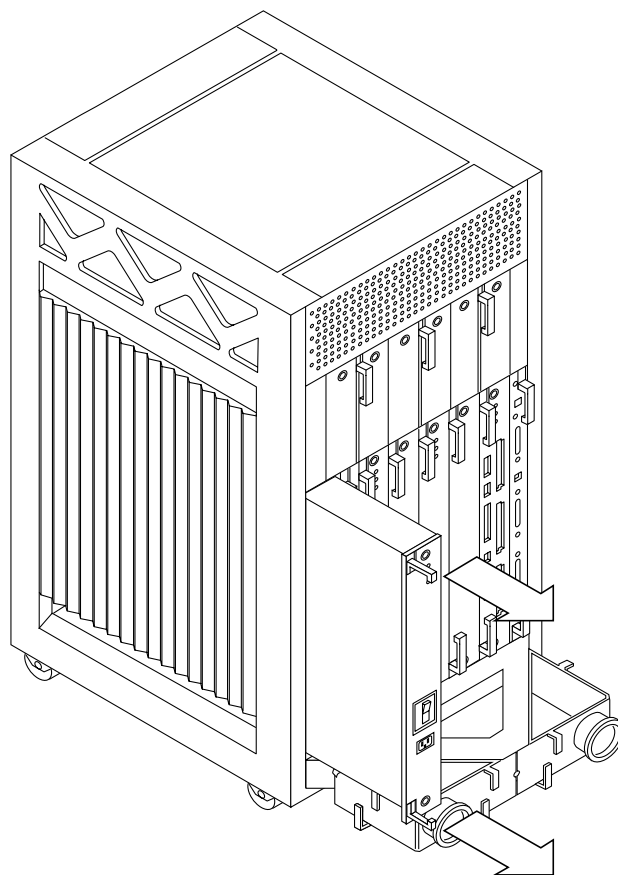


FIGURE 7-4 Replacing the Peripheral Power Supply/AC Input

6. Carefully insert the replacement power supply in the proper slot using the guide slots.

Ensure that both extraction levers are in the outward position. The power supply will not seat fully unless the levers are in this starting position.

7. Slide the power supply toward the centerplane.

Ensure that the arrows in the quarter-turn access slots point to the unlocked position (FIGURE 7-3).



Caution – DO NOT FORCE the power supply into a slot; this can cause damage to the power supply and system.

The power supply should insert and seat smoothly. If the power supply binds, remove it, and inspect the slot for any obvious obstructions. Do not damage the springfingers at the bottom of the power supply.

8. Use the extraction levers to seat the power supply.

Simultaneously swing both levers inward to the locked position. Do not press on the front panel of the power supply to seat it—doing so will damage the connector pins.

9. Lock the power supply to the system chassis by inserting a Phillips No. 1 screwdriver into each quarter-turn access slot and then turning to the locked position (FIGURE 7-3).

10. Connect the AC cord and power on the Enterprise 3500 system.

See the power on instructions in Chapter 11 “Powering Off and On.”

11. Check to be sure the green LED on the power supply is lit.

If the green LED is not lit, the power supply may not be seated properly. Check to see if it is seated properly by repeating Step 6 to Step 11. If the green LED is still not lit, see Chapter 10 “Flow Diagrams for Troubleshooting,” for more information.

7.4.3 Replacing the Thermal Protection Module or Auxiliary Peripheral Power Supply (PPS1)

All Enterprise 3500 systems *must have* either a thermal protection module or an auxiliary peripheral power supply (PPS1) installed in the PPS1 slot in the front of the system.

7.4.3.1 Removing a Thermal Protection Module

- 1. Use the key provided to unlock and open the system front door.**
- 2. Grasp the handle on the thermal protection module and firmly pull the module toward you, out of the PPS1 slot in the system chassis.**
- 3. Before powering on the system, install an auxiliary peripheral power supply or return the thermal protection module to the PPS1 slot.**

7.4.3.2

Replacing an Auxiliary Peripheral Power Supply



Caution – Remove and replace the auxiliary peripheral power supply (PPS 1) in a running system but not in the low power mode. In low power mode, the front panel and board LEDs are all off, while the yellow LEDs are lit on the power supplies. Replacing the PPS (PPS 1) during low power mode causes the system to power on immediately.

1. Use the key provided to unlock and open the system front door.
2. Release the power supply from the system chassis by loosening the captive screws.
3. Pull the ends of the extraction levers outward to release the power supply from the centerplane.
4. Pull the power supply straight out.

You will see a message similar to the following example on your system console:

```
NOTICE: Peripheral Power Supply 1 Removed
```

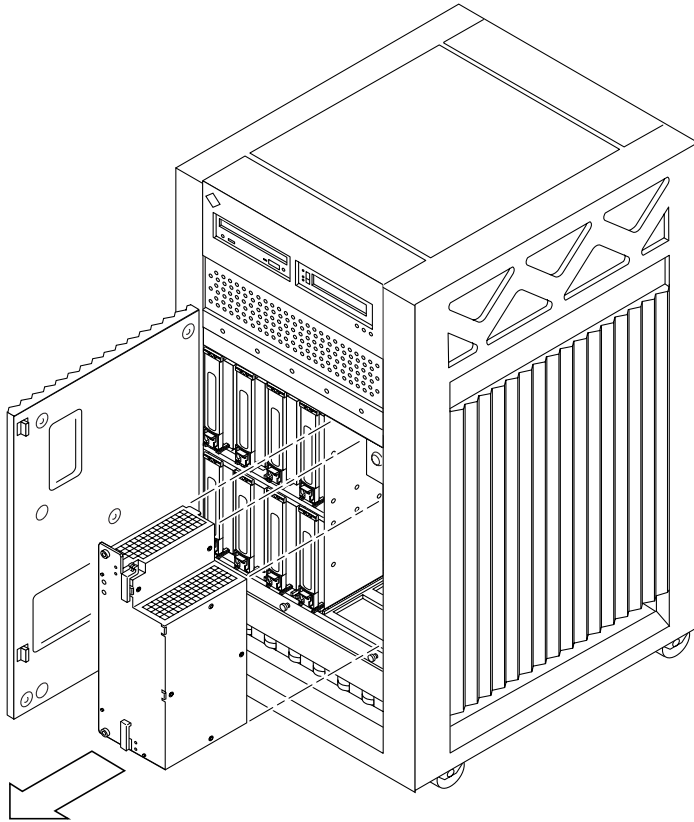


FIGURE 7-5 Replacing the Auxiliary Peripheral Power Supply (PPS1)

5. Carefully insert the replacement power supply in the PPS1 slot.

Ensure that both extraction levers are in the outward position. The power supply will not seat fully unless the levers are in this starting position.

6. Slide the power supply toward the centerplane.



Caution – DO NOT FORCE the power supply into a slot; this can cause damage to the power supply and system.

The power supply should insert and seat smoothly. If the power supply binds, remove it, and inspect the slot for any obvious obstructions.

7. Use the extraction levers to seat the power supply.

Simultaneously swing both levers inward to the locked position. Do not press on the front panel of the power supply to seat it—doing so will damage the connector pins.

8. Lock the power supply to the system chassis by tightening the captive screws.

9. Check to be sure the green LED on the power supply is lit.

If the green LED is not lit, the power supply may not be seated properly. Check to see if it is seated properly by repeating Step 5 to Step 9. If the green LED is still not lit, see Chapter 10 “Flow Diagrams for Troubleshooting,” for more information.

If the green LED is lit, you see a message similar to the following example on your system console:

```
NOTICE: Peripheral Power Supply 1 Installed
```

```
NOTICE: Peripheral Power Supply 1 OK
```

7.5 Power/Cooling Module (PCM)

The power/cooling module (PCM, FIGURE 7-6) provides power for two boards. The PCM also supplies cooling air to the board slots, so in normal operation each board must be next to a working PCM.

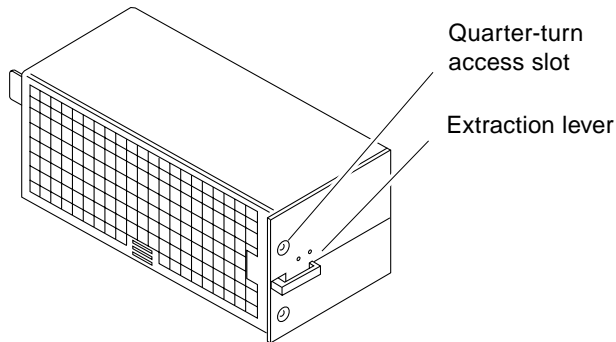


FIGURE 7-6 PCM

The PCM incorporates an AC inrush limit circuit and two precharge inputs (3.3V and 5V) that enable it to be hot-pluggable into a live centerplane.

Within a system all PCMs operate in a parallel redundant mode, sharing 2.0V, 3.3V, and 5V output currents. The shared 5V output also includes the 5V output of a peripheral power supply.

7.5.1 Requirements for Redundant Power

If a DC supply in a PCM fails, the system boards will continue to be powered and cooled by the other power supplies if sufficient redundancy (an additional power supply) is present.

For example, if an Enterprise 3500 system needs a minimum of two PCMs and three are present, then the system has redundancy (TABLE 7-3).

Note – The presence of an additional (extra) PCM in the system provides redundancy and allows hot-plug of PCMs. *When all five board slots are populated, there is no redundancy because of the two PCMs per board rule.*

TABLE 7-3 Minimum and Redundant Working Power Supplies Required to Power Active Boards

Enterprise 3500 System		
Number of Boards	Minimum Number of Working PCMs	Redundant Working PCMs (Hot-Pluggable)
1-2	1	2
3-4	2	3
5	3	No redundancy

Failed power supplies must be replaced as soon as practical. Otherwise, the Enterprise 3500 system will lose its redundancy and result in an outage at the next PCM failure.

7.5.2 Cooling Requirements

Note – In the Enterprise 3500 system, all boards must be adjacent to a PCM. The fans in the PCM cool the boards. The minimum configuration is one PCM for every two adjacent boards.

The PCMs incorporate redundant bulk fan power so that the fans continue to operate in a failed power supply via the redundant fan power from the peripheral power supply.

Note – A PCM or an auxiliary fan tray must be working in PCM slot 5. The fans cool the peripheral power supply/AC input.

7.5.3 Troubleshooting a PCM

A green LED is lit on the power supply when it is operational. When a PCM fails, a yellow LED is lit on the PCM.

You will see a message similar to the following example on your system console when a PCM fails:

```
WARNING: Core Power Supply 3 Failing
WARNING: Redundant power lost
```

See Chapter 10 “Flow Diagrams for Troubleshooting,” for more information.

7.5.4 Replacing a PCM



Caution – Do not replace a PCM while the system is in the *low-power mode*. Remove and replace the PCM only in a running system. Replacing a PCM during low-power mode will cause the system to power up immediately and result in a severe overload condition for that PCM (the other PCMs will remain in the low-power mode).

The system is in the low power mode if the front panel and board LEDs are all off while the yellow LEDs are lit on the power supplies.



Caution – Replace the PCM immediately or risk overheating the board(s) cooled by the fans in that power supply.

Remember the following rules for hot-plug replacement of a PCM:

- The peripheral power supply/AC (PPS0) must be fully operational (to provide precharge current).
 - There must be a redundancy of electrical power (TABLE 7-3) in the system.
1. Use the `prtdiag (1M)` command to determine if precharge current is present.
 2. Release the power supply from the system chassis by inserting a Phillips No. 1 screwdriver into each quarter-turn access slot and then turning to the unlocked position (FIGURE 7-7).

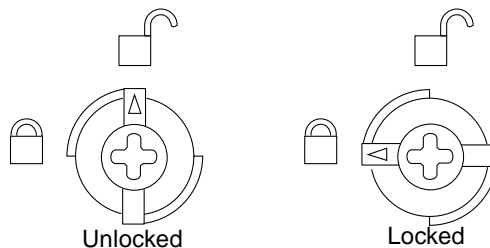


FIGURE 7-7 Quarter-Turn Access Slots

3. Pull the end of the extraction lever outward to release the power supply from the centerplane.
4. Pull out the power supply (FIGURE 7-8).

You see a message similar to the following example on your system console:

```
NOTICE: Core Power Supply 5 Removed
```

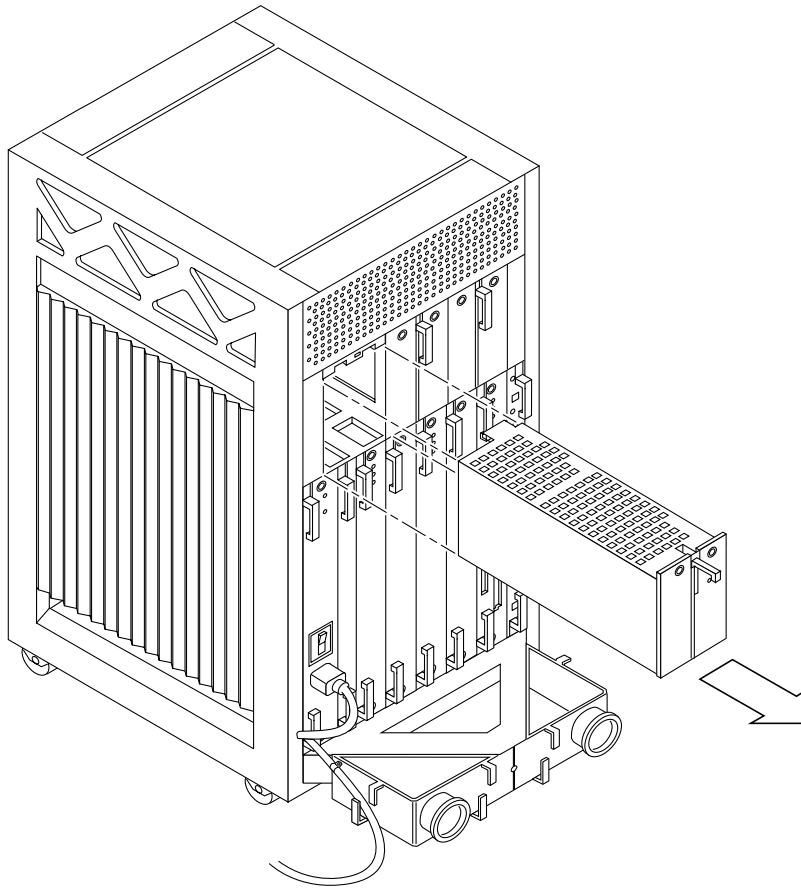


FIGURE 7-8 Replacing a PCM in the Enterprise 3500 System

- 5. Carefully insert the replacement power supply in the proper slot.**
 - a. Orient the PCM with the extraction lever on the outside edge of the Enterprise 3500 system.**
 - b. Verify that the arrows in the quarter-turn access slots are turned to the unlocked position.**
 - c. Ensure that the extraction lever is in the outward, unlocked position.**

The power supply does not seat fully unless the lever is in the unlocked position.



Caution – DO NOT FORCE the power supply into a slot. This can cause damage to the power supply and system.

The power supply should insert and seat smoothly. If it binds, remove it, and inspect the slot for any obvious obstructions. Do not damage the springfingers at the bottom of the power supply.

6. Slide the power supply toward the centerplane, then use the extraction lever to seat the power supply (FIGURE 7-8).

Swing the lever inward to the locked position. Do not press on the front panel of the power supply to seat it—doing so will damage the connector pins.(FIGURE 7-7).

7. Lock the power supply to the system chassis by inserting a Phillips #1 screwdriver into each quarter-turn access slot and then turning to the locked position (FIGURE 7-7).

8. Check to be sure the green LED on the PCM is lit.

If the green LED is not lit, the power supply is not seated properly. Repeat Step 5 to Step 8. If the green LED is still not lit, see Chapter 10 “Flow Diagrams for Troubleshooting,” for more information.

If the green LED is lit, you will see a message similar to the following example on your system console:

```
NOTICE: Core Power Supply 5 Installed
NOTICE: Core Power Supply 5 OK
NOTICE: Redundant power available
```


Internal SCSI and FC-AL Devices

This chapter contains the following topics:

- Section 8.1 “Tape and DVD-ROM Drives” on page 8-2
 - Section 8.1.2 “Removing/Replacing a Tape or DVD-ROM Drive” on page 8-3
- Section 8.2 “Disk Drives” on page 8-5
 - Section 8.2.2 “Removing a Disk Drive” on page 8-6
 - Section 8.2.3 “Installing a Disk Drive” on page 8-8

The following SCSI devices are supported in a Sun Enterprise 3500 system:

- DVD-ROM drive
- Tape drive

The following FC-AL devices are supported in a Sun Enterprise 3500 system:

- Disk drive

FIGURE 8-1 shows the location of the system internal SCSI and FC-AL devices.

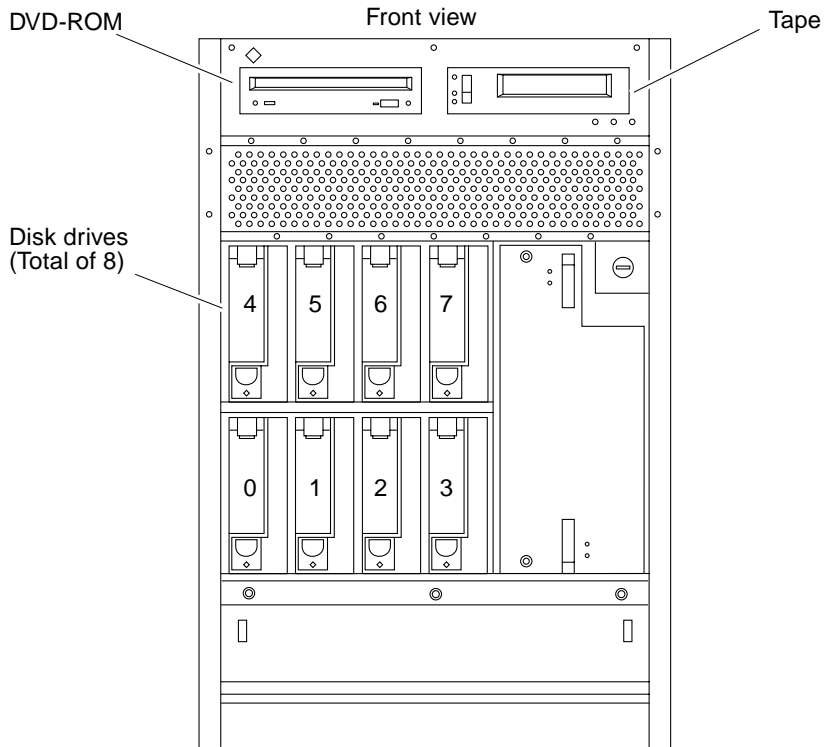


FIGURE 8-1 Internal SCSI and FC-AL Device Locations

8.1 Tape and DVD-ROM Drives

8.1.1 Use and Maintenance

Refer to the documentation that came with your device for information on use and maintenance.

8.1.2 Removing/Replacing a Tape or DVD-ROM Drive

1. Remove the front bezel.

a. Grasp the front bezel on both sides near the center.

Place your thumbs on top of the front bezel and place your other fingers at the slight indentations under the front bezel for leverage.

b. Pull the front bezel straight out toward you and set it aside (FIGURE 8-2).

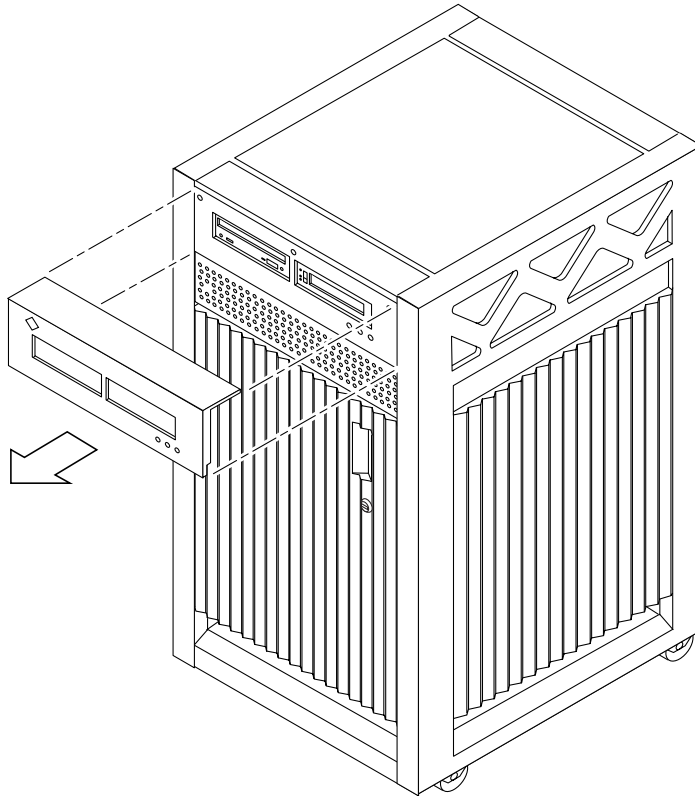


FIGURE 8-2 Front Bezel

2. Loosen the bottom two captive screws that secure the media tray to the chassis tray (FIGURE 8-3).

3. Use a screwdriver in the notch at the bottom center of the tray to assist in separating the media tray from the rear slip connectors, and pull out the tray containing the devices (FIGURE 8-3).

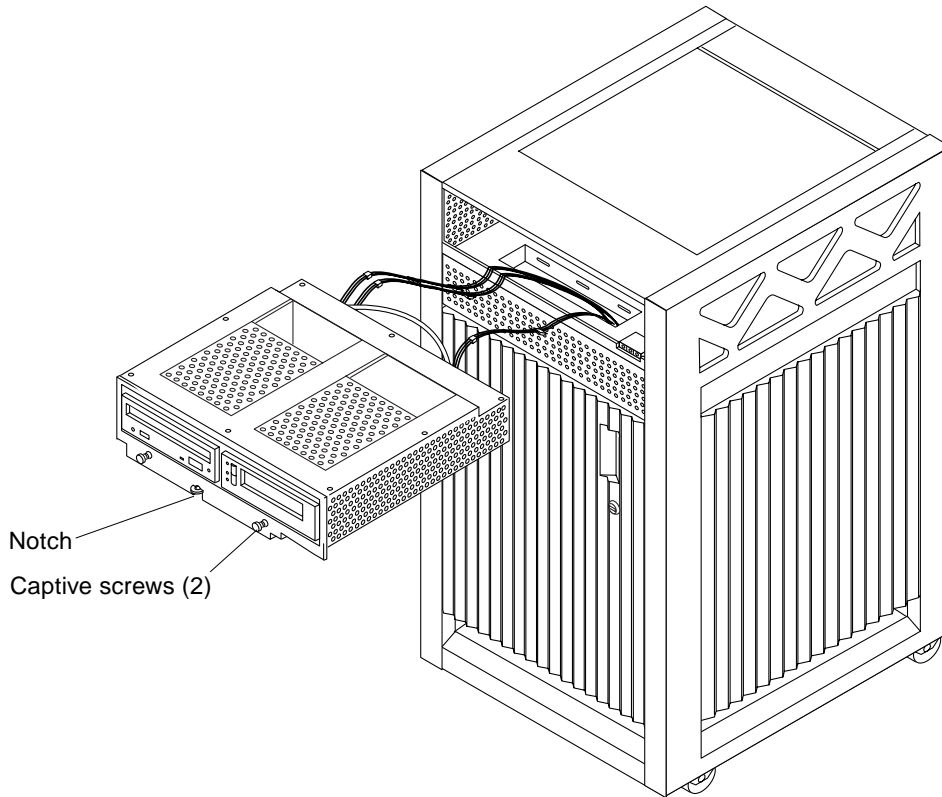


FIGURE 8-3 Media Tray Removal and Replacement

4. To access the devices in the media tray, turn the tray over and place it upside down on top of the Enterprise 3500 cabinet.

To remove and replace an existing device, perform Step 5. To install a tape drive for the first time, proceed to Step 6.

5. To replace a DVD-ROM or a tape drive:

a. Loosen the four screws securing the drive to the media tray.

b. Disconnect the drive data and power connector from the socket in the media tray, and slide the drive out of the tray.

c. Set the replacement drive SCSI address to 6 for a DVD-ROM drive, to 5 for a tape drive.

d. Slide the replacement drive into the media tray. Use the four screws removed in Step 5a to secure the drive; tighten the four screws.

- e. Connect the data and power connector on the drive into the socket in the media tray.
 - f. To complete the replacement, reverse Step 1 through Step 4.
6. To install a tape drive for the first time:
- a. Remove the filler mechanism by loosening the captive screws and then removing the unit.
 - b. Set the SCSI address on the tape drive to 5.
 - c. Slide the drive into the media tray and secure the drive to the tray using the four screws removed in Step 6b.
 - d. Connect the data and power connector on the drive into the socket in the media tray.
 - e. To complete the installation, reverse Step 1 through Step 4.

8.2 Disk Drives

Disk drive banks are located in the front of the Enterprise 3500 system. A system supports up to eight single connector 3.5 inch hard disk drives of the 1.0 inch form factor, or eight drives of the 1.6 inch form factor. Disk drives with different form factors may be mixed within a single system.

All disk drives use fiber optic interface and connect by way of the centerplane connectors to an interface board (IB) that can be installed in the system rear, next to the peripheral power supply/AC. For information about the IB and GBICs (Gigabit interface converters), see Chapter 6.

Note – Reserve drive bay 0 for the boot disk (FIGURE 8-5).

8.2.1 Use and Maintenance

Refer to the documentation that came with your disk drive for instructions on use and maintenance.

8.2.2

Removing a Disk Drive



Caution – Prior to performing the following procedure, ensure that you perform any necessary software tasks. Failure to perform any necessary software tasks prior to removing or replacing a disk drive may result in loss of data.

Note – Disk drives used in Enterprise 3500 systems have a retainer mechanism that doubles as an extraction handle.

1. **Open the system front door (FIGURE 8-4).**

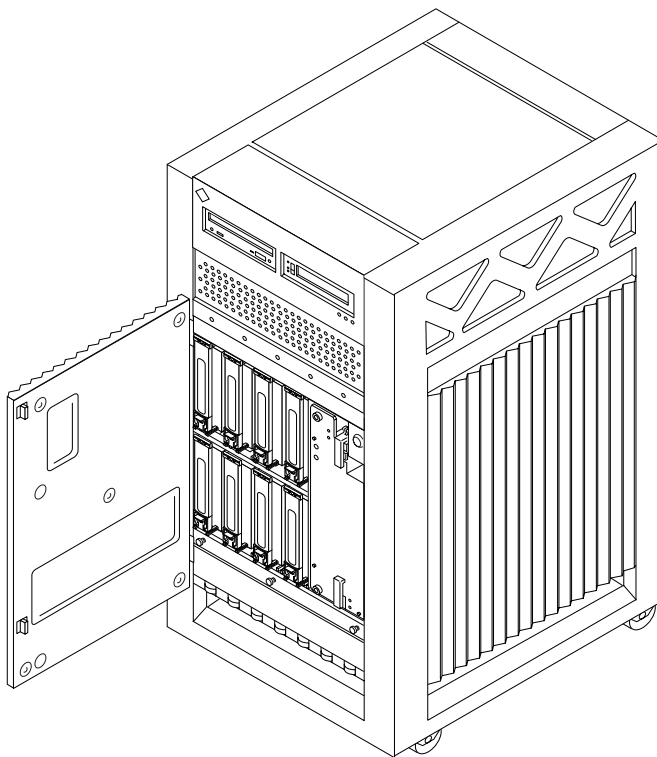


FIGURE 8-4 Disk Drive Access

2. **Locate the drive to be replaced (FIGURE 8-5).**



Caution – You must wear a wrist strap when handling disk drives to prevent damage to the system components.

Front view

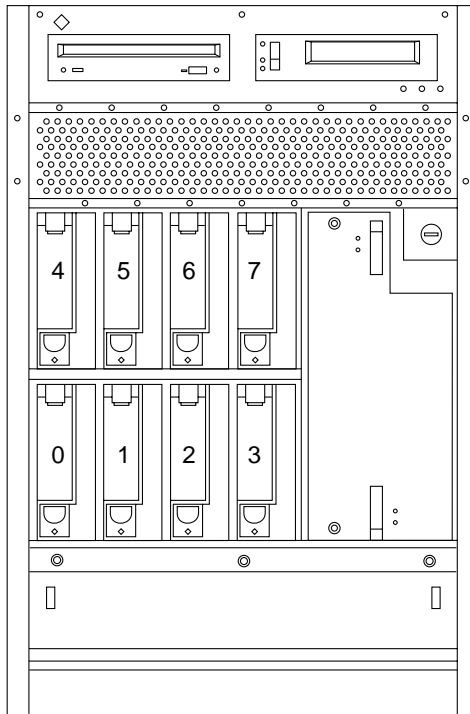


FIGURE 8-5 Disk Drive Bays

Note – The disk drive retainer must be unlatched and then extended 45 degrees, to an unlocked position, for a drive to be removed or replaced in the system chassis.



Caution – Do not tug with abrupt force on the retainer; doing so can cause it to break off.

3. To remove the drive:

- a. **Unlatch the drive retainer and extend it 45 degrees. Use the extended, unlocked retainer as a handle (FIGURE 8-6).**

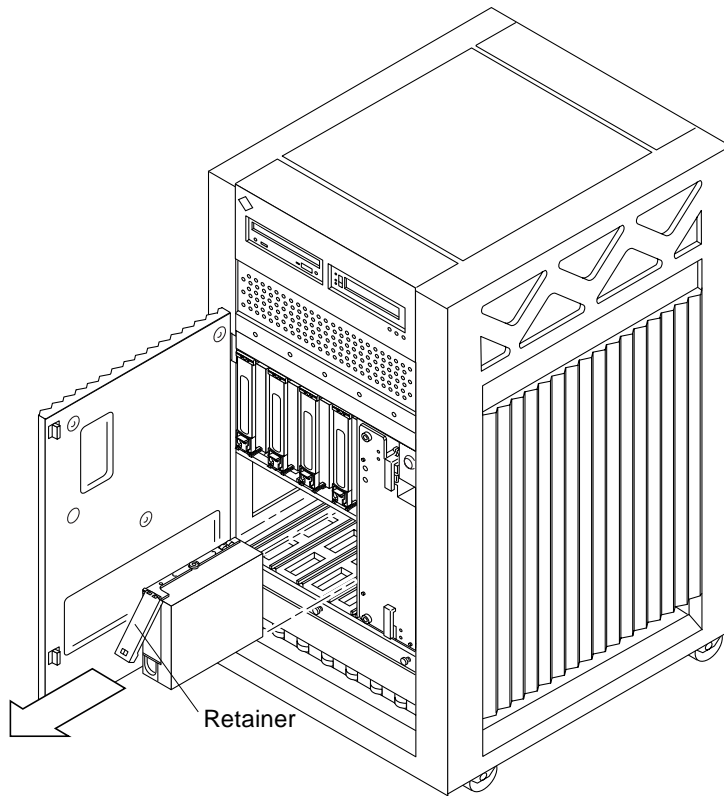


FIGURE 8-6 Disk Drive With Retainer Unlatched and Extended

b. Gently but firmly pull on the handle to slide the drive out of the chassis.

Once the drive is partially removed from the mounting rails, grasp the bottom of the drive to aid in removal.

4. If the drive is to be replaced, proceed to Section 8.2.3 “Installing a Disk Drive.”

8.2.3 Installing a Disk Drive

1. Attach a grounding wrist strap.

Refer to the documentation that came with your antistatic kit.



Caution – You must wear a wrist strap when handling disk drives to prevent damage to the system components.

2. **Remove the disk drive from its protective packaging and place it on an antistatic mat.**

Note – The drive retainer must be unlatched and extended 45 degrees, to an unlocked position, in order for the drive to be inserted into the system chassis guide rails.

3. **Unlatch and then extend the drive retainer to the unlocked position (FIGURE 8-6).**
Use the extended retainer as a handle to gently guide the drive so that the plastic rails on the top and bottom of the drive slide in to the drive mounting rails in the system chassis.
4. **Once the connector on the rear of the drive is positioned against the centerplane connector, gently compress the face of the drive and snap the connectors together.**
The drive and centerplane connectors make a clicking sound as they come together.

Note – Disk drive IDs are automatically selected when a drive is placed in a disk drive bay. The disk drive ID for the corresponding bay is marked on the system chassis.

5. **Latch the drive retainer into place.**

Check that the retainer on the disk drive is latched into place when closed, and does not extend past the edge of the chassis.

If the retainer extends past the edge of the chassis or does not fully latch, the disk drive connector is not joined with the centerplane connector. Do the following:

- a. **Unlatch the drive retainer and extend it to the unlocked position.**
- b. **Do not remove the drive; instead, use the retainer as a handle to slide it out an inch or two.**
- c. **Check that the connectors are not broken and that nothing blocks the joining of the two connectors.**

Put the disk drive back into its protective packaging and contact your service representative if there is still a problem.

Note – If you are installing the disk in a previously unused disk drive bank and the system does not recognize the disk, the GBIC interface for that bank may be missing or located in the wrong port on the IB. See TABLE 8-1 and FIGURE 8-7.

TABLE 8-1 GBIC Controllers for Disk Drive Ports

Disk Drives	Drive Port	GBIC Name and Drive Location
0, 1, 2, 3	A	GBIC LA (Lower bank)
0, 1, 2, 3	B	GBIC LB (Lower bank)
4, 5, 6, 7	A	GBIC UA (Upper bank)
4, 5, 6, 7	B	GBIC UB (Upper bank)

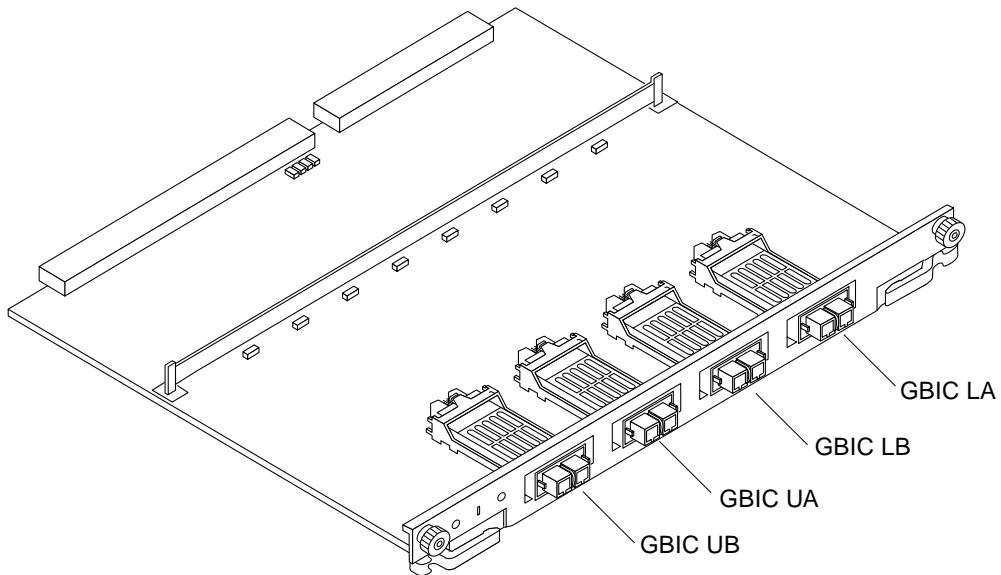


FIGURE 8-7 Interface Board GBIC Ports

Troubleshooting Overview

This chapter contains the following topics:

- Section 9.1 “Using a Terminal” on page 9-1
- Section 9.2 “Reset Switches” on page 9-2
- Section 9.3 “Hardware Indicators” on page 9-3
- Section 9.4 “Card Cage Slot Information” on page 9-7
- Section 9.5 “Diagnosing Problems” on page 9-8
- Section 9.6 “Specific Problems and Solutions” on page 9-12

9.1 Using a Terminal

If your system does not normally have a terminal, you may find it useful to attach a console terminal directly to the system for troubleshooting.

Note – Alternatively, you can log in remotely through a network. You can also control the system remotely through a modem and a system serial port.

- 1. Halt the system and turn off power.**
- 2. Connect the terminal to serial port A on the clock+ board.**
The clock+ board is located at the back of system. See FIGURE 9-1.
- 3. Power on the terminal.**
- 4. Set up the terminal.**

Refer to the *OpenBoot Command Reference* for instructions for using the `set-defaults` and `printenv` commands.

The settings vary with the terminal type, but these settings are often used:

- 9600 bps
- 8 data bits
- 1 stop bit
- Even parity
- Full duplex

5. Power on the system and reboot.

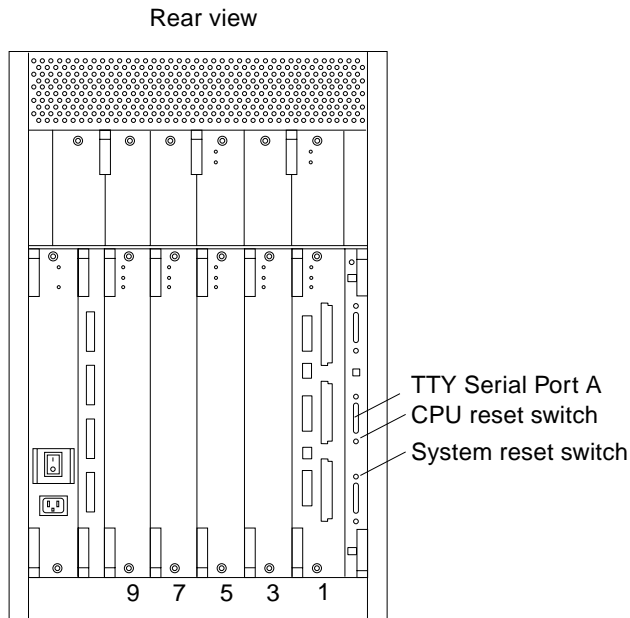


FIGURE 9-1 Details of the Clock+ Board

9.2 Reset Switches

In the event that the system hangs, reset the system by pressing the system reset switch (marked \triangleleft) on the clock+ board. See FIGURE 9-1.

A second button, the CPU reset switch (marked (CPU) \triangleleft), is useful during software debugging.

9.3 Hardware Indicators

Many LEDs are used to indicate the status of the system. FIGURE 9-2 shows the meanings of the symbols marked on the front panel and also on individual boards and modules.

	Power	Hardware failure	Cycling or running normally
System:		⚙️	🔄
Board:	⊙	⚙️	🔄
PCM:	⊙	⚙️	

FIGURE 9-2 LED Symbols

FIGURE 9-3 shows the location of the front panel LEDs. In normal operation, two green LEDs are lit, Power and Cycling.

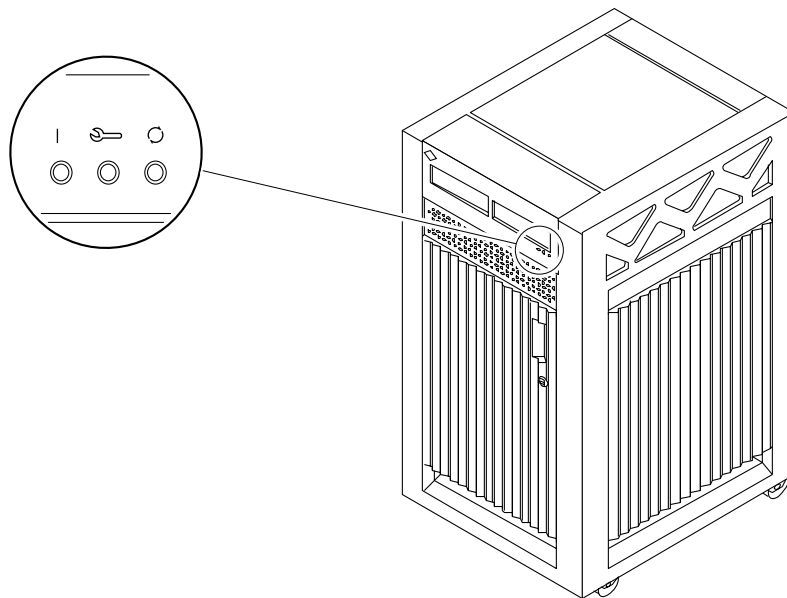



FIGURE 9-3 Front Panel LEDs

TABLE 9-1 lists complete LED codes for the system front panel.

TABLE 9-1 System Front Panel LED Codes

Power	Service	Running	Condition
Off	Off	Off	System has no power.
Off	On	Off	Failure mode.
Off	Off	On	Failure mode.
Off	On	On	Failure mode.
On	Off	Off	System is hung, either in POST/OpenBoot or in the operating system.
On	Off	On	Hung in OS.
On	On	Off	(1) Hung in POST/OpenBoot PROM or (2) Hung in OS and failed component on board.
On	On	On	(1) Hung in POST/OpenBoot PROM or (2) Hung in OS and failed component on board.
On	Off	Flash	OS running.
On	On	Flash	OS running and failed component on board.
On	Flash	Off	Slow flash = POST. Fast flash = OpenBoot PROM.
On	Flash	On	Undefined.

9.3.1 Clock+ Board LEDs

The LED codes for the clock+ board are the same as for the front panel, except the clock+ board uses this symbol  instead of a vertical bar to indicate that the board is receiving electrical power.

9.3.2

CPU/Memory+ and I/O+ Board LEDs

Most of the codes for the CPU/Memory+ and I/O+ board LEDs are similar to codes for the front panel and clock+ board. The major exception is the second code (Off-On-Off). For hot-pluggable boards, this code indicates that the board is in low-power mode and is ready to remove.



Caution – If the Running LED is lit or flashing, do not remove the board. Electrical shorting will result, damaging the board and the system.

TABLE 9-2 lists all LED codes for the CPU/Memory+ and I/O+ boards.

TABLE 9-2 LED Codes for the CPU/Memory+ and I/O+ Boards

Power	Service	Running	Condition
Off	Off	Off	Board has no electrical power.
Off	On	Off	Board is in low power mode, can be unplugged.
Off	Off	On	Undefined.
Off	On	On	Undefined.
On	Off	Off	System is hung, either in POST/OpenBoot or in the operating system.
On	Off	On	Hung in OS.
On	On	Off	(1) Hung in POST/OBP or (2) hung in OS and failed component on board.
On	On	On	(1) Hung in POST/OBP or (2) hung in OS and failed component on board.
On	Off	Flash	OS running.
On	On	Flash	OS running and failed component on board.
On	Flash	Off	Slow flash = POST. Fast flash = OBP.
On	Flash	On	Undefined.

The general rules for the CPU/Memory+ and I/O+ boards are:

- If no LEDs are lit, there is no electrical power to the board.
- If the green LEDs (⊙ and ⊚) are not lit, the board is ready for removal.
- If no LEDs are flashing, the system is hung.
- The board requires service if the yellow Service LED is lit continuously (not flashing). Note that it is a normal condition for the Service LED to flash during POST testing.

9.3.3 Power Supplies

There are several types of power supply modules, but all have two LEDs. The locations of the green (Power) LED and the yellow (Service) LED vary according to the module type.

9.3.3.1 Peripheral Power Supplies

The system has one peripheral power supply/AC unit (PPS/AC), located at the rear of the cabinet.

The system may also have the optional auxiliary peripheral power supply (PPS), located at the front of the cabinet. If the auxiliary PPS is not installed, the slot contains a thermal protection module.

On both the PPS/AC and the PPS, the green Component Power LED is located above the yellow Service LED. The Component Power LED is lit when the power supply is operating, but does not necessarily indicate that the DC outputs are fully within specification. The yellow Service LED is lit when a DC power output has failed or a voltage level is out of specification.

9.3.3.2 Power/Cooling Modules

The system has up to three power/cooling modules (PCMs).

Each PCM has two LEDs. The green Component Power LED is located below the yellow Service LED. TABLE 9-3 summarizes the LED codes for the PCM.

TABLE 9-3 PCM LED Codes

Component Power	Service	Condition
Off	Off	No AC input.
On	Off	Normal operation.
On	On	A fan has failed.
Off	On	One or more DC outputs have failed or the voltages are out of specification.

9.3.4 Disk Tray Indicators

The availability and type of status information varies with the disk tray type used in a system. Refer to the disk tray user manual for specific status information.

9.4 Card Cage Slot Information

When installing a board, remember:

Slot numbers	Board slots are numbered 1, 3, 5, 7, 9 ¹ , from right to left (FIGURE 9-4.)
Slot functions	Slot 1 should contain an I/O+ board (connects to media tray). Aside from the requirement for the I/O+ board, all five card cage slots are equivalent.

1. See Section D.1 “Card Cage,” for an explanation of the missing even-numbered slots.

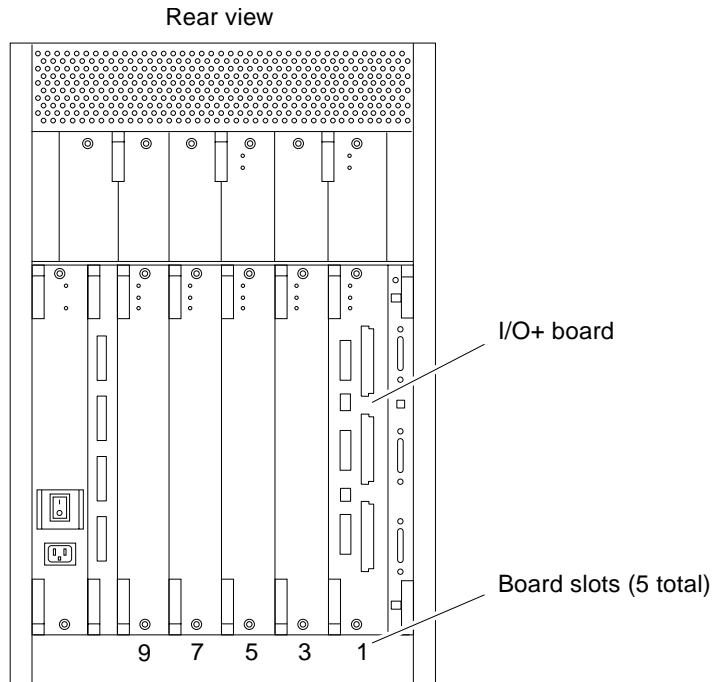


FIGURE 9-4 Slot Numbers for the Card Cage

For a more complete set of rules for configuring the system, see Appendix D “Rules for System Configuration.”

9.5 Diagnosing Problems

9.5.1 Servicing Obvious Problems

If the Service LED on the system front panel (or the clock+ board) indicates a hardware failure, find the failing module by looking for a lit service LED on the individual module.

The system contains a number of hot-pluggable modules. Under limited conditions, these modules can be removed and replaced while the system continues running. (For a general description of the hot-plug feature, see Section 3.3 “Hot-Plug Feature.”)

The hot-pluggable modules include these types: CPU/Memory+ board, SBus+ I/O board, Graphics+ I/O board, PCI+ I/O board, and PCM.



Caution – The hot-plug feature requires a functional peripheral power supply/AC. If the peripheral power supply cannot provide current, the hot-pluggable module will be damaged if you attempt to remove or replace it.

If a module fails and there are redundant resources in the system, it may be safe to leave the module in a running system until a replacement part is delivered. For example, if a CPU fails (as indicated perhaps by system messages), but other CPUs continue to function in the system, you can leave the CPU/Memory+ board in place until a replacement CPU is available. Note that it is particularly helpful to leave a module in place if you do not have a filler panel to replace it.

If you choose to remove a faulty board or PCM, remember that you must fill the vacated slot with a replacement or a filler panel to prevent the system from overheating.

9.5.2 Troubleshooting Less Obvious Problems

When board LED codes do not specify the failing hardware, several types of software programs are available to supply information about the problem. This software includes the SunVTS™ program, the `prtdiag` command, the `prtenv` command, POST and OpenBoot PROM commands, and the Sun Management Center program.

9.5.2.1 SunVTS

Run SunVTS™ under the Solaris operating environment, or equivalent.

The SunVTS online validation test suite is designed to stress test Sun hardware. By running multiple and multithreaded diagnostic hardware tests, the SunVTS software verifies the system configuration and functionality of most hardware controllers and devices.

SunVTS tests many board and system functions, as well as interfaces for Fibre Channel, SCSI, and SBus interfaces. SunVTS accepts user-written scripts for automated testing.

Refer to the *SunVTS User's Guide* for starting and operating instructions.

9.5.2.2 prtdiag Command

Use the `prtdiag` command to display:

- System configuration, including information about:
 - Clock frequencies
 - CPUs
 - Memory
 - I/O+ card types
- Diagnostic information
- Failed field replaceable units (FRUs)

Refer to the `prtdiag` man page for instructions.

9.5.2.3 History Log Option

To isolate an intermittent failure, it can be helpful to maintain a `prtdiag` history log. Use the `prtdiag` command with the `-l (log)` option to send output to a log file in the `/var/adm` directory.

9.5.2.4 Running prtdiag

To run `prtdiag`, type:

```
% /usr/platform/sun4u/sbin/prtdiag
```

or use the log option:

```
% /usr/platform/sun4u/sbin/prtdiag -l
```

9.5.3 POST and OpenBoot

POST and OpenBoot work together in the system to test and manage system hardware.

POST resides in the OpenBoot PROM on each CPU/Memory+ board and I/O+ board. When the system is turned on, or if a system reset is issued, POST detects and tests buses, power supplies, boards, CPUs, DIMMs, and many board functions. POST controls the status LEDs on the system front panel and all boards. POST displays diagnostic and error messages on a console terminal, if available.

Only POST can configure the system hardware, and only POST can enable hot-pluggable boards. If a new PCM is added to the card cage after the system has booted, the new PCM will not work until the system is rebooted, at which time POST reconfigures the system, using the PCMs that are found in the system at that time.

OpenBoot provides basic environmental monitoring, including detection of overheating conditions and out-of-tolerance voltages. For example, if an overheated board is found, OpenBoot issues a warning message. If the temperature passes the danger level, POST puts the overheated board(s) in low-power mode.

OpenBoot also provides a set of commands and diagnostics at the `ok` prompt. For example, you can use OpenBoot to set NVRAM variables that reserve a board or a set of DIMMs for hot-sparing.

The following OpenBoot commands may be useful for diagnosing problems:

9.5.3.1 show-devs Command

Use the `show-devs` command to list the devices that are included in the system configuration.

9.5.3.2 printenv Command

Use the `printenv` command to display the system configuration variables stored in the system NVRAM. The display includes the current values for these variables, as well as the default values.

If the system cannot communicate with a 10BASE-T network, the Ethernet link test setting for the port may be incompatible with the setting at the network hub. See Section 9.6.1 “Failure of Network Communications,” for further details.

9.5.3.3 `probe-scsi-all` Command

The `probe-scsi` command locates and tests SCSI devices attached to the system. `probe-scsi` is run from the OpenBoot prompt.

When it is not practical to halt the system, you can use SunVTS as an alternate method of testing the SCSI interfaces.

9.5.3.4 `probe-fcal-all` Command

The `probe-fcal-all` command locates and tests fibre channel devices attached to the system. `probe-fcal-all` is run from the OpenBoot prompt. This command could take longer to complete if one or more of the Fibre Channel Arbitrated Loops are unconnected.

When it is not practical to halt the system, you can use SunVTS as an alternate method of testing the fibre channel interfaces.

9.5.3.5 Reference Documents for POST/OpenBoot

- *OpenBoot 3.x Command Reference*, part number 802-3242
- *Writing FCode 3.x Programs*, part number 802-3230

9.5.4 Sun Management Center

The Sun Management Center program monitors system functioning and features a graphical user interface (GUI) to continuously display system status. Sun Management Center is intended to complement system management tools such as SunVTS.

Sun Management Center is accessible through an SNMP interface from network tools such as Solstice SunNet Manager™.

Refer to the *Sun Management Center User's Guide* manual, part number 802-5355, for starting and operating instructions.

9.6 Specific Problems and Solutions

9.6.1 Failure of Network Communications

9.6.1.1 Description of the Problem

The system cannot communicate with a network if the system and the network hub are not set in the same way for the Ethernet link integrity test. This problem particularly applies to 10BASE-T network hubs, where the Ethernet link integrity test is optional. This is not a problem for 100BASE-T networks, where the test is enabled by default.

If you connect the system to a network and the network does not respond, use the OpenBoot command `watch-net-all` to display conditions for all network connections:

```
ok watch-net-all
```

For SBus Ethernet cards, the test can be enabled or disabled with a hardware jumper, which you must set manually. For the TPE and MII onboard ports on the I/O+ board, the link test is enabled or disabled through software, as shown below.

Remember also that the TPE and MII ports are not independent circuits and as a result, both ports cannot be used at the same time.

Note – Some hub designs do not use a software command to enable/disable the test, but instead permanently enable (or disable) the test through a hardware jumper. Refer to the hub installation or user manual for details of how the test is implemented.

9.6.1.2 Determining the Device Names of the I/O+ Boards

To enable or disable the link test for an onboard TPE (`hme`) port, you must first know the device name for the I/O+ board. To list the device names:

1. **Shut down the system and take the system into OpenBoot.**
2. **Determine the device names of the I/O+ boards:**

a. Type:

```
ok show-devs
```

b. In the show-devs listing, find the node names.

Node names take the general form `/sbus@3,0/SUNW,hme@3,8c00000`.

Solution 1— while the operating system is running:

1. Become superuser.

2. Type:

```
# eeprom nvramrc="probe-all install-console banner apply disable-link-pulse
device-name "
  (Repeat for any additional device names.)
# eeprom "use-nvramrc?"=true
```

3. Reboot the system (when convenient) to make the changes effective.

Solution 2 — when the system is already in OpenBoot:

1. At the monitor OpenBoot prompt, type:

```
ok nvedit
0: probe-all install-console banner
1: apply disable-link-pulse device-name
  (Repeat this step for other device names as needed.)
  (Press CONTROL-C to exit nvedit.)
ok nvstore
ok setenv use-nvramrc? true
```

2. Reboot to make the changes effective.

9.6.2 Using a Remote Console

It is possible to reset the system or cycle power 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 the key switch is in the Secure or Off position, the remote key sequences and button resets are ignored.
- Security features permit the use of the remote console.
- You must use a slow typing speed, not less than 0.5 seconds and not more than 5 seconds between characters.

TABLE 9-4 Remote Console Commands

Command	Enter this 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,
~ (tilde) = 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.

The remote system reset command is useful for resetting the system under general conditions. The remote XIR reset command is used for software development and debugging.

Flow Diagrams for Troubleshooting

This chapter discusses solutions for the following subjects:

- Section 10.1 “No AC/DC Power” on page 10-2
- Section 10.2 “System Cannot Boot” on page 10-3
- Section 10.3 “Defective CPU/Memory+ Board” on page 10-4
- Section 10.4 “Defective I/O+ Board or Interface Board” on page 10-5
- Section 10.5 “Defective Disk Drive” on page 10-6
- Section 10.6 “Defective Power Supplies” on page 10-7
- Section 10.7 “Defective Clock+ Board” on page 10-8

10.1 No AC/DC Power

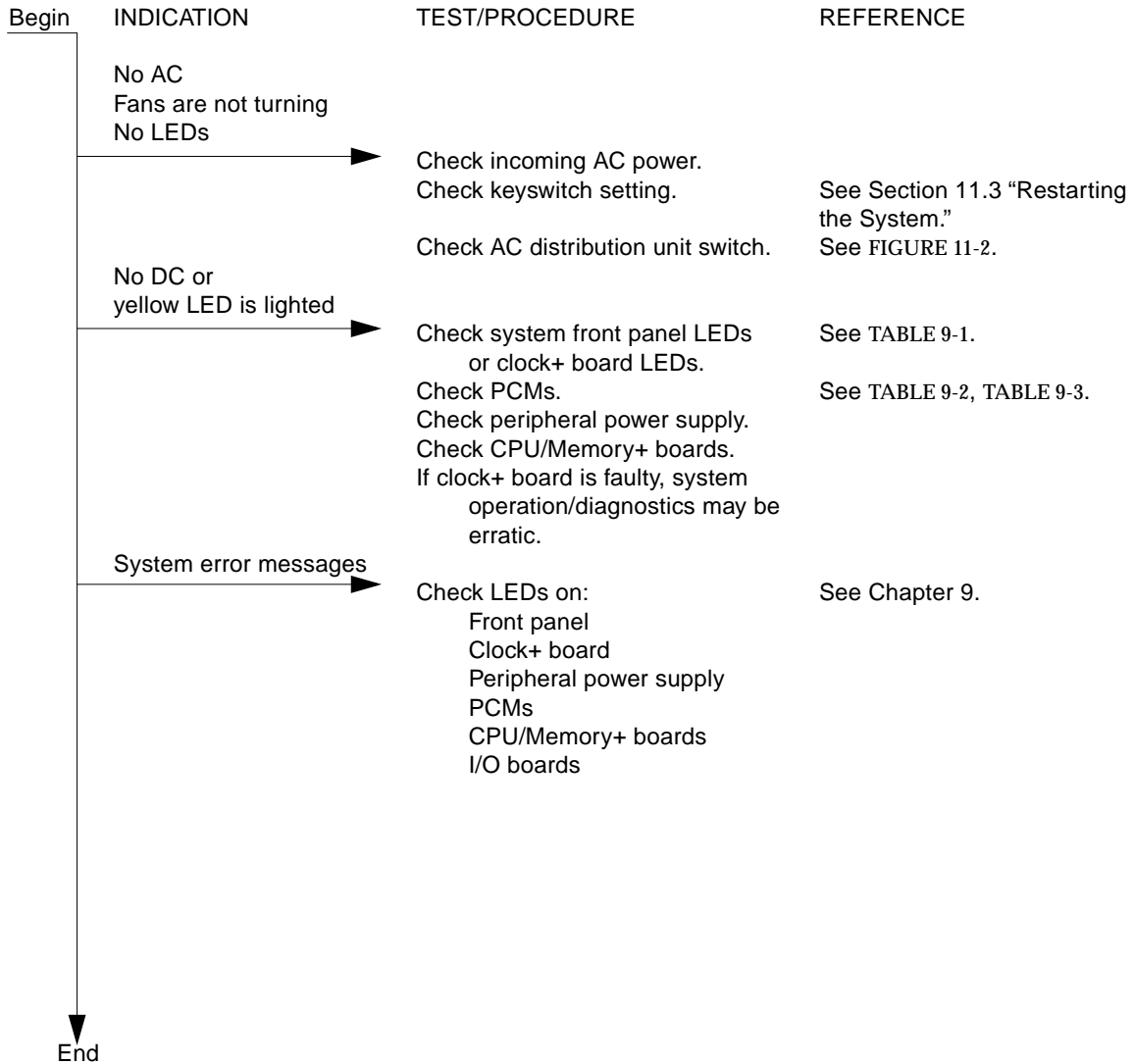


FIGURE 10-1 Diagnosing AC/DC Power Problems

10.2 System Cannot Boot

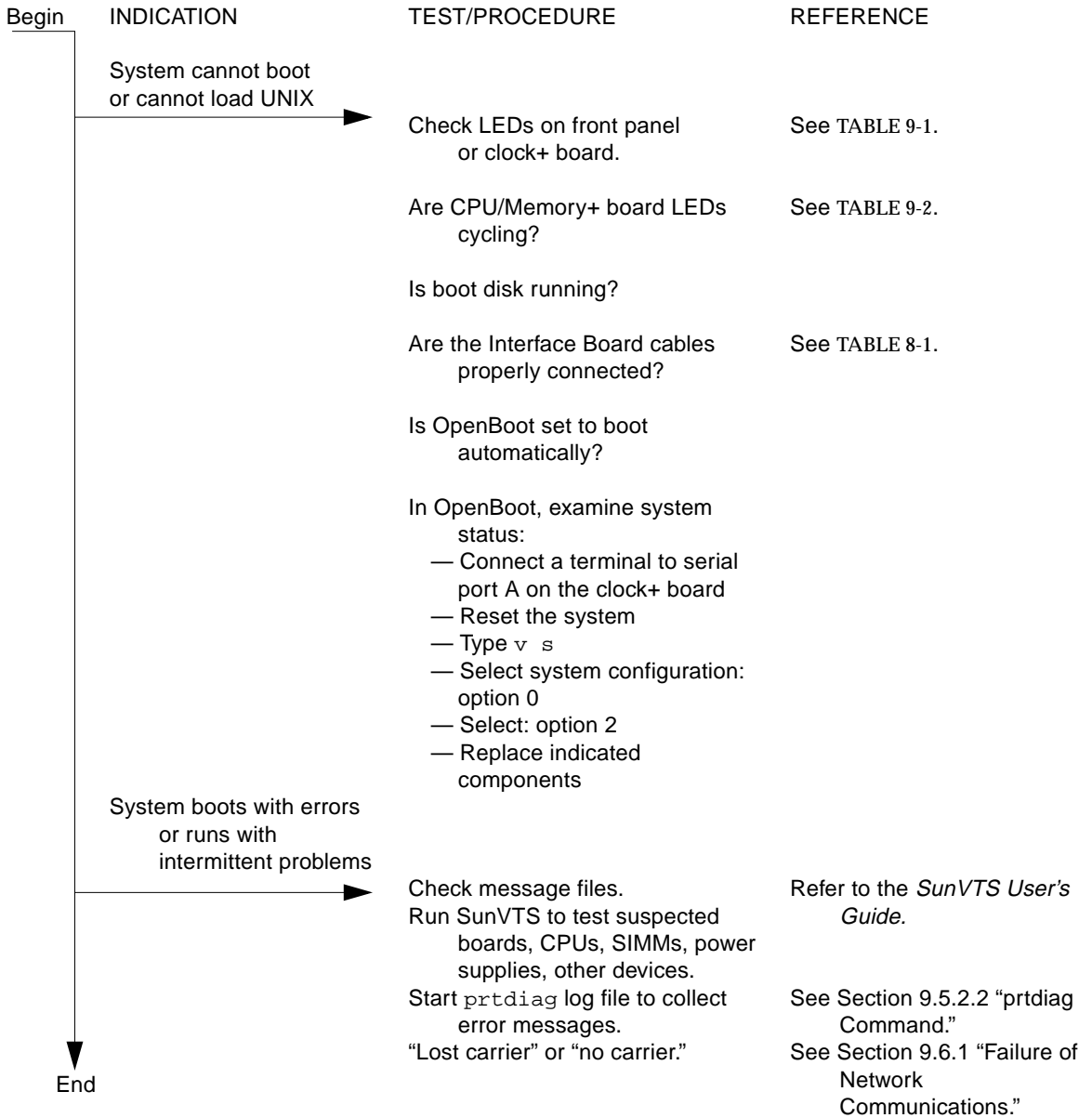


FIGURE 10-2 Diagnosing Operating System Problems

10.3 Defective CPU/Memory+ Board

CPU/Memory+ boards are hot-pluggable.

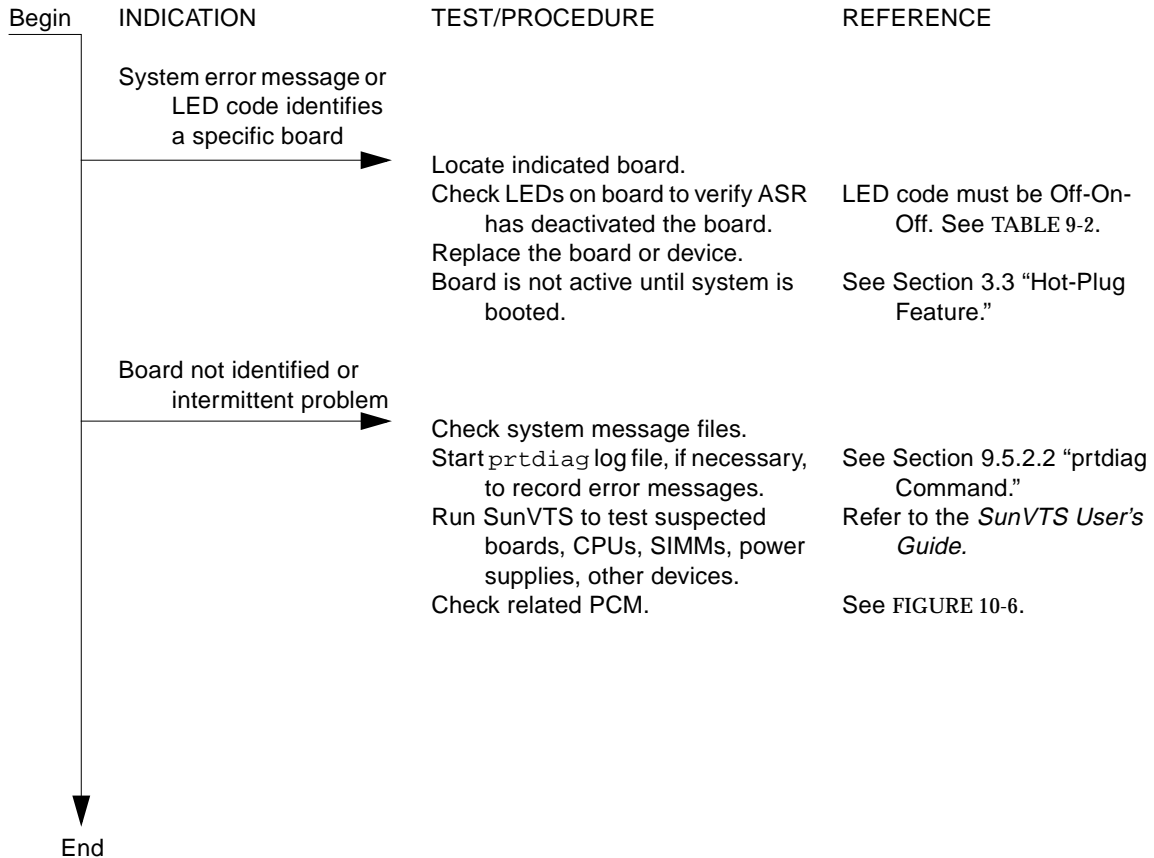


FIGURE 10-3 Replacing I/O Interface

10.4 Defective I/O+ Board or Interface Board

This information is for SBus+, Graphics+, and PCI+ I/O boards, and for the interface board (IB).

Interface boards are hot-pluggable in many instances.

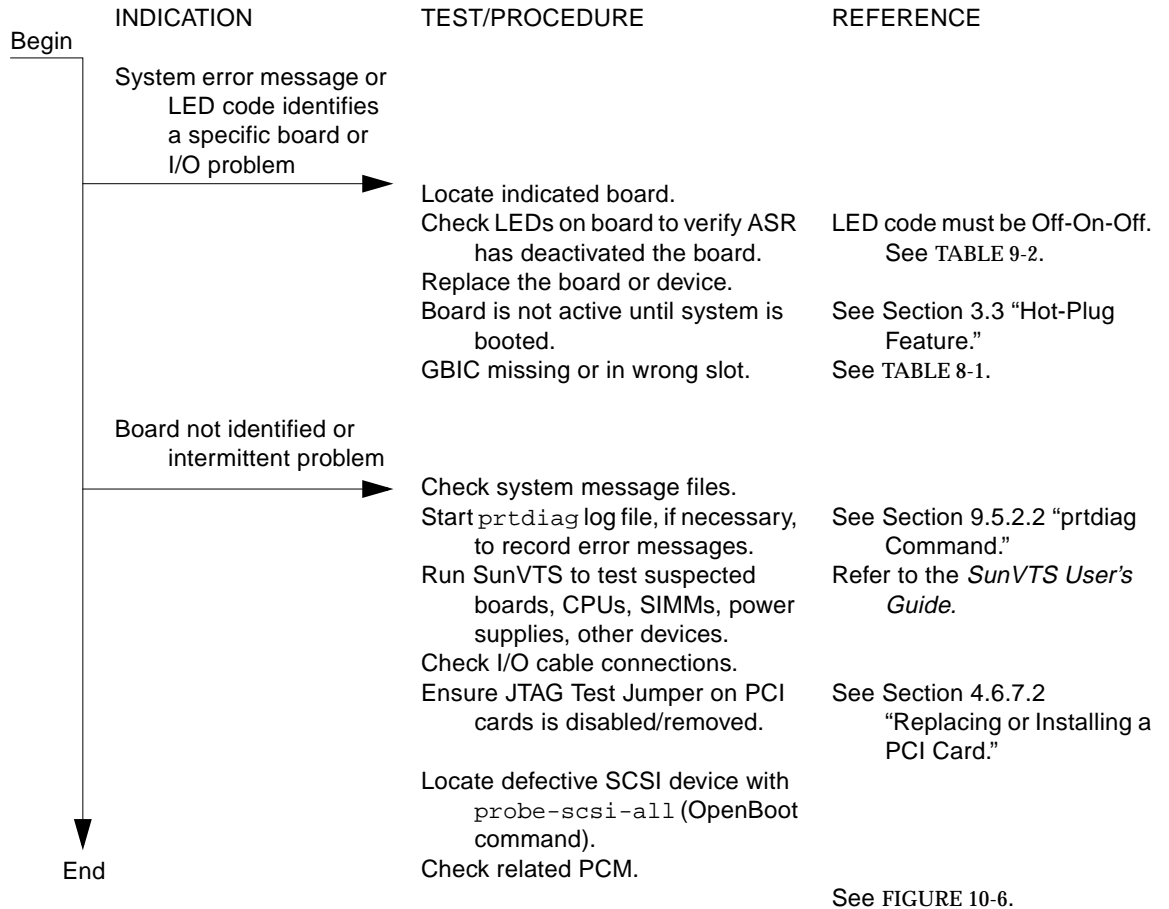


FIGURE 10-4 Replacing I/O Interface

10.5 Defective Disk Drive

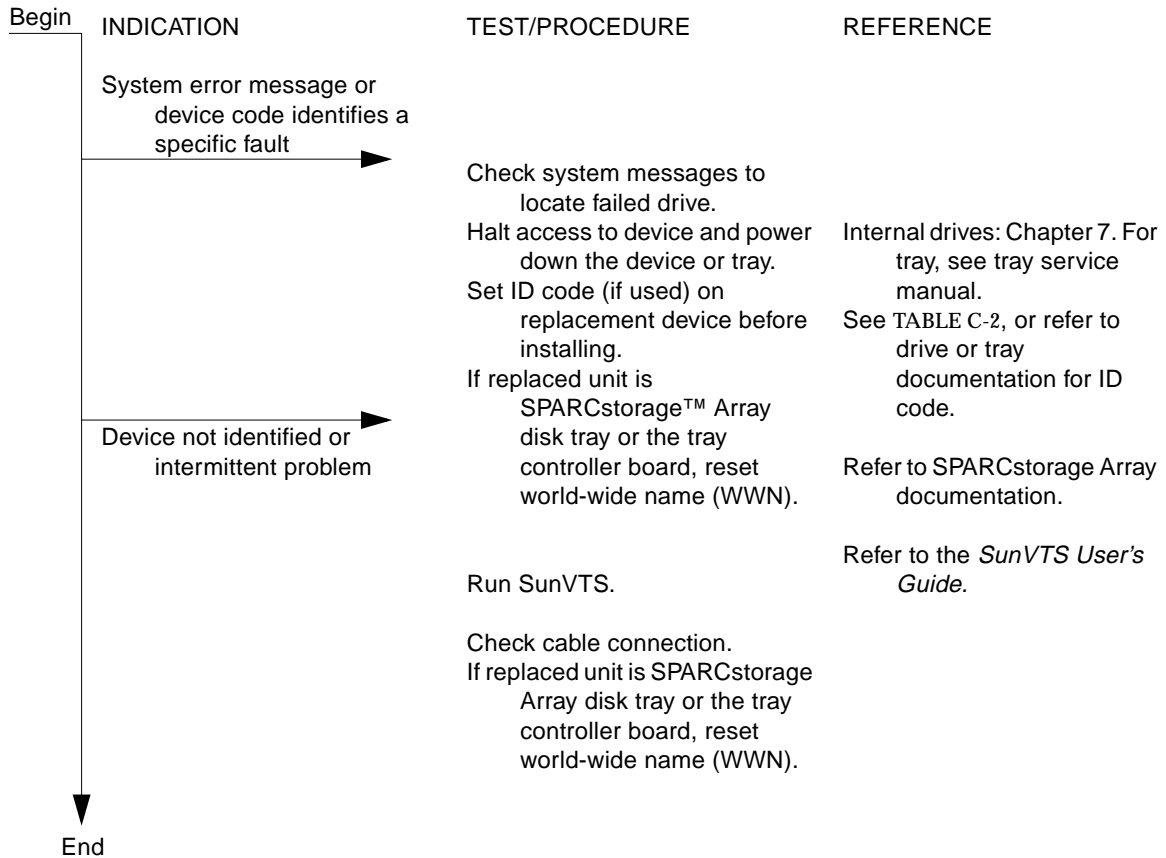


FIGURE 10-5 Diagnosing Disk Drive Problems

10.6 Defective Power Supplies

The power/cooling modules (PCMs) are hot-pluggable.



Caution – Boards in slots adjacent to a PCM may overheat if the supply is removed and not replaced. The PCM provides cooling air to two board slots.



Caution – Do not hot-plug boards or modules if the AC/peripheral power supply is defective. The hot-pluggable feature requires a working peripheral power supply/AC for precharge current.

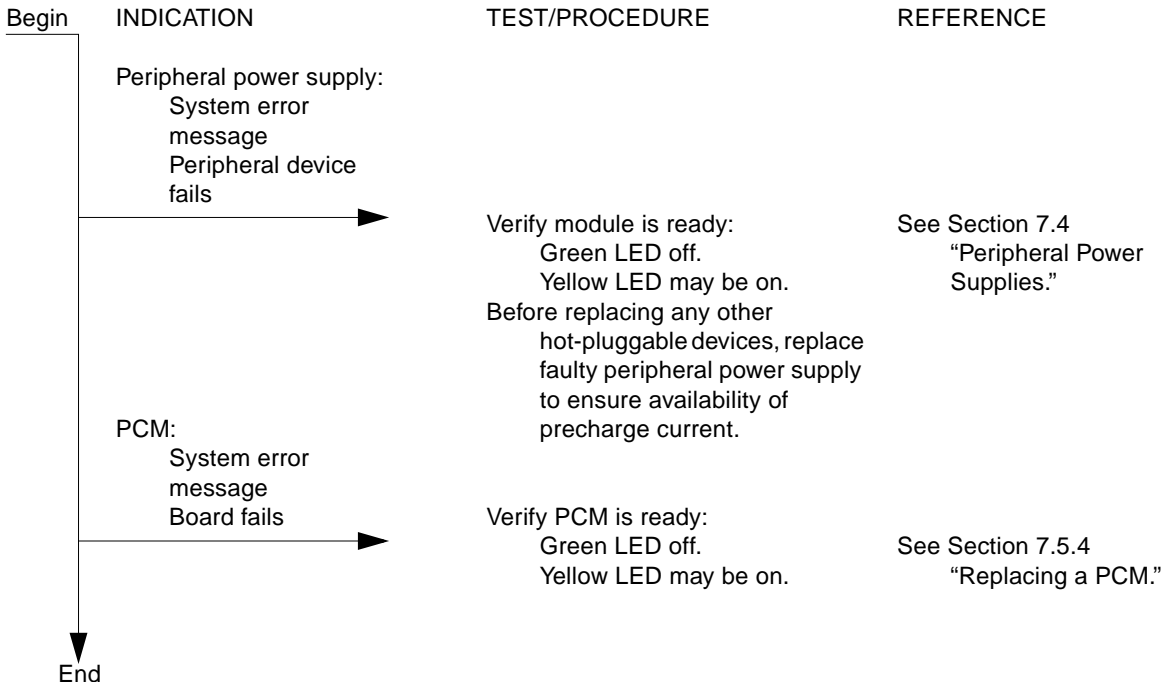


FIGURE 10-6 Diagnosing Power Supply Problems

10.7 Defective Clock+ Board

There is one clock+ board in the system.



Caution – The clock+ board is not hot-pluggable. You must halt the operating system and turn off AC power before replacing the clock+ board.

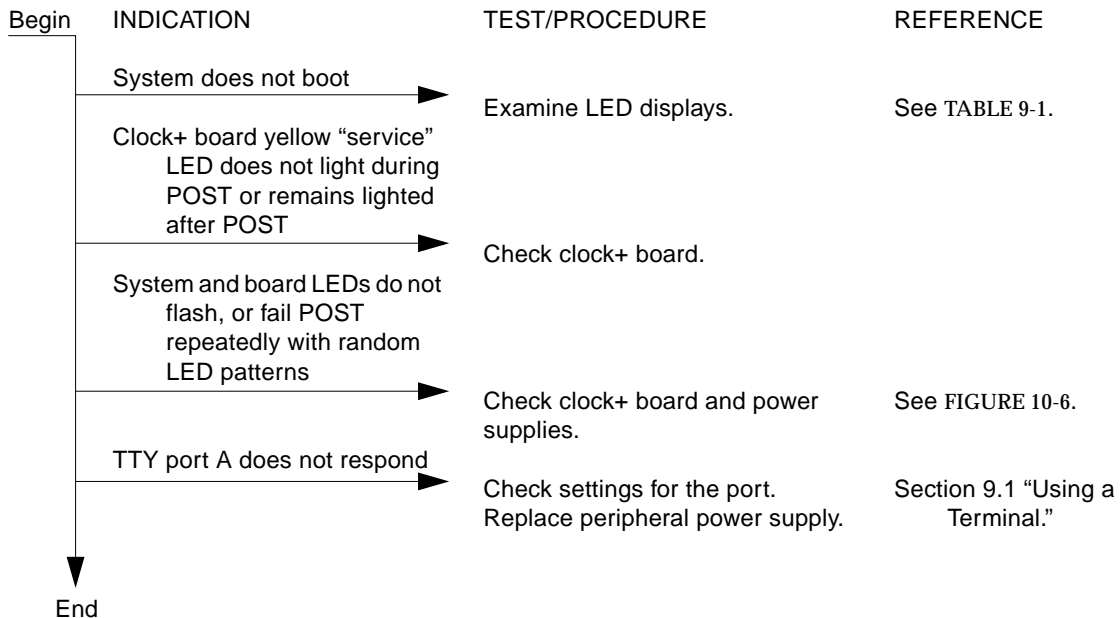


FIGURE 10-7 Diagnosing a Defective Clock+ Board

Powering Off and On

This chapter contains information necessary to prepare the system for servicing. Included are system power off and on, and external cable removal procedures.

- Section 11.1 “Powering Off the System” on page 11-1
- Section 11.2 “Removing the External Cables” on page 11-3
- Section 11.3 “Restarting the System” on page 11-3
- Section 11.4 “Reading Boot Messages” on page 11-5

11.1 Powering Off the System

Before turning off system power, halt the operating system as shown below. Failure to halt the operating system properly can cause the loss of disk drive data.

If you are troubleshooting system problems, you may find it convenient to reset the system or even cycle system power from the console. See Section 9.6.2 “Using a Remote Console” on page 9-14.

- 1. Notify users that the system is powering down.**
- 2. Back up the system files and data to tape, if necessary.**
- 3. Halt the system using the appropriate commands. Refer to the *Solaris Handbook for SMCC Peripherals* that corresponds to your operating system.**
- 4. Wait for the system-halted message and the boot monitor prompt.**
- 5. Use the key provided to unlock and open the system front door.**
- 6. Locate the system key switch in the upper right corner, and turn the key switch to the Standby position (fully counterclockwise). See FIGURE 11-1.**

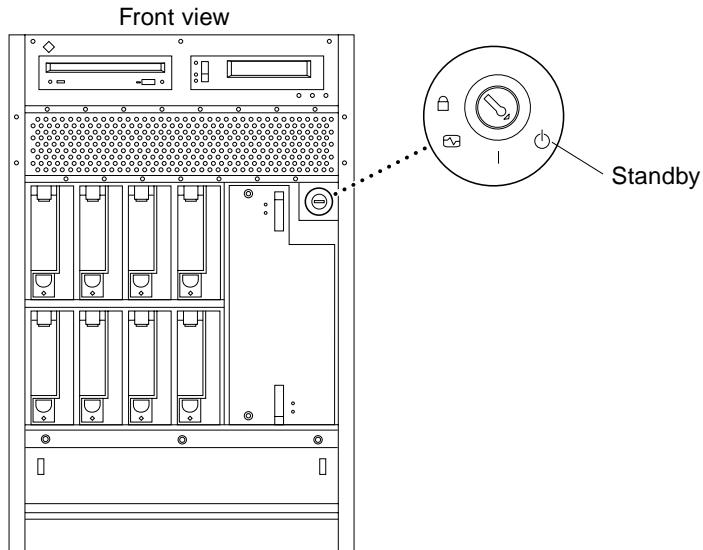


FIGURE 11-1 Key Switch Standby Position

7. Turn the AC power switch on the system rear off.

This switch is on the peripheral power supply/AC that is installed in the far left corner (FIGURE 11-2).

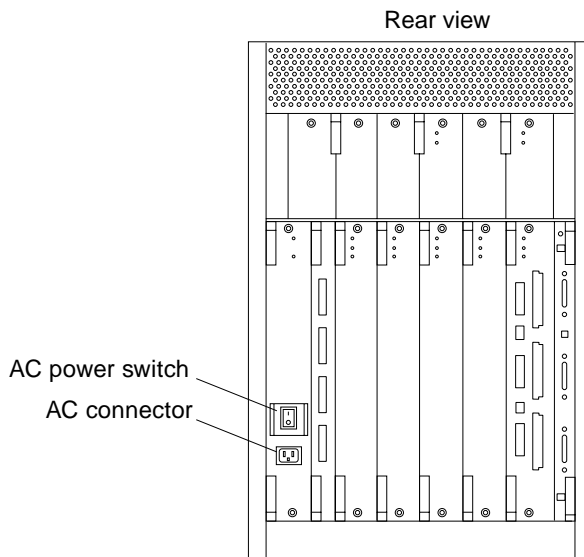


FIGURE 11-2 AC Power Switch and AC Connector

11.2 Removing the External Cables

1. **Position the server for easy access to the rear.**
2. **Disconnect each cable from the I/O+ boards carefully.**

Squeeze the locking tabs on the sides of the connector body, or loosen any retaining screws (if provided), and pull the connectors out.
3. **Mark each cable for identification as you remove it.**
4. **Remove any cable restraints.**
5. **Clear the cables away from the server.**

11.3 Restarting the System

Note – As the system starts up, watch for error messages from the POST diagnostic program. If a terminal is not already part of the system, install a TTY terminal before continuing the start up. See Section 9.1 “Using a Terminal” on page 9-1.

1. **Use the key provided to unlock and open the Enterprise 3500 system front door.**
2. **Locate the system key switch in the upper right corner, and turn the key switch to the standby position (⊖). See FIGURE 11-1.**



Caution – The outlet must be a 100-120 or 200-240 VAC 30-ampere circuit, intended solely for use by the server, as described in the site preparation instructions in the *Sun Enterprise 3500 System Installation Guide*. The electrical receptacle must be grounded, and the grounding conductor serving this receptacle must be connected to the earth ground at the service equipment.

3. **Turn on the AC power sequencer power switch (FIGURE 11-2).**
4. **Turn on power to the terminal.**

A terminal is required for viewing system messages. For setup instructions, see Section 9.1 “Using a Terminal” on page 9-1.
5. **Turn the key switch to the power-on position (⊕).**

See FIGURE 11-1. Several things will happen:

- The left front panel LED (green) turns on immediately to indicate the DC power supply is functioning.
- The middle front panel LED (yellow) lights immediately and should turn off after approximately 60 seconds.
- The right front panel LED (green) flashes after POST has ended to show that booting is successful and the operating system is running.
- The terminal screen lights up upon completion of the internal self test.



Caution – Never move the server or the expansion cabinets when system power is on. Excessive movement can cause catastrophic disk drive failure. Always power the system OFF before moving cabinets.

6. Watch the terminal screen for any POST error messages.

At the conclusion of testing, POST automatically configures the system, omitting any devices that have failed diagnostics. After POST ends, the system will boot using the new configuration.

Note – If the middle front panel LED (yellow) remains lit after the system has booted, the system has failed POST.

Note – POST does not test drives or internal parts of SBus cards. To test these devices, run OBP diagnostics manually after the system has booted. Refer to the *OpenBoot Command Reference* manual for instructions.

7. To start POST again, or if the system hangs, press the CPU reset switch on the clock+ board (FIGURE 11-3).

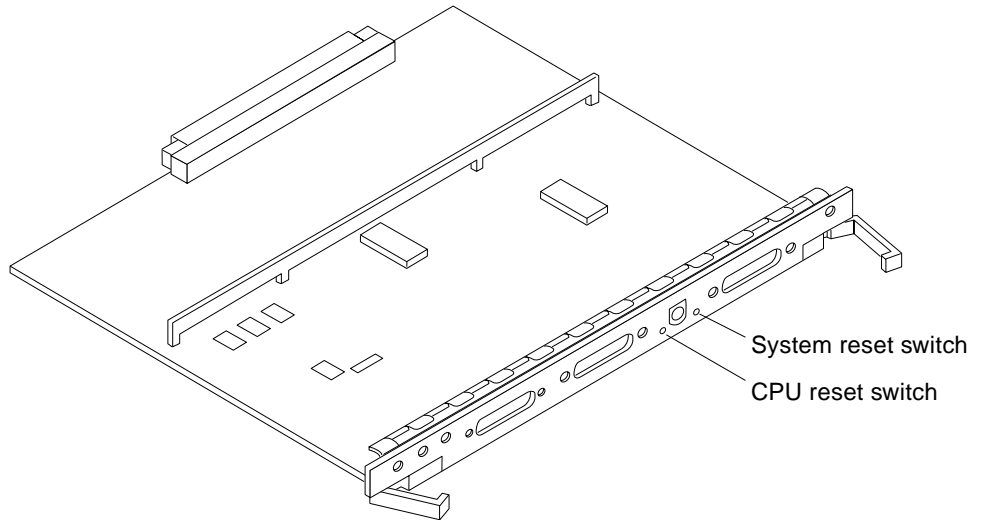


FIGURE 11-3 System Reset Switch on Clock+ Board

11.4 Reading Boot Messages

- Use the boot software messages to verify the presence of options in the system. After POST completes the system self-test, a message similar to the following will appear on your screen. The message lists hardware detected in the system.

Note – The following screen display is only an example. The actual message displayed on the screen will vary with the software running on the system.

```
5-slot Sun Enterprise 3500, Keyboard Present
OpenBoot -.- FCS, --- MB memory installed, Serial #---.
Ethernet address -:-:---:---:---:---, Host ID: -----.
```

If there is no terminal on this system, you must check the system status by inspecting LEDs on the front panel (FIGURE 11-4).

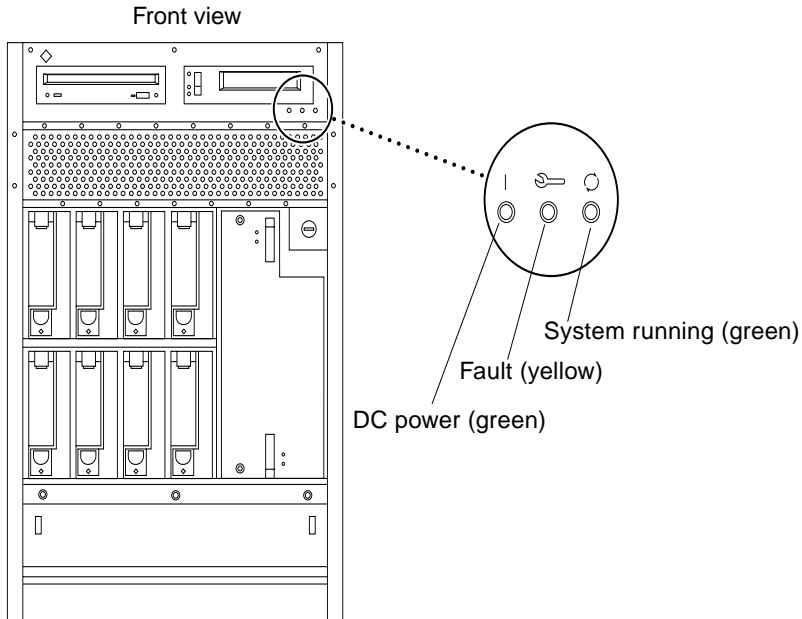


FIGURE 11-4 Front Panel Status LEDs

TABLE 11-1 summarizes the front panel LED status conditions during and after POST.

TABLE 11-1 LED Status Indicators

LED	Condition
Left LED (green)	On — DC power supply is receiving AC current. Off — There is no DC power.
Middle LED (yellow)	On flashing — (first 60 seconds) Self tests are running. Off — (after self tests end) No hardware failures. On — (after self tests end) Hardware failure was detected.
Right LED (green)	Off — (first 60 seconds) Self tests are running. On flashing — (after self tests end) System is running. Off — (after self tests end) System cannot run; repair is needed.

Preparing for Service

This chapter contains information about preparing the system for service after the system has been powered off.

- Section 12.1 “Servicing Hot-Pluggable Components” on page 12-1
- Section 12.2 “Powering Off the System” on page 12-1
- Section 12.3 “Internal Access” on page 12-2

12.1 Servicing Hot-Pluggable Components

Hot-pluggable components can be removed and replaced without powering off the system. For information about disconnecting and connecting hot-pluggable components that require service, see Section 3.3 “Hot-Plug Feature” on page 3-4.

12.2 Powering Off the System

See Section 11.1 “Powering Off the System.”

12.3 Internal Access

The system has a front bezel that must be removed to access the media tray.

12.3.1 Front Bezel

To remove the front bezel:

1. Grasp the front bezel on both sides near the center.

Place your thumbs on top of the front bezel and place your other fingers at the slight indentations under the front bezel for leverage.

2. Pull the front bezel straight out toward you and set it aside.

Press down on the top of the bezel as you pull it toward you (FIGURE 12-1).

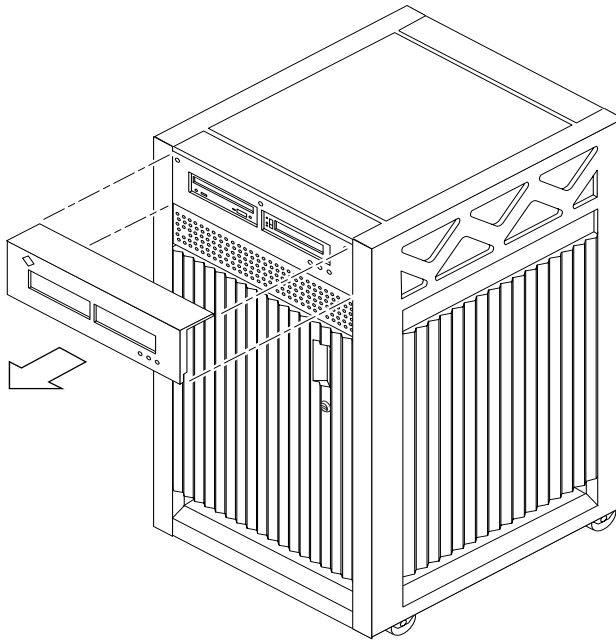


FIGURE 12-1 Removing the Front Bezel

To replace the front bezel, reverse these instructions.

12.3.2 Media Tray

To access the media tray:

1. **Remove the front bezel. See Section 12.3.1 “Front Bezel.”**
2. **Loosen the two captive screws securing the media tray in the chassis.**
3. **Insert a screwdriver or similar instrument in the notch at the bottom center of the tray. Using the screwdriver, slightly pull out the tray (FIGURE 12-2).**
4. **Grasp the media tray and gently pull it from the chassis.**
Disconnect the cables from the back of the tray.
5. **To access the devices in the media tray, turn the tray over and place it upside down on top of the Enterprise 3500 cabinet.**
6. **Loosen the four screws securing the drive to the media tray and remove the drive.**

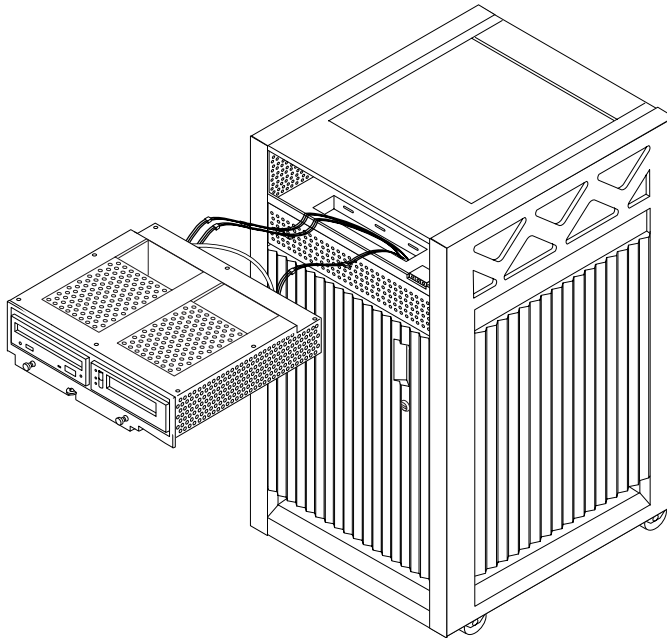


FIGURE 12-2 Removing the Media Tray

To replace the media tray, reverse these procedures.

12.4 Powering On the System

See Section 11.3 “Restarting the System,” to power on after all panels have been replaced.

Specifications

This appendix contains the following topics:

- Section A.1 “Physical Specifications” on page A-1
- Section A.2 “Electrical Specifications” on page A-2
- Section A.3 “Environmental Requirements” on page A-3

A.1 Physical Specifications

TABLE A-1 System Physical Specifications

	U.S.	Metric
Height	25.5 in	64.5 cm
Width	17 in	43.2 cm
Depth	23.5 in	59.7 cm
Weight	185 lb, approx	84 kg, approx
Power cord	6 ft	1.8 m

TABLE A-2 Clearance and Service Access

	U.S.	Metric
Front	18 in	45.7 cm
Rear	18 in	45.7 cm
Left	6 in	15 cm
Right	6 in	15 cm

TABLE A-3 Shipping Specifications

	U.S.	Metric
Height	34 in	86 cm
Width	29 in	74 cm
Depth	22.5 in	57 cm
Weight	220 lb, approx	100 kg, approx

A.2 Electrical Specifications

TABLE A-4 Server Electrical Specifications

Parameter		Value
Input current	Voltage range	100-120 Vac or 200-240 Vac
	Current, maximum	9.5@100 V
	Current frequency range	47-63 Hz
Input power rating	Total continuous power	875W
Volt-Ampere rating		950 VA
BTU rating		3000 BTU
Power factor		0.92 - 0.96
Plug type	U.S.	NEMA 5-15P
	International	10A, single phase IEC 320, C14

A.3 Environmental Requirements

TABLE A-5 Temperature, Humidity, and Altitude Limits

	Operating	Nonoperating
Temperature	41°F to 104°F (5°C to 40°C*)	-4°F to 140°F (-20°C to 60°C)
Humidity	20% to 80% RH noncondensing, 27C max wb	93% RH
Altitude	9,843 ft (3 km)	39,370 ft (12 km)

*Maximum operating temperature is 95°F (35°C) when using tape media.

Refer to the *Sun Microsystems Data Center Site Planning Guide, Data Centers' Best Practices* (805-5863) for more information on the recommended optimal operating system environment.

Functional Description

The 5-slot Enterprise 3500 system is part of the Sun Enterprise server family, which includes the 16-slot and 8-slot cabinet servers and an 8-slot standalone server.

All systems feature shared-memory multiprocessors and use the same boards, power/cooling modules (PCMs), and operating software.

This appendix contains the following topics:

- Section B.1 “System Overview” on page B-1
- Section B.2 “Board Hot-Swapping Procedures” on page B-5
- Section B.3 “CPU/Memory+ Board” on page B-5
- Section B.4 “I/O+ Boards” on page B-8
- Section B.5 “Power Supplies” on page B-12
- Section B.6 “Clock+ Board” on page B-15
- Section B.7 “Network Interfaces” on page B-16
- Section B.8 “Internal Disk Drives” on page B-16
- Section B.9 “Media (DVD-ROM/Tape Drive) Tray” on page B-16
- Section B.10 “Expansion Cabinets” on page B-16

B.1 System Overview

This section describes the Enterprise 3500 system enclosure (FIGURE B-1 and FIGURE B-2)

The front of the cabinet contains the DVD-ROM/tape drives, the key switch, the internal disk drives, the auxiliary peripheral power supply (PPS1) or thermal protection module, and the fan tray.

The rear of the cabinet contains the peripheral power supply/AC (PPS0, with power switch and AC cable socket), the clock+ board, the interface board (optional) or filler panel, the board slots, and the PCM slots.

Air circulation inside the cabinet is provided by fans in the power/cooling modules and in the fan tray. The PCMs have two fans each. The fans provide cooling for the PCM itself, plus two adjacent board slots. PCM slot 5 must contain either a fan tray or a spare PCM. These fans cool the peripheral power supply.

Note – PCM slot 5 may contain either an auxiliary fan tray or a spare PCM.

All empty slots require filler panels for proper airflow, cooling, and EMI protection.

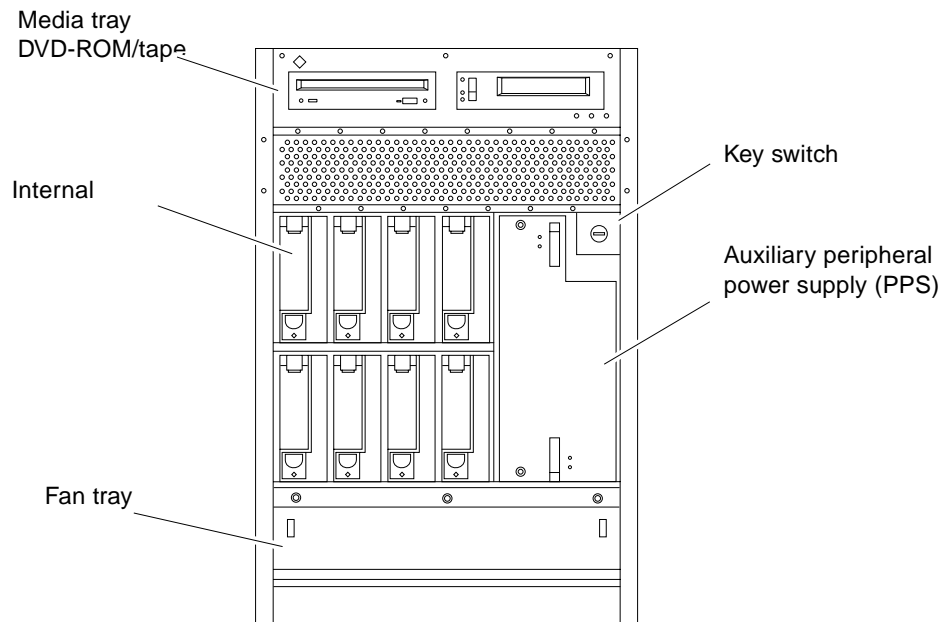


FIGURE B-1 Enterprise 3500 System— Front View

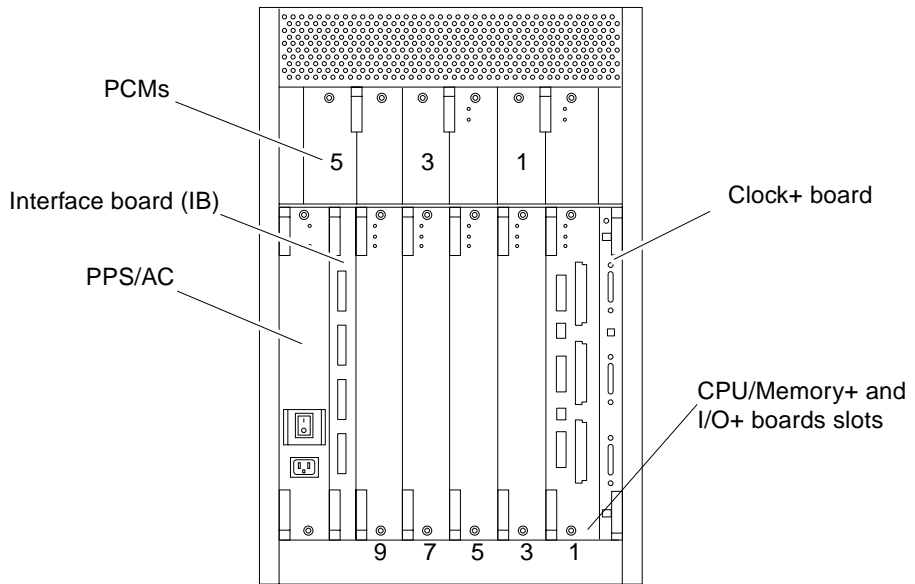


FIGURE B-2 Enterprise 3500 System—Rear View

B.1.1 Board Types

- The CPU/Memory+ board supports up to two UltraSPARC II CPU modules and 16 DIMM slots.
- The SBus+ I/O board includes two SYSIO ASICs that provide two SBuses: one for two plug-in SBus cards and two GBIC (100 MB/sec Fibre Channel) interfaces, and one for one plug-in SBus card and the onboard devices (10/100 Mbit TPE and Single-ended Fast/Wide SCSI).
- The Graphics+ I/O board includes one SYSIO ASIC that provides a single SBus for two plug-in SBus cards, two GBIC (100 MB/sec Fibre Channel) interfaces, and the onboard devices (10/100 Mbit TPE and Single-ended Fast/Wide SCSI).
- The PCI+ I/O board has two PCI bus connectors, each of which can accommodate a PCI riser card. Each riser card accommodates one PCI short card. In addition, onboard devices provide Fast Ethernet (10/100 Mbit) and Fast Wide SCSI interfacing.

The Enterprise 3500 server features a high-speed centerplane bus that includes separate address and data buses.

There are few differences between board slots and each slot can accept any board type. However, an I/O+ board should be installed in slot 1 since this slot connects directly to the internal media tray through the centerplane and related cables. The internal tape and/or DVD-ROM drives cannot be used unless an I/O+ board is present in slot 1.

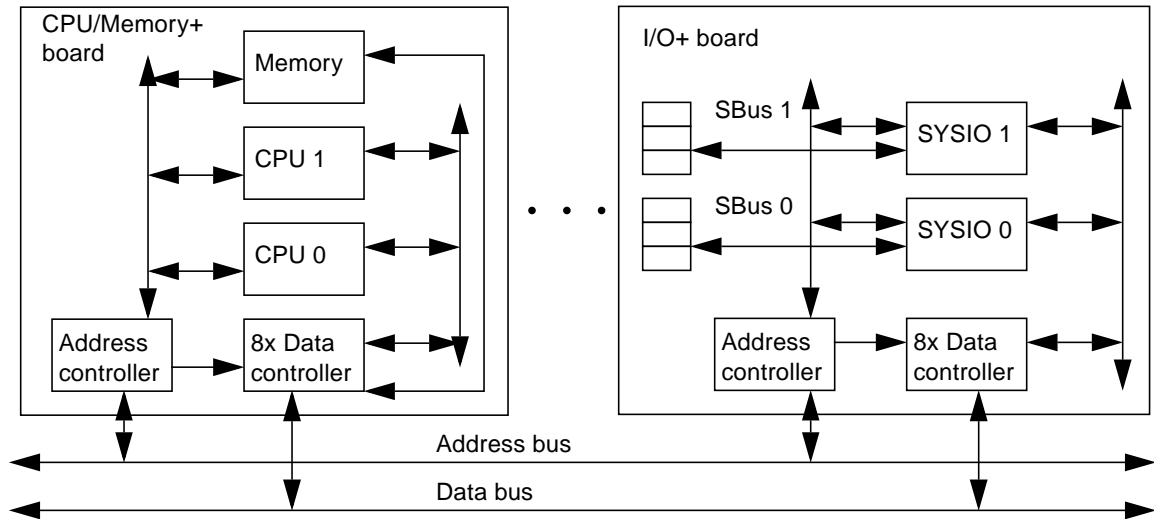


FIGURE B-3 Enterprise System Logical Organization

B.2 Board Hot-Swapping Procedures

The CPU/Memory+ board and the I/O+ boards are hot-swappable under certain conditions. If the operating system detects a hardware failure in the board, the system powers down the corresponding board slot and turns off the left green status LED on the board. (There are three status LEDs on each board. See TABLE 9-2 for the board LED codes.)

When the left green LED is off, it is safe to remove the board.

B.3 CPU/Memory+ Board

The system will support up to three CPU/Memory+ boards. All empty card cage slots must have a filler panel installed.

The CPU/Memory+ board (FIGURE B-4) supports up to 2 CPU modules and 16 DIMMs.

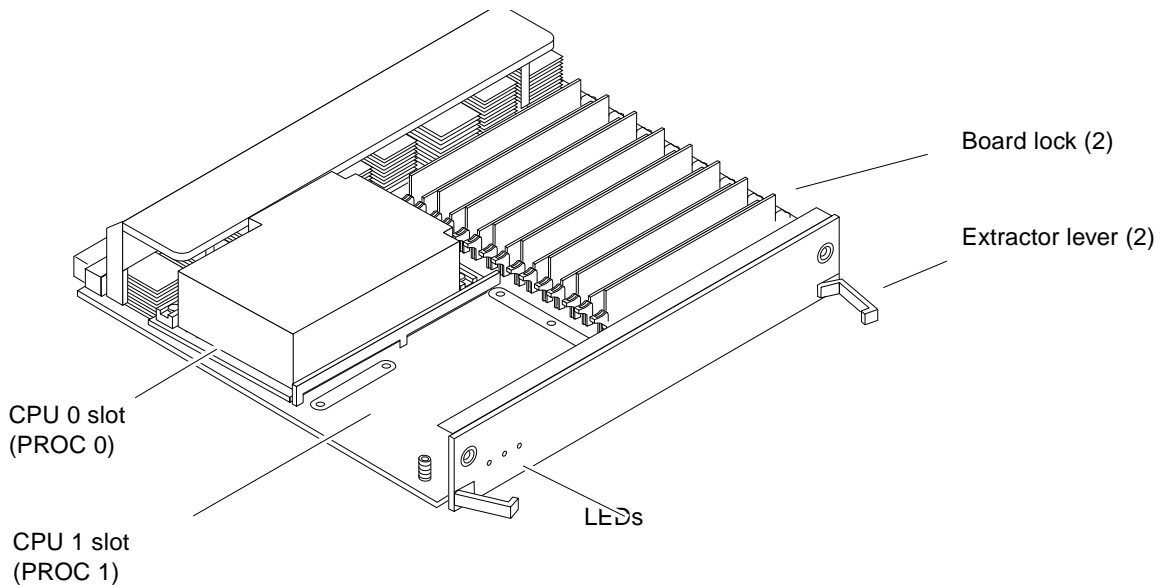


FIGURE B-4 CPU/Memory+ Board

B.3.1 CPU Modules

Each CPU/Memory+ board has two sets of CPU connectors, marked PROC 0 and PROC 1.

The order in which you fill CPU slots is not critical. However, to optimize heat dissipation in the system:

- Fill all PROC 0 locations on all CPU/Memory+ boards before filling any PROC 1 locations. To receive the maximum quantity of diagnostic information, fill PROC 0 on board 3.
- After all PROC 0 locations are filled, you may begin filling the PROC 1 locations, again starting from the lowest slot number to the highest.

TABLE B-1 shows slot locations for five CPUs on three CPU/Memory+ boards. Two slots (1 and 9) do not have CPU/Memory+ boards installed because slot 1 is reserved for an I/O+ board, and in this example, slot 9 has a filler panel installed.

TABLE B-1 Locations for Five CPUs on Three Boards — Example Only

Board Slot Number	PROC 0	PROC 1
1 – Reserved, I/O+ board		
3	in	in
5	in	in
7	in	—
9 – Filler panel installed		

B.3.2 System Master

The board slots are interchangeable. A system master board is selected for the duration of POST and OBP testing to control the testing processes. The system master is normally the lowest-numbered slot containing a board with a functional CPU. After the tests are finished, the board slots are again fully equivalent.

B.3.3 DIMMs

The CPU/Memory+ board has 16 slots for DIMMs, organized as two banks of eight DIMMs.

B.3.3.1 Slot Locations

DIMMs must be installed in full banks of eight. FIGURE B-5 shows the slot numbers for bank 0 and bank 1.

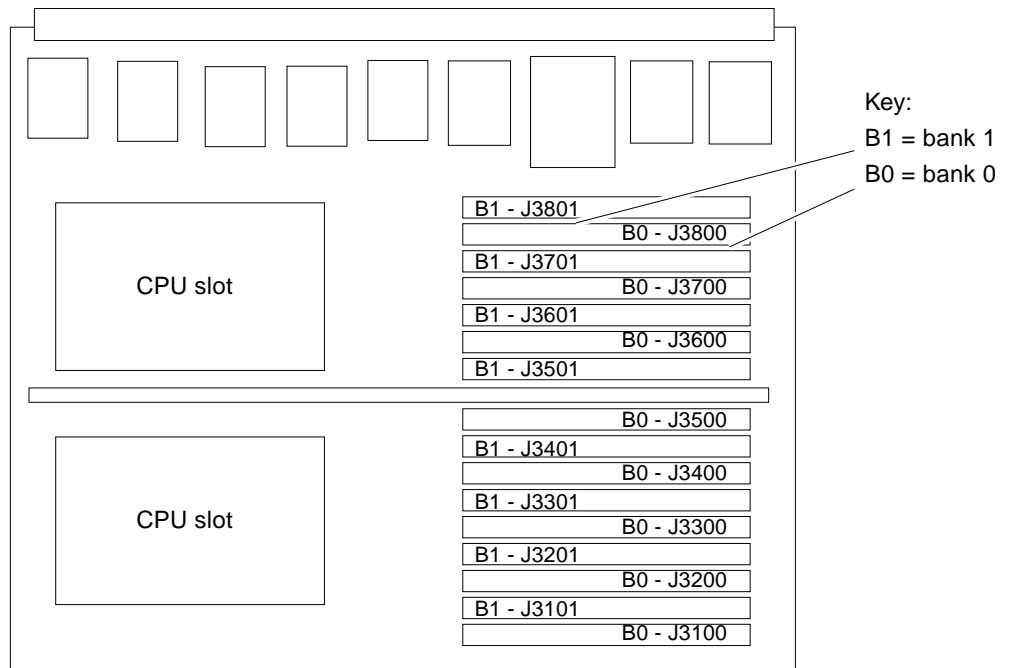


FIGURE B-5 DIMM Slot Locations

B.3.3.2 DIMM Selection

The JEDEC standard 3.3 volt DIMMs are available in 8, 32, or 128 Mbyte capacities. All are 168-pin DIMMs.

Do not mix different capacities in a bank.

B.4 I/O+ Boards

Several types of I/O+ boards are available: SBus+ I/O board, Graphics+ I/O board, and PCI+ I/O board.

Note – Board slot 1 requires an I/O+ board because this is the only slot that connects with the internal media tray. If slot 1 does not contain an I/O+ board, the drives in the media tray will not function.

Note – All empty card cage slots must contain a filler panel.

B.4.1 SBus+ I/O Board

The SBus+ I/O board with 100 MByte/sec Fibre Channel (FIGURE B-6) includes two SYSIO ASICs that provide two SBuses:

- One for two plug-in SBus cards and two GBIC (100 MByte9/sec Fibre Channel) interfaces
- One for one plug-in SBus card and the onboard devices (10/100 Mbit TPE and Single-ended Fast/Wide SCSI)

Note – SBus connector slots 1 and 2 on the SBus+ I/O board can accommodate a double-wide SBus card.

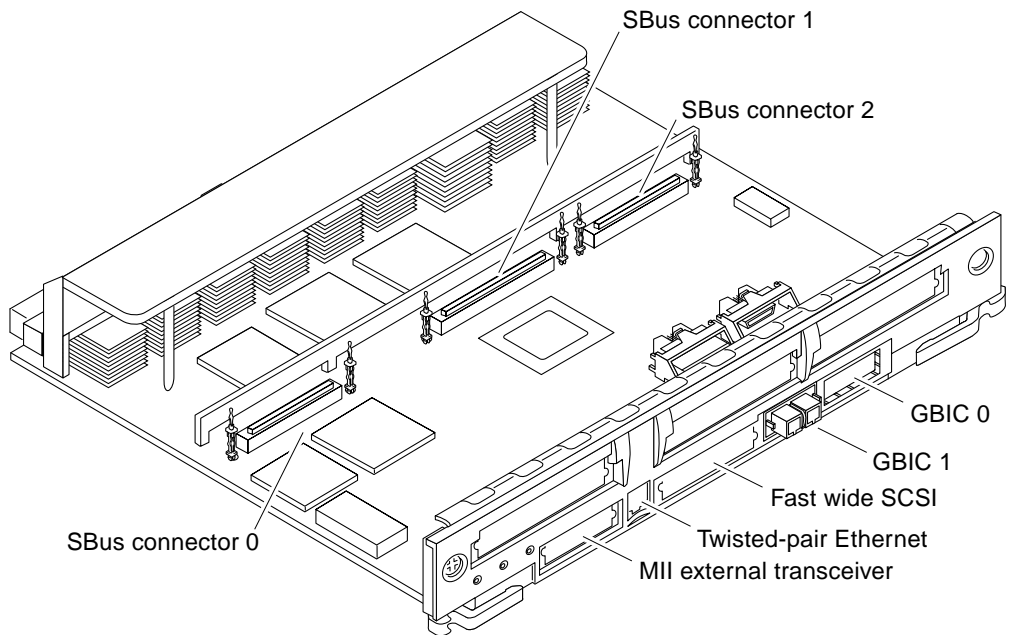


FIGURE B-6 SBus+ I/O Board

B.4.2 Graphics+ I/O Board

The Graphics+ I/O board with 100 MByte/sec Fibre Channel (FIGURE B-7) includes one SYSIO ASIC that provides a single SBus for two plug-in SBus cards, two GBIC (100 MByte/sec Fibre Channel) interfaces, and the onboard devices (10/100 Mbit TPE and Single-ended Fast/Wide SCSI).

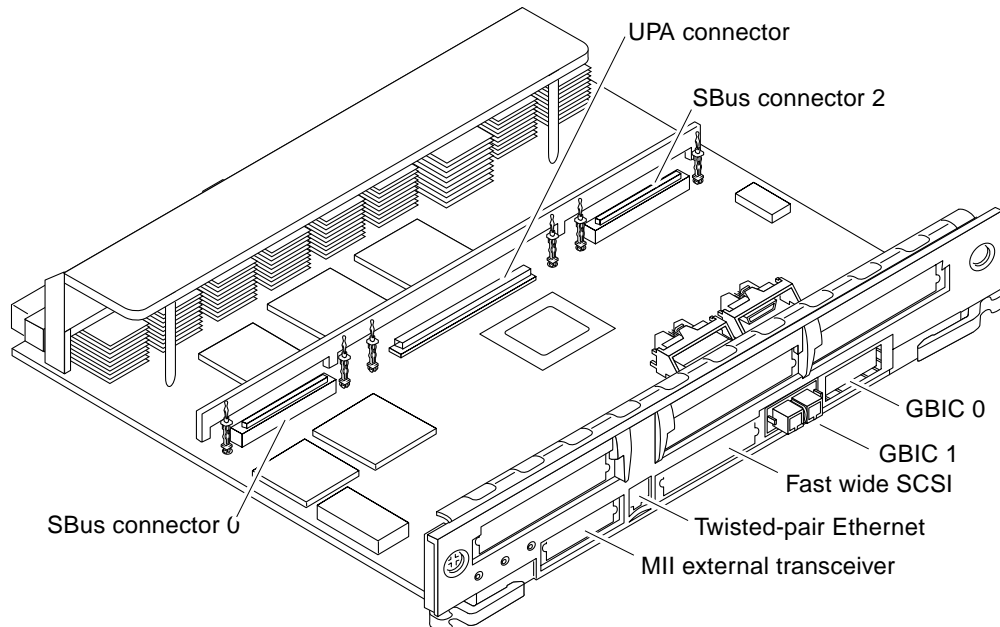


FIGURE B-7 Graphics+ I/O Board

B.4.3 PCI+ I/O Board

The PCI+ I/O board (FIGURE B-8) has two PCI bus connectors:

- Each connector can accommodate a PCI riser card.
- Each riser card accommodates one PCI short card.

In addition, onboard devices on the PCI+ I/O board provide Fast Ethernet (10/100 Mbit) and Fast Wide SCSI interfacing.

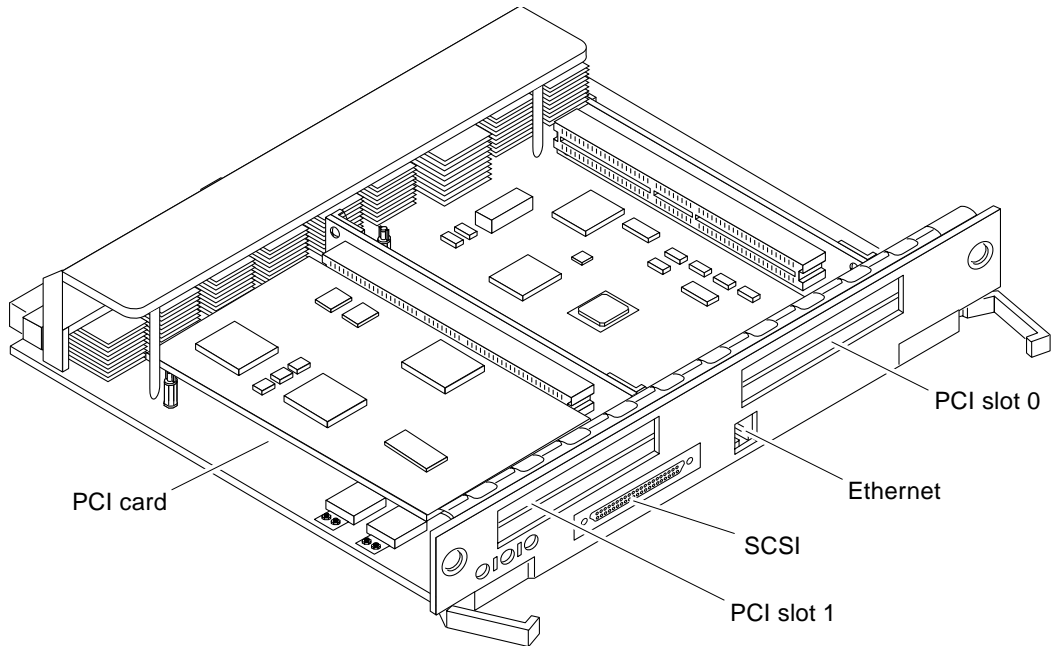


FIGURE B-8 PCI+ I/O Board

The board contains five subsystems: IO(PCI Bus), Memory, Bus Interface, FireHose Interface, and Clock Generation. Four of these subsystems: the IO(PCI Bus), Memory, Bus Interface and internal board interface subsystems include ASICs. The Clock subsystem distributes and generate clocks for the ASICs and PCI Bus Interfaces on the board.

B.5 Power Supplies

There are three types of power supplies: power/cooling modules (PCMs), auxiliary peripheral power supply (optional), and peripheral power supply/AC. PCMs provide DC current and cooling air to boards in the card cage. The peripheral power supply provides current for peripheral devices (such as a tape or DVD-ROM drive) in the media tray. The peripheral power supply/AC provides current for peripheral devices, and has the AC switch and AC cable socket.

B.5.1 Power/Cooling Modules

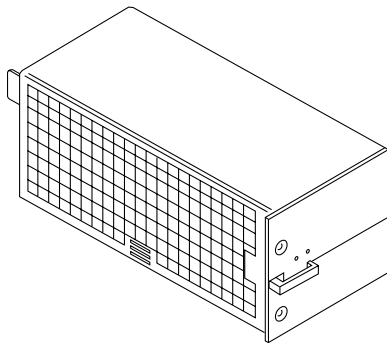


FIGURE B-9 PCM

The DC power to the centerplane is supplied by one or more PCMs. Each PCM also provides cooling air for two board slots. If a slot contains a board, the adjacent PCM slot must contain a PCM to supply cooling air.

The system has a maximum capacity of three PCMs. The slot above the peripheral power supply/AC may have either a PCM or a fan tray.

Current from individual PCMs is shared on the centerplane.

With automatic system reconfiguration (ASR), a PCM can be taken offline and replaced without halting the system. There are two restrictions:

1. The remaining power/cooling modules must provide sufficient electrical power. As a general rule, the number of boards must be less than half the number of PCMs.
2. The PCM should be replaced quickly so that any adjacent boards will not overheat from lack of fan cooling.

B.5.2 Peripheral Power Supply/AC

The system has one peripheral power supply/AC input (PPS/AC) installed in the rear of the system. The PPS/AC, also known as PPS 0 to the system software, has the AC switch and AC cable socket.

Additionally, the peripheral power supply/AC provides DC power for the DVD-ROM/tape drives tray and precharge power for hot-plugable boards and PCMs.

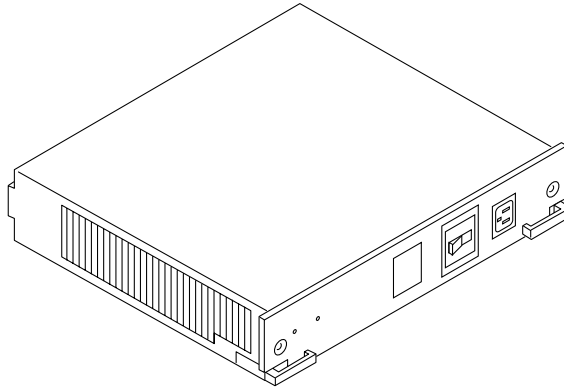


FIGURE B-10 Peripheral Power Supply/AC

B.5.3 Peripheral Power Supply

In the front of the system is a slot for an optional auxiliary peripheral power supply (PPS). The PPS, also known as PPS1 to the system software, supplies redundant current for the peripheral devices.

If an auxiliary peripheral power supply is not installed, a thermal protection module must be installed in the PPS slot.



Caution – A thermal protection module or a power supply *is required in the PPS1 slot* to ensure maximum operating temperature is not exceeded.

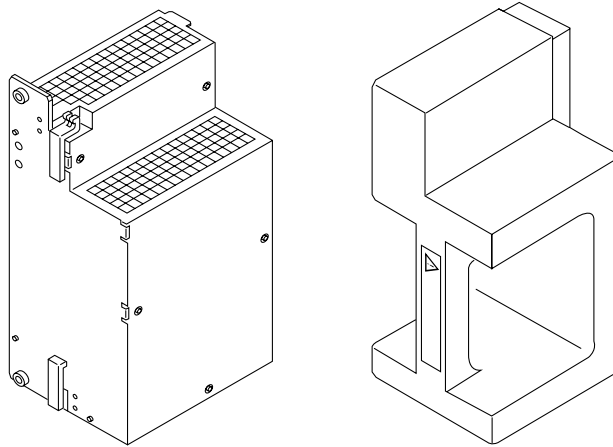


FIGURE B-11 Auxiliary Peripheral Power Supply and Thermal Protection Module

B.6 Clock+ Board

The clock+ board is located at the rear of the cabinet, at the right side of the card cage. See FIGURE B-12.

The clock+ board receives cooling air from the PCM located above the two board slots on the right side of the card cage.

The clock+ board provides 16 pairs of system clocks, 32 pairs of processor clocks.

The processor clock frequency is set to match the lowest-frequency processor in the system. All processors run at the same clock speed. The system clock and the processor clocks are derived from a single clock source. The frequency of the clock source as well as the processor and system clocks are programmable and set by firmware.

The clock+ board also includes central devices including serial ports, keyboard and mouse, and a time of day (TOD) chip.

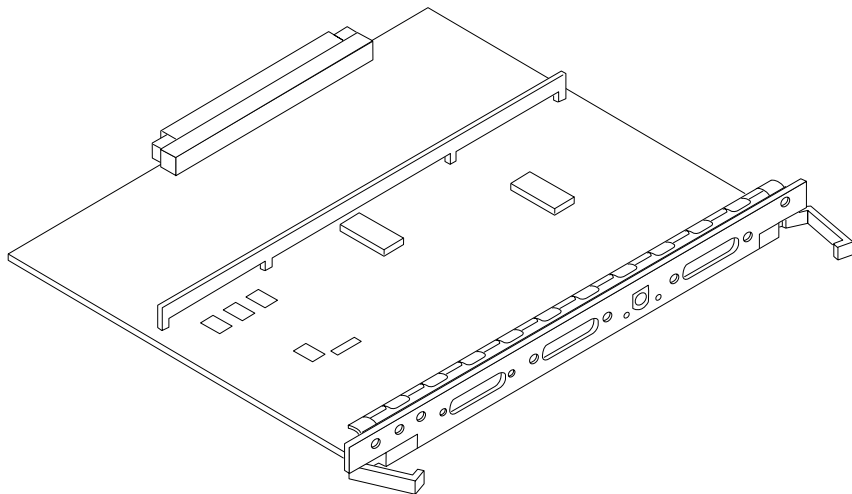


FIGURE B-12 Clock+ Board

B.7 Network Interfaces

Each I/O+ board has an onboard Ethernet circuit, connected to an RJ-45 twisted-pair connector and a 40-pin media independent interface (MII) connector. The circuit automatically adapts to 10 Mbit or 100 Mbit at the twisted-pair port. The 100 Mbit MII connector accepts external Ethernet transceivers. If a transceiver is attached to the MII connector, the twisted-pair connector is disabled.

Ethernet SBus interface cards may also be added to one or more I/O+ boards for additional networks.

B.8 Internal Disk Drives

The 5-slot standalone Enterprise 3500 server has a capacity of eight internal FC-AL disk drives. ID addresses are set automatically and are determined by disk bay location.

B.9 Media (DVD-ROM/Tape Drive) Tray

The media tray at the front of the system accepts two SCSI devices, such as a DVD-ROM drive and optional tape drive. The drives connect to the wide SCSI connector of the first I/O+ board (in card cage slot 1). See Appendix C for SCSI ID addressing.

B.10 Expansion Cabinets

The Enterprise 3500 system supports Fibre Channel and differential SCSI interface disk storage options.

SCSI and FC-AL Devices

This appendix contains the following topics:

- Section C.1 “SCSI Target ID Number Addressing” on page C-1
- Section C.2 “Device Naming Conventions” on page C-2
- Section C.3 “SCSI Cable Length” on page C-3
- Section C.4 “SCSI Termination” on page C-4

C.1 SCSI Target ID Number Addressing

C.1.1 Media Tray

The default SCSI ID numbers for devices in the media tray are:

TABLE C-1 Media Tray Default SCSI ID Numbers

Device	ID
DVD-ROM drive	6
Tape drive	5

C.1.2 Internal Disk Drives

The default ID numbers for internal disk drives are:

TABLE C-2 Internal Disk Drive Default ID Numbers

Drive Bay	ID Number
0 (boot disk)	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7

C.2 Device Naming Conventions

SCSI and FC-AL devices are identified by path names or aliases.

A full path name can be of the form `/sbus@1f,0/cgsix@1,0`.

A short path name does not include address information. For example, the full path name shown above can be shortened to `/sbus/cgsix`. This form of name can be ambiguous if more than one of the devices is installed.

An alias is another form of short name. Use the OpenBoot `devalias` command to list current aliases.

Some common aliases are:

TABLE C-3 Examples of Alias Names

Alias	Full Path Name
net	<code>/sbus@3,0/SUNW,hme@3,8c00000</code>
DVD	<code>/sbus@3,0/SUNW,fas@3,8800000/sd@6,0:f</code>
ttya	<code>/central/fhc/zs@0,902000:a</code>

TABLE C-3 Examples of Alias Names

Alias	Full Path Name
ttyb	/central/fhc/zs@0,902000:b
screen	/SUNW,ffb@2,0
disk	/sbus@2,0/SUNW,socal@d,10000/sf@0,0/ssd@0,0

C.3 SCSI Cable Length

The following sections show the SCSI-length information for the Enterprise 3500. The total length of cabling in the SCSI strings must not exceed the maximums shown in Table C-4 and C-5.

C.3.1 Onboard SCSI

The onboard SCSI bus supports single-ended SCSI devices. The calculated lengths of SCSI strings in the Enterprise 3500 are shown in Table C-4.

TABLE C-4 SCSI Lengths for Onboard SCSI (meters, approximate)

Maximum External Lengths	Slot1	All Other Slots
Fast SCSI (10MB/sec)	1.5	2.5
Slow SCSI (5MB/sec)	4.5	5.5
Fast wide (20MB/sec)	1.5	2.5

Note – Slot 1 has different measurements because it connects to the internal media tray, which has the DVD-ROM drive. The tray may contain an optional second SCSI drive. Onboard Ultra SCSI is not supported.

C.3.2 SBus SCSI Cards

There are two I/O boards on which SBus I/O interface cards can be added: The SBus+ I/O board and the Graphics+ I/O board. Table C-5 shows the SCSI cabling length for SCSI cards.

TABLE C-5 Maximum SCSI Cabling Length for SCSI Cards (meter, approximate)

Length	Differential	Nondifferential
Maximum External Length	24.5	5.5

C.4 SCSI Termination

The I/O+ board in slot 1 of any Enterprise server must be terminated. This slot connects to the internal DVD-ROM drive and optional tape drive.

The SCSI bus on an I/O+ board in any other slot must be terminated only if SCSI devices are connected to that board.

C.5 Fiber Cable Length

Use a 2-meter cable to ensure that the 1.0 inch minimum bend radius rule for fiber optic cables is observed.

The interface board, together with interconnecting fiber optic cabling, provides four independent FC-AL loops between the host I/O+ board and the internal fiber optic disks.

Rules for System Configuration

Some of the following rules are suggestions for optimizing your system. Other rules are required or maximum values and are marked with the notation **Requirement** or **Maximum**.

This appendix contains the following topics:

- Section D.1 “Card Cage” on page D-1
- Section D.2 “I/O+ Boards” on page D-2
- Section D.3 “Interface Board” on page D-3
- Section D.4 “CPU/Memory+ Boards” on page D-3
- Section D.5 “Power Supplies and Fan Cooling” on page D-4
- Section D.6 “Filler Panels” on page D-4
- Section D.7 “SBus Cards” on page D-5
- Section D.8 “CPU Modules” on page D-5
- Section D.9 “Memory Modules” on page D-6
- Section D.10 “Cabling” on page D-6
- Section D.11 “DVD-ROM/Tape Drive Media Tray” on page D-7
- Section D.12 “Disk Drives” on page D-8

D.1 Card Cage

In the card cage (FIGURE D-1), board slots are numbered from right to left: 1, 3, 5, 7, and 9.¹

1. This seemingly unconventional numbering system is derived from the slot numbering used in the general card cage design of the Enterprise server family. The Enterprise 3500 server card cage is based on the Enterprise 4500 card cage, which is double-sided, with even-numbered slots (0, 2, 4, 6) on the front and odd-numbered slots (1, 3, 5, 7) on the back. The Enterprise 3500 card cage uses the system internal SCSI bus (slot 1), which in turn dictated the use of the back half of the Enterprise 4500 card cage design.

In most respects, all five board slots in the card cage are equivalent. However, slot 1 is the only slot that is physically connected in the card cage to the SCSI bus on the centerplane. Slot 1 is therefore normally reserved for an I/O+ board, since the CPU/Memory+ board does not have a SCSI bus controller.

D.2 I/O+ Boards

1. **Requirement** — Reserve slot 1 for an I/O+ board (FIGURE D-1). This is the only slot that allows direct access to the internal SCSI devices.
2. **Maximum** — Up to four graphics (UPA) cards are supported in a system.
3. **Requirement** — The SCSI bus on the I/O+ board in slot 1 must be terminated because it connects to the internal system SCSI bus.
4. An I/O+ board in a slot other than slot 1 does not require termination if no devices connect to the SCSI bus on that board.

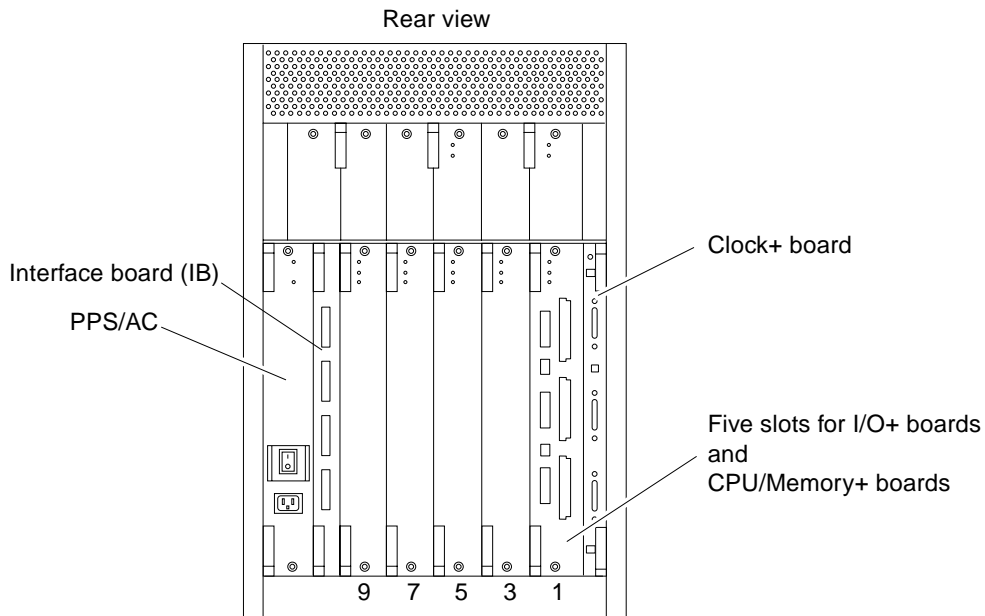


FIGURE D-1 Board Slots and AC Power Supply

D.3 Interface Board

1. There is a slot for one Interface Board (IB) in the system (FIGURE D-1). The IB provides circuitry for disk drives using Fibre Channel Arbitrated Loop (FC-AL) interfacing.
2. The system can have up to eight internal fiber optic disk drives, which are controlled by Gigabit Interface Converters (GBICs) mounted on the IB. The GBICs are hot-pluggable. The GBICs on the IB connect by cables to GBICs on the I/O+ board(s).
3. The IB has FC-AL circuitry to support up to eight internal fiber optic disk drives. Two GBICs (in slots LA and UA) on the IB connect through cables to GBICs on the I/O+ board. The remaining GBIC slots (LB and UB) on the IB can be used for redundant interfacing to another I/O+ board or (with the proper software) to an entirely separate system.
4. One GBIC can control up to four fiber optic disk drives (disk bays 0 to 3 in the lower bank, or bays 4 to 7 in the upper bank).

Reserve bay 0 for the boot drive.

5. There are two FC-AL loops for the internal disk drives. The lower loop connects disks 0 to 3 (lower disk bays); the upper loop connects disks 4 to 7 (upper disk bays).

D.4 CPU/Memory+ Boards

1. When configured at the factory, a CPU/Memory+ board is installed in the second slot (slot 3) of the five board slots (FIGURE D-1.) As noted earlier, slot 1 is reserved for an I/O+ board.
2. **Maximum** — The Enterprise 3500 server supports up to four CPU/Memory+ boards.

D.5 Power Supplies and Fan Cooling

1. **Requirement** — The slot directly above a CPU/Memory+ board or I/O+ board must contain a power/cooling module (PCM), because the fans in the PCM are the only source of cooling air for the board slot.
2. **Requirement** — All unused slots must contain a filler panel to avoid loss of cooling air.
3. Under some circumstances, you can remove a PCM from an active system for a short time. However, if the boards in the adjacent slots create large quantities of heat, it is safer to halt and power off the system first.
4. **Requirement** — The peripheral power supply/AC input (PPS/AC) must be fully functional if you replace a hot-pluggable board or PCM. (Only the PPS/AC provides precharge current to the system. If the PPS/AC cannot supply precharge current, the hot-pluggable module will be damaged.)
5. **Requirement** — The slot above the PPS/AC must contain either a PCM or an auxiliary fan tray.
6. The auxiliary peripheral power supply (PPS 1) is an option. The PPS 1 is located at the front of the system, to the right of the disk drive area.
7. **Requirement** — If PPS 1 is absent, the slot must contain a thermal protection module to ensure the maximum operating temperature is not exceeded.
8. PPS 1 does not provide precharge current.

D.6 Filler Panels

1. **Requirement** — Board filler panels are required for all unused board slots.
2. **Requirement** — PCM filler panels are required for all unused PCM bays.
3. **Requirement** — A thermal protection module must be installed if an auxiliary peripheral power supply (PPS1) is not installed.

D.7 SBus Cards

1. Install double-wide SBus cards only on the SBus+ I/O board in SBus slots 1 and 2. The location of SBus slot 0 prevents its use with double-wide cards.
2. Double-wide SBus cards cannot be used with the Graphics+ I/O board. The middle card connector does not fit SBus cards.

D.8 CPU Modules

1. Each CPU/Memory+ board has two sets of CPU connectors, marked PROC 0 and PROC 1.
2. Do not mix CPU speeds.
3. The order in which you fill CPU slots is not critical. However, to optimize heat dissipation in the system:
 - Fill all PROC 0 locations on all CPU/Memory+ boards before filling any PROC 1 locations. To receive the maximum quantity of diagnostic information, fill PROC 0 on board 3.
 - After all PROC 0 locations are filled, you can begin filling the PROC 1 locations, again starting from the lowest slot number to the highest.

TABLE D-1 shows slot locations for an example of five CPUs on three CPU/Memory+ boards.

TABLE D-1 CPU Placement - Example Only

Slot Number	PROC 0	PROC 1
3	in	in
5	in	in
7	in	—

D.9 Memory Modules

1. The DIMMs are 168-pin, JEDEC-standard devices. Do not use other types of memory modules.
2. **Requirement** — Do not mix 8, 32, or 128 Mbyte DIMMs in the same bank. (All DIMMs in a bank — eight DIMMs — must have the same capacity.)
3. Note that two banks of DIMM slots on a CPU/Memory+ board are interleaved. A bank is composed of eight alternating DIMM slots.
4. All DIMMs in a bank should have the same speed rating. If DIMMs of different speeds are mixed in a bank, the bank will function, but at the lowest speed.

D.10 Cabling

D.10.1 SCSI

1. **Requirement** — Do not attach any external SCSI devices to the onboard SCSI connector of the I/O+ board in card cage slot 1.
2. To add external SCSI devices, use the SBus slots on the I/O+ board, or add a second I/O+ board. You may use either an SBus+ I/O board or a Graphics+ I/O board.
3. **Maximum** — The maximum length for a chain of single-ended (non-differential) SCSI cables is 6.0 meters (20 feet).
4. **Maximum** — The maximum length for a chain of differential SCSI cables is 25 meters (82 feet).

D.10.2 Fiber Optic

The minimum bend radius for fiber optic cable is 1.0 inch. The IB has FC-AL circuitry to support up to eight internal fiber optic disk drives. Two GBICs (in slots LA and UA) on the IB connect through cables to GBICs on the I/O+ board; use a 2-meter cable. The remaining GBIC slots (LB and UB) on the IB can be used for

redundant interfacing to another I/O+ board or (with the proper software) to an entirely separate system. Use the fiber cable organizer that came with your Enterprise 3500 system to help ensure the 1.0 inch bend radius rule is observed.

D.10.3 Ethernet

1. The main Ethernet should be connected to the I/O+ board in slot 1.
2. Each I/O+ board has one Ethernet circuit with both TPE and MII connectors. Only one type of connector may be used at a time.
3. After slot 1 is connected to a network, additional Ethernet connections may be made to I/O+ boards or SBus cards in any other card cage slot.

D.10.4 Video Interface

1. A system that is operated with a monitor can use a graphics adapter mounted on either a Graphics+ I/O board or an SBus+ I/O board.
2. Up to four Graphics+ I/O boards are supported in a system.

D.11 DVD-ROM/Tape Drive Media Tray

The media tray is located at the upper front of the cabinet. Various DVD-ROM and tape drive options are available. A SCSI cable connects the tray to card cage slot 1 on the centerplane.

D.12 Disk Drives

Disk drive bays are located at the front of the cabinet.

In the lower bank of disk drives, the bay numbers are 0, 1, 2, and 3, numbered from left to right (FIGURE D-2.)

Requirement — Bay 0 is reserved for the boot disk.

In the upper bank of disk drives, the bay numbers are 4, 5, 6, and 7.

All disk drives connect through the centerplane to the interface board (IB) which provides a fiber optical interface.

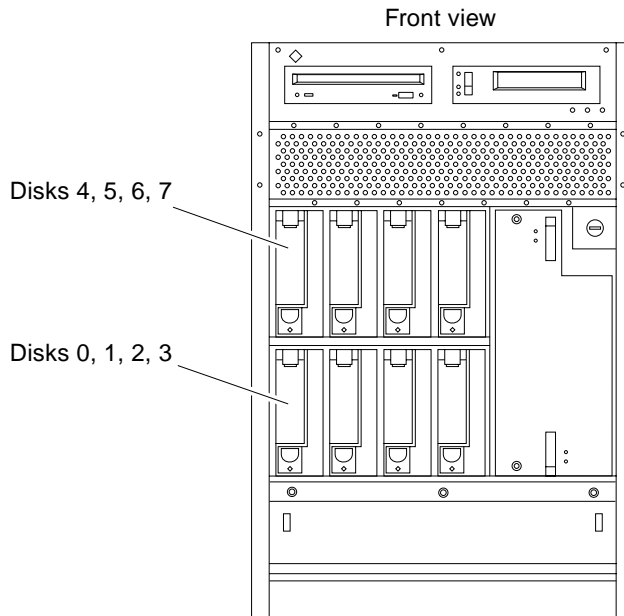


FIGURE D-2 Disk Drive Bay Numbers

Non-Chassis Field Replaceable Units (FRUs)

See the following pages to remove and replace system subassemblies.

This appendix contains the following topics:

- Section E.1 “FRU List” on page E-2
- Section E.2 “Fan Tray Assembly” on page E-2
 - Section E.2.1 “Removing the Fan Tray Assembly” on page E-2
 - Section E.2.2 “Replacing the Fan Tray Assembly” on page E-3
- Section E.3 “Auxiliary Fan Tray Assembly” on page E-4
 - Section E.3.1 “Removing the Auxiliary Fan Tray Assembly” on page E-4
 - Section E.3.2 “Replacing the Auxiliary Fan Tray Assembly” on page E-5
- Section E.4 “Removing the Front and Side Panels” on page E-6
 - Section E.4.1 “Removing the Side Panels and Front Bezel” on page E-6
 - Section E.4.2 “Removing the Media Tray and Front Decorative Panel” on page E-8
 - Section E.4.3 “Media Tray Data and DC Power Cable Assemblies” on page E-10
 - Section E.4.4 “Key Switch PWB Centerplane Cable Assembly” on page E-11
 - Section E.4.5 “Key Switch Lock Cable Assembly” on page E-14
- Section E.5 “Replacing the Front and Side Panels” on page E-22
 - Section E.5.1 “Replacing the Media Tray and Front Decorative Panel” on page E-22
 - Section E.5.2 “Replacing the Front Bezel and Side Panels” on page E-22

E.1 FRU List

TABLE E-1 List of Field Replaceable Units

FRU List Items	Part Number	Page Number
Assembly, cable, SCSI tray data (media tray)	530-2220	page E-9
Assembly, cable, power, DC	530-2221	page E-9
Assembly, cable, key switch PWB centerplane	530-2226	page E-11
Centerplane	501-4799	page 9-13
Fan tray assembly	540-3566	page E-2
Fan tray assembly, auxiliary	540-2757	page E-4
Key switch lock cable assembly	530-2148	page E-14
LED board	501-2599	page E-16

E.2 Fan Tray Assembly

E.2.1 Removing the Fan Tray Assembly

- 1. Pull open the front door of the Enterprise 3500 system.**
- 2. Locate the fan tray assembly at the bottom of the system.**
- 3. Loosen the three captive screws securing the fan tray assembly in the chassis (FIGURE E-1).**

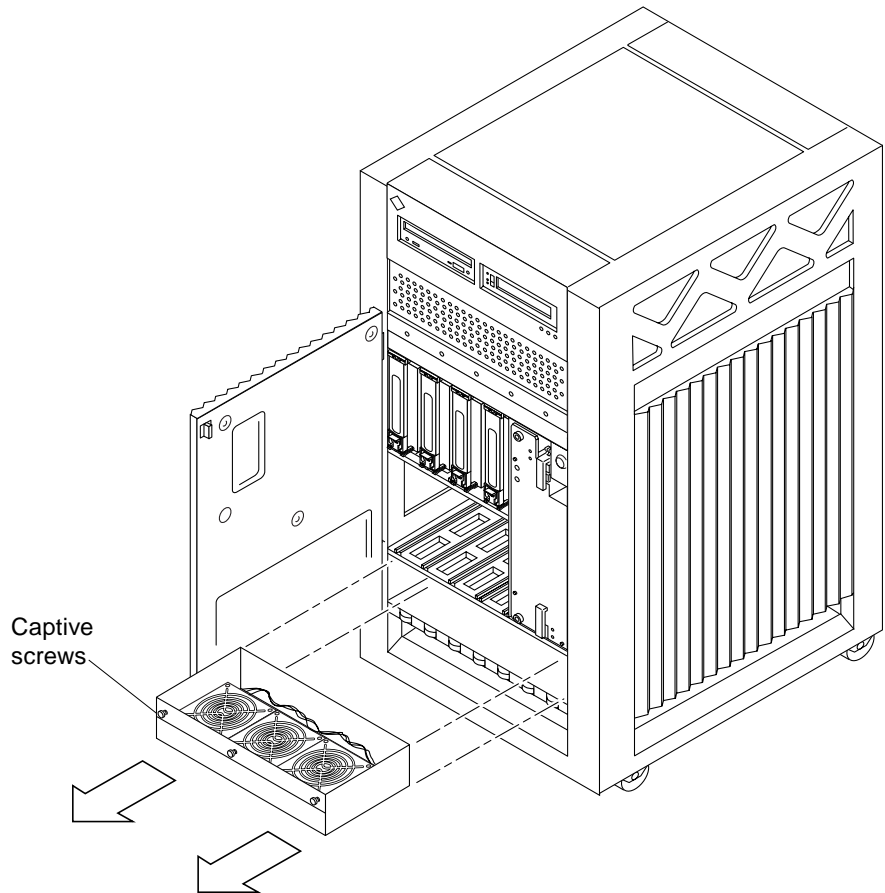


FIGURE E-1 Removing the Fan Tray Assembly

4. Gently pull the fan tray assembly from the chassis and set it aside.

E.2.2 Replacing the Fan Tray Assembly

1. Carefully insert the fan tray assembly in the bottom of the Enterprise 3500 system (FIGURE E-1).



Caution – DO NOT FORCE the fan tray assembly into the slot; this can cause damage to the fan tray assembly and system.

The fan tray assembly should insert and seat smoothly. If it binds, remove it, and inspect the slot for any obvious obstructions. Do not damage the springfingers at the bottom of the fan tray assembly.

2. Tighten the three captive screws securing the fan tray assembly to the chassis.
3. Close the front door of the Enterprise 3500 system.

E.3 Auxiliary Fan Tray Assembly

E.3.1 Removing the Auxiliary Fan Tray Assembly

1. Locate the auxiliary fan tray assembly at the back of the system.

Viewed from the rear of the system, the auxiliary fan tray is on the upper left side of the chassis, in PCM slot 5 (slot 5 can contain either an auxiliary fan tray or a PCM).

2. Release the auxiliary fan tray from the system chassis by inserting a Phillips #1 screwdriver into each quarter-turn access slot and turning to the unlocked position (FIGURE E-2).

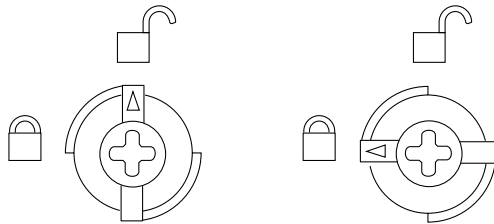


FIGURE E-2 Unlocking and Locking Quarter-Turn Access Slots

3. Pull the end of the extraction lever outward to release the auxiliary fan tray assembly from the centerplane (FIGURE E-3).

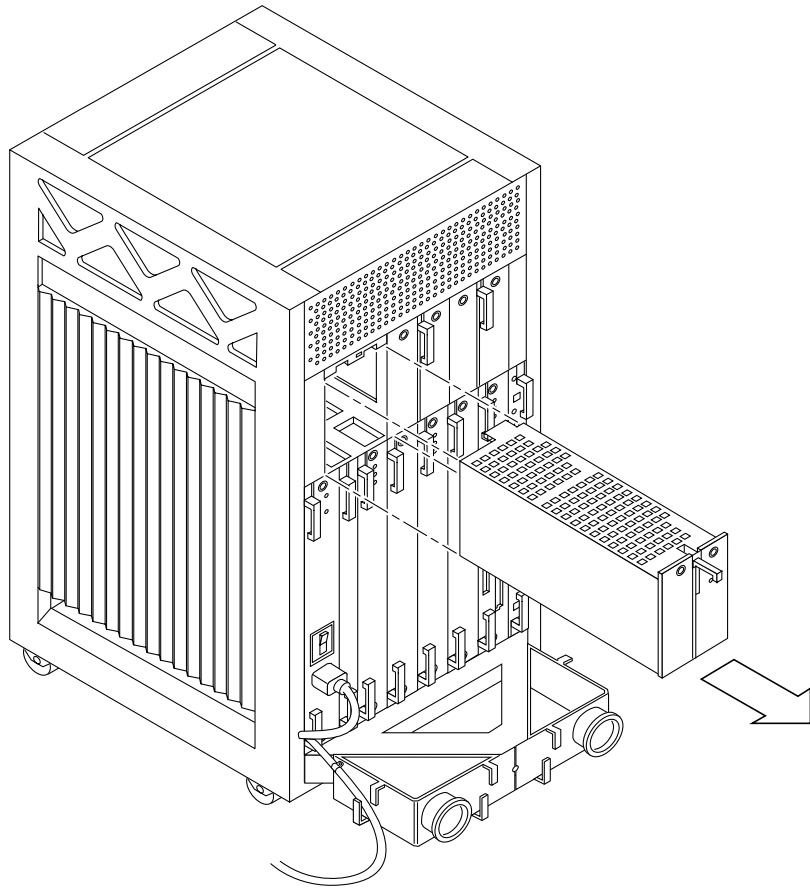


FIGURE E-3 Removing the Auxiliary Fan Tray

4. Slowly remove the auxiliary fan tray assembly from the chassis and set it aside.

E.3.2 Replacing the Auxiliary Fan Tray Assembly

1. Carefully insert the auxiliary fan tray into the slot at the back of the Enterprise 3500 system.
 - Ensure that the extraction lever is in the outward position.
 - Orient the auxiliary fan tray with the extraction lever on the outside edge of the Enterprise 3500 system (FIGURE E-3).

2. Slide the auxiliary fan tray assembly toward the centerplane.

The auxiliary fan tray assembly will not seat fully unless the lever is in this starting position.



Caution – DO NOT FORCE the auxiliary fan tray assembly into the slot; this can cause damage to the auxiliary fan tray and system.

The auxiliary fan tray assembly should insert and seat smoothly. If it binds, remove it, and inspect the slot for any obvious obstructions. Do not damage the springfingers at the bottom of the auxiliary fan tray assembly.

3. Swing the extraction lever inward to the locked position to seat the auxiliary fan tray assembly.

Do not press on the front panel of the auxiliary fan tray assembly to seat it; doing so will damage the connector pins.

4. Lock the auxiliary fan tray to the system chassis by inserting a Phillips #1 screwdriver into each quarter-turn access slot and then turning to the locked position (FIGURE E-2).

E.4 Removing the Front and Side Panels

Complete the following section as a prerequisite if you are removing one of the following subassemblies:

- Media (SCSI) tray data and DC power cable assemblies
- Key switch PWB centerplane cable assembly
- Key switch lock cable assembly
- LED board
- Centerplane

E.4.1 Removing the Side Panels and Front Bezel

1. Completely power off the Enterprise 3500 system.

See the power-off instructions in Chapter 11 “Powering Off and On.”

2. Remove the side panels.

- Grasp the bottom of the side panel in the center and pull the panel out slightly until the snap disengages.
- Lift the side panel up and then lift the panel out (FIGURE E-4).

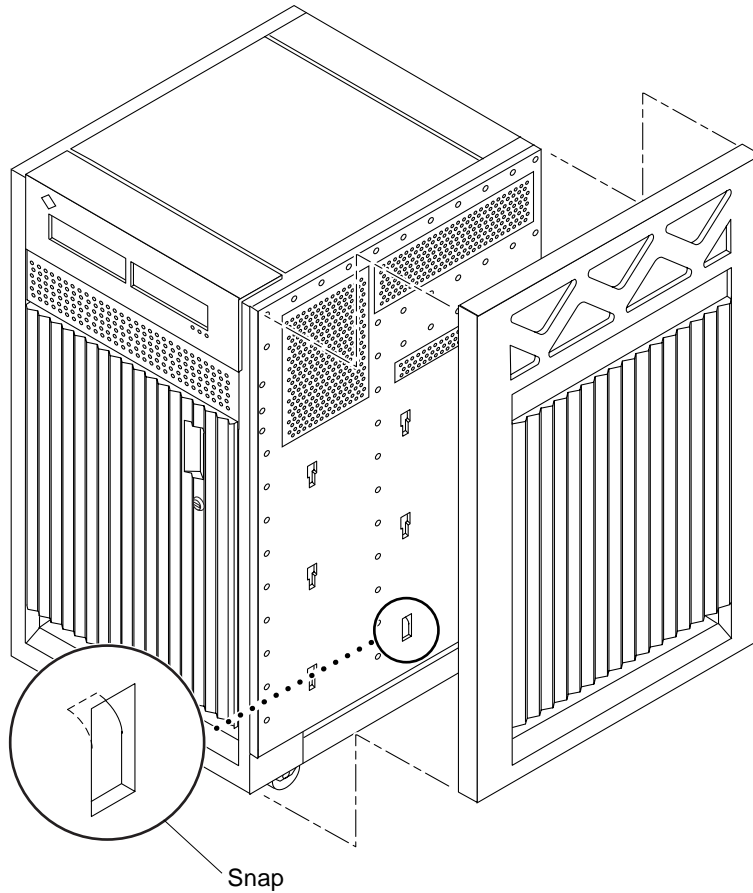


FIGURE E-4 Removing the Side Panel

3. Grasp the front bezel on both sides near the center.

Place your thumbs on top of the front bezel and place your other fingers at the slight indentations under the front bezel.

4. Pull the front bezel straight out toward you and set it aside.

Press down on the top of the bezel as you pull it toward you, and pull back slightly on the top with your thumbs (FIGURE E-5).

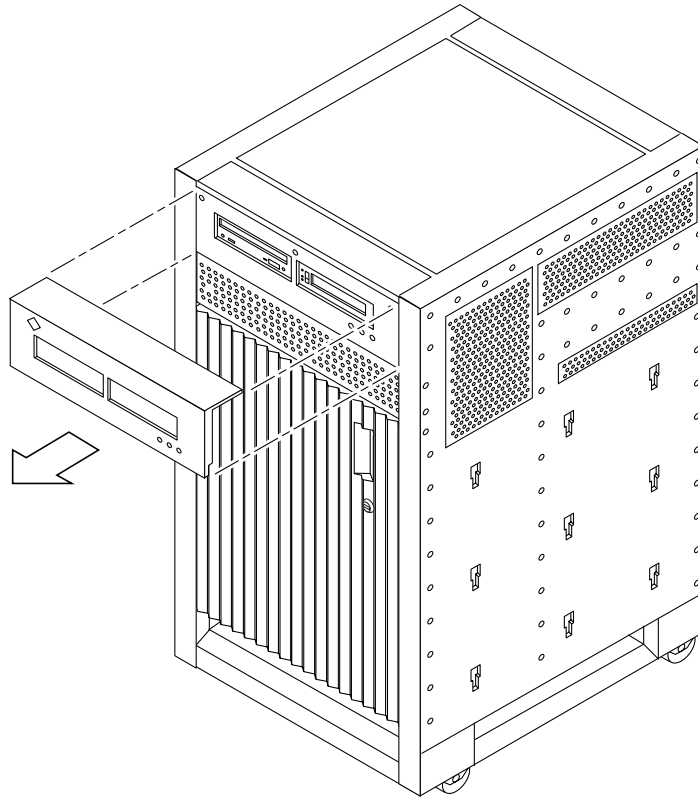


FIGURE E-5 Removing the Front Bezel

E.4.2 Removing the Media Tray and Front Decorative Panel

1. Loosen the two captive screws securing the media tray in the chassis.
2. Insert a screwdriver or similar instrument in the notch at the bottom center of the media tray. Using the screwdriver, slightly pull out the media tray.
3. Grasp the media tray and gently pull it from the chassis (FIGURE E-6).

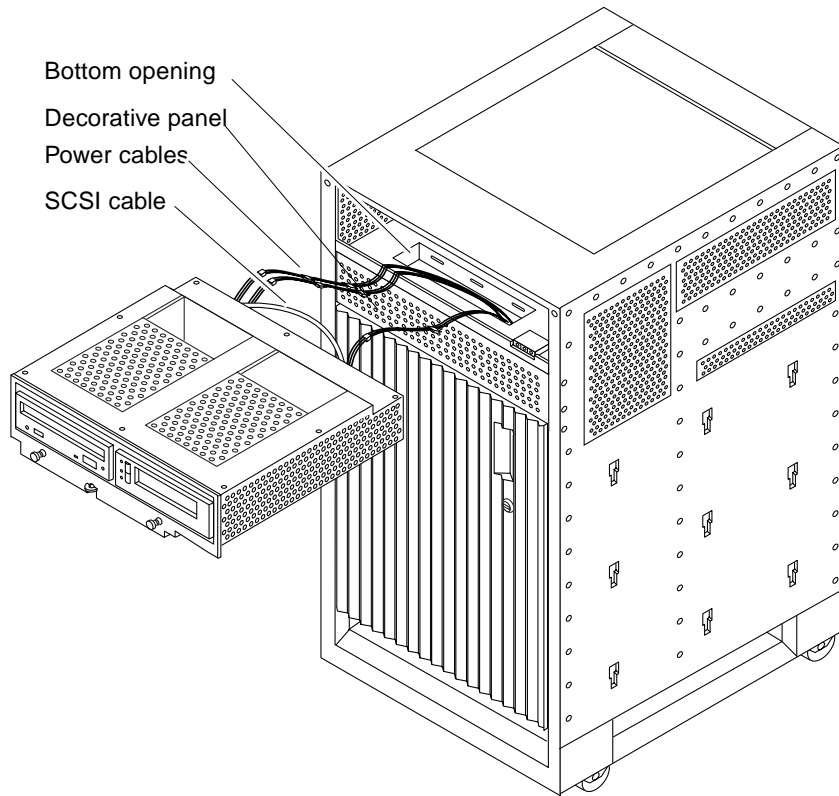


FIGURE E-6 Removing the Media Tray

Note – If you are not replacing the SCSI cables or the centerplane, you may simply flip over the media tray and rest it on the top of the Enterprise 3500 system.

4. **If you are replacing SCSI cables or the centerplane, disconnect the cables from the back of the media tray.**
5. **Open the front door of the Enterprise 3500 system.**
 - If you are replacing the centerplane, go to Section E.4.7 “Centerplane” on page E-18.
 - Otherwise, continue with Step 6.
6. **Remove the screws securing the front decorative (perforated) panel in the chassis.**

There are eight screws on the top, seven screws on the bottom, and three screws on each side of the front decorative panel.
7. **Grasp the front decorative panel and set it aside.**

E.4.3 Media Tray Data and DC Power Cable Assemblies

E.4.3.1 Removing the Data and Power Cables

1. Remove the panels covering the data and power cables.

Complete the steps in Section E.4 “Removing the Front and Side Panels.”

2. Reach through the space previously occupied by the front decorative (perforated) panel and disconnect the SCSI cables from the centerplane.

3. Cut the cable ties that secure the cables to the chassis.

4. Remove the cables.

E.4.3.2 Replacing the Data and Power Cables

1. Connect the cables to the back of the media tray.

Note – The SCSI data and power cables are keyed so that the cables fit into the connectors in only one direction and cannot be reversed.

2. Place the cables through the chassis opening vacated by the media tray. Drop the cables through the bottom opening.

The cables should be visible through the opening normally covered by the front decorative (perforated) panel (FIGURE E-6).

3. Reach through the space normally covered by the front decorative panel and connect the cables to the centerplane (FIGURE E-7).

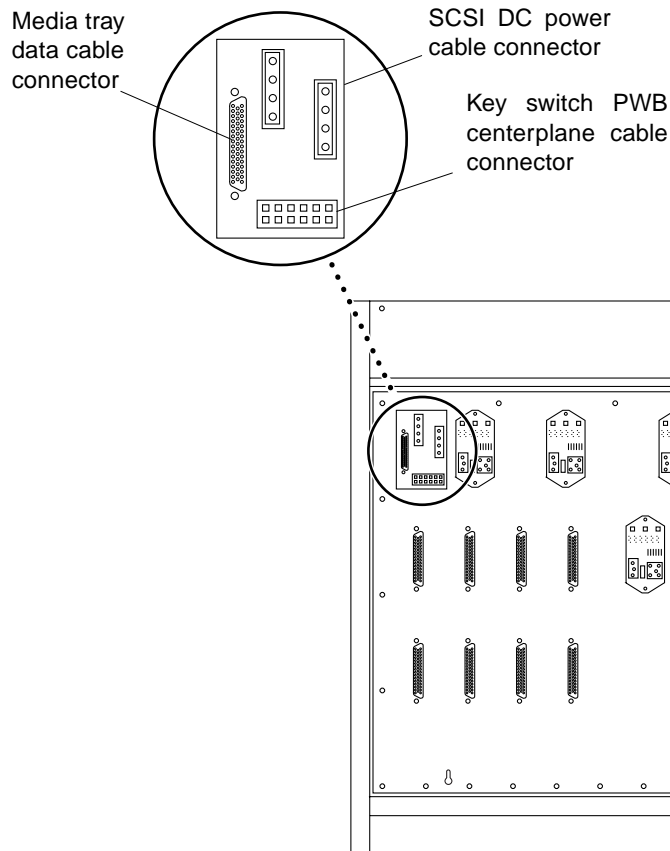


FIGURE E-7 Cable Connectors on the Centerplane

4. Replace the panels covering the data and power cables.

Complete the steps in Section E.5 “Replacing the Front and Side Panels.”

E.4.4 Key Switch PWB Centerplane Cable Assembly

E.4.4.1 Removing the Key Switch PWB Centerplane Cable Assembly

1. Remove the panels covering the key switch printed wiring board (PWB) centerplane cable.

Complete the steps in Section E.4 “Removing the Front and Side Panels.”

2. **Disconnect the key switch PWB centerplane cable from the centerplane** (FIGURE E-8).

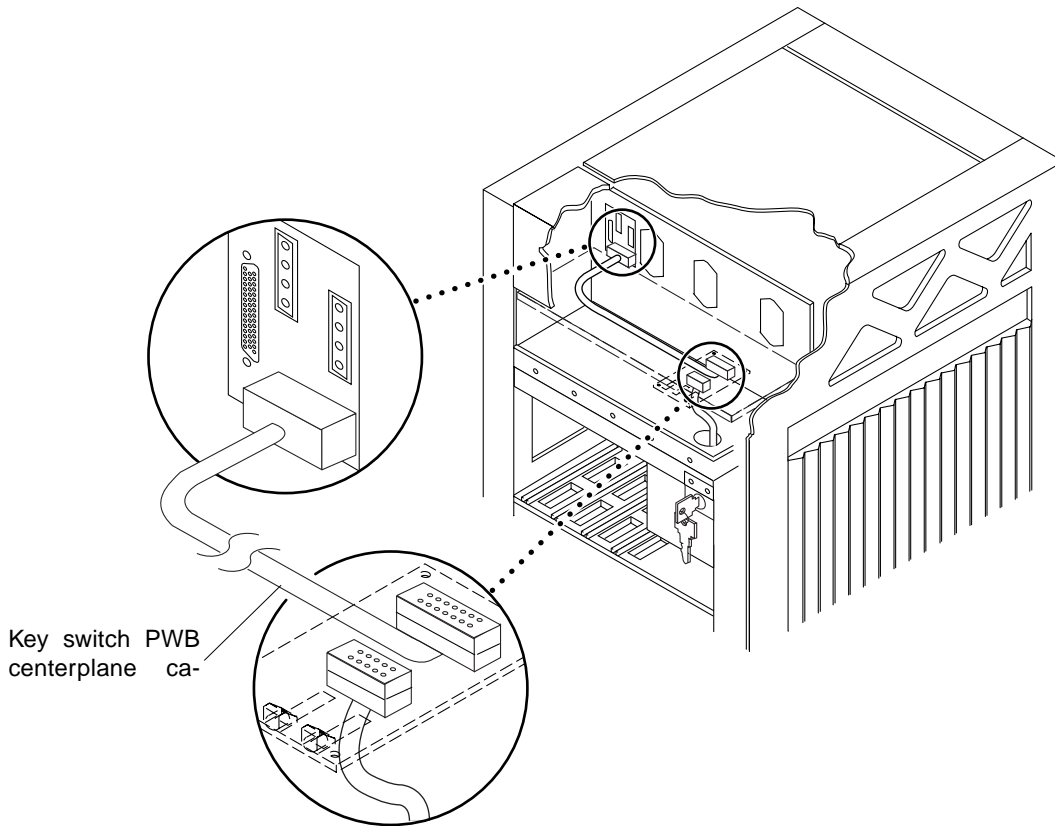


FIGURE E-8 Key Switch PWB Centerplane Cable

3. **Disconnect the key switch PWB centerplane cable from the LED board.**
 - a. **Pull forward on the two locking tabs securing the cable to the LED board.**

The key switch PWB centerplane cable is in back of the key switch lock cable assembly (FIGURE E-9).

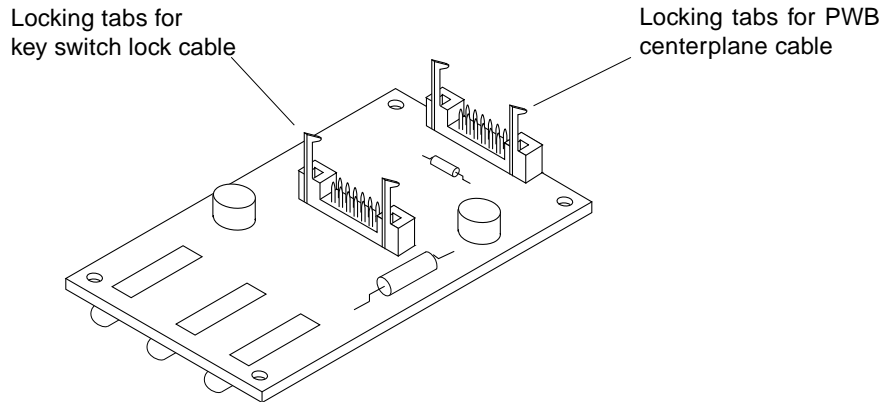


FIGURE E-9 Locking Tabs on the LED Board

b. Disconnect the cable.

- 4. Cut the cable tie and remove the key switch PWB centerplane cable.**

E.4.4.2 Replacing the Key Switch PWB Centerplane Cable Assembly

Note – Both ends of the key switch printed wiring board (PWB) centerplane cable are keyed so that the cable fits into the connector in only one direction and cannot be reversed.

- 1. Connect the key switch PWB centerplane cable to the LED board.**
 - a. Connect the cable.**
The key switch PWB centerplane cable is in back of the key switch lock cable assembly (FIGURE E-8).
 - b. Push back on the two locking tabs and secure the cable to the LED board.**
The two locking tabs fit over the connector, securing the key switch PWB centerplane cable to the LED board (FIGURE E-9).
- 2. Connect the other end of the cable to the centerplane.**
- 3. Use a cable tie and secure the key switch PWB centerplane cable to the chassis.**
- 4. Replace the panels covering the key switch lock assembly.**
Complete the steps in Section E.5 “Replacing the Front and Side Panels.”

E.4.5 Key Switch Lock Cable Assembly

E.4.5.1 Removing the Key Switch Lock Cable Assembly

1. Remove the panels covering the key switch lock cable assembly.

Complete the steps in Section E.4 “Removing the Front and Side Panels.”

2. Disconnect the key switch lock cable from the LED board.

a. Pull forward on the two locking tabs securing the cable to the LED board.

The key switch lock cable is in front of the key switch PWB centerplane cable.
(FIGURE E-9).

b. Disconnect the cable.

3. Remove the two screws that attach the key switch lock assembly to the chassis.

4. Twist the key switch lock assembly to the left and pull it forward and out away from the chassis.

The key switch lock assembly has a hook that sits on the bracket in the chassis. You need to turn the assembly so that the hook clears the bracket before the key switch lock assembly can be removed (FIGURE E-10).

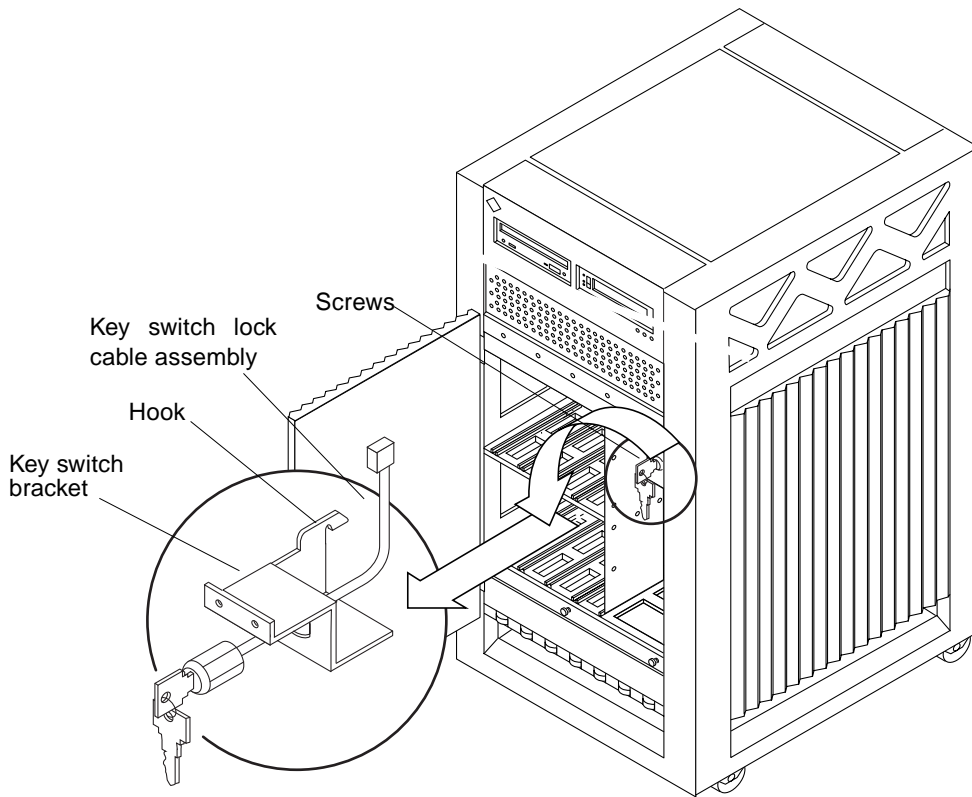


FIGURE E-10 Removing the Key Switch Lock Cable Assembly

5. Separate the key switch lock cable from the key switch bracket.

- a. Remove the U-shaped key switch keeper by pulling it straight out away from the key switch lock assembly.**

The key switch keeper is located on the inside of the key switch bracket and secures the cable to the bracket.

- b. Remove the key switch lock cable by pulling it through the keyhole (FIGURE E-10).**

E.4.5.2 Replacing the Key Switch Lock Cable Assembly

1. **Secure the key switch lock cable to the key switch bracket.**
 - a. **Insert the key switch lock cable into the keyhole of the key switch bracket.**

Position the key switch lock cable so that the arrow on the front of the cable assembly is turned upward (FIGURE E-10).
 - b. **Secure the key switch lock cable to the bracket using the key switch keeper.**

Slip the key switch keeper into the groove on the cable to secure the cable to the bracket.
2. **Twist the key switch lock assembly to the left and thread it through the round hole in the right front side of the chassis.**
3. **Twist the key switch lock assembly to the right so that the hook rests on the bracket in the chassis (FIGURE E-10).**
4. **Replace the two screws that attach the key switch lock assembly to the chassis.**
5. **Connect the key switch lock cable to the LED board.**

Note – The key switch lock cable is keyed so that the cable fits into the connector in only one direction and cannot be reversed.

- a. **Connect the cable.**

The key switch lock cable is in front of the key switch PWB centerplane cable (FIGURE E-9).
 - b. **Push back on the two locking tabs and secure the cable to the LED board.**

The two locking tabs fit over the connector, securing the key switch lock cable assembly to the LED board.
6. **Replace the panels covering the key switch lock assembly.**

Complete the steps in Section E.5 “Replacing the Front and Side Panels.”

E.4.6 LED Board

Note – Use a short Phillips screwdriver to complete this procedure.

E.4.6.1 Removing the LED Board

1. Remove the panels covering the LED board.

Complete the steps in Section E.4 “Removing the Front and Side Panels.”

2. Disconnect the key switch lock and PWB centerplane cables from the LED board (FIGURE E-9).

a. Pull forward on the two locking tabs securing the cables to the LED board.

b. Disconnect the cables.

3. Remove the four screws securing the LED board to the chassis.

There is one screw in each corner of the LED board.

4. Remove the LED board.

E.4.6.2 Replacing the LED Board

1. Orient the LED board so that the three LEDs are visible through the chassis window cutout.

2. Insert a screw into the front right corner of the LED board.

Use this screw as a guide and place the LED board against the chassis.

3. Slightly tighten the first screw and attach this corner of the LED board to the chassis.

4. Replace the three other screws that attach the LED board to the chassis.

5. Tighten all four screws.

6. Connect the key switch lock and PWB centerplane cables to the LED board (FIGURE E-9).

Note – The key switch lock and PWB centerplane cables are keyed so that the cables fit into the connectors in only one direction and cannot be reversed.

a. Connect the cables.

The key switch lock cable is in front of the key switch PWB centerplane cable.

b. Push back on the locking tabs and secure the cables to the LED board.

The two locking tabs fit over the connector, securing the cable assembly to the LED board.

7. Replace the panels covering the LED board.

Complete the steps in Section E.5 “Replacing the Front and Side Panels.”

E.4.7 Centerplane

E.4.7.1 Removing the Centerplane

1. Remove the panels covering the front of the chassis.

Complete the steps in Section E.5 “Replacing the Front and Side Panels.”

2. Remove all the disk drives.

See Chapter 8 “Internal SCSI and FC-AL Devices,” for information on removing disk drives.

3. Remove the fan tray assembly.

See Section E.2 “Fan Tray Assembly,” for information on removing the fan tray assembly.

4. Remove the 15 screws on each side that secure the front chassis to the main chassis (FIGURE E-11).

5. Remove the two screws on the top front corners that secure the front chassis to the main chassis (FIGURE E-11).

6. Gently pull out the front chassis and set it aside.

7. Disconnect all the cables from the centerplane.

a. Disconnect the media tray data and DC power cable assemblies.

See Section E.4.3 “Media Tray Data and DC Power Cable Assemblies,” for information on disconnecting these cables.

b. Disconnect the key switch PWB centerplane cable assembly.

See Section E.4.4 “Key Switch PWB Centerplane Cable Assembly,” for information on disconnecting this cable.

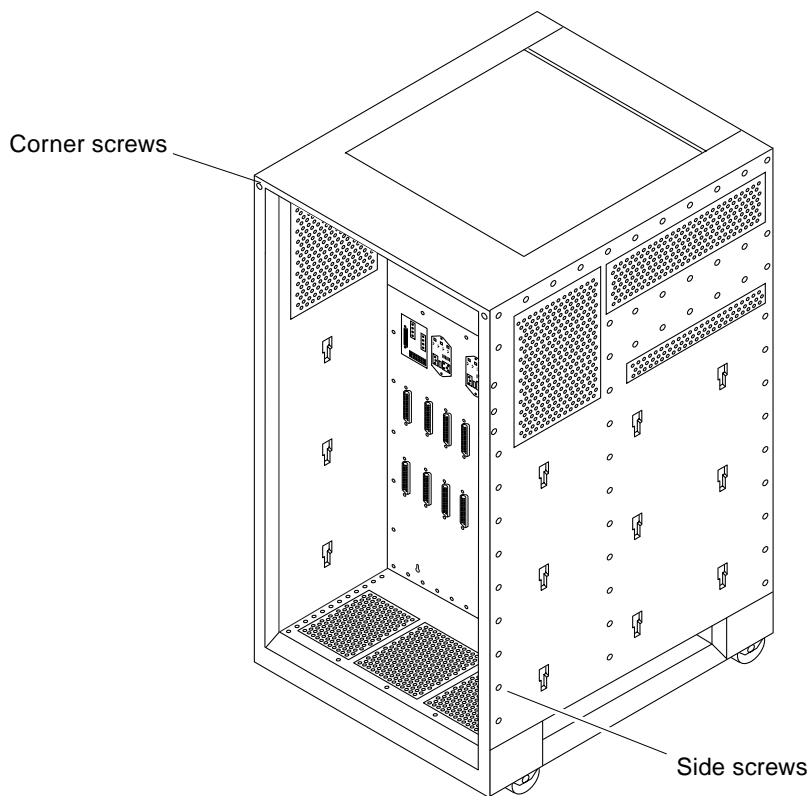


FIGURE E-11 Enterprise 3500 System Without the Front Chassis

8. Disconnect all the boards from the centerplane.

See Chapter 3 “CPU/Memory+ Boards and Components,” Chapter 4 “I/O+ Boards and Components,” Chapter 5 “Clock+ Board,” and Chapter 6 “Interface Board,” for information on removing the boards.

9. Disconnect the peripheral power supplies from the centerplane.

See Chapter 7 “Power Supplies,” for information on removing the peripheral power supplies.

10. Disconnect the PCMs from the centerplane.

See Chapter 7 “Power Supplies,” for information on removing the PCMs.

11. If present, disconnect the auxiliary fan tray from the centerplane.

See Section E.3.1 “Removing the Auxiliary Fan Tray Assembly,” for information on removing the auxiliary fan tray.

12. If present, disconnect all the filler panels from the centerplane.

- a. Use a Phillips No. 1 screwdriver to turn the arrows in the quarter-turn access slots on the filler panels to the unlocked position (FIGURE E-2).
 - b. Pull out and disengage the filler panels from the centerplane.
13. From the front of the system, remove the 24 screws that secure the centerplane to the main chassis.
 14. Remove the centerplane.

E.4.7.2 Replacing the Centerplane

1. Replace the 24 screws to secure the centerplane to the main chassis.
2. Replace and secure the front chassis to the centerplane.
Use the three guide pins to align the front chassis with the centerplane.

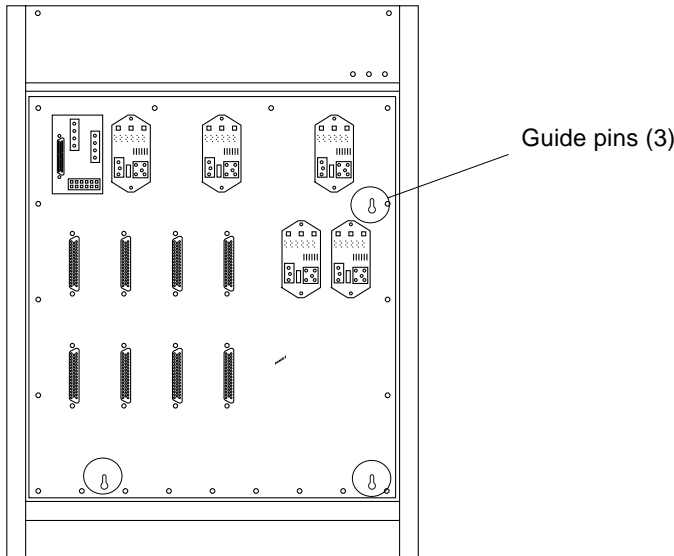


FIGURE E-12 Centerplane Guide Pins

3. Replace the two screws on the top front corners that secure the front chassis to the main chassis (FIGURE E-11).
4. Replace the 15 screws on each side that secure the front chassis to the main chassis (FIGURE E-11).
5. Connect all the cables to the centerplane.

- a. Connect the key switch PWB centerplane cable assembly.**

See Section E.4.4 “Key Switch PWB Centerplane Cable Assembly,” for information on connecting this cable.
 - b. Connect the media tray data and DC power cable assemblies.**

See Section E.4.3 “Media Tray Data and DC Power Cable Assemblies,” for information on connecting these cables.
- 6. If present, connect the auxiliary fan tray to the centerplane.**

See Section E.3.1 “Removing the Auxiliary Fan Tray Assembly,” for information on replacing the auxiliary fan tray.
- 7. Connect the PCMs to the centerplane.**

See Chapter 7 “Power Supplies,” for information on replacing the PCMs.
- 8. Connect the peripheral power supplies to the centerplane.**

See Chapter 7 “Power Supplies,” for information on replacing the peripheral power supplies.
- 9. Connect all the boards to the centerplane.**

See Chapter 3 “CPU/Memory+ Boards and Components,” Chapter 4 “I/O+ Boards and Components,” Chapter 5 “Clock+ Board,” and Chapter 6 “Interface Board,” for information on replacing the boards.
- 10. Replace all the filler panels.**
 - a. Slide the filler panels toward the centerplane.**

Ensure that the arrows in the quarter-turn access slots point to the unlocked position.

The filler panel should insert and seat smoothly. If it binds, remove it, and inspect the slot for any obvious obstructions.
 - b. Use a Phillips No. 1 screwdriver to turn the arrows in the quarter-turn access slots to the locked position (FIGURE E-2).**
- 11. Replace all the disk drives.**

See Chapter 8 “Internal SCSI and FC-AL Devices,” for information on replacing the disk drives.
- 12. Replace the fan tray assembly.**

See Section E.2 “Fan Tray Assembly,” for information on replacing the fan tray assembly.
- 13. Replace the panels covering the front of the chassis.**

Complete the steps in Section E.5 “Replacing the Front and Side Panels.”

E.5 Replacing the Front and Side Panels

E.5.1 Replacing the Media Tray and Front Decorative Panel

1. Replace the front decorative (perforated) panel.

There are eight screws on the top, seven screws on the bottom, and three screws on each side of the front decorative panel.

2. Close the front door of the Enterprise 3500 system.

3. If necessary, connect the SCSI cables to the back of the media tray.

4. Replace the media tray into the chassis opening at the front of the system.

5. Tighten the two captive screws securing the media tray in the chassis.

E.5.2 Replacing the Front Bezel and Side Panels

1. Place the front bezel against the chassis.

Press the panel into place (FIGURE E-5).

2. Replace the side panels.

a. Place the side panel alongside the chassis

The top edge of the side panel should be approximately 1 inch higher than the chassis.

b. Slide the side panel down until it snaps into place (FIGURE E-4).

3. Power on the Enterprise 3500 system.

See the power-on instructions in Chapter 11 “Powering Off and On.”

Illustrated Parts Breakdown

The illustrations and tables in this appendix are intended to supplement the removal and replacement procedures described in previous chapters and appendices.

F.1 Finding Part Numbers

Note – Part numbers in this section may differ from those found in your system. Before ordering replacement parts, find the label on the part to be replaced and place your order using that number. Be sure to use the right part number (for the entire assembly instead of the individual components) as shown in TABLE F-1.

For example, the part number for the fan tray assembly is 540-3566. Although the individual fans in the assembly may have a separate part number, the part number you should use when placing your order is 540-3566 for the entire assembly.

Note – For information about additional capacity drives and other replacement options, contact your sales representative.

F.2 Replaceable Components

TABLE F-1 List of Replaceable Components

General Category	Description	Part Number	Illustration
Fan tray	Fan tray assembly	540-3566	page F-18
	Fan tray assembly, auxiliary	540-2757	page F-19
SCSI and FC-AL devices	Fiber optic cable assembly, 2-meter	537-1004	
	Terminator, 68-pin	150-2267	page F-19
	Sun CD	370-3416	page F-16
	4/8 Gbyte 4 mm tape drive	370-2177	
	2.5 Gbyte QIC tape	370-2202	
	9 Gbyte 10K RPM	540-3869	page F-17
	18 Gbyte 10K RPM	540-4191	
	36 Gbyte 10K RPM	540-4525	
	SCSI DC power cable assembly	530-2221	page F-16
	Key switch lock cable assembly	530-2148	page F-6
	Key switch tray, LED board	501-2599	page F-8
Power	Key switch PWB centerplane cable assembly	530-2226	
	Power supply, peripheral (auxiliary)	300-1358	page F-9
	Power supply, peripheral with AC input	300-1400	page F-10
	Power/cooling module (PCM)	300-1444	page F-9
	PCM filler panel	540-2593	
	Peripheral P/S Filler Panel	540-3815	page F-9
Boards	Centerplane assembly	501-4799	page F-8
	CPU/Memory+ board assembly	501-4882	page F-10
	4 Mbyte, 250 MHz CPU module	501-4249	
	4 Mbyte, 336MHz CPU module	501-4363	
	4 Mbyte, 400MHz CPU module	501-5425	
	8 Mbyte, 400MHz CPU module	501-5762	

TABLE F-1 List of Replaceable Components *(Continued)*

General Category	Description	Part Number	Illustration
	Assembly, DRAM, 1MX72, JEDEC, DIMM, 60 ns	501-2652	page F-10
	Assembly, DRAM, 4MX72, JEDEC, DIMM, 60 ns	501-2653	page F-10
	Assembly, DRAM, 16MX72, JEDEC, DIMM, 60 ns	501-2654	page F-10
	SBus+ I/O board assembly	501-4883	page F-11
	Graphics+ I/O board assembly	501-4884	page F-12
	PCI+ I/O board	501-4926	page F-13
	Optical link card	370-2303	
	SFB, FFB Graphics Card, 67 MHz	501-4127	
	Clock+ board assembly	501-5365	page F-14
	Board, filler panel	540-2592	page F-15
	Interface board	501-4820	page F-20
	Interface board, filler panel	540-3795	

F.3 Illustrations

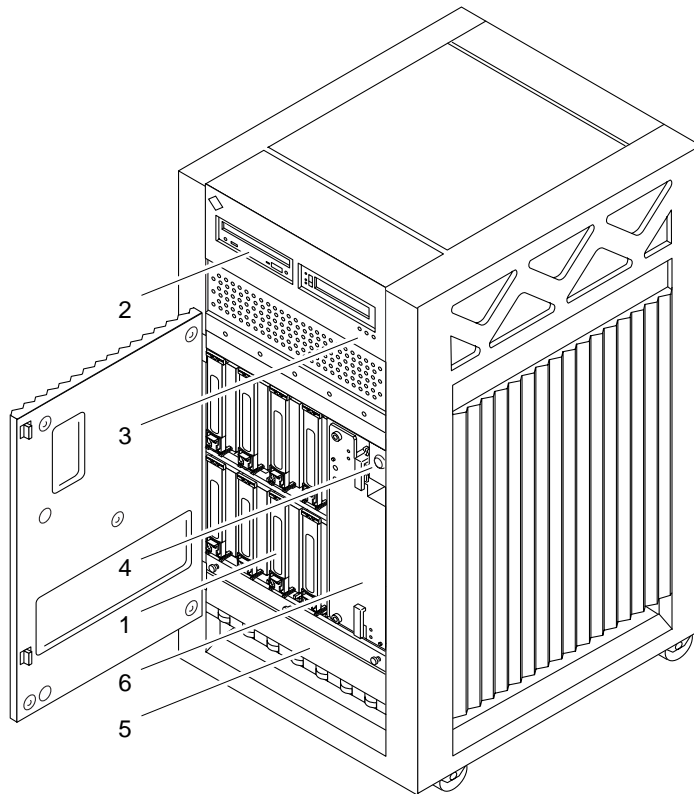


FIGURE F-1 Front View

Key	Description	Part Number
1	Disk drive	540-3249
2	DVD	370-3416
3	LED board	501-2599
4	Key switch lock cable	530-2148
5	Fan tray assembly	540-2756
6	Power supply, peripheral	300-1358

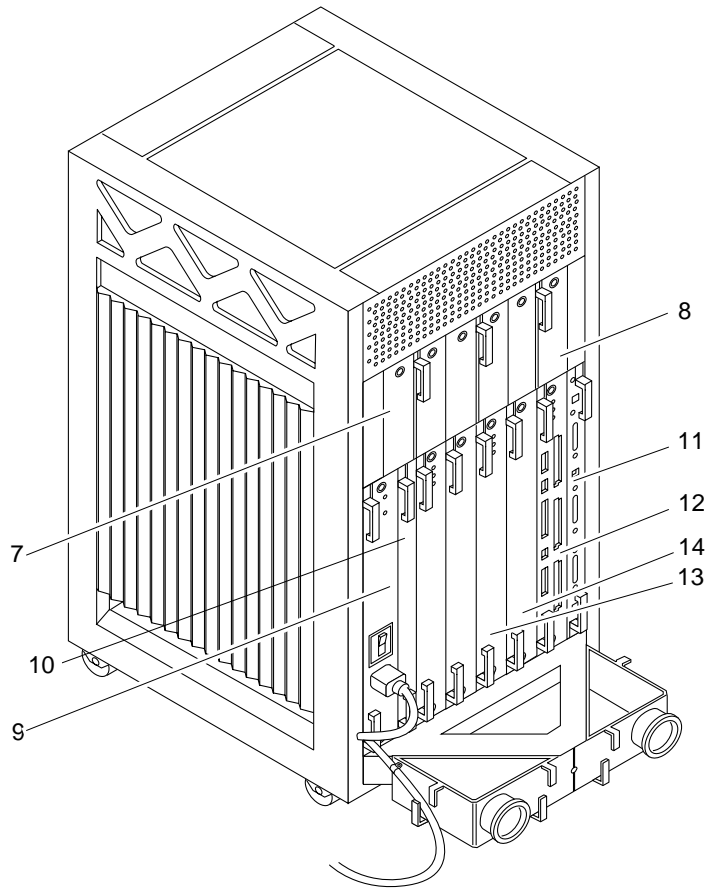


FIGURE F-2 Rear View

Key	Description	Part Number
7	Auxiliary fan tray	540-2757
8	PCM	300-1260
9	Power supply, peripheral/AC input	300-1400
10	Interface board	501-4820
11	Clock+ board assembly	501-4946
12	SBus+ I/O board assembly	501-4883
13	Graphics+ I/O board assembly	501-4884
14	CPU/Memory+ board assembly	501-4882

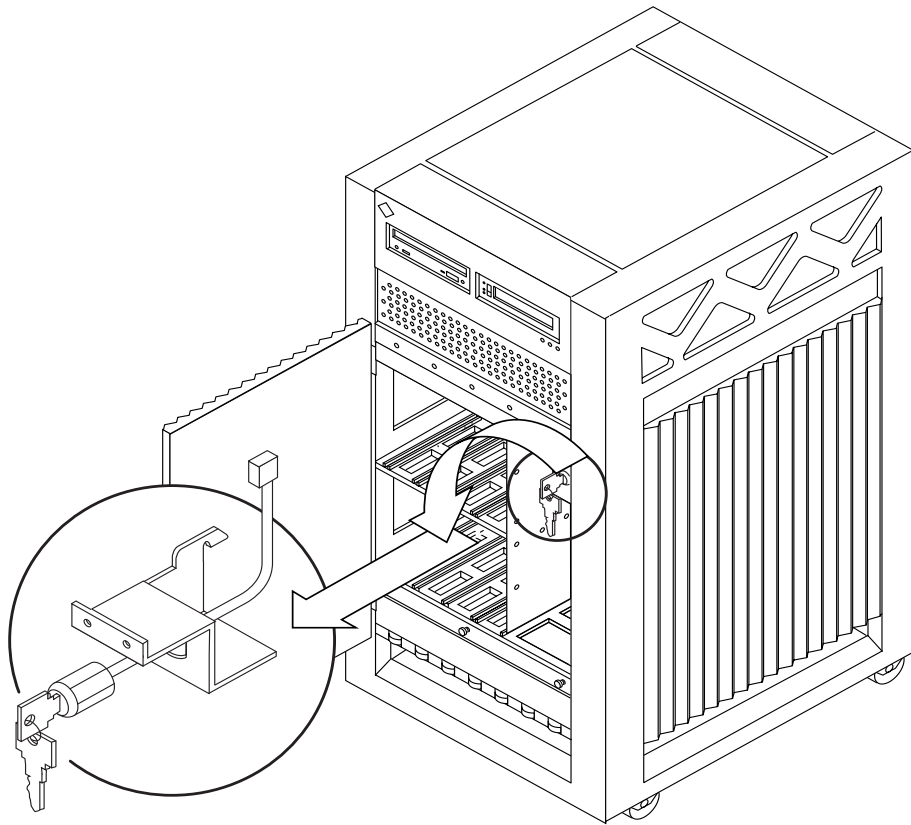


FIGURE F-3 Key Switch Lock Cable Assembly

Description	Part Number
Key switch lock cable assembly	530-2148

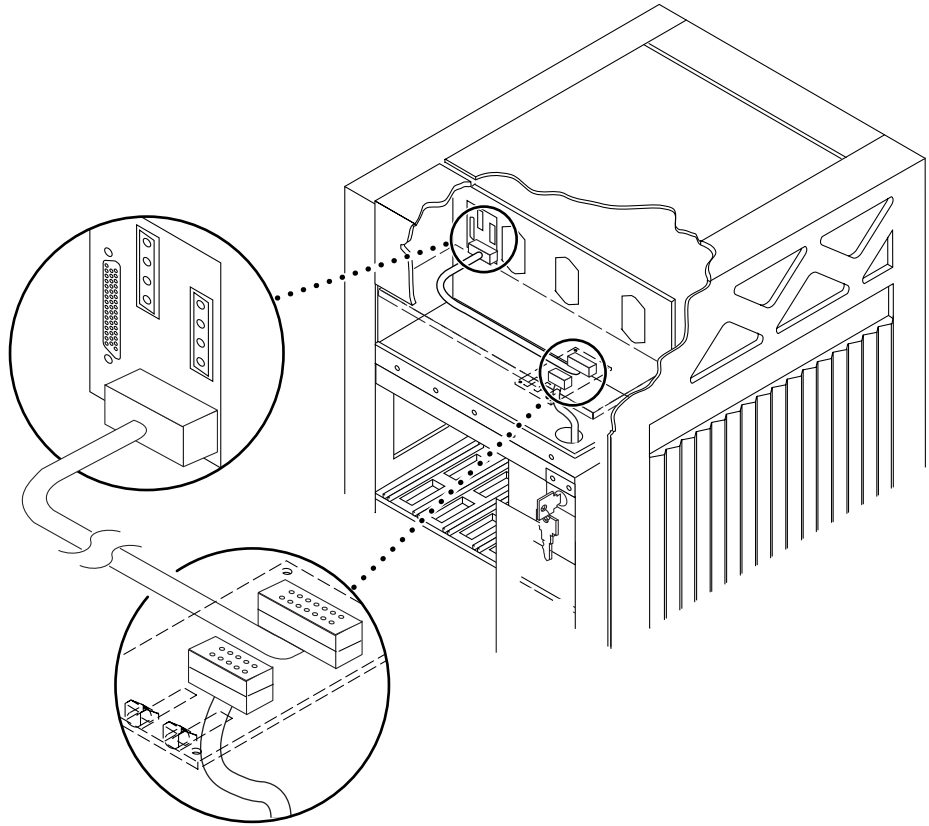


FIGURE F-4 Key Switch PWB Centerplane Cable Assembly

Description	Part Number
Key switch PWB centerplane cable assembly	530-2226

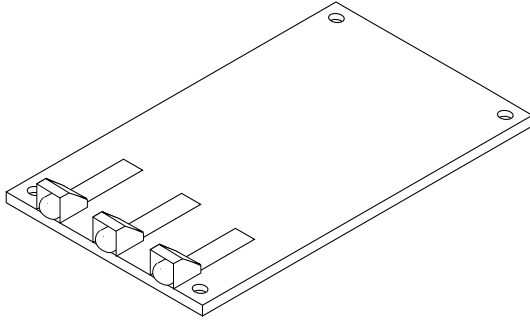


FIGURE F-5 Key Switch Tray, LED Board

Description	Part Number
LED board	501-2599

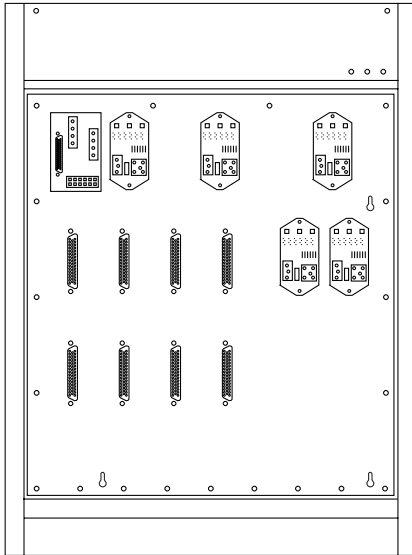


FIGURE F-6 Centerplane Assembly

Description	Part Number
Centerplane assembly	501-4799

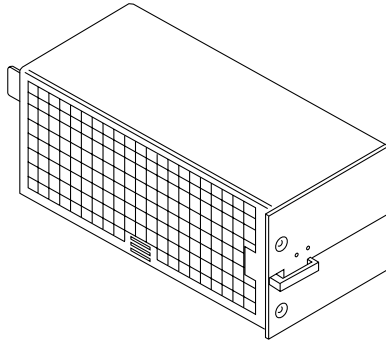


FIGURE F-7 PCM

Description	Part Number
PCM	300-1260

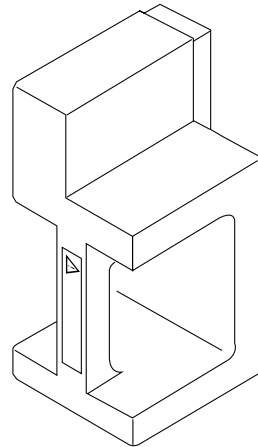
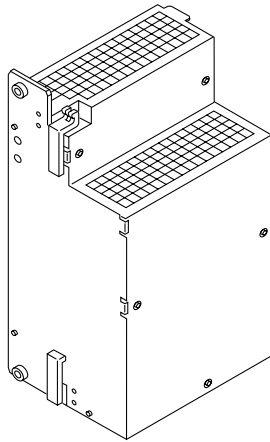


FIGURE F-8 Peripheral Power Supply (Auxiliary) and Thermal Protection Module

Description	Part Number
Power supply, peripheral	300-1358
Thermal protection module	540-3815

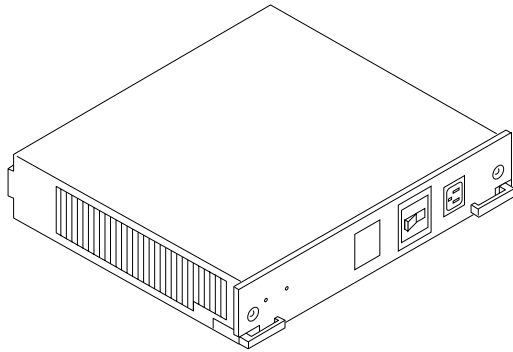


FIGURE F-9 Peripheral Power Supply/AC Input

Description	Part Number
Power supply, peripheral with AC input	300-1400

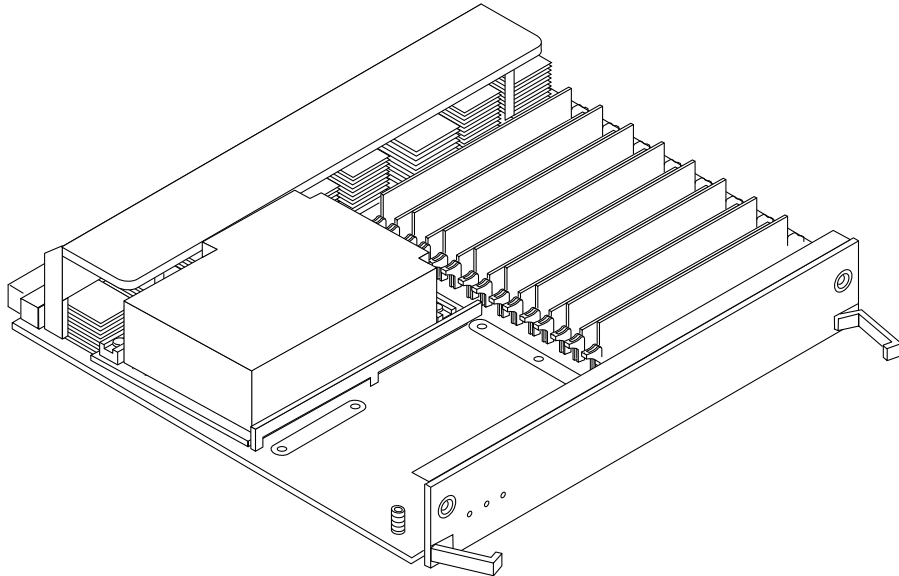


FIGURE F-10 CPU/Memory+ Board Assembly

Description	Part Number
CPU/Memory+ board assembly (CPU and memory are not included)	501-4882

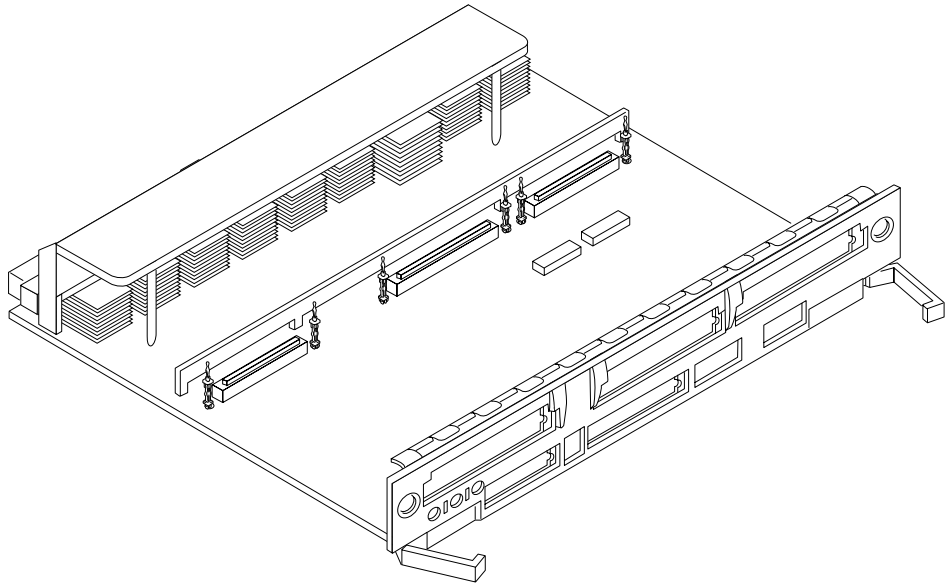


FIGURE F-11 SBus+ I/O Board Assembly

Description	Part Number
SBus+ I/O board assembly	501-4883

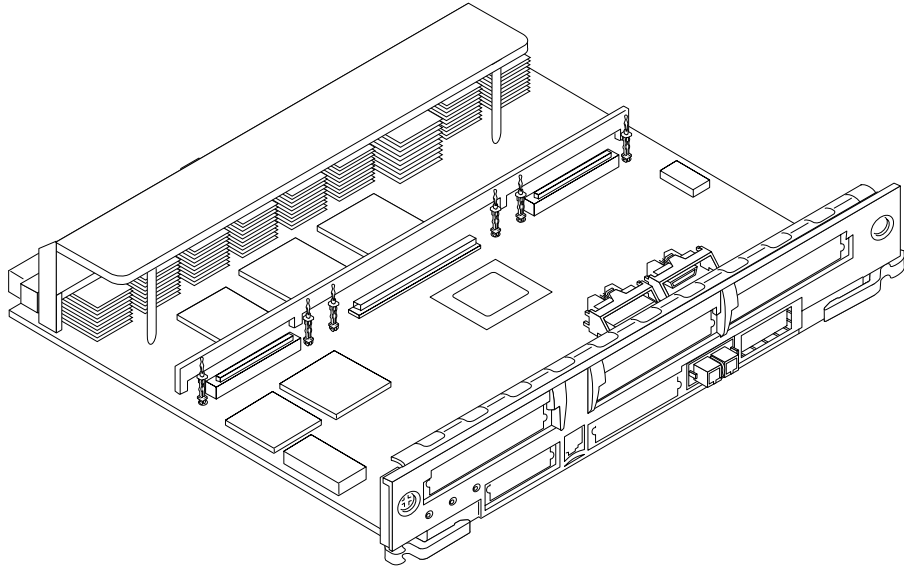


FIGURE F-12 Graphics+ I/O Board Assembly

Description	Part Number
Graphics+ I/O board assembly	501-4884

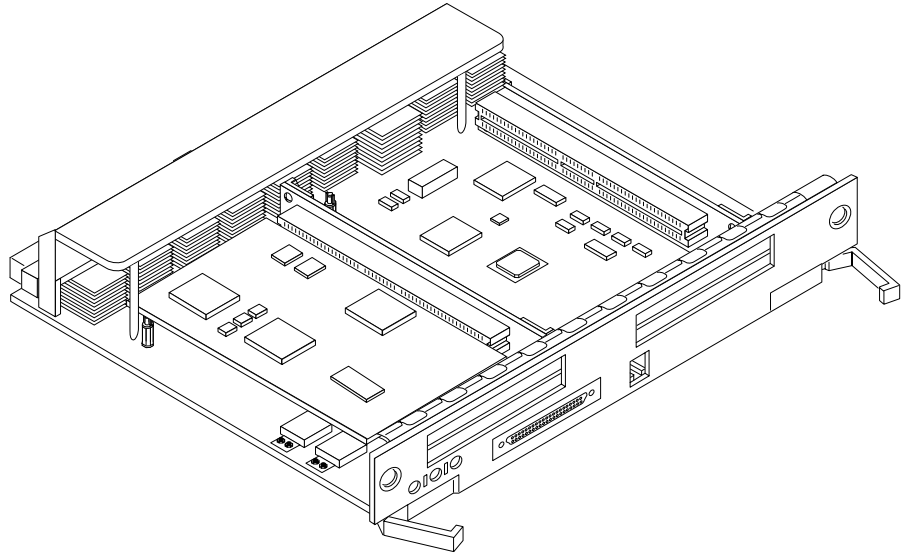


FIGURE F-13 PCI+ I/O Board Assembly

Description	Part Number
PCI+ I/O board assembly	501-4926

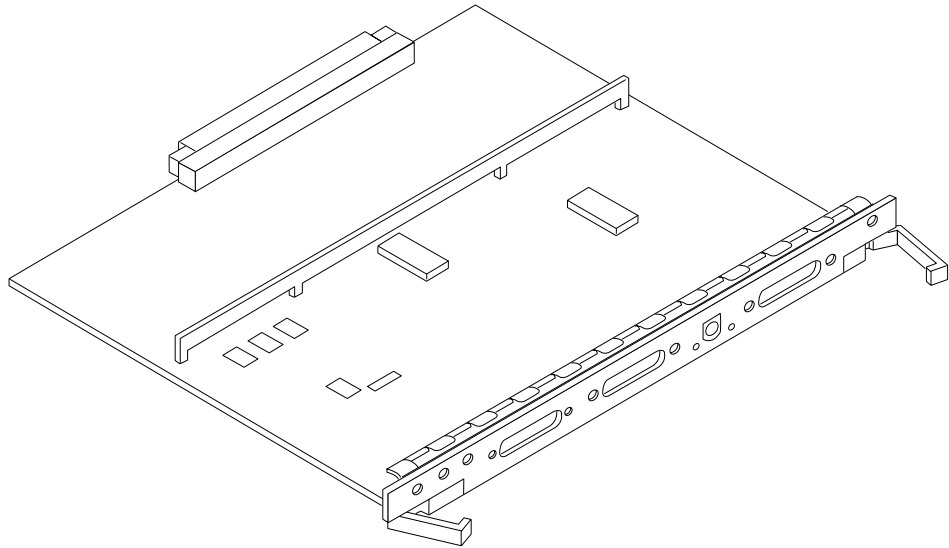


FIGURE F-14 Clock+ Board Assembly

Description	Part Number
Clock+ board assembly	501-4946

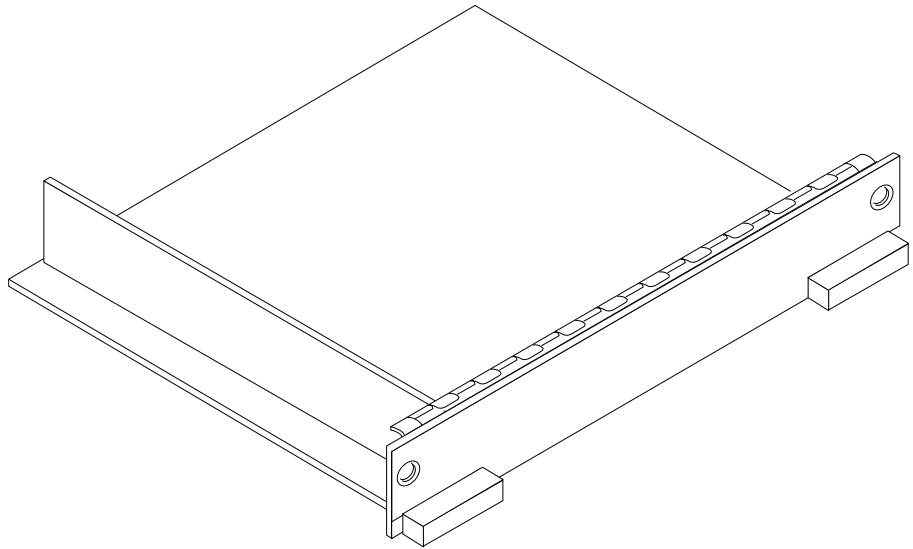


FIGURE F-15 Filler Board Panel Assembly

Description	Part Number
Filler panel board assembly	540-2592

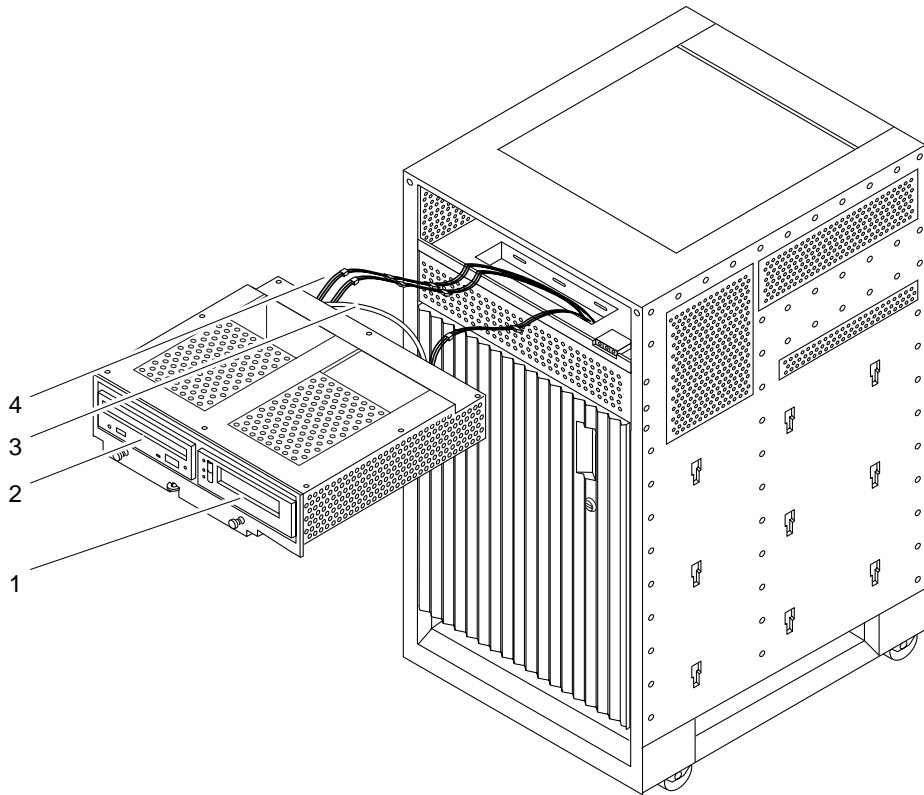


FIGURE F-16 Media (SCSI) Tray Assembly

Key	Description	Part Number
1	Tape drive	
2	Sun CD	370-3416
3	Media (SCSI) tray data cable assembly	530-2220
4	SCSI DC power cable assembly	530-2221

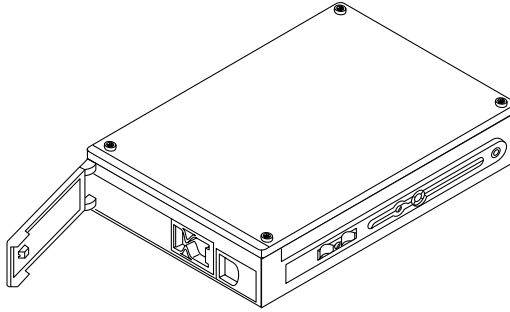


FIGURE F-17 Disk Drive

Description	Part Number
9Gbyte 10K RPM	540-3869

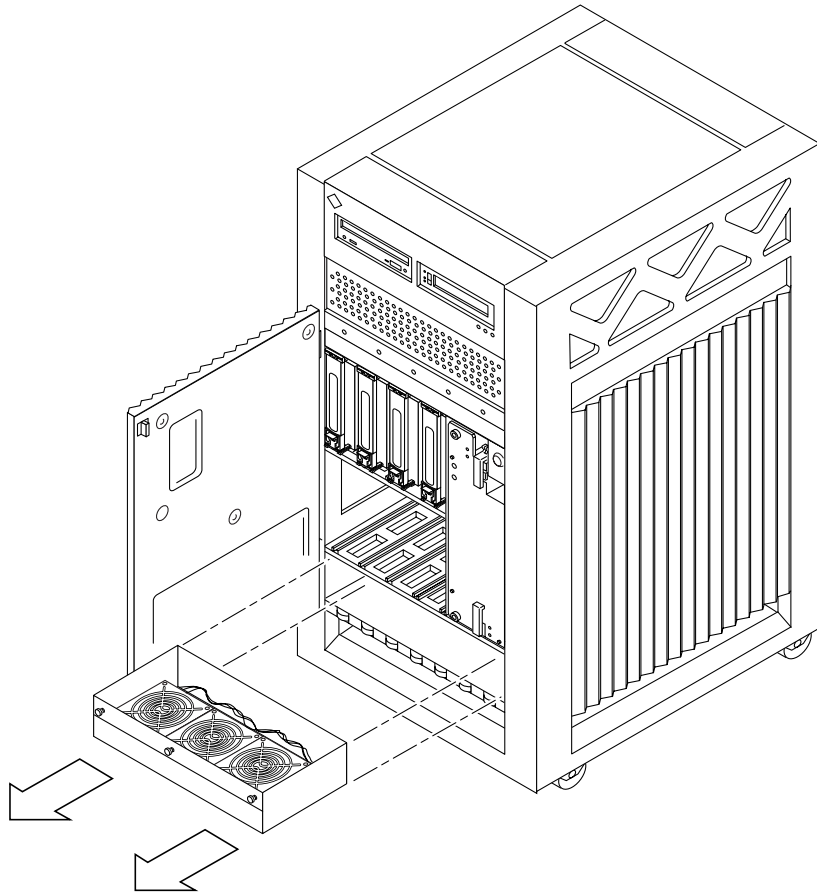


FIGURE F-18 Fan Tray Assembly

Description	Part Number
Fan tray assembly	540-3566

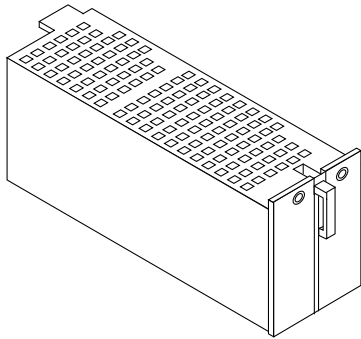


FIGURE F-19 Auxiliary Fan Tray Assembly

Description	Part Number
Auxiliary fan tray assembly	540-2757

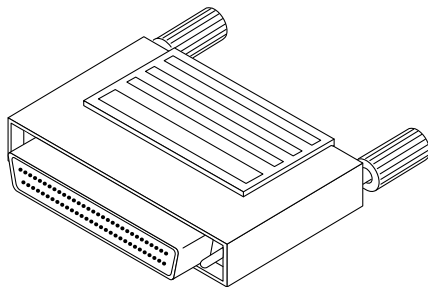


FIGURE F-20 68-Pin Terminator

Description	Part Number
68-pin terminator	150-2267

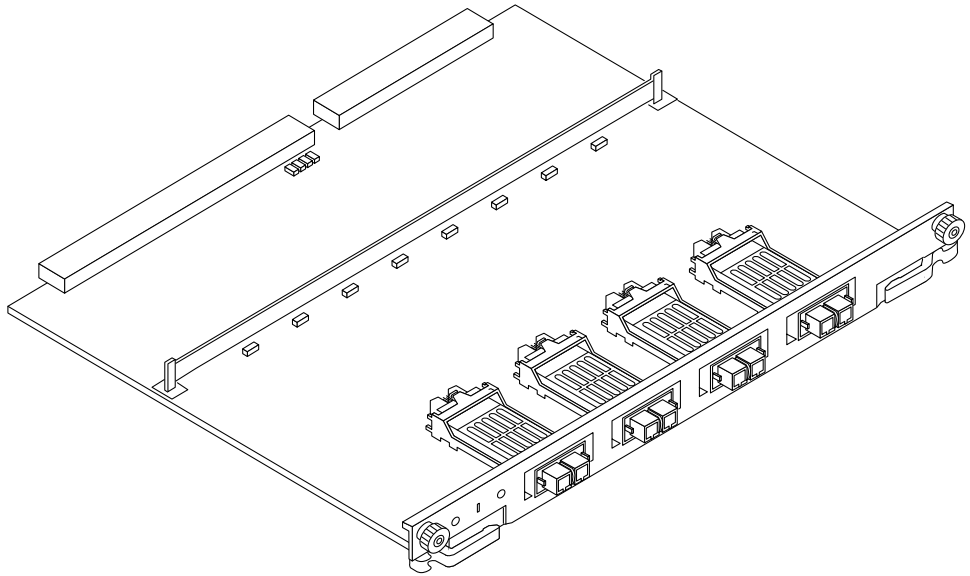


FIGURE F-21 Interface Board

Description	Part Number
Interface board	501-4820

Connectors

This appendix contains the following topics:

- Section G.1 “CPU/Memory+ Board” on page G-2
 - Centerplane Connector—page G-2
 - CPU Module Connectors—page G-4
- Section G.2 “I/O+ Boards” on page G-4
 - Centerplane Connector—page G-6
 - SBus Connectors—page G-6
 - UPA Connector Location—page G-7
 - Ethernet and MII Connectors—page G-8
 - GBIC Connectors—page G-8
 - PCI Connectors—page G-9
 - SCSI Connector—page G-10
- Section G.3 “Clock+ Board” on page G-10—page G-10
 - Centerplane Connector—page G-10
 - Serial Port Connectors—page G-11
 - Keyboard and Mouse Connector—page G-11
- Section G.4 “Interface Board (IB)” on page G-12—page G-12
 - GBIC Slots—page G-12

G.1 CPU/Memory+ Board

FIGURE G-1 shows the locations of the centerplane and CPU module connectors.

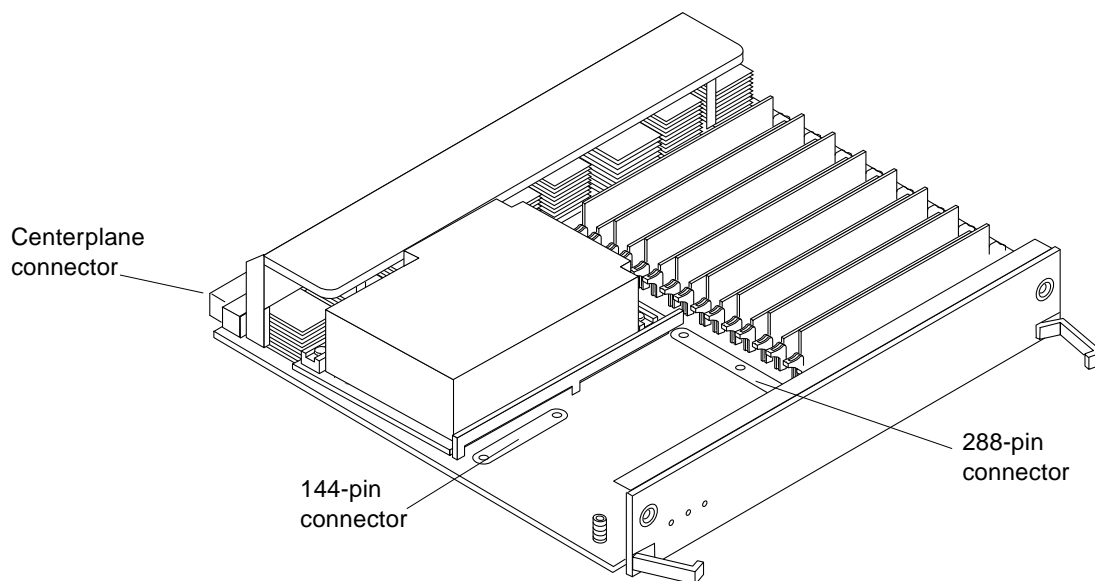


FIGURE G-1 CPU/Memory+ Board Connector Locations

G.1.1 Centerplane Connector

Note – Information for the CPU/Memory+ board centerplane connector also applies to the I/O+ board centerplane connector.

The CPU/Memory+ board centerplane connector is mounted on the rear of the board. The connector is divided into modular sections (FIGURE G-2). The connector has one three-bladed power section. The rest of the connector contains six 120-pin rows, labeled A through F. Each section (1 through 5) has 24 pins of each 120-pin row.

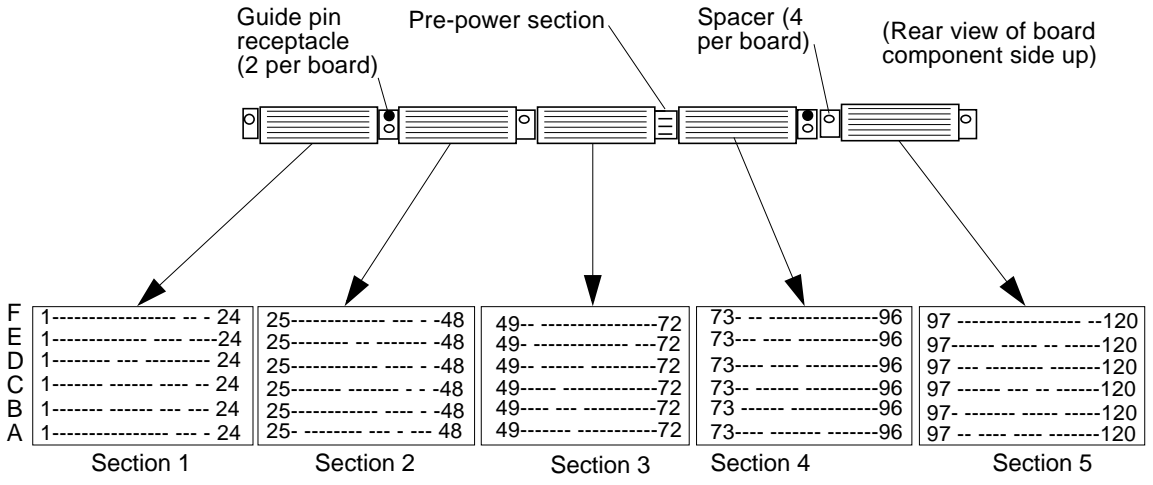


FIGURE G-2 Centerplane Connector Detail

G.1.2 CPU Module Connectors

There are two connectors for each CPU module, one with 144 pins and the other with 288 pins (FIGURE G-3).

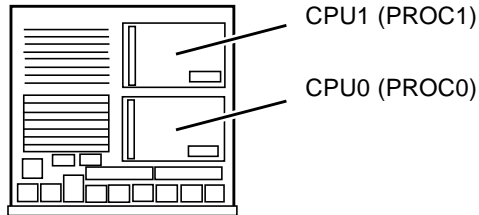


FIGURE G-3 CPU Modules 0 and 1

G.2 I/O+ Boards

FIGURE G-4 through FIGURE G-6 show the locations of the connectors and slots on the I/O+ boards.

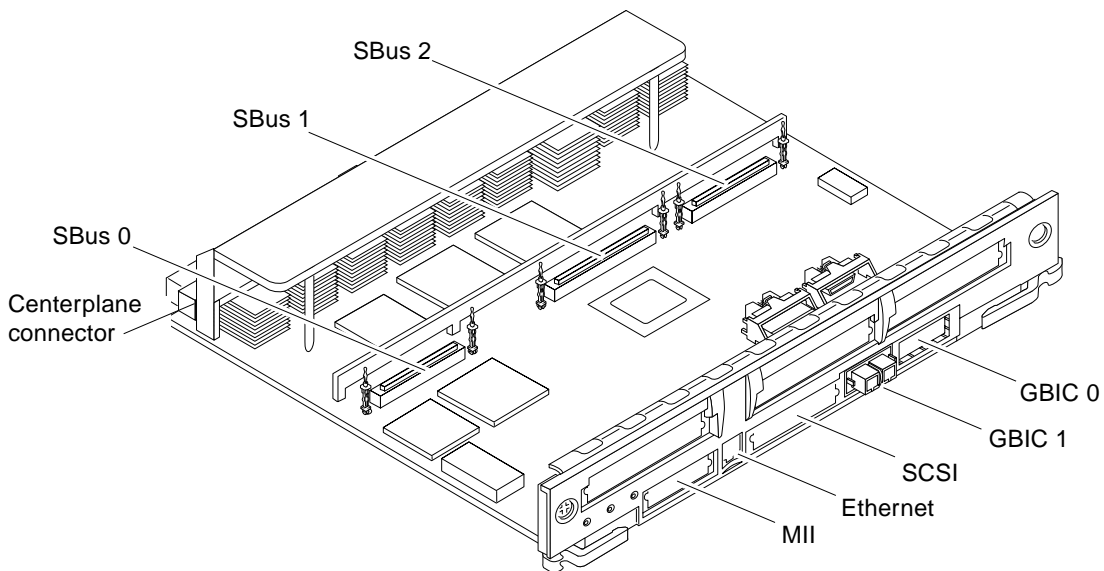


FIGURE G-4 SBus+ I/O Board Connectors

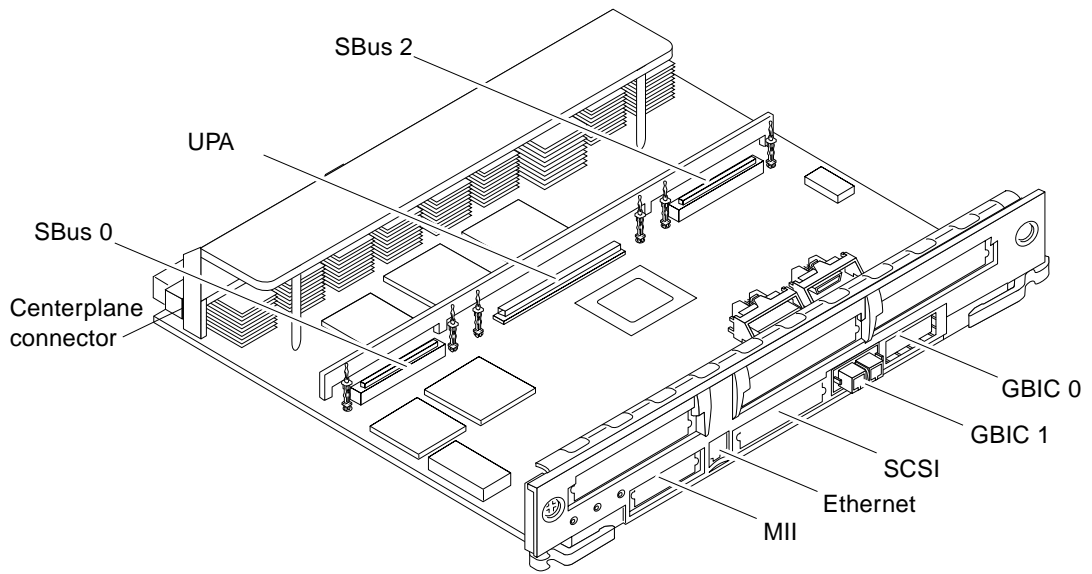


FIGURE G-5 Graphics+ I/O Board Connectors

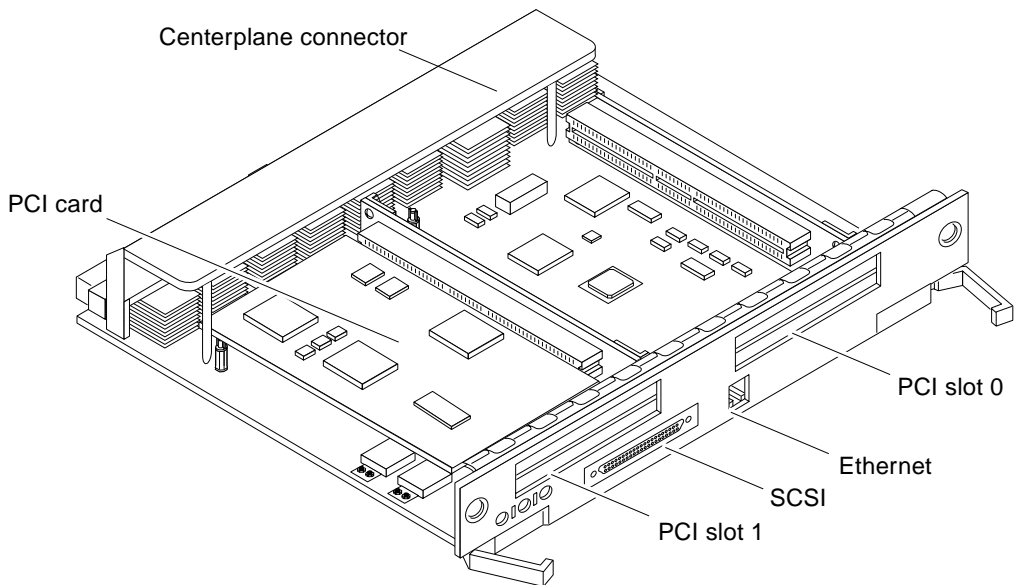


FIGURE G-6 PCI+ I/O Board Connectors

G.2.1 Centerplane Connector

Information for the CPU/Memory+ board centerplane and the I/O+ boards centerplane is the same. See Section G.1.1 “Centerplane Connector” on page G-2.

G.2.2 SBus Connectors

Two I/O+ boards have SBus connectors:

- The SBus+ I/O board has three SBus connectors, SBus 0, 1, and 2 (FIGURE G-7).
- The Graphics+ I/O board has two SBus connectors, SBus 0 and 2 (FIGURE G-8).

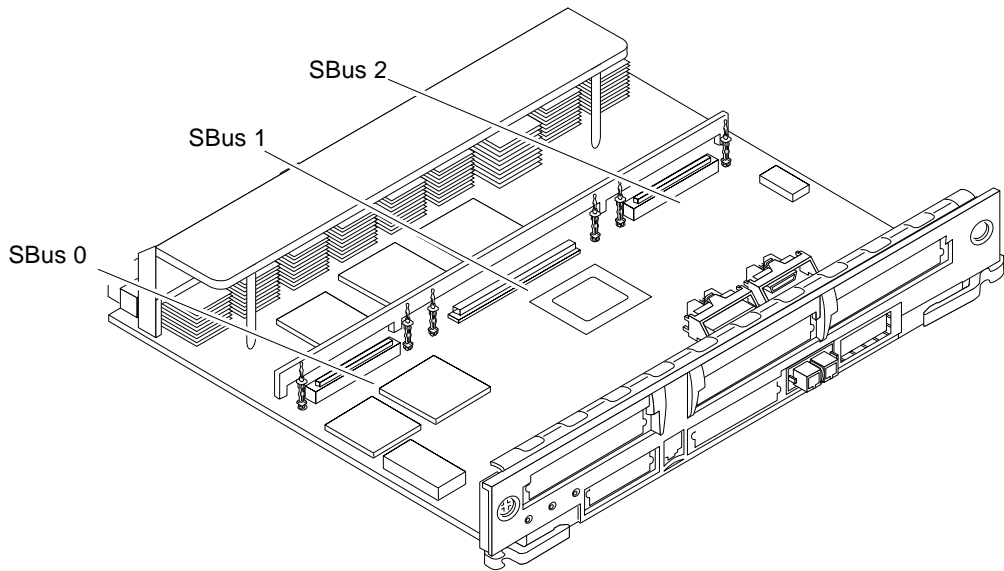


FIGURE G-7 SBus I/O+ Board SBus Connectors

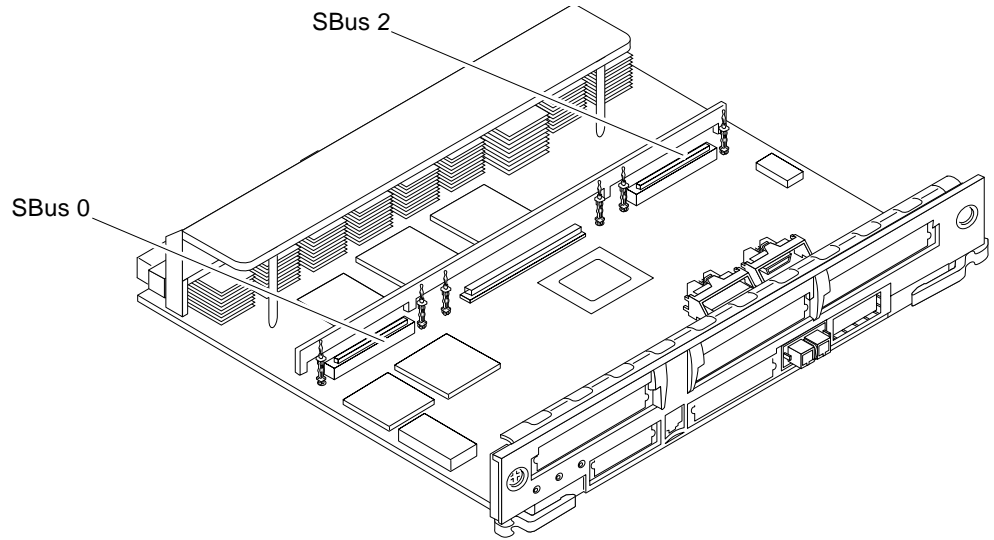


FIGURE G-8 Graphics+ I/O Board SBus Connectors

G.2.3 UPA Connector Location

The Graphics+ I/O board has one UPA connector.

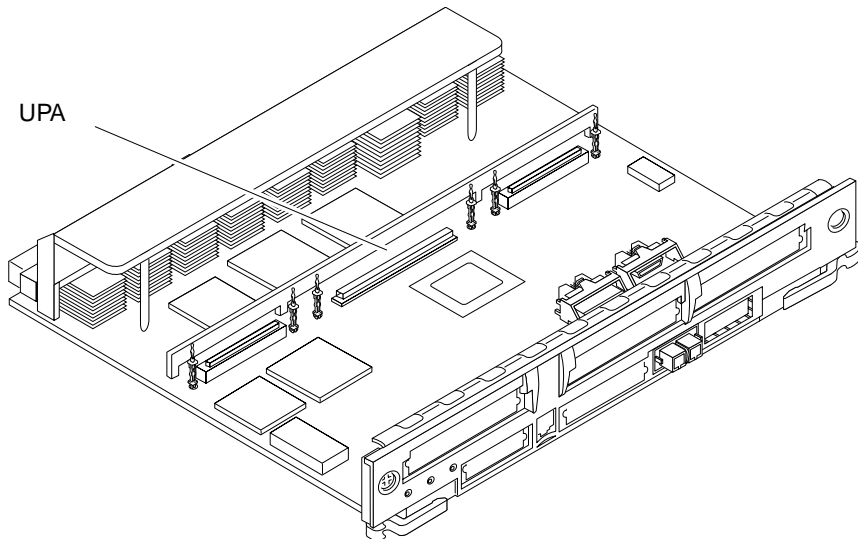


FIGURE G-9 Graphics+ I/O Board UPA Connector

G.2.4 Ethernet and MII Connectors

There is one onboard twisted-pair Ethernet (TPE) connector on the SBus+ I/O board (FIGURE G-4), the Graphics+ I/O board (FIGURE G-5), and the PCI+ I/O board (FIGURE G-6).

There is one media-independent interface connector on the SBus+ I/O board (FIGURE G-4) and the Graphics+ I/O board (FIGURE G-5). The PCI+ I/O board does not have an MII connector.

Note – The onboard Ethernet and MII ports share one set of I/O circuitry, so both ports cannot be used at the same time.

G.2.5 GBIC Connectors

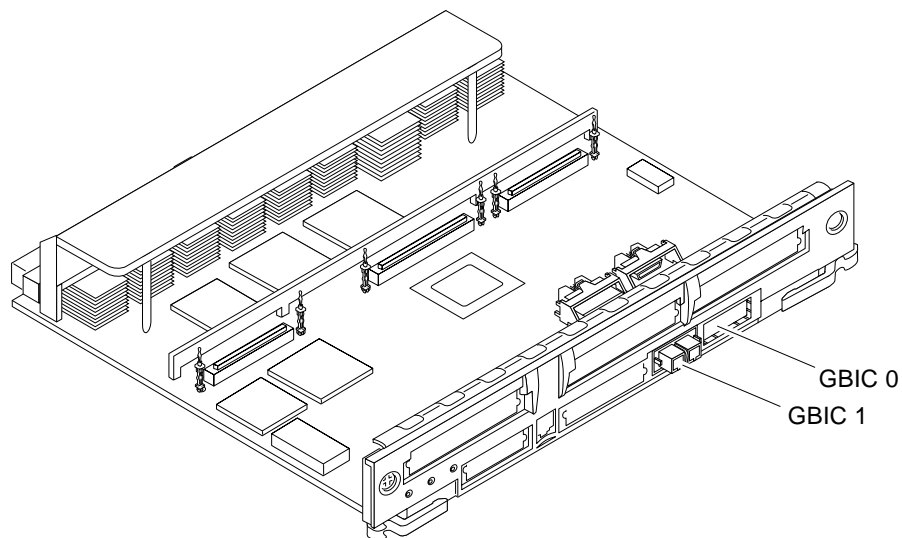


FIGURE G-10 SBus I/O+ Board GBIC Slots

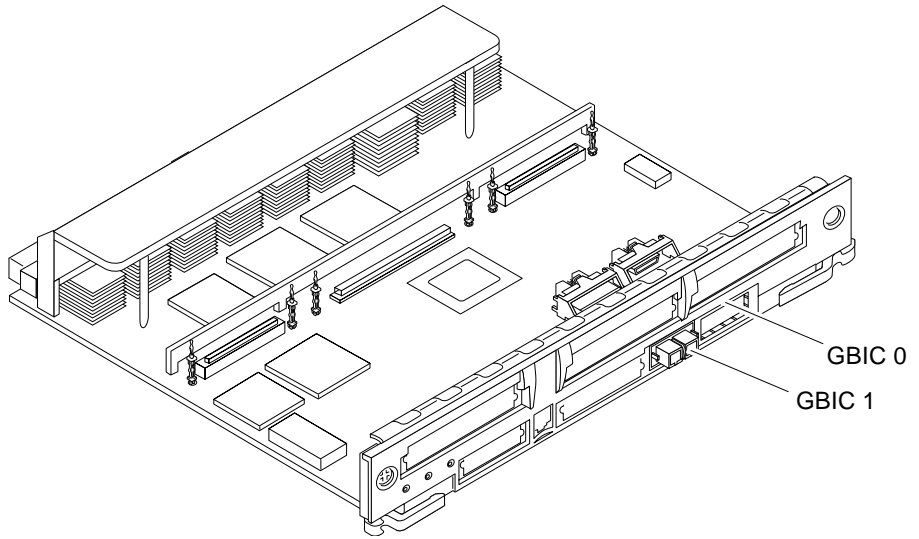


FIGURE G-11 Graphics+ I/O Board GBIC Slots

G.2.6 PCI Connectors

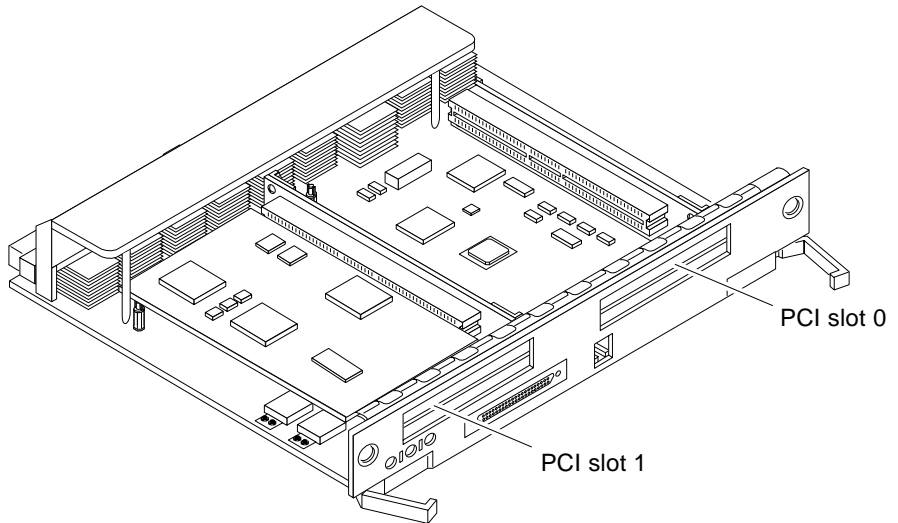


FIGURE G-12 PCI+ I/O Board Slots

G.2.7 SCSI Connector

There is one on-board SCSI connector on the SBus+ I/O board (FIGURE G-4), the Graphics+ I/O board (FIGURE G-5), and the PCI+ I/O board (FIGURE G-6).

G.3 Clock+ Board

FIGURE G-13 shows the clock+ board connectors.

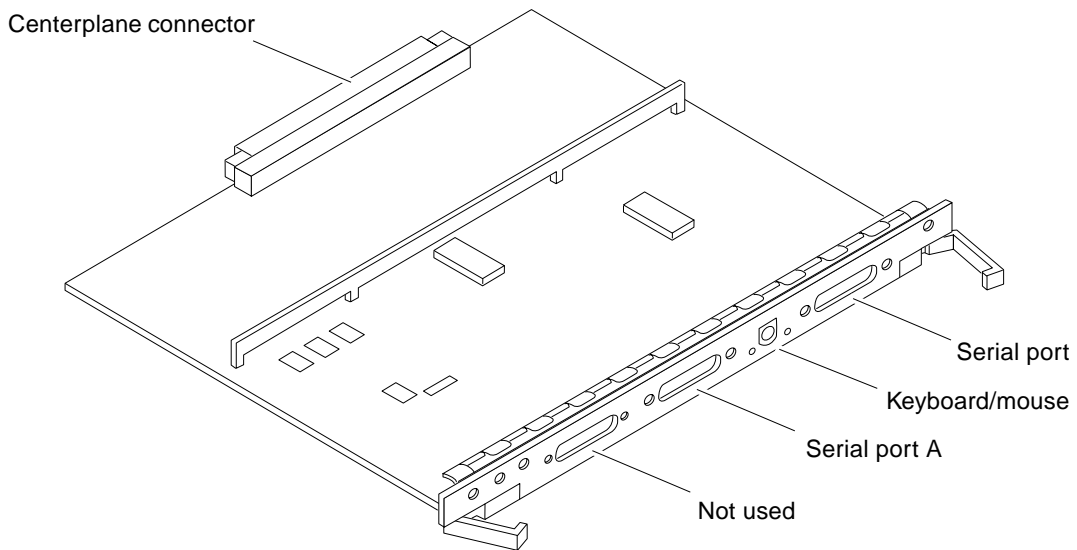


FIGURE G-13 Clock+ Board Connectors

G.3.1 Centerplane Connector

The clock+ board centerplane connector interfaces the board to the system. The connector is divided into six rows of pins labeled A through F; each row has 72 pins.

G.3.2 Serial Port Connectors

		1			1
	14	2	TXDA		14
DBA	15	3	RXDA	DBB	15
	16	4	RTSA		16
DDA	17	5	CTSA	DDB	17
	18	6	DSRA		18
	19	7	GND		19
DTRA	20	8	DCDA	DTRB	20
	21	9			21
	22	10			22
	23	11			23
DAA	24	12		DAB	24
	25	13			25

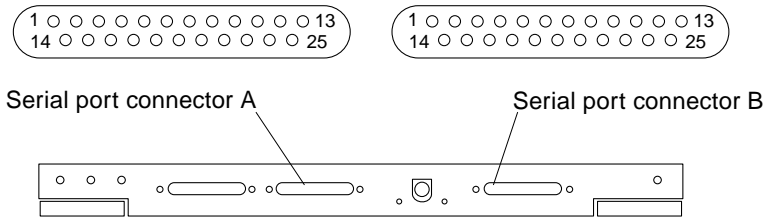


FIGURE G-14 Serial Port A and B Connector Pinouts

G.3.3 Keyboard and Mouse Connector

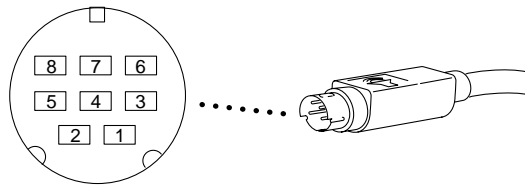


FIGURE G-15 Keyboard and Mouse Connector Pinouts

G.4 Interface Board (IB)

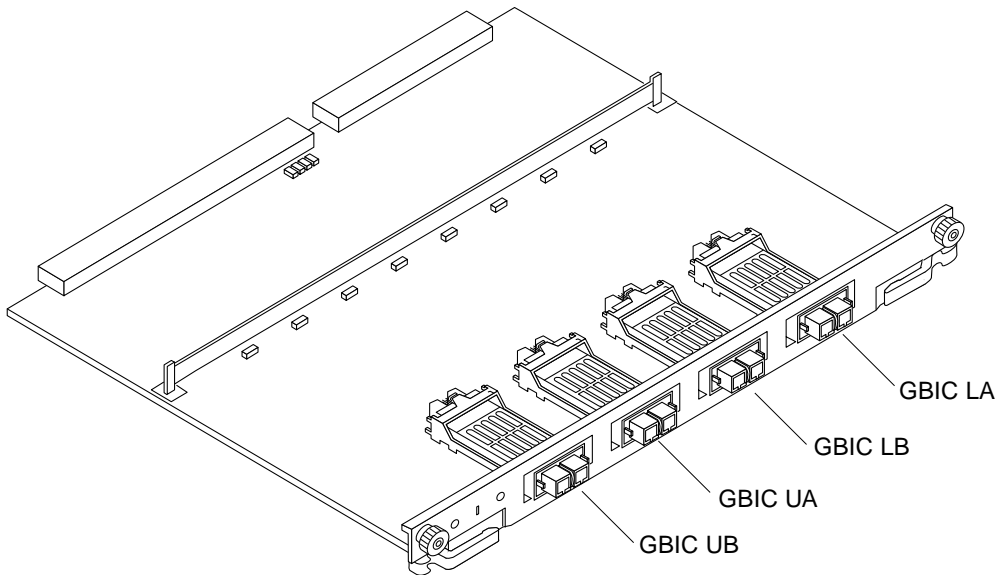


FIGURE G-16 GBIC Slots

Compliance Statements

Safety Agency Compliance Statements

Read this section before beginning any procedure. The following text provides safety precautions to follow when installing a Sun Microsystems product.

Safety Precautions

For your protection, observe the following safety precautions when setting up your equipment:

- Follow all cautions and instructions marked on the equipment.
- Ensure that the voltage and frequency of your power source match the voltage and frequency inscribed on the equipment's electrical rating label.
- Never push objects of any kind through openings in the equipment. Dangerous voltages may be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock, or damage to your equipment.

Symbols

The following symbols may appear in this book:



Caution – There is risk of personal injury and equipment damage. Follow the instructions.



Caution – Hot surface. Avoid contact. Surfaces are hot and may cause personal injury if touched.



Caution – Hazardous voltages are present. To reduce the risk of electric shock and danger to personal health, follow the instructions.



On – Applies AC power to the system.

Depending on the type of power switch your device has, one of the following symbols may be used:



Off – Removes AC power from the system.



Standby – The On/Standby switch is in the *standby* position.

Modifications to Equipment

Do not make mechanical or electrical modifications to the equipment. Sun Microsystems is not responsible for regulatory compliance of a modified Sun product.

Placement of a Sun Product



Caution – Do not block or cover the openings of your Sun product. Never place a Sun product near a radiator or heat register. Failure to follow these guidelines can cause overheating and affect the reliability of your Sun product.



Caution – The workplace-dependent noise level defined in DIN 45 635 Part 1000 must be 70Db(A) or less.

SELV Compliance

Safety status of I/O connections comply to SELV requirements.

Power Cord Connection



Caution – Sun products are designed to work with single-phase power systems having a grounded neutral conductor. To reduce the risk of electric shock, do not plug Sun products into any other type of power system. Contact your facilities manager or a qualified electrician if you are not sure what type of power is supplied to your building.



Caution – Not all power cords have the same current ratings. Household extension cords do not have overload protection and are not meant for use with computer systems. Do not use household extension cords with your Sun product.



Caution – Your Sun product is shipped with a grounding type (three-wire) power cord. To reduce the risk of electric shock, always plug the cord into a grounded power outlet.

The following caution applies only to devices with a **Standby** power switch:



Caution – The power switch of this product functions as a standby type device only. The power cord serves as the primary disconnect device for the system. Be sure to plug the power cord into a grounded power outlet that is nearby the system and is readily accessible. Do not connect the power cord when the power supply has been removed from the system chassis.

Lithium Battery



Caution – On Sun CPU boards, there is a lithium battery molded into the real-time clock, SGS No. MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, or MK48T08. Batteries are not customer replaceable parts. They may explode if mishandled. Do not dispose of the battery in fire. Do not disassemble it or attempt to recharge it.

System Unit Cover

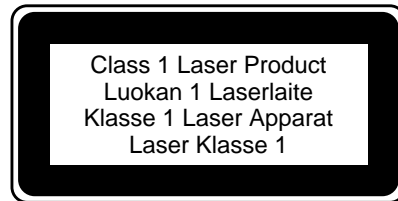
If you must remove the cover of your Sun computer system unit in order to add cards, memory, or internal storage devices, be sure to replace the top cover before powering up your computer system.



Caution – Do not operate Sun products without the top cover in place. Failure to take this precaution may result in personal injury and system damage.

Laser Compliance Notice

Sun products that use laser technology comply with Class 1 laser requirements.



DVD-ROM



Caution – Use of controls, adjustments, or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

Einhaltung sicherheitsbehördlicher Vorschriften

Auf dieser Seite werden Sicherheitsrichtlinien beschrieben, die bei der Installation von Sun-Produkten zu beachten sind.

Sicherheitsvorkehrungen

Treffen Sie zu Ihrem eigenen Schutz die folgenden Sicherheitsvorkehrungen, wenn Sie Ihr Gerät installieren:

- Beachten Sie alle auf den Geräten angebrachten Warnhinweise und Anweisungen.
- Vergewissern Sie sich, daß Spannung und Frequenz Ihrer Stromquelle mit der Spannung und Frequenz übereinstimmen, die auf dem Etikett mit den elektrischen Nennwerten des Geräts angegeben sind.
- Stecken Sie auf keinen Fall irgendwelche Gegenstände in Öffnungen in den Geräten. Leitfähige Gegenstände könnten aufgrund der möglicherweise vorliegenden

gefährlichen Spannungen einen Kurzschluß verursachen, der einen Brand, Stromschlag oder Geräteschaden herbeiführen kann.

Symbole

Die Symbole in diesem Handbuch haben folgende Bedeutung:



Achtung – Gefahr von Verletzung und Geräteschaden. Befolgen Sie die Anweisungen.



Achtung – Hohe Temperatur. Nicht berühren, da Verletzungsgefahr durch heiße Oberfläche besteht.



Achtung – Gefährliche Spannungen. Anweisungen befolgen, um Stromschläge und Verletzungen zu vermeiden.



Ein – Setzt das System unter Wechselstrom.

Je nach Netzschaltertyp an Ihrem Gerät kann eines der folgenden Symbole benutzt werden:



Aus – Unterbricht die Wechselstromzufuhr zum Gerät.



Wartezustand (Stand-by-Position) - Der Ein-/Wartezustand-Schalter steht auf Wartezustand. Änderungen an Sun-Geräten.

Nehmen Sie keine mechanischen oder elektrischen Änderungen an den Geräten vor. Sun Microsystems, übernimmt bei einem Sun-Produkt, das geändert wurde, keine Verantwortung für die Einhaltung behördlicher Vorschriften

Aufstellung von Sun-Geräten



Achtung – Um den zuverlässigen Betrieb Ihres Sun-Geräts zu gewährleisten und es vor Überhitzung zu schützen, dürfen die Öffnungen im Gerät nicht blockiert oder verdeckt werden. Sun-Produkte sollten niemals in der Nähe von Heizkörpern oder Heizluftklappen aufgestellt werden.



Achtung – Der arbeitsplatzbezogene Schalldruckpegel nach DIN 45 635 Teil 1000 beträgt 70Db(A) oder weniger.

Einhaltung der SELV-Richtlinien

Die Sicherung der I/O-Verbindungen entspricht den Anforderungen der SELV-Spezifikation.

Anschluß des Netzkabels



Achtung – Sun-Produkte sind für den Betrieb an Einphasen-Stromnetzen mit geerdetem Nulleiter vorgesehen. Um die Stromschlaggefahr zu reduzieren, schließen Sie Sun-Produkte nicht an andere Stromquellen an. Ihr Betriebsleiter oder ein qualifizierter Elektriker kann Ihnen die Daten zur Stromversorgung in Ihrem Gebäude geben.



Achtung – Nicht alle Netzkabel haben die gleichen Nennwerte. Herkömmliche, im Haushalt verwendete Verlängerungskabel besitzen keinen Überlastungsschutz und sind daher für Computersysteme nicht geeignet.



Achtung – Ihr Sun-Gerät wird mit einem dreiadrigen Netzkabel für geerdete Netzsteckdosen geliefert. Um die Gefahr eines Stromschlags zu reduzieren, schließen Sie das Kabel nur an eine fachgerecht verlegte, geerdete Steckdose an.

Die folgende Warnung gilt nur für Geräte mit Wartezustand-Netzschalter:



Achtung – Der Ein/Aus-Schalter dieses Geräts schaltet nur auf Wartezustand (Stand-By-Modus). Um die Stromzufuhr zum Gerät vollständig zu unterbrechen, müssen Sie das Netzkabel von der Steckdose abziehen. Schließen Sie den Stecker des Netzkabels an eine in der Nähe befindliche, frei zugängliche, geerdete Netzsteckdose an. Schließen Sie das Netzkabel nicht an, wenn das Netzteil aus der Systemeinheit entfernt wurde.

Lithiumbatterie



Achtung – CPU-Karten von Sun verfügen über eine Echtzeituhr mit integrierter Lithiumbatterie (Teile-Nr. MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, oder MK48T08). Diese Batterie darf nur von einem qualifizierten Servicetechniker ausgewechselt werden, da sie bei falscher Handhabung explodieren kann. Werfen Sie die Batterie nicht ins Feuer. Versuchen Sie auf keinen Fall, die Batterie auszubauen oder wiederaufzuladen.

Gehäuseabdeckung

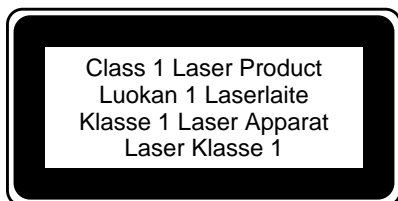
Sie müssen die obere Abdeckung Ihres Sun-Systems entfernen, um interne Komponenten wie Karten, Speicherchips oder Massenspeicher hinzuzufügen. Bringen Sie die obere Gehäuseabdeckung wieder an, bevor Sie Ihr System einschalten.



Achtung – Bei Betrieb des Systems ohne obere Abdeckung besteht die Gefahr von Stromschlag und Systemschäden.

Einhaltung der Richtlinien für Laser

Sun-Produkte, die mit Laser-Technologie arbeiten, entsprechen den Anforderungen der Laser Klasse 1.



DVD-ROM



Warnung – Die Verwendung von anderen Steuerungen und Einstellungen oder die Durchführung von Prozeduren, die von den hier beschriebenen abweichen, können gefährliche Strahlungen zur Folge haben.

Conformité aux normes de sécurité

Ce texte traite des mesures de sécurité qu'il convient de prendre pour l'installation d'un produit Sun Microsystems.

Mesures de sécurité

Pour votre protection, veuillez prendre les précautions suivantes pendant l'installation du matériel :

- Suivre tous les avertissements et toutes les instructions inscrites sur le matériel.
- Vérifier que la tension et la fréquence de la source d'alimentation électrique correspondent à la tension et à la fréquence indiquées sur l'étiquette de classification de l'appareil.
- Ne jamais introduire d'objets quels qu'ils soient dans une des ouvertures de l'appareil. Vous pourriez vous trouver en présence de hautes tensions dangereuses. Tout objet conducteur introduit de la sorte pourrait produire un court-circuit qui entraînerait des flammes, des risques d'électrocution ou des dégâts matériels.

Symboles

Vous trouverez ci-dessous la signification des différents symboles utilisés :



Attention : risques de blessures corporelles et de dégâts matériels. Veuillez suivre les instructions.



Attention : surface à température élevée. Evitez le contact. La température des surfaces est élevée et leur contact peut provoquer des blessures corporelles.



Attention : présence de tensions dangereuses. Pour éviter les risques d'électrocution et de danger pour la santé physique, veuillez suivre les instructions.

MARCHE – Votre système est sous tension (courant alternatif).

Un des symboles suivants sera peut-être utilisé en fonction du type d'interrupteur de votre système:



ARRET – Votre système est hors tension (courant alternatif).



VEILLEUSE – L'interrupteur Marche/Veilleuse est en position « Veilleuse ».

Modification du matériel

Ne pas apporter de modification mécanique ou électrique au matériel. Sun Microsystems n'est pas responsable de la conformité réglementaire d'un produit Sun qui a été modifié.

Positionnement d'un produit Sun



Attention : pour assurer le bon fonctionnement de votre produit Sun et pour l'empêcher de surchauffer, il convient de ne pas obstruer ni recouvrir les ouvertures prévues dans l'appareil. Un produit Sun ne doit jamais être placé à proximité d'un radiateur ou d'une source de chaleur.



Attention : Le niveau de pression acoustique au poste de travail s'élève selon la norme DIN 45 635 section 1000, à 70 dB (A) ou moins.

Conformité SELV

Sécurité : les raccordements E/S sont conformes aux normes SELV.

Connexion du cordon d'alimentation



Attention : les produits Sun sont conçus pour fonctionner avec des alimentations monophasées munies d'un conducteur neutre mis à la terre. Pour écarter les risques d'électrocution, ne pas brancher de produit Sun dans un autre type d'alimentation secteur. En cas de doute quant au type d'alimentation électrique du local, veuillez vous adresser au directeur de l'exploitation ou à un électricien qualifié.



Attention : tous les cordons d'alimentation n'ont pas forcément la même puissance nominale en matière de courant. Les rallonges d'usage domestique n'offrent pas de protection contre les surcharges et ne sont pas prévues pour les systèmes d'ordinateurs. Ne pas utiliser de rallonge d'usage domestique avec votre produit Sun.



Attention : votre produit Sun a été livré équipé d'un cordon d'alimentation à trois fils (avec prise de terre). Pour écarter tout risque d'électrocution, branchez toujours ce cordon dans une prise mise à la terre.

L'avertissement suivant s'applique uniquement aux systèmes équipés d'un interrupteur VILLEUSE:



Attention : le commutateur d'alimentation de ce produit fonctionne comme un dispositif de mise en veille uniquement. C'est la prise d'alimentation qui sert à mettre le produit hors tension. Veillez donc à installer le produit à proximité d'une prise murale facilement accessible. Ne connectez pas la prise d'alimentation lorsque le châssis du système n'est plus alimenté.

Batterie au lithium



Attention : sur les cartes CPU Sun, une batterie au lithium (référence MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, ou MK48T08.) a été moulée dans l'horloge temps réel SGS. Les batteries ne sont pas des pièces remplaçables par le client. Elles risquent d'exploser en cas de mauvais traitement. Ne pas jeter la batterie au feu. Ne pas la démonter ni tenter de la recharger.

Couvercle

Pour ajouter des cartes, de la mémoire, ou des unités de stockage internes, vous devrez démonter le couvercle de l'unité système Sun. Ne pas oublier de remettre ce couvercle en place avant de mettre le système sous tension.

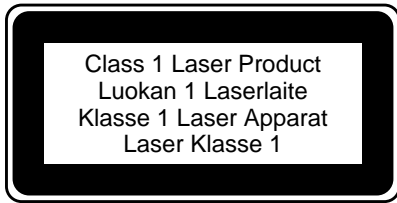


Attention : il est dangereux de faire fonctionner un produit Sun sans le couvercle en place. Si l'on néglige cette précaution, on encourt des risques de blessures corporelles et de dégâts matériels.

Conformité aux certifications Laser

Les produits Sun qui font appel aux technologies lasers

sont conformes aux normes de la classe 1 en la matière.



DVD-ROM



Attention – L'utilisation de contrôles, de réglages ou de performances de procédures autre que celle spécifiée dans le présent document peut provoquer une exposition à des radiations dangereuses.

Normativas de seguridad

El siguiente texto incluye las medidas de seguridad que se deben seguir cuando se instale algún producto de Sun Microsystems.

Precauciones de seguridad

Para su protección observe las siguientes medidas de seguridad cuando manipule su equipo:

- Siga todas las avisos e instrucciones marcados en el equipo.
- Asegúrese de que el voltaje y la frecuencia de la red eléctrica concuerdan con las descritas en las etiquetas de especificaciones eléctricas del equipo.
- No introduzca nunca objetos de ningún tipo a través de los orificios del equipo. Pueden haber voltajes peligrosos.
Los objetos extraños conductores de la electricidad pueden producir cortocircuitos que provoquen un incendio, descargas eléctricas o daños en el equipo.

Símbolos

En este libro aparecen los siguientes símbolos:



Precaución – Existe el riesgo de lesiones personales y daños al equipo. Siga las instrucciones.



Precaución – Superficie caliente. Evite el contacto. Las superficies están calientes y pueden causar daños personales si se tocan.



Precaución – Voltaje peligroso presente. Para reducir el riesgo de descarga y daños para la salud siga las instrucciones.

Encendido – Aplica la alimentación de CA al sistema.

Según el tipo de interruptor de encendido que su equipo tenga, es posible que se utilice uno de los siguientes símbolos:



Apagado – Elimina la alimentación de CA del sistema.



En espera – El interruptor de Encendido/En espera se ha colocado en la posición de *En espera*.

Modificaciones en el equipo

No realice modificaciones de tipo mecánico o eléctrico en el equipo. Sun Microsystems no se hace responsable del cumplimiento de las normativas de seguridad en los equipos Sun modificados.

Ubicación de un producto Sun



Precaución – Para asegurar la fiabilidad de funcionamiento de su producto Sun y para protegerlo de sobrecalentamientos no deben obstruirse o taparse las rejillas del equipo. Los productos Sun nunca deben situarse cerca de radiadores o de fuentes de calor.



Precaución – De acuerdo con la norma DIN 45 635, Parte 1000, se admite un nivel de presión acústica para puestos de trabajo máximo de 70Db(A).

Cumplimiento de la normativa SELV

El estado de la seguridad de las conexiones de entrada/salida cumple los requisitos de la normativa SELV.

Conexión del cable de alimentación eléctrica



Precaución – Los productos Sun están diseñados para trabajar en una red eléctrica monofásica con toma de tierra. Para reducir el riesgo de descarga eléctrica, no conecte los productos Sun a otro tipo de sistema de alimentación eléctrica. Póngase en contacto con el responsable de mantenimiento o con un electricista cualificado si no está seguro del sistema de alimentación eléctrica del que se dispone en su edificio.



Precaución – No todos los cables de alimentación eléctrica tienen la misma capacidad. Los cables de tipo doméstico no están provistos de protecciones contra sobrecargas y por tanto no son apropiados para su uso con computadores. No utilice alargadores de tipo doméstico para conectar sus productos Sun.



Precaución – Con el producto Sun se proporciona un cable de alimentación con toma de tierra. Para reducir el riesgo de descargas eléctricas conéctelo siempre a un enchufe con toma de tierra.

La siguiente advertencia se aplica solamente a equipos con un interruptor de encendido que tenga una posición "En espera":



Precaución – El interruptor de encendido de este producto funciona exclusivamente como un dispositivo de puesta en espera. El enchufe de la fuente de alimentación está diseñado para ser el elemento primario de desconexión del equipo. El equipo debe instalarse cerca del enchufe de forma que este último pueda ser fácil y rápidamente accesible. No conecte el cable de alimentación cuando se ha retirado la fuente de alimentación del chasis del sistema.

Batería de litio



Precaución – En las placas de CPU Sun hay una batería de litio insertada en el reloj de tiempo real, tipo SGS Núm. MK48T59Y, MK48TXXB-XX, MK48T18-XXXPCZ, M48T59W-XXXPCZ, o MK48T08. Las baterías no son elementos reemplazables por el propio cliente. Pueden explotar si se manipulan de forma errónea. No arroje las baterías al fuego. No las abra o intente recargarlas.

Tapa de la unidad del sistema

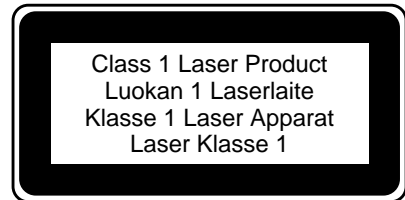
Debe quitar la tapa del sistema cuando sea necesario añadir tarjetas, memoria o dispositivos de almacenamiento internos. Asegúrese de cerrar la tapa superior antes de volver a encender el equipo.



Precaución – Es peligroso hacer funcionar los productos Sun sin la tapa superior colocada. El hecho de no tener en cuenta esta precaución puede ocasionar daños personales o perjudicar el funcionamiento del equipo.

Aviso de cumplimiento con requisitos de láser

Los productos Sun que utilizan la tecnología de láser cumplen con los requisitos de láser de Clase 1.

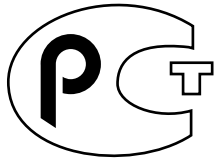


DVD-ROM



Precaución – El manejo de los controles, los ajustes o la ejecución de procedimientos distintos a los aquí especificados pueden exponer al usuario a radiaciones peligrosas.

GOST-R Certification Mark



Nordic Lithium Battery Cautions

Norge



A D V A R S E L – Litiumbatteri —

Ekspløsjonsfare.

Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

Sverige



WARNING – Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

Danmark



ADVARSEL! – Litiumbatteri — Ekspløsjonsfare ved fejlagtig håndtering. Udsiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

Suomi



VAROITUS – Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

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