SPARCserver 1000 System Service Manual

Warning – Procedures contained in this manual must be performed by qualified service-trained maintenance providers.

Refer to the section entitled “Notes, Cautions, and Warnings” found in the Preface of the front matter of this service manual Binder.

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Revision History

Revision	Dash	Date	Comments
801-2895-15	-A	June 1996	4th Revision to FCS
801-2895-13	-A	October 1994	3rd Revision to FCS
801-2895-12	-A	May 1994	2nd Revision to FCS
801-2895-11	-A	August 1993	1st Revision to FCS
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Contents

Preface xxi

Part 1 —System Information

1. Product Description 1-1

1.1 System Features 1-1

1.1.1 Chassis Assembly 1-4

1.1.2 Power Supply 1-5

1.1.3 Fan Tray 1-6

1.1.4 SCSI Tray Assembly 1-7

1.1.5 System Board 1-8

1.1.6 Options 1-9

1.1.7 External Options 1-9

1.1.8 Internal Options 1-10

Part 2 —Troubleshooting

2. Troubleshooting Overview 2-1

2.1 System Control 2-1

2.2 Status Lights and Indicators 2-3

3. Diagnostics and Commands for Troubleshooting. 3-1

3.1 Diagnosing Problems 3-1

3.1.1 LEDs 3-1

3.1.2 Console Messages 3-2

3.2 Using `prtdiag` 3-3

3.3 Using `probe scsi` 3-4

3.4 Precautions when Using POST 3-6

3.5 Precautions when Using OBP 3-6

3.5.1 System Boards with PROM Revision 2.11 (or Lower) 3-6

3.5.2 System Boards with PROM Revision 2.13 (or Higher) 3-7

3.6 Connecting a Terminal to the System Master 3-8

3.7 Running OBP and POST 3-10

3.8 Interpreting System Board LEDs 3-17

3.8.1 While POST Is Running 3-17

3.8.2 After POST Ends 3-17

3.9 Disabling and Enabling the Link Integrity Test 3-18

3.10 SuperSPARC Modules 3-18

3.11 SIMMs and NVSIMMs. 3-18

4. Troubleshooting Flow Diagrams 4-1

4.1 Flow Diagrams 4-2

Part 3 —Preparing for Service

5. Safety and Tools Requirements 5-1

5.1 Safety Precautions 5-1

5.2 Tools Required 5-2

6. Powering Off and On 6-1

6.1 Powering Off the System 6-1

6.2 Restarting the System 6-3

6.3 Boot Messages 6-8

Part 4 —Subassembly Removal and Replacement

7. Internal Access 7-1

7.1 Front Panel 7-1

7.2 EMI Shield 7-2

7.3 Air Restrictor Boards 7-3

7.4 Side Panels 7-4

7.5 Top Panel 7-5

7.6 Bottom Panel 7-8

8. Major Subassemblies 8-1

8.1 Fan Tray 8-2

8.1.1 Removal 8-2

8.1.2 Replacement 8-3

8.2 SCSI Tray Assembly 8-3

8.2.1 Removal 8-3

8.2.2 Replacement 8-5

8.3 Power Supply 8-5

8.3.1 Removal 8-5

8.3.2 Replacement 8-6

8.4 Backplane 8-7

8.4.1 Removal 8-7
8.4.2 Replacement 8-9
9. Storage Devices 9-1
9.1 CD-ROM Drive: SunCD Plus and SunCD 2Plus 9-2
9.1.1 Removal 9-2
9.1.2 Replacement 9-3
9.2 Tape Drive 9-4
9.2.1 Removal 9-4
9.2.2 Replacement 9-5
9.3 Disk Drive 9-5
9.3.1 Removal 9-5
9.3.2 Replacement 9-7
9.4 Control Board 9-7
9.4.1 Removal 9-8
9.4.2 Replacement 9-8
9.5 Disk Card (Option). 9-9
9.5.1 Removal 9-9
9.5.2 Replacement 9-11
9.6 Disk Card Disk Drive. 9-14
Part 5 —System Board
10. System Board Overview 10-1
10.1 Damage Prevention 10-1
10.2 Handling System Boards and Subassemblies 10-1
10.3 System Board Description 10-2

10.4 System Board Block Diagram 10-4

11. System Board and Component Replacement 11-1

11.1 System Board. 11-1

11.1.1 Removal 11-1

11.1.2 Replacement 11-4

11.2 Using Standoffs. 11-5

11.3 SuperSPARC Modules 11-6

11.3.1 Removing a SuperSPARC Module 11-7

▼ SuperSPARC Module A 11-8

▼ SuperSPARC Module B 11-8

11.3.2 Replacing a SuperSPARC Module 11-9

11.4 SBus Cards. 11-10

11.4.1 Removal 11-11

11.4.2 Preparing a New SBus Card 11-12

11.4.3 Installing an SBus Card 11-15

11.5 SIMMs and NVSIMMs. 11-16

11.5.1 Removal 11-17

11.5.2 Replacement 11-19

11.5.3 NVSIMM 11-20

11.6 OpenBoot PROMs 11-20

11.6.1 Removal 11-20

11.6.2 Replacement 11-21

11.7 System Restart. 11-22

Part 6 —Illustrated Parts Breakdown

12. Illustrated Parts Breakdown 12-1

12.1 Replaceable Units 12-1

12.2 Exterior Components 12-4

12.3 Chassis Assembly 12-5

12.4 SCSI Tray Assembly 12-6

Part 7 —Appendixes, Glossary, Index

A. Product Specifications A-1

A.1 Physical Specifications A-1

A.2 Electrical Specifications A-2

A.3 Environmental Requirements A-2

B. Functional Description B-1

B.1 System Overview B-1

B.1.1 System Board B-1

B.2 System Architecture B-2

B.3 Arbitration System B-3

B.4 SuperSPARC Module B-4

B.5 I/O Unit B-4

B.6 Main Memory Unit B-5

B.7 Control Board B-5

B.8 SBus Cards B-6

B.9 Power Distribution B-6

B.9.1 Power Supply B-6

C. SIMMs and Jumpers C-1

C.1 SIMM Configuration C-1

C.1.1 System Board Rules C-1
C.1.2 Locating a Failing SIMM C-3
C.2 Jumper Configuration C-3
D. Connector Pinouts. D-1
D.1 Connector Locations. D-1
D.2 Keyboard and Mouse Connector D-2
D.3 Serial Port Connectors D-3
D.4 SBus Connectors D-4
D.5 Backplane Connector D-7
D.6 SuperSPARC Module Connectors D-9
E. General Rules for System Configuration E-1
E.1 Selecting Installation Locations E-1
E.2 System Master Board E-1
E.2.1 Identifying the System Master. E-2
E.2.2 Minimum Requirements for the System Master . . . E-2
E.2.3 Selecting the System Master Board E-3
E.3 System Slave Boards. E-5
E.3.1 SuperSPARC Modules E-5
E.3.2 SBus Cards E-7
E.3.3 SIMMs. E-8
E.4 Selecting Drive ID Numbers in the SCSI Tray E-11
E.5 Connecting Cables E-16
E.5.1 SCSI Cables E-16
E.5.2 Ethernet Cables E-16

E.5.3 Video Cables E-16
Glossary. Glossary-1

Figures

Figure 1-1	SPARCserver 1000 System	1-2
Figure 1-2	Internal Components	1-3
Figure 1-3	Chassis Assembly	1-4
Figure 1-4	Power Supply	1-5
Figure 1-5	Fan Tray	1-6
Figure 1-6	SCSI Tray Assembly	1-7
Figure 1-7	SPARCserver 1000 System Board	1-8
Figure 2-1	Reset Switch and Status Indicators	2-4
Figure 3-1	LEDs on System Board	3-8
Figure 3-2	TTY Serial Port	3-9
Figure 3-3	Key Switch	3-10
Figure 3-4	Removing the Front Panel	3-11
Figure 3-5	Reset Switch and Status Indicators	3-12
Figure 4-1	Troubleshooting Flow Diagram Overview	4-2
Figure 4-2	Branch A: Physical Inspection	4-3
Figure 4-3	Branch A.1: Control Board	4-4

Figure 4-4	Branch A.2: Checking the SuperSPARC Modules	4-5
Figure 4-5	Branch B: Power-on Self-test (POST) Functions	4-6
Figure 4-6	Branch B.1: Fails Self-Test	4-7
Figure 4-7	Branch B.2: SIMM Memory Fault	4-7
Figure 4-8	Branch B.3: SBus Card Fault	4-8
Figure 4-9	Branch C: Monitoring the System Boot-up	4-9
Figure 4-10	Branch D: Checking Boot Path and NVRAM	4-10
Figure 4-11	Branch E: Checking the Neta	4-11
Figure 4-12	Branches E.1, E.2, and E.3: Client Boot Status	4-12
Figure 4-13	Branch E.4: Additional Ethernet Messages	4-12
Figure 6-1	Key Switch in the Standby Position	6-2
Figure 6-2	AC Power Switch and Plug	6-3
Figure 6-3	Key Switch in On Position	6-4
Figure 6-4	Removing the Front Panel	6-6
Figure 6-5	Reset Switch (Behind the Front Panel) and Front Panel Status LEDs	6-7
Figure 7-1	Removing the Front Panel	7-2
Figure 7-2	Removing the EMI Shield	7-3
Figure 7-3	Removing Air Restrictor Board Retaining Screws	7-4
Figure 7-4	Removing the Side Panels	7-5
Figure 7-5	Removing the Popouts from the Top Panel	7-6
Figure 7-6	Removing the Top Panel	7-7
Figure 7-7	Replacing the Popouts in the Top Panel	7-7
Figure 7-8	Removing the Feet	7-8
Figure 8-1	Subassembly Location	8-2
Figure 8-2	Fan Tray	8-3

Figure 8-3 SCSI Tray Assembly 8-4
Figure 8-4 Power Supply..... 8-6
Figure 8-5 Backplane 8-8
Figure 8-6 Removing the Backplane 8-8
Figure 9-1 Removing the Mounting Bracket from the SCSI Tray 9-2
Figure 9-2 Removing the CD-ROM Drive from the Mounting Bracket .. 9-3
Figure 9-3 Removing the Tape Drive 9-4
Figure 9-4 Removing the Disk Drive Tray 9-6
Figure 9-5 Removing the Disk Drive from the Mounting Plate 9-6
Figure 9-6 Removing the Control Board..... 9-8
Figure 9-7 Removing Disk Card Mounting Screws..... 9-10
Figure 9-8 Removing or Installing the Disk Card 9-11
Figure 9-9 Closing the Ejector / Injector Levers 9-12
Figure 9-10 Single Disk Card per SCSI-2 Host Adapter Cabling 9-13
Figure 9-11 Multiple Disk Card per Wide SCSI-2 Host Adapter Cabling . 9-14
Figure 9-12 Opening the Ejector / Retainer to Remove a Disk Drive 9-15
Figure 9-13 Closing the Ejector / Retainer to Install a Disk Drive 9-16
Figure 10-1 System Board Three-Quarter View..... 10-2
Figure 10-2 System Board Block Diagram 10-4
Figure 11-1 Removing the System Board 11-3
Figure 11-2 Closing the Ejector / Injector Levers 11-5
Figure 11-3 Locking and Unlocking Standoffs..... 11-6
Figure 11-4 SuperSPARC Modules A and B..... 11-7
Figure 11-5 Installing SuperSPARC Module B 11-9
Figure 11-6 SBus Card Locations 11-10

Figure 11-7 Removing or Installing an SBus Card 11-12
Figure 11-8 Removing the SBus Card Retainer and Adapter Bracket 11-13
Figure 11-9 DSBE/S SBus Card 11-14
Figure 11-10 FSBE/S SBus Card..... 11-14
Figure 11-11 Disabling and Enabling the Link Integrity Test 11-15
Figure 11-12 SIMMs and the NVSIMM (Battery Side) 11-17
Figure 11-13 SIMM Socket Locations..... 11-18
Figure 11-14 Unlocking a SIMM..... 11-18
Figure 11-15 Creating Space to Remove a SIMM..... 11-19
Figure 11-16 NVSIMM Jumper Locations..... 11-20
Figure 11-17 OpenBoot PROMs on the System Board 11-21
Figure B-1 SPARCserver 1000Simplified Block Diagram B-1
Figure B-2 System Board Components B-2
Figure B-3 Detailed Block Diagram B-3
Figure B-4 Processor Module Block Diagram..... B-4
Figure B-5 I/O Unit Block Diagram..... B-5
Figure B-6 Main Memory Unit Block Diagram B-5
Figure B-7 Control Board Block Diagram B-6
Figure B-8 Power Distribution Block Diagram..... B-6
Figure C-1 SIMM Group Locations on the System Board..... C-2
Figure C-2 Jumper Locations on the System Board C-4
Figure D-1 System Board Three-Quarter View..... D-2
Figure D-2 Keyboard/Mouse Connector Pinout D-2
Figure D-3 Serial Port A and B Connector Pinouts D-3
Figure E-1 System Board Open Boot PROM Location E-4

Figure E-2 SuperSPARC module Locations E-6
Figure E-3 SBus Card Locations E-7
Figure E-4 SIMMs and NVSIMM E-9
Figure E-5 System Board SIMM Locations E-10
Figure E-6 NVSIMM Jumper Locations. E-11
Figure E-7 SCSI Tray Assembly E-12
Figure E-8 CD-ROM Drive Device Addressing E-13
Figure E-9 CD-ROM Drive Device Addressing E-14
Figure E-10 8 mm and 4 mm Tape Drive Device Addressing E-15
Figure E-11 Seagate Disk Drive Device Addressing E-15
Figure E-12 Conner Disk Drive Device Addressing E-16

Tables

Table 1-1	Internal Options	1-10
Table 2-1	Hardware and Software Control of the System	2-2
Table 2-2	Front Panel LED System Status	2-4
Table 2-3	Indicator Locations	2-5
Table 3-1	Terms Used in the System Status Display	3-15
Table 4-1	Problem Areas	4-1
Table 5-1	Safety Precautions	5-2
Table 6-1	Front Panel LED System Status	6-8
Table 11-1	SIMM Variations	11-16
Table 12-1	List of Replaceable Components	12-1
Table 12-2	Parts List for Exterior Components	12-4
Table 12-3	Parts List for Base Chassis and Backplane	12-5
Table 12-4	Parts List for SCSI Tray Assembly	12-6
Table A-1	Physical Specifications	A-1
Table A-2	Clearance and Service Access	A-1
Table A-3	Power Supply Characteristics	A-2

Table C-1	SIMM Group Organization	C-3
Table C-2	System Board Jumpers	C-3
Table D-1	SBus Connector 1 (Connector J4901)	D-4
Table D-2	SBus Connector 2 (Connector J4902)	D-5
Table D-3	SBus Connector 3 (Connector J4903)	D-6
Table D-4	Backplane Connector (Connector J0200)	D-7
Table D-5	SuperSPARC Module Connectors (Connectors J2000 and J2300)	D-9
Table E-1	Example of Connector and Slot Priorities	E-7
Table E-2	Example of SBus Card Distribution	E-8

Preface

This system board manual is written for a trained service provider who intends to service the SPARCserver 1000™ or SPARCserver 1000E™ system. In general, the term SPARCserver 1000 refers to both the SPARCserver 1000 and the SPARCserver 1000E system. Where the SPARCserver 1000E is different, this is explicitly noted.

Document Organization

This information in this manual is in seven parts:

System Information, provides a product description.

Troubleshooting, contains fault isolation information and a flow diagram which can be used to locate system hardware problems.

Preparing For Service, explains how to prepare the system for service and access the subassemblies.

System Board, shows how to install and service the system board, and how to remove and replace the processor modules, memory modules and SBus cards.

Subassembly Removal and Replacement, shows how to remove and replace the major replaceable subassemblies in the system chassis.

Illustrated Parts Breakdown, lists and illustrates all replaceable units; includes part numbers.

Appendixes, Glossary, Index, provides additional reference information of interest to the qualified service-trained maintenance provider.

What Typographic Changes Mean

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

Table P-1 Typographic Conventions

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

Shell Prompts in Command Examples

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

Table P-2 Shell Prompts

Shell	Prompt
C shell prompt	`machine_name%`
C shell superuser prompt	`machine_name#`
Bourne shell and Korn shell prompt	`$`
Bourne shell and Korn shell superuser prompt	`#`

Related Documentation

The following documents give information about installing and using the server or related boards and peripherals.

Table P-3 Related Documents

Application	**Title**	**Part Number**
Installation	*SPARCserver 1000 Installation Manual*	801-2893
	DSBE/S SBus Card Manual	800-7176
	SBus Intelligent SCSI Host Adapter Guide	800-5355
	disk card Installation Manual	801-7671
	2.1 Gbyte disk card Installation Manual	801-2196
Diagnostics	*SPARCserver 1000 Open Boot PROM Documentation Set*	825-1346
	OpenBoot Command Reference	800-6076
	OpenBoot Quick Reference	800-5075
User's Guides	*SPARCserver 1000 Storage Device User's Guide*	801-2198
	SPARCserver 1000 POST User's Guide	801-2916
Service, System	*SPARCserver 1000 Technical Reference Manual*	801-3389
Service, Peripherals	*Memory Module Installation Manual*	801-2888
	disk tower 1000 Installation Manual	801-5115
Safety, Other	*SPARCserver 1000 Cabinet Regulatory Compliance Manual*	801-2892
	Sun Site Preparation Guide Manual Set	825-1392

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Luxembourg	32-2-720-09-09	32-2-725-88-50
Germany	01-30-81-61-91	01-30-81-61-92
The Netherlands	06-022-34-45	06-022-34-46
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Notes, Cautions, and Warnings

Warning – The SuperSPARC module has a *hot surface.* Avoid contact. Surfaces are hot and may cause personal injury if touched.

Warning – This equipment contains lethal voltage. Accidental contact can result in serious injury or death.

Warning – Risk of personal injury. To reduce the risk, follow the instructions.

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 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.

Part 1 — System Information

Product Description 1

1.1 System Features

The SPARCserver 1000 system provides file service, database service, timeshare, or computing services to a network and attached devices. It is an expandable multiprocessor system with the following capabilities:

- Up to four modular system boards
- Up to eight SPARC modules — each with a large SuperCache
- Up to 2 Gbytes of memory with 16-Mbit DRAM SIMMs
- Up to 12 SBus slots, three per system board
- On-board 10Base-T Ethernet on each system board
- Up to four on-board SCSI-2 ports
- Up to four half-height 3.5-inch disk drives
- Up to three disk cards, featuring four half-height 3.5-inch disk drives per board
- SunCD Plus™ or SunCD 2Plus™ drive
- 4 mm DAT tape drive or 8 mm tape drive

The SPARCserver 1000 system features an architecture allowing incremental system expansion.

The SPARCserver 1000 is a stackable, tabletop unit featuring front and rear component accessibility. See Figure 1-1.

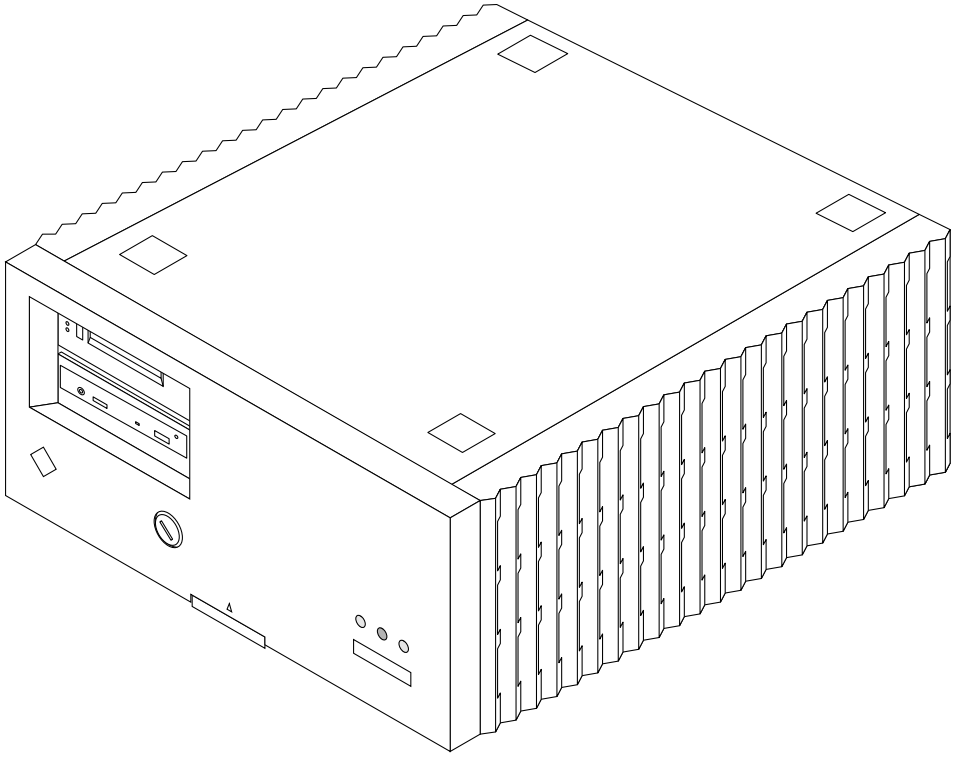


Figure 1-1 SPARCserver 1000 System

The internal components of SPARCserver 1000 system, shown in Figure 1-1are:

- Power supply
- Fan tray
- SCSI tray assembly with on-board controller
- System board

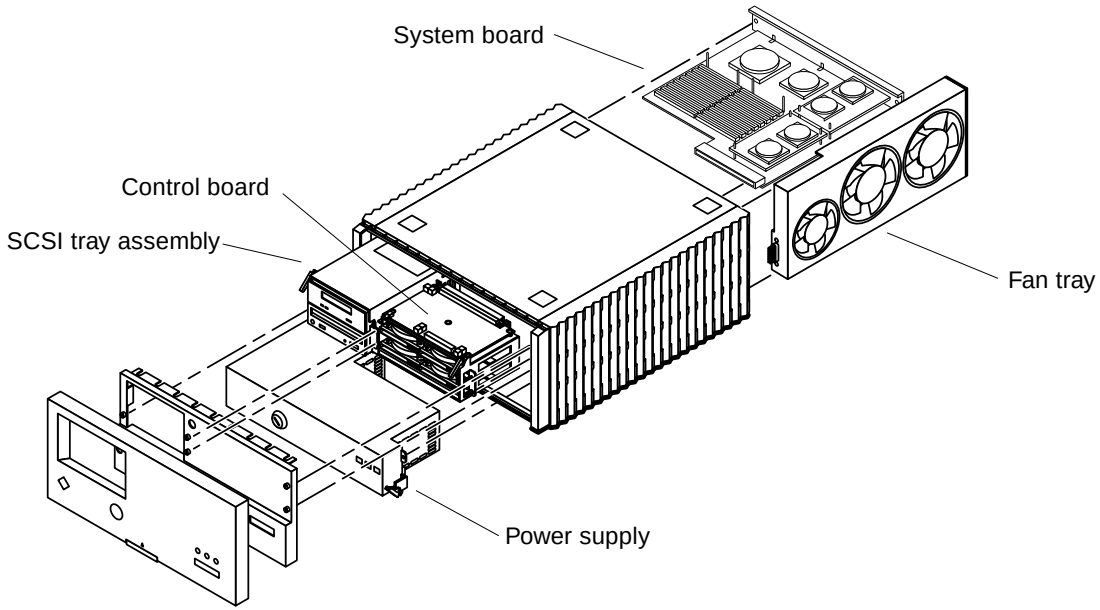


Figure 1-2 Internal Components

1.1.1 Chassis Assembly

The chassis assembly (see Figure 1-3) consists of:

- Chassis
- Backplane

The backplane is near the center of the chassis. This allows for insertion and removal of system components from the system front and rear.

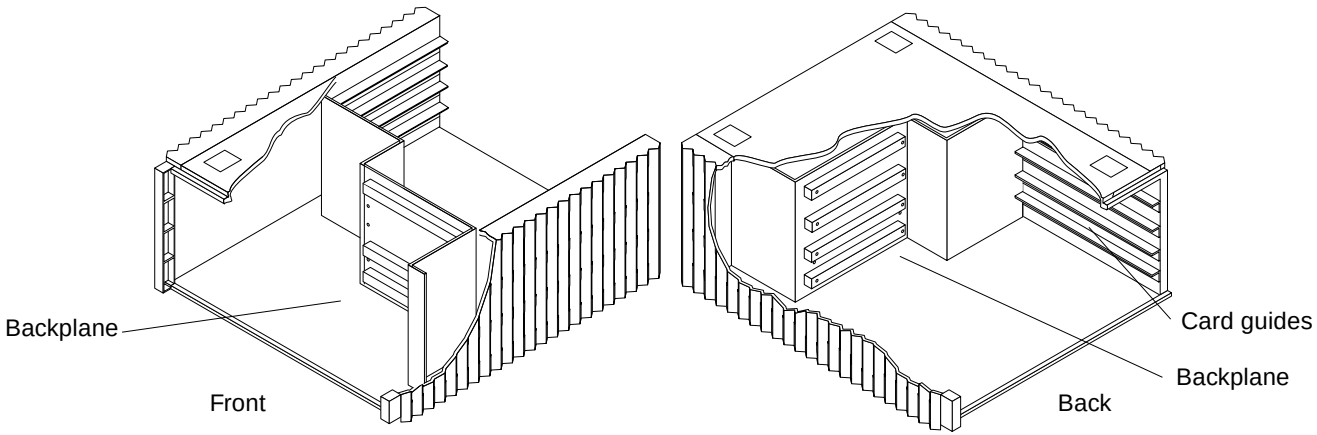


Figure 1-3 Chassis Assembly

The SPARCserver 1000 backplane contains:

- 1 XDBus (64-bit data and 1-bit parity)
- System monitoring bus
- System scan bus

1.1.2 Power Supply

The power supply, shown in Figure 1-4, provides 650 watts of power and includes a system maintenance panel with three status LEDs. The power supply plugs directly into the backplane through two 240-pin connectors. Connection to the fan tray is provided through a single connector located on the right rear side of the power supply. The connector routes AC power to the power supply and provides DC power for the fans and the fan fail signals.

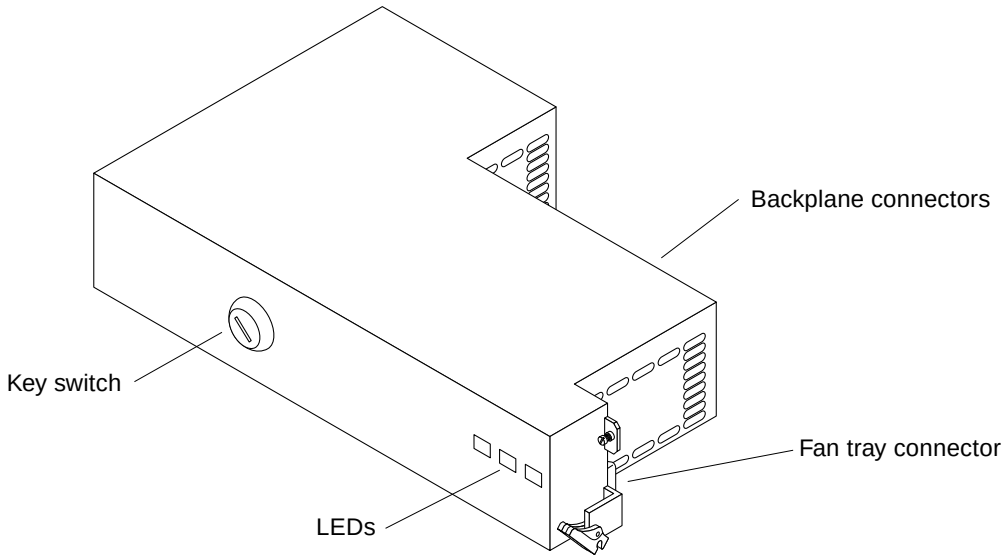


Figure 1-4 Power Supply

1.1.3 Fan Tray

The SPARCserver 1000 fan tray, shown in Figure 1-5, provides cooling for the power supply, system boards, and the SCSI tray assemblies. In addition, this module routes AC power from the chassis rear to the power supply. Each fan has a fail sensor to enable orderly system shutdown if a fan fails. (DC power for the fans is obtained from the power supply via a connector in the rear of the fan tray.) The AC power switch is on the fan tray rear.

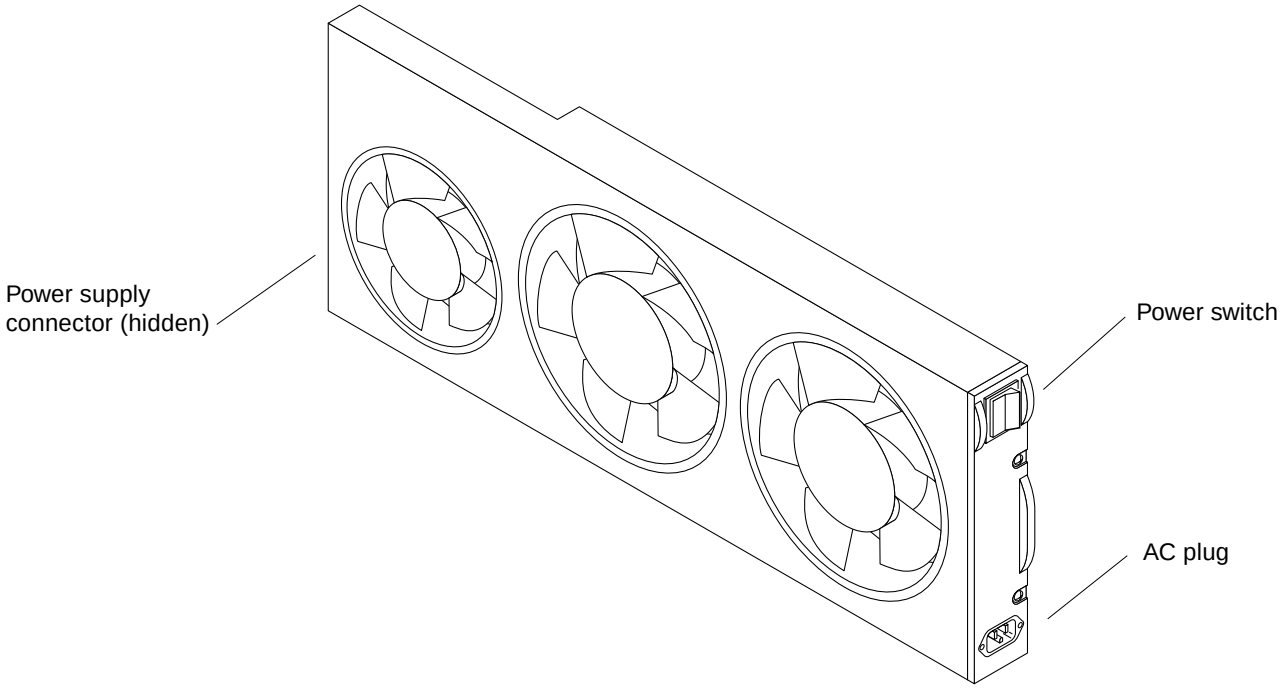


Figure 1-5 Fan Tray

1.1.4 SCSI Tray Assembly

The SCSI tray assembly, shown in Figure 1-6, consists of:

- Backup device tray on the left side
- SCSI disk drive tray on the right side
- Control board on top of the SCSI-2 disk drives

The SCSI tray assembly mounts above the power supply in the chassis front. The backup device tray, on the left, contains a SunCD Plus or SunCD 2Plus drive and may contain a SCSI-2 tape device. The SCSI-2 disk drive tray, on the right, contains two or four half-height disk drives. The control board is mounted on top of the SCSI-2 disk drive tray and incorporates the Reset switch. The control board also provides SCSI-2 data and power to peripherals.

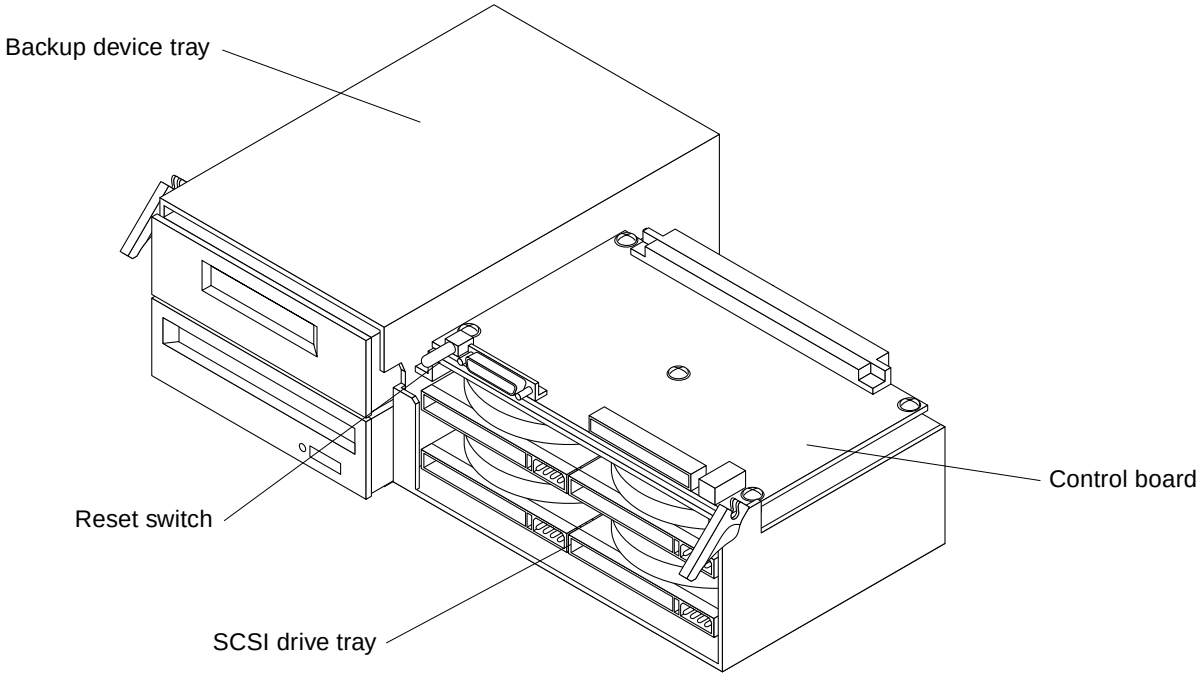


Figure 1-6 SCSI Tray Assembly

1.1.5 System Board

Each SPARCserver 1000 system must have at least one system board. The first board is located in slot 0 of the card cage. The system board contains:

- One single-ended narrow SCSI-2 port
- 10Base-T Ethernet port
- Two serial ports
- At least one SuperSPARC module processor
- Three SBus locations

The system board is shown in Figure 1-6.

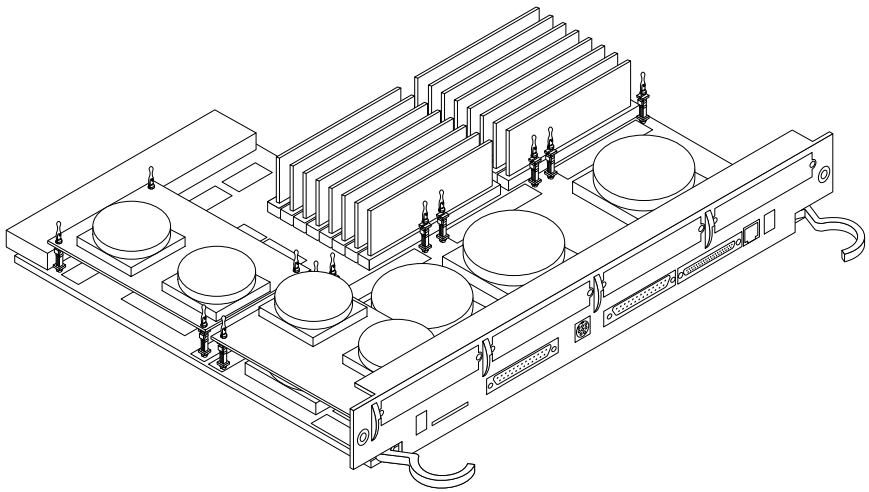


Figure 1-7 SPARCserver 1000 System Board

1.1.6 Options

Options add computing power and mass storage capacity to the minimum configuration. System options include:

- NVSIMMs
- ECC memory (DRAM SIMM) expansion
- SBus cards
- Disk drives
- Tape drive
- SuperSPARC modules
- Disk card
- System board with 0 CPU and 0 Mbyte memory
- System board with 2 CPU and 64 Mbyte memory
- System board with 2 CPUs and 128 Mbyte memory

1.1.7 External Options

External options usually require SBus interface cards. Each system board contains three SBus slots for system expansion.

Note – An Ethernet controller is incorporated directly on the system board so an SBus card is not needed for this function.

A monitor is not necessary for normal server operation and many servers lack monitors. However, a TTY terminal or SPARCstation can be attached to the server to display system messages and power-on self-test diagnostic results. Once the server is running in auto-boot mode, the monitor can be removed.

1.1.8 Internal Options

The system contains a card cage with space for up to four boards. Table 1-1 summarizes the internal options for the SPARCserver 1000 system.

Table 1-1 Internal Options

Option	Location	Quantity	Comments
System board	Card cage	1-4 per system	
SuperSPARC module	System board	1-8 per system	0-2 modules on each system board[1].
SIMMs	System board	0-16 per system board	System boards can have 0, 4, 8, 12, or 16 SIMMs. installed. They are always installed in groups of 4. SIMMs sizes are 8 or 32 MB DRAM or 1 MB NVRAM.
SBus cards	System board	0-12	0-3 cards per system board.
Drives in SCSI tray	Chassis	Up to 4 half-height 3 1/2-inch disk drives plus 2 additional 5 1/4-inch devices	Drives are numbered 0 to 3. One SunCD (standard equipment) per system. One tape device optional.
Disk card	Card cage	0-3 per system	Each board contains 4 half-height, 3 1/2-inch SCSI-2 disk drives.

1. A system board with zero SPARC modules can be used for memory expansion and for additional SBus slots.

Part 2 — Troubleshooting

Troubleshooting Overview 2

This chapter explains how to determine which hardware or software controls the system during different phases of system operation.

2.1 System Control

To troubleshoot a problem, determine which part of the system is in control during the involved phase of operation.

When AC power is applied, system control passes in the order below:

- Power switch, in rear
- Key switch, in front
- Control board
- Power-on self-test (POST) program
- OpenBoot program
- Operating system

Table 2-1 shows the actions that occur as system control progresses from one phase to the next.

The last column lists indicators used to verify system operation.

Table 2-1 Hardware and Software Control of the System

Control Area	Actions	Observations	Indicators
AC input	With the AC power switch (system rear) on and the key switch in ⏻ (Standby), AC (via the fan tray) is applied to the DC power supply.	Listen to hear the fans.	The left green LED (front panel) should light denoting the power supply is delivering DC.
Control board	The control board maintains the system in reset until all DC supplies reach nominal operating voltage. Buffers on the control board pass status signals from the power supply and fan tray to the system board.	The control board has eight LEDs: the four yellow (left side) denote system status; the four green (right side) denote power supply status.	All green LEDs should be on All yellow LEDs should be off.
System board	The system monitors AC voltage, DC voltages, fan rotation speed, and system board temperature. The system will shut down the power supply if monitored conditions fail to reach or to maintain nominal range.		
POST	Each system board runs POST individually. Then POST tests the ability of system boards to work together on the backplane. POST does not test individual SBus cards, drives, or interface cables. POST next configures the system, omitting marginal or failing circuits. The system master is assigned to be the first functional system board (with at least one SPARC module) residing in the lowest card cage slot. This is often (but not always) slot 0.	POST • displays error messages on a terminal (if connected) • displays LED codes on system boards (note: POST may reset the SPARC processors and LED codes may be lost)	POST cycles the middle (yellow) front panel LED — denoting tests are running. After about 60 seconds, the yellow LED turns off and the two green LEDs light; any other combination of LEDs denotes a minor or major problem. If the problem is • minor, system boot initiates (all three LEDs lit) • major, the system cannot run and the right side green LED remains off

Table 2-1 Hardware and Software Control of the System *(Continued)*

Control Area	Actions	Observations	Indicators
OpenBoot	The boot program runs additional tests such as the disk drive tests. The program boots the system by loading the operating system from the root disk drive. The root disk is usually drive number 0 in the internal SCSI disk drive tray.	To read OBP messages, connect the console (serial ASCII terminal) to the system master. If the console connects to the wrong system board, messages will NOT appear on the screen. If set to verbose mode, OpenBoot displays a list of system hardware options.	System board LEDs: • system master (slot 0); the eight lower (yellow) LEDs cycle constantly • all others; the yellow LEDs remain on (do not cycle) • any system board; if the yellow LEDs are off, the board has failed POST
Operating system (UNIX)	The operating system loads into memory and begins running. If a hardware failure occurs while the system is running, POST can automatically configure around the failure, and reboot.	All system boards; the left two green LEDs denote that 0, 1, or 2 SPARC modules are installed and functional.	System board LEDs: • all boards; the eight lower (yellow) LEDs cycle constantly, except those having no SPARC modules

2.2 Status Lights and Indicators

Figure 2-1 shows the location of indicators on the system front panel.

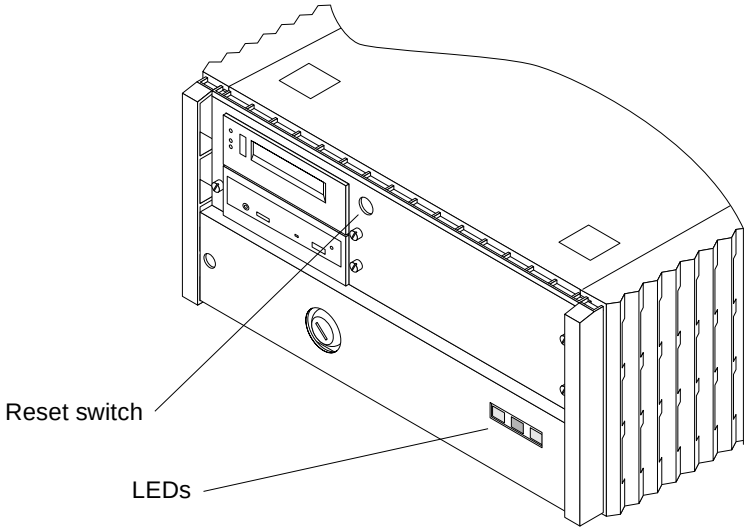


Figure 2-1 Reset Switch and Status Indicators

Table 2-2 lists the function of the front panel LEDs and Table 2-3 lists the other indicators on the SPARCserver 1000.

Table 2-2 Front Panel LED System Status

LED Position	Condition
Left (green)	On — DC power supply is receiving AC current
Middle (yellow)	On — (first 60 seconds of AC power) POST is running Off — (when POST completes) no hardware failure detected On — (when POST completes) hardware failure is detected
Right (green)	Off — (first 60 seconds of AC power) POST is running On — (after POST completes) system is running Off — (after POST completes) system cannot run; repair needed

Table 2-3 Indicator Locations

Location	Access	Description
System board(s)	View from rear of system chassis	Ten LEDs used with POST diagnostics: Left 2 LEDs (green) indicate presence of SuperSPARC module A and B. On system master only, right 8 LEDs (yellow) cycle constantly. Other system boards, the right 8 LEDs display a solid pattern.
SCSI tray (left side)	Exterior lights for SunCD and tape drive	LEDs on drives denote operation only
Control board	Remove front panel and EMI shield	Eight LEDs on control board: The four left LEDs (yellow) indicate system status; any lit yellow LED denotes system problem. The left right LEDs (green) are DC power indicators; all must be ON.

Diagnostics and Commands for Troubleshooting 2

This chapter describes basic troubleshooting procedures.

2.1 Diagnosing Problems

2.1.1 LEDs

To determine if a system failure has occurred, look at the front panel LEDs. If the center (yellow) LED is lit, the system has one or more hardware failures.

System board LED patterns provide some information about board status. It is best to use a terminal and execute the `prtdiag` command. Alternatively, initiate Power-On Self-Test (POST) and OpenBoot PROM (OBP) programs.

To identify the system master, observe status LEDs (yellow, marked 0 through 7) on the system board rear (valid *only* while OBP is booting.) LEDs on the system board in slot 0 will flash in a repeated cyclical pattern. For other system boards, LEDs should present a solid pattern.

When boot is complete, LED patterns change: the status LEDs on *all* boards present a cyclical pattern, with several exceptions. Boards lacking SuperSPARC modules present a solid LED pattern. On failed boards, LEDs are off.

Caution – The system master (system board in slot 0) is a standard system board. However, the following is recommended: Do **NOT** swap the system master with another board for purpose of troubleshooting. The system master is configured to fulfill minimum requirements, and if swapped with another board of lesser configuration, results may be misleading.

2.1.2 Console Messages

A system console (or tip line) is an alternative means for troubleshooting. The system console is connected to serial port "A" on the system board in slot 0 only; messages will not display if the console is connected to any other system board. See Section 2.1.1, "LEDs," to determine system master.

To install and setup a terminal, See Section 2.6, "Connecting a Terminal to the System Master."

The `prtdiag` command displays information which is useful for most field repairs. See Section 2.2, "Using `prtdiag`."

The `probe scsi` command displays the complement and status of SCSI-2 devices installed in your system. See Section 2.3, "Using `probe scsi`."

As system boot initializes, POST tests the general functionality of system boards and some supporting system hardware. POST presents several menus to help the user debug failures. For a complete explanation of menus, see the *SPARCserver 1000 POST User's Guide*. The menus provide detailed information that may prove more useful in the factory or service depot than in the field.

When POST ends, OBP continues the boot process by establishing communication among separate functional hardware elements in the system configuration. OBP displays messages on a terminal connected to the OBP system board in slot 0. For information on OBP messages and commands, see the *OpenBoot Command Reference*.

Caution – Pauses may occur during boot which can be easily misinterpreted as a locked-up system. If the terminal remains blank during POST, See Section 2.4, "Precautions when Using POST." If the system appears to lock up during OBP, See Section 2.5, "Precautions when Using OBP."

2.2 *Using* `prtdiag`

`prtdiag` command is the preferred tool for locating replaceable board components.

Note – `prtdiag` is a UNIX command. It can only be accessed if the OS is booted and running on the machine in question. `prtdiag` resides in `/usr/kvm`.

Below is an example of the command and its output, actual output will differ.

Code Example 2-1 The `prtdiag` Command

```
# ./prtdiag
System Configuration:  Sun Microsystems  sun4d SPARCserver 1000
System clock frequency: nn MHz
Memory size: nnnMb
Number of XDBuses: 1
====== CPU Units [MHz] ======== Memory Groups [MB] ==============
        A       B               grp0    grp1    grp2    grp3
        --      --              ----    ----    ----    ----
Board0: nn      nn              nn      nn      nn      nn
Board1: nn      nn              nn      nn      nn      nn
Board2: nn      nn              nn      nn      nn      nn
Board3:                         nn      nn      nn      nn
======================SBus Cards==========================
Board0:        0: dma/esp(scsi)         'SUNW,500-nnnn'
                  lebuffer/le(network)  'SUNW,500-nnnn'
               1: dma/esp(scsi)         'SUNW,500-nnnn'
                  lebuffer/le(network)  'SUNW,500-nnnn'
               2: cgsix                 'SUNW,501-nnnn'
               3: dma/esp(scsi)         '500-nnnn-01'
                  lebuffer/le(network)  '500-nnnn-01'
Board1:        0: <empty>
               1: dma/esp(scsi)         '500-nnnn-01'
                  lebuffer/le(network)  '500-nnnn-01'
               2: bf                    'SUNW,501-nnnn'
               3: bf                    'SUNW,501-nnnn'
Board2:        1: <empty>
               2: <empty>
               3: <empty>
Board3:        1: <empty>
               2: <empty>
               3: <empty>
```

Code Example 2-1 The `prtdiag` Command *(Continued)*

```
Failed Field Replaceable Units (FRU) in System:
===============================================
SBus Card unavailable on System Board #3
Failed Field Replaceable Unit is SBus card 0
cpu-unit unavailable on System Board #3
Failed Field Replaceable Unit is SuperSPARC Module 0
#
```

As shown above, `prtdiag` displays the status of system boards and replaceable system board components:

- System boards, by location
- SuperSPARC modules, by number, location, and type (identified as operating speed)
- SIMMs, by quantity and locations (identified by group)
- SBus cards, by location and type

2.3 *Using* `probe scsi`

Use this command to verify operation for a new or replacement SCSI-2 device installed in the system.

1. **Become superuser.**
2. **Use the appropriate command to halt the system.**
   Once the system is halted, several system messages display. When messages finish, condition a or b below exists; respond as appropriate:

   a. The “ok” prompt displays; proceed to step 3.

   b. The screen below displays

```
Type b (boot), c (continue), or n (new command mode)
>
```

Type the following:

```
> n <return>
```

This yields the “ok” prompt.

3. **Enter the appropriate command to probe the system for SCSI-2 devices.**

   a. **To probe all SCSI-2 devices installed in the system:**

```
probe-scsi-all <return>
```

   b. **To confine the probe to SCSI-2 devices hosted by a specific on-board or SBus SCSI-2 host, substitute for variables *A* and *B* in the command below, where *A* is the board number (0-3) and *B* is the SCSI-2 host; 0 for on-board SCSI-2; 1, 2 or 3 for the corresponding SBus slot:**

```
probe-scsi-all /io-unit@f,eA200000/sbi@0,0/dma@B,81000 <return>
```

4. **Verify the drive in question is listed.**
   After entering the command above, a list of drives like the one below displays:

```
Target 0
      Unit 0 Disk < drive brand name>
Target 3
      Unit 0 Disk < drive brand name>
Target 5
      Unit 0 Tape < drive brand name>
Target 6
      Unit 0 Removable Read Only Device
```

   The “Target #” lines identify the SCSI-2 addresses of installed devices. If the address is listed for the device in question, installation was successful. If the address is absent, verify the cables are installed correctly.

5. **Reboot the system using the command below:**

```
reset <return>
```

   The screen goes blank for several seconds as the system reboots.

2.4 Precautions when Using POST

A system may appear to be hung or not communicating if the terminal is mistakenly connected to the wrong system board.

By convention, the system master is in slot 0. The factory ships systems in this configuration. It is possible POST may assign a new system master in a different slot if the original system master fails. If this occurs, correct it and install a fully functional system board in slot 0.

Note – POST does not test components and functions internal to SBus cards, disk drives, other peripheral devices, or interface cables. See diagnostic software manuals supplied with your system for test instructions.

To run POST, See Section 2.7, “Running OBP and POST.”

2.5 Precautions when Using OBP

An appropriately configured system board must be selected from among those available to become the system master. The method used to determine which board is the correct one to become the system master depends on the Boot PROM revision installed on the boards available.

- if any board has Boot PROM revision 2.11 or lower, see Section 2.5.1
- if all boards have Boot PROM revision 2.13 or higher, see Section 2.5.2

Note – Boot PROM version 2.12 released was never released.

2.5.1 System Boards with PROM Revision 2.11 (or Lower)

PROM revision 2.11 (or lower) uses master-nvram scheme to select the system master board. In multiple-board configurations, when the system is powered on for the first time, OBP may prompt you to select a system board to become the new master. This prompt will appear *only if*:

- The system does not recognize any board as the system master.
- More than one board is recognized as being qualified to function as the system master.

Caution – To see the OBP message prompt, the system master board must be connected to a terminal. If the terminal is connected to the *wrong* board, the message will not appear. The system may seem to be locked up, but OBP is only pausing, waiting for you to respond to the prompt.

The following example for a three board system shows the prompt and the recommended responses (`0` and `y`).

```
ttya initialized
Need to select system master from the following boards:
Board#0 -- nvram slave, Prom Version 2.11
Board#1 -- nvram slave, Prom Version 2.11
Board#2 -- nvram slave, Prom Version 2.11
Please enter the desired board#: 0
Are you sure? <y/n>: y
Resetting ...
```

If you enter an illegal board number, or select a board that has no SuperSPARC modules, OBP will prompt you for another selection.

If there is no terminal on the system, remove all system boards from the card cage except the one in slot 0. This action forces OBP to select the board in slot 0 board as the new master

Note – The system board in slot 0 must have at least one SuperSPARC module.

2.5.2 *System Boards with PROM Revision 2.13 (or Higher)*

PROM revision 2.13 uses auto-master scheme instead of master-nvram scheme to select the system master board, and then nvram information is automatically propagated to all boards.

If there is no system hardware error, OBP will select the POST master board (or the lowest board that has a functional CPU) as the system master board.

The auto-master scheme ignores the status of nvram master or slave.

If any system hardware error occurs after power on, then OBP will use the master-nvram scheme to select a system master. See Section 2.5.1.

To identify the system master while the system is booting, look for the one board back panel with flashing diagnostic LEDs. Figure 2-1 shows these LEDs and the CPU LEDs. Diagnostic LEDs on all other system boards will be *OFF*. After boot completes, the LED displays change:

- all system boards with modules display the same cycling LED pattern
- LEDs on system boards without SPARC modules are *ON* in a solid pattern

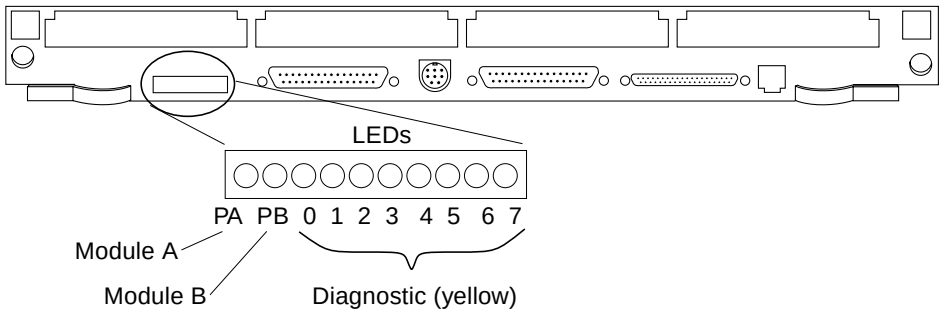


Figure 2-1 LEDs on System Board

The installer (or system administrator or service provider at a later time) can change the selection of the system master, but to maintain consistency between systems, the default selection should not be overridden.

To run POST, See Section 2.7, “Running OBP and POST.”

2.6 *Connecting a Terminal to the System Master*

Note – Halt the operating system before turning off system power or data may be lost.

1. **Connect a terminal to serial port A on the system master.**
   In UNIX, system master is identified by a cycling LED pattern 0-7 (yellow).

Note – Sun ships systems with the master board in slot 0. To be selected by POST as master board, a system board must have at least one SuperSPARC module, and must be the first such board located in the card cage. Install any moduleless boards in slots 1 or higher.

- When swapping system boards in a card cage, remember that the master board must connect with
  • root disk
  • system console
  If the console connects to the wrong system board, you will not see POST and OBP messages.

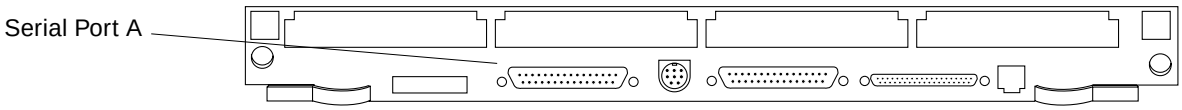


Figure 2-2 TTY Serial Port

2. **Set up the terminal.**
   Settings commonly used are:

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

Caution – The setup parameters may differ from the example shown. See the `set-defaults` and `printenv` commands in the *OpenBoot Command Reference*.

To shut down the system and give users a shutdown warning:

1. **Notify users that the system is going down.**
2. **Back up the system files and data to tape, if necessary.**
3. **Halt the system using the appropriate commands.**
4. **Wait for the system-halted message and the boot monitor prompt.**
5. **Turn the key switch to ⏻ (the standby position).**
   See Figure 2-3.

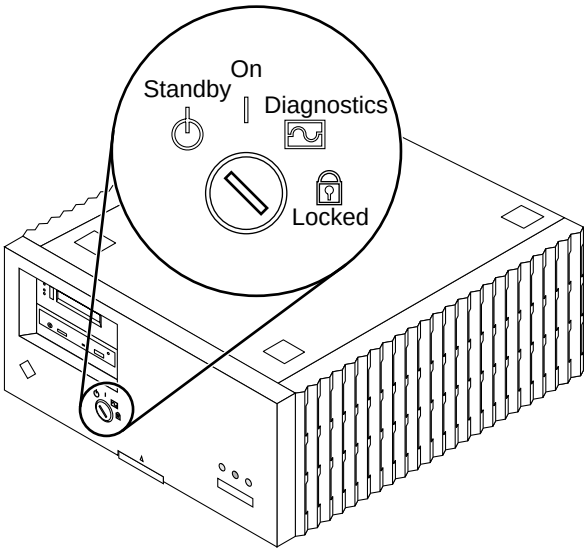


Figure 2-3 Key Switch

2.7 Running OBP and POST

1. **To reach and activate the reset switch:**
   a. **Remove the key from the key switch.**
   b. **Remove the front panel. Lift up on the latch at the bottom of the panel.** The top of the front panel rests in a grooved channel on the system top front edge. Once unlatched, the front panel lifts off. See Figure 2-4.
   c. **Insert the back of a pencil or other narrow object into the small opening in the center of the metal face plate and press the reset button.** See Figure 2-5.
2. **After the system has been reset, replace the front plastic panel.** Rest the top of the front panel in the grooved channel on the top panel. Push in on the lower portion of the front panel until it snaps back into place.
3. **Return the key to the key switch.**

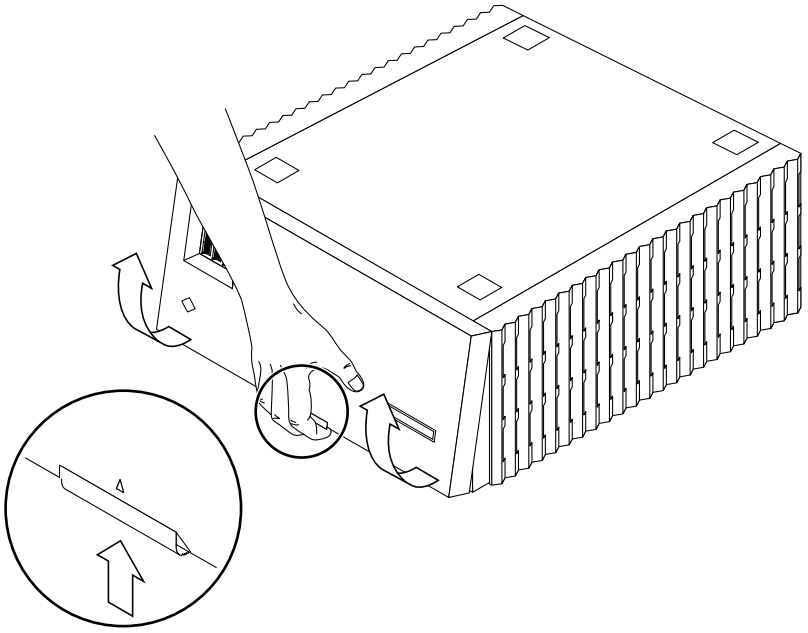


Figure 2-4 Removing the Front Panel

Warning – Once the system is operating, do not move or attempt to move the SPARCserver 1000 with the system power on. Failure to heed this caution may result in catastrophic disk drive failure. Always power the system off completely before attempting a move.

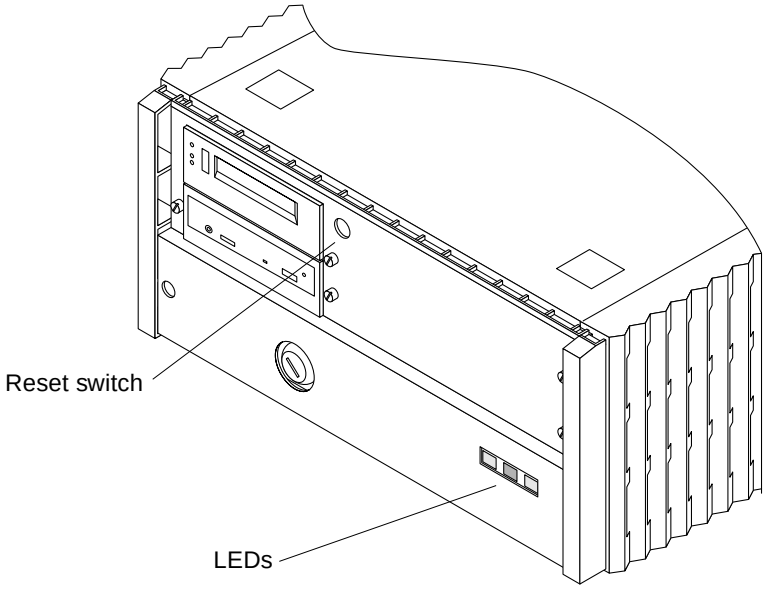


Figure 2-5 Reset Switch and Status Indicators

4. **Start the diagnostic menu from the OpenBoot PROM (OBP) mode, as follows (OBP is identified by an `ok` prompt):**
   - If the system is in OBP, enter the following in sequence:

     `reset` at the keyboard
     `v` key
     `s` key
   - If the system is in an unknown state, press the following in sequence:

     system Reset switch (See Figure 2-5)
     `v` key
     `s` key

   An example terminal display is shown below.

```
<#2> ok reset
Resetting...
1A>
 *** Toggle Verbose Flag = 1 ***

1A>
```

```
 *** Toggle Stop POST Flag = 1 ***

1A>
DEMON
1A>Select one of the following functions
1A>    '0'        System Parameters
1A>    '1'        Read/Write device
1A>    '2'        Software Reset
1A>    '3'        NVRAM Management
1A>    '4'        Error Reporting
1A>    '5'        Analyze Error Logs
1A>    '6'        Power Off at Main Breaker
1A>    '7'        NVRAM SIMM tests
1A>    'r'        Return to selftest
1A>
Command ==>
```

5. Type `0` to enter the System Parameters submenu.

```
Command ==> 0
1A>
System Parameters
1A>Select one of the following functions
1A>    '0'         Set POST Level
1A>    '1'         Dump Device Table
1A>    '2'         Display System
1A>    '3'         Dump Board Registers
1A>    '4'         Dump Component IDs
1A>    '5'         Clear Error Logs
1A>    '6'         Display Simms
1A>    '7'         Scrub Main Memory

1A>    'r'         Return
```

6. Type `2` to display the system status.
(The display below is an example. Your display will vary with options actually installed.)

```
Command ==> 2
0A>TEST FAILED - CO MQH.Memory ID 30.5 LED 0x1E
0A>Uncorrectabgle Error Bd 0 SIMM Group  (0,0,3800,0)
0A>Group disabled, too many errors : board 3 XDBus 0 group 0
ECC Error Board 3 XDBus 0 Group 0 SIMM Group (2800,2900,3000,3100) Address 00001780
0AWARNING Board 0 has failed POST
0AWARNING Board 1 has failed POST
0AWARNING Board 2 has failed POST
0AWARNING Board 3 has failed POST
0A>  (0=failed,1=passed,blank=untested/unavailable)
     (sbus 1=card present,0=card not present,x=failed)
0A>----+----+---+---+----+---+---+--+----+----+---+----+
0A>Slot|cpuA|bw0|cpuB|bw0|bb|ioc0|sbi|mqh0|mem|sbus|xd0|
0A>----+----+---+---+----+---+---+--+----+----+---+----+
0A>  0 | 1  | 1 |    |    | 1|  1 | 1 | 1  | 64|1001| 1 |
0A>  1 | 0  |   | 0  |    | 0|  1 | 1 | 1  |128|0001| 1 |
0A>  2 | 0  |   | 1  | 1  | 1|  1 | 1 | 1  |128|0001| 1 |
0A>  3 | 1  | 1 | 1  | 1  | 1|  1 | 1 | 1  |128|0001| 1 |
0A>----+----+---+---+----+---+---+--+----+----+---+----+
0A>
0A>Memory Group Status
   (0=failed,1=passed,m=simm missing,c=simm mismatch,blank=unpopulated/unused)
0A>+---+------+------+------+------+
0A>Slot|  g0  |  g1  |  g2  |  g3  |
0A>+---+------+------+------+------+
0A>  0 |   1  |   1  |   0  |      |
0A>  1 |   1  |   1  |      |      |
0A>  2 |   1  |   1  |   1  |   1  |
0A>  3 |   0  |      |      |      |
0A>+---+------+------+------+------+
0A>Hit any key to continue :
```

As noted in headers in the example, “0” in the sbus section denotes the SBus slot is empty. “0” in any other test category denotes the test failed.

Note – Before replacing a system board, connect a terminal to the board in question and initiate POST to gain details about the failure. In the example above, you would connect the terminal the board in slot 0, 1, 2 or 3, then press the reset button to initiate POST.

Table 2-1 describes in more detail the fields in the system status display.

Table 2-1 Terms Used in the System Status Display

Term	Meaning	Comment
Slot	card cage slot number	
cpuA, cpuB	SuperSPARC module slot A or B	0 = module failed 1 = not present Blank = not present
bw0, bw1	SuperSPARC module detected on system bus	0 = SuperSPARC module is not present on bus 1 = SuperSPARC module is present
bb	boot bus communication	if fail, connect terminal to involved board and initiate POST
ioc0, ioc11	SBus to system bus communication	if fail, replace system board
sbi	SBus to system bus communication	if fail, replace system board
mqh0, mqh1	SIMM to system bus interface	if fail, replace system board
mem	total memory on system board	# = size of memory, in megabytes
sbus	SBus card in slot 3, 2, 1, or 0	0 = card not present 1 = card present
xd0, xd1		if fail, replace system board

7. To test for memory failure, return to the main menu by typing r, then type 3 to enter the NVRAM Management submenu.

```
Command ==> r
0A>
DEMON
0A>Select one of the following functions
0A> ‘0’ System Parameters
0A> ‘1’ Read/Write device
0A> ‘2’ Software Reset
0A> ‘3’ NVRAM Management
0A> ‘4’ Error Reporting
0A> ‘5’ NVRAM SIMM tests
0A> ‘r’ Return to selftest
Command ==> 3
0A>
Bootbus NVRAM Management
0A>Select one of the following functions
0A> ‘0’ Print Bad Group List
```

```
0A> ‘1’ Clear Bad Group List
0A> ‘2’ Print Bad Page List
0A> ‘3’ Clear Bad Page List
0A> ‘r’ Return to Main menu
0A>
Command ==>
```

8. Type 0 to list bad groups of memory.

```
Command ==> 0
0A>Bad Memory Groups on System

0A>No Bad groups found
0A>Hit any key to continue :
0A>
0A>
Bootbus NVRAM Management
0A>Select one of the following functions
0A> ‘0’ Print Bad Group List
0A> ‘1’ Clear Bad Group List
0A> ‘2’ Print Bad Page List
0A> ‘3’ Clear Bad Page List
0A> ‘r’ Return to Main menu
0A>
Command ==>
```

9. Type 2 to list any bad pages of memory.

```
Command ==> 2
0A>Bad Memory Pages in System

0A>No Bad pages found
0A>Hit any key to continue :
0A>
0A>
Bootbus NVRAM Management
0A>Select one of the following functions
0A> ‘0’ Print Bad Group List
0A> ‘1’ Clear Bad Group List
0A> ‘2’ Print Bad Page List
0A> ‘3’ Clear Bad Page List
0A> ‘r’ Return to Main menu
0A>
Command ==>
```

10. **To exit the menu, press r to return to the main menu, then press r again to return to the self test.**

2.8 Interpreting System Board LEDs

If no terminal is present, inspect front panel LEDs for a POST- found problem.

Note – The middle (yellow) LED should light while POST is running, then turn off when POST ends. In normal operation, both green LEDs should be on, and the middle LED should be off.

If the front panel LEDs indicate a problem, look at the status LEDs on the system boards to determine which board has the problem.

2.8.1 While POST Is Running

With the key switch in On position, POST should finish in one minute or less. Do not use the diagnostic position; extended diagnostics take much longer and display detail usually not useful to the field engineer.

Note – Severe hardware problems can cause POST to retry a test and the LED codes on a board may be reset. (This situation is called a *watchdog reset*.) The preferred method of using POST is with a terminal.

2.8.2 After POST Ends

After the system has booted, the left and right (green) front panel LEDs should be lit, and the middle (yellow) LED should be off.

On system boards with SuperSPARC modules, one or two green LEDs, (PA and PB) should be lit; all yellow LEDs should cycle in a repeating pattern.

On system boards lacking SuperSPARC modules, both green LEDs should be off, and the yellow LEDs should be lit in a solid pattern.

Note – A system board can be installed without SuperSPARC modules to provide additional SBus slots or serve as a memory expansion board.

On any system board, if the eight yellow LEDs are off, the board is not functioning. However, if *all* system boards show errors, a faulty common unit is indicated. Candidates may be the control board, backplane, or power supply.

2.9 Disabling and Enabling the Link Integrity Test

If the network hub does not use the 10BaseT Link Integrity Test, the system may report “no carrier” and be unable to transmit. If this occurs, disable the link integrity test (the default state for Sun equipment). This test can be disabled or enabled on some SBus cards using a jumper. However, for consistency in maintenance, disable the test using software commands below.

For a single network, disable the test using the command below:

At the ok prompt, enter: **`false set-tpe-test`**

For a system connected to two or more networks, program the system NVRAM using statements is the type:

```
false " <Ethernet-node1-pathname>" " set-tpe-test" execute-device-method drop
false " <Ethernet-node2-pathname>" " set-tpe-test" execute-device-method drop
false " <Ethernet-node3-pathname>" " set-tpe-test" execute-device-method drop
(Repeat for additional nodes.)
```

If you need to re-enable testing at the server, use the command below:

At the ok prompt, enter: **`true set-tpe-test`**

2.10 SuperSPARC Modules

When adding or moving SuperSPARC modules, fill all A slots in the system before filling B slots. See Chapter 11, Section 11.3, “SuperSPARC Modules” for module location and replacement procedure.

2.11 SIMMs and NVSIMMs

POST will identify failed SIMMs or NVSIMMs. See Chapter 11, Section 11.5, “SIMMs and NVSIMMs” for location and replacement procedure.

Troubleshooting Flow Diagrams 3

This chapter presents strategies for quickly locating faulty hardware.

Use Table 3-1 to locate the flow diagram section that applies to your problem.

Table 3-1 Problem Areas

Problem Area	**Flow Diagram Branch**	**Reference**
Physical system and connections	A	Figure 3-2
Control Board	A.1	Figure 3-3
Faulty SuperSPARC module	A.2	Figure 3-4
Power-on self-tests (POST)	B, B.1	Figure 3-5 and Figure 3-6
Faulty CPU motherboard	A.2, B.1	Figure 3-4 and Figure 3-6
Faulty SIMM	B.2	Figure 3-7
Faulty SBus card	B.3	Figure 3-8
System does not boot	C, D	Figure 3-9 and Figure 3-10
System configuration	C, D	Figure 3-9 and Figure 3-10
Wrong boot path	D	Figure 3-10
Network configuration	E	Figure 3-11
Client boot status	E.1, E.2, E.3	Figure 3-12
Ethernet error messages	E.4	Figure 3-13

3.1 Flow Diagrams

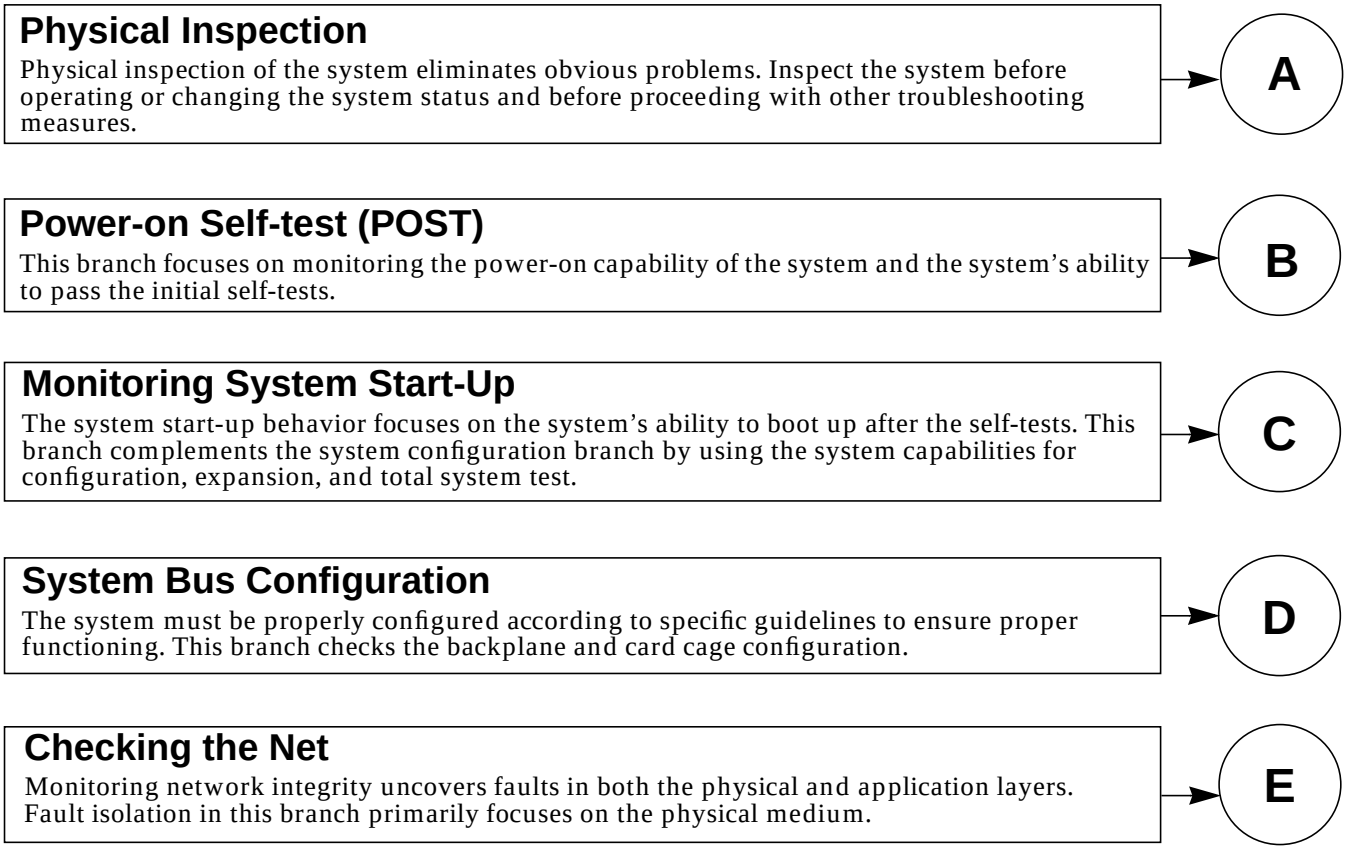


Figure 3-1 Troubleshooting Flow Diagram Overview

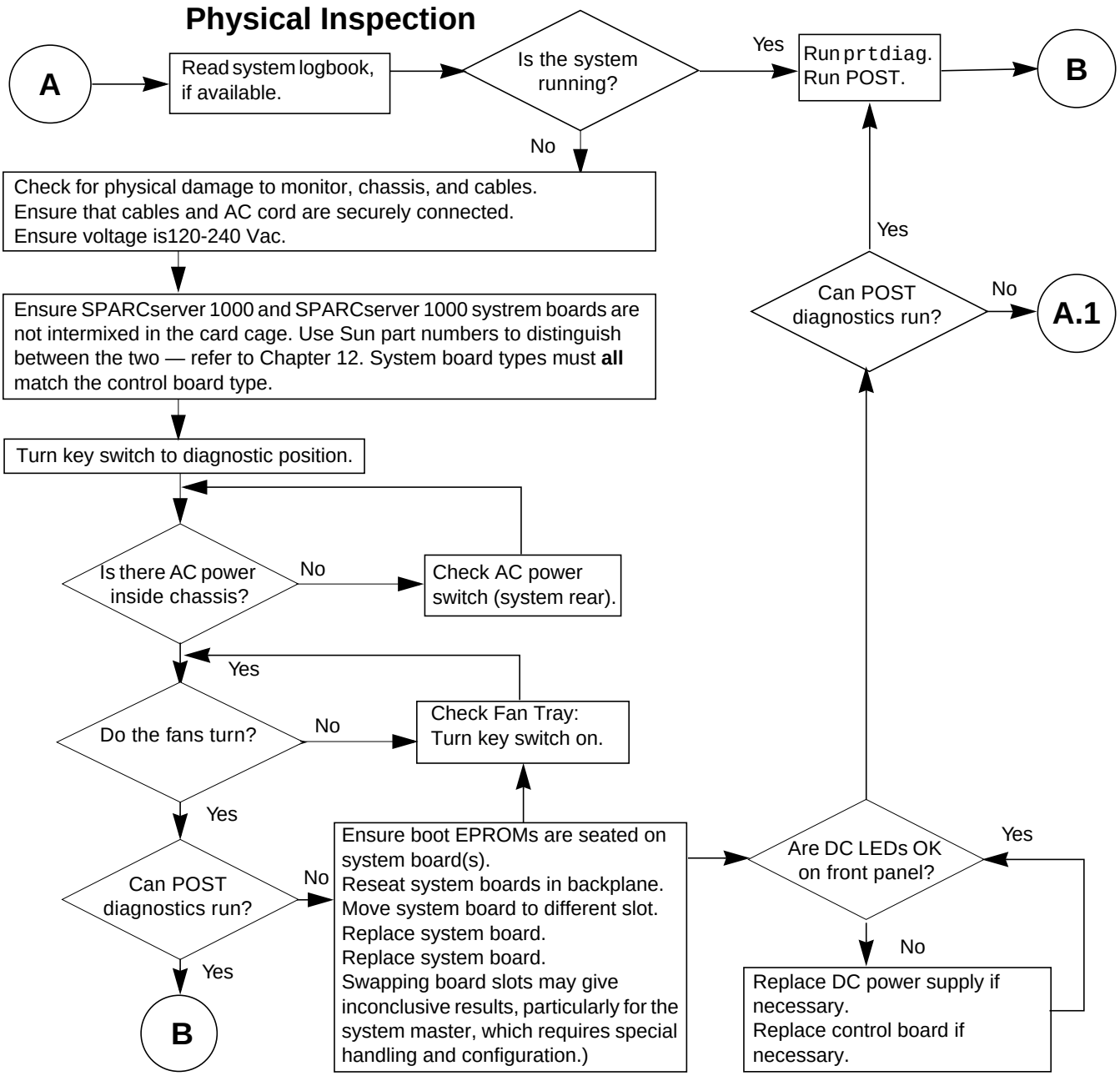


Figure 3-2 Branch A: Physical Inspection

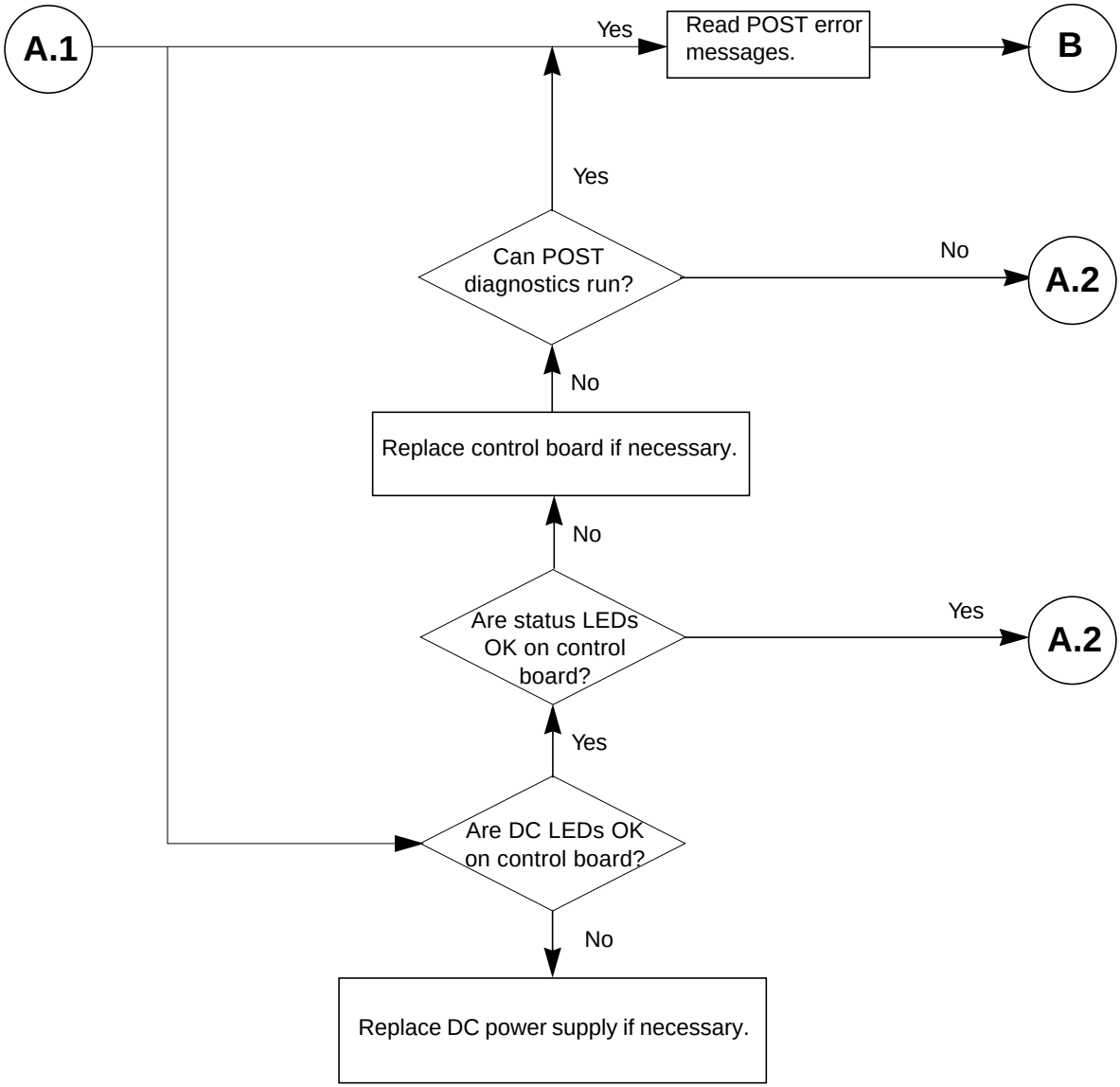


Figure 3-3 Branch A.1: Control Board

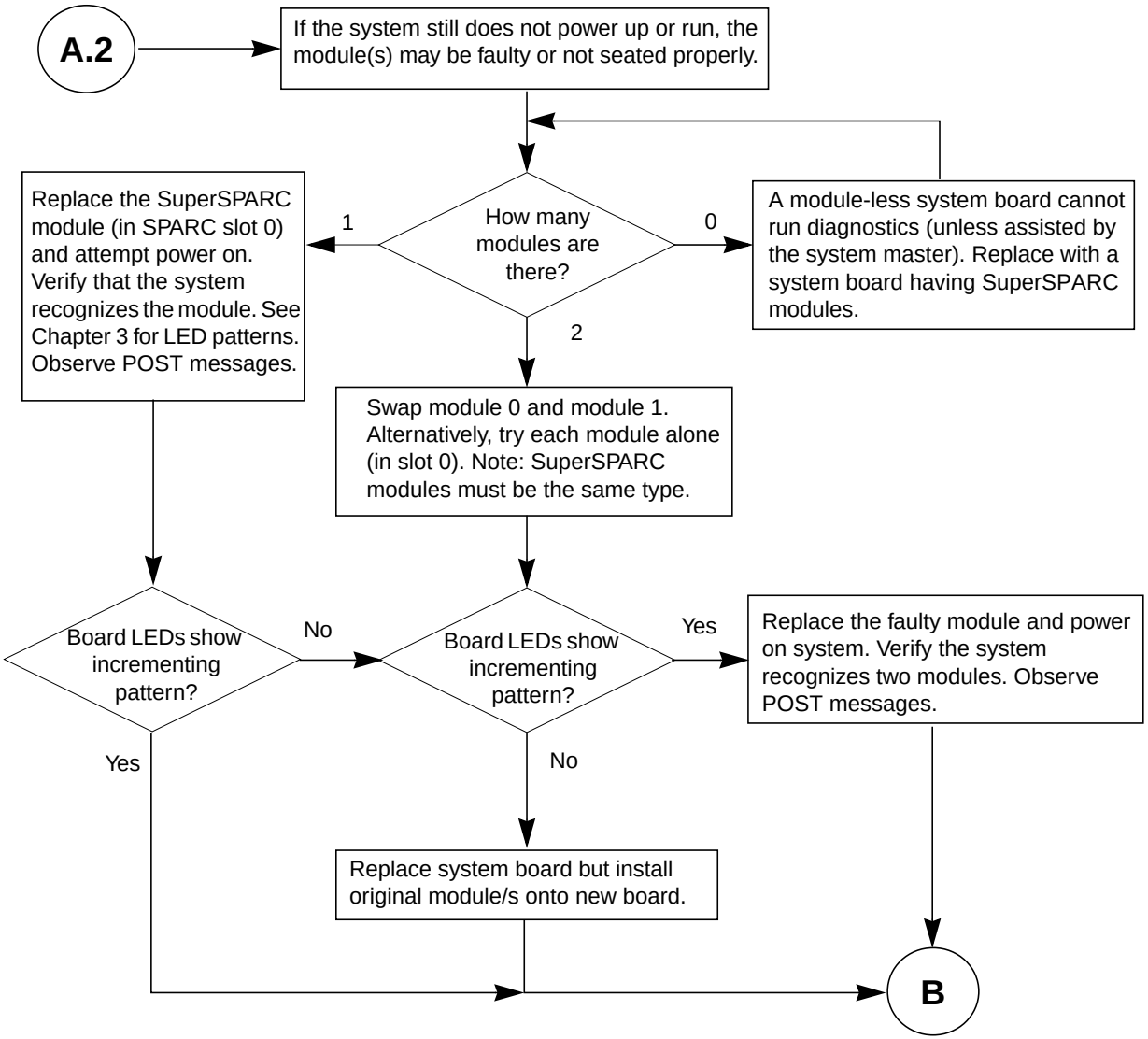


Figure 3-4 Branch A.2: Checking the SuperSPARC Modules

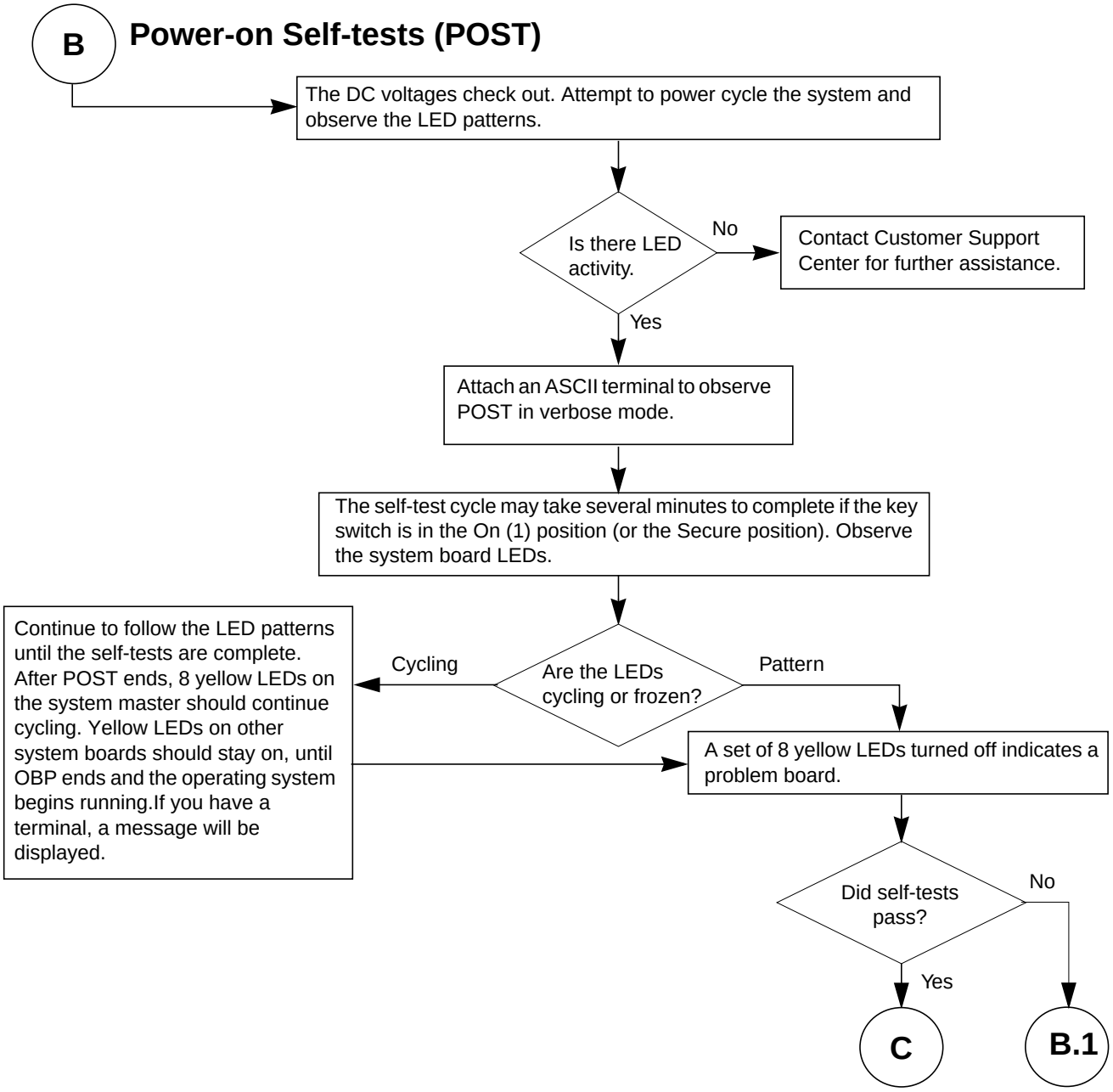


Figure 3-5 Branch B: Power-on Self-test (POST) Functions

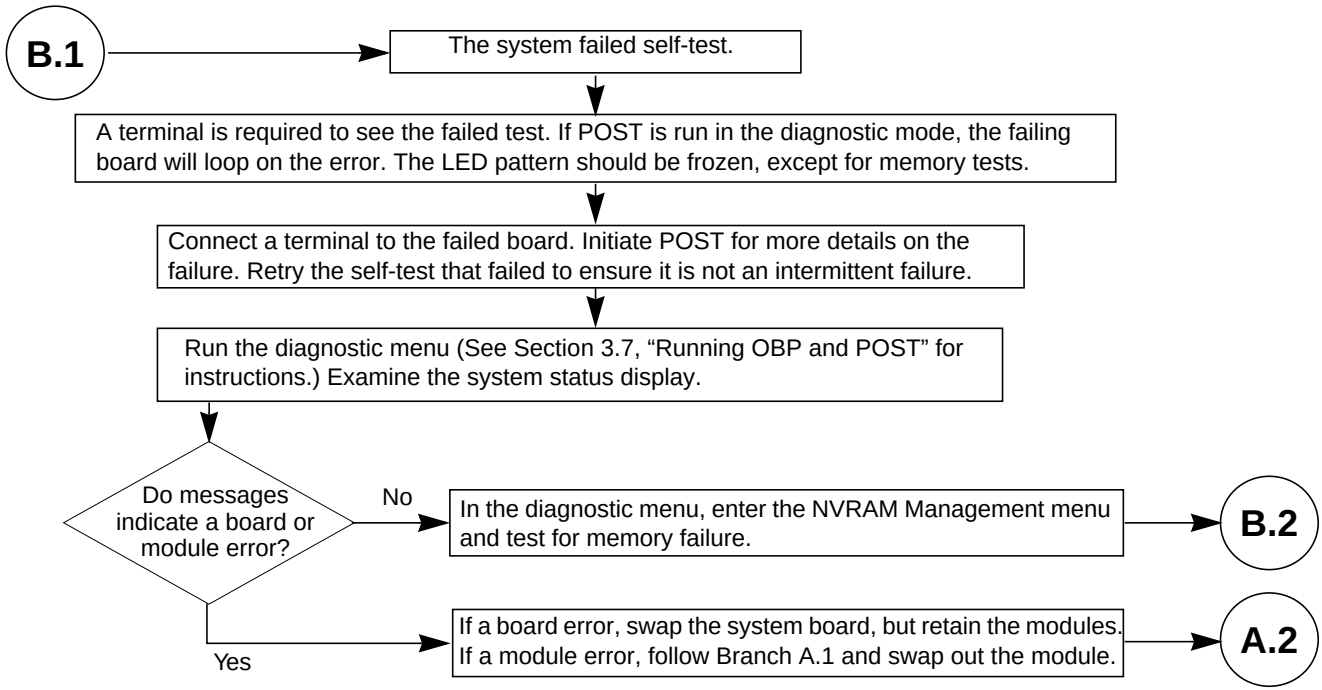


Figure 3-6 Branch B.1: Fails Self-Test

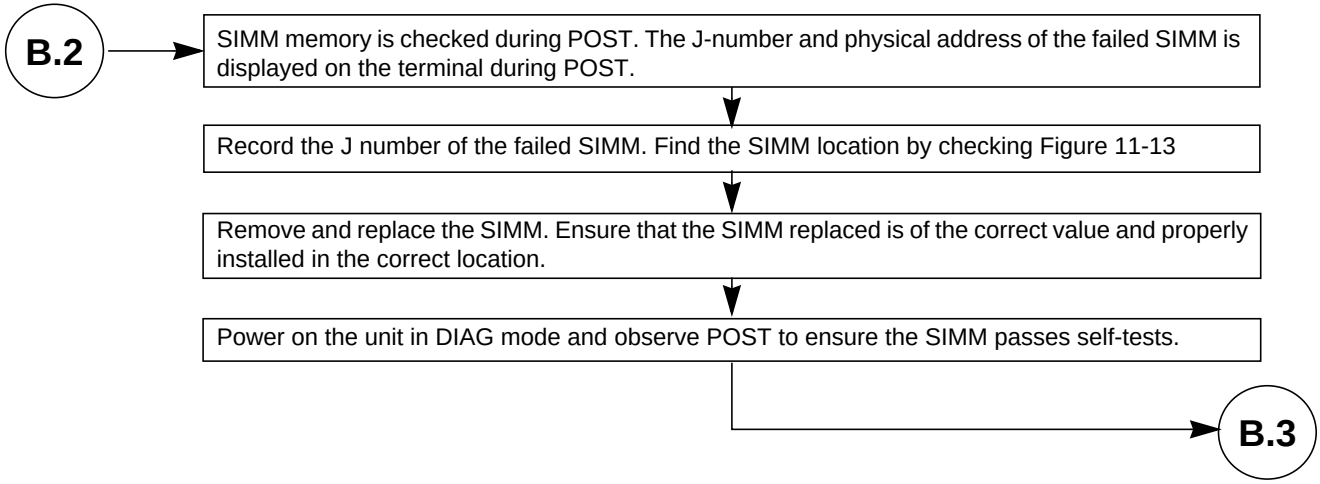


Figure 3-7 Branch B.2: SIMM Memory Fault

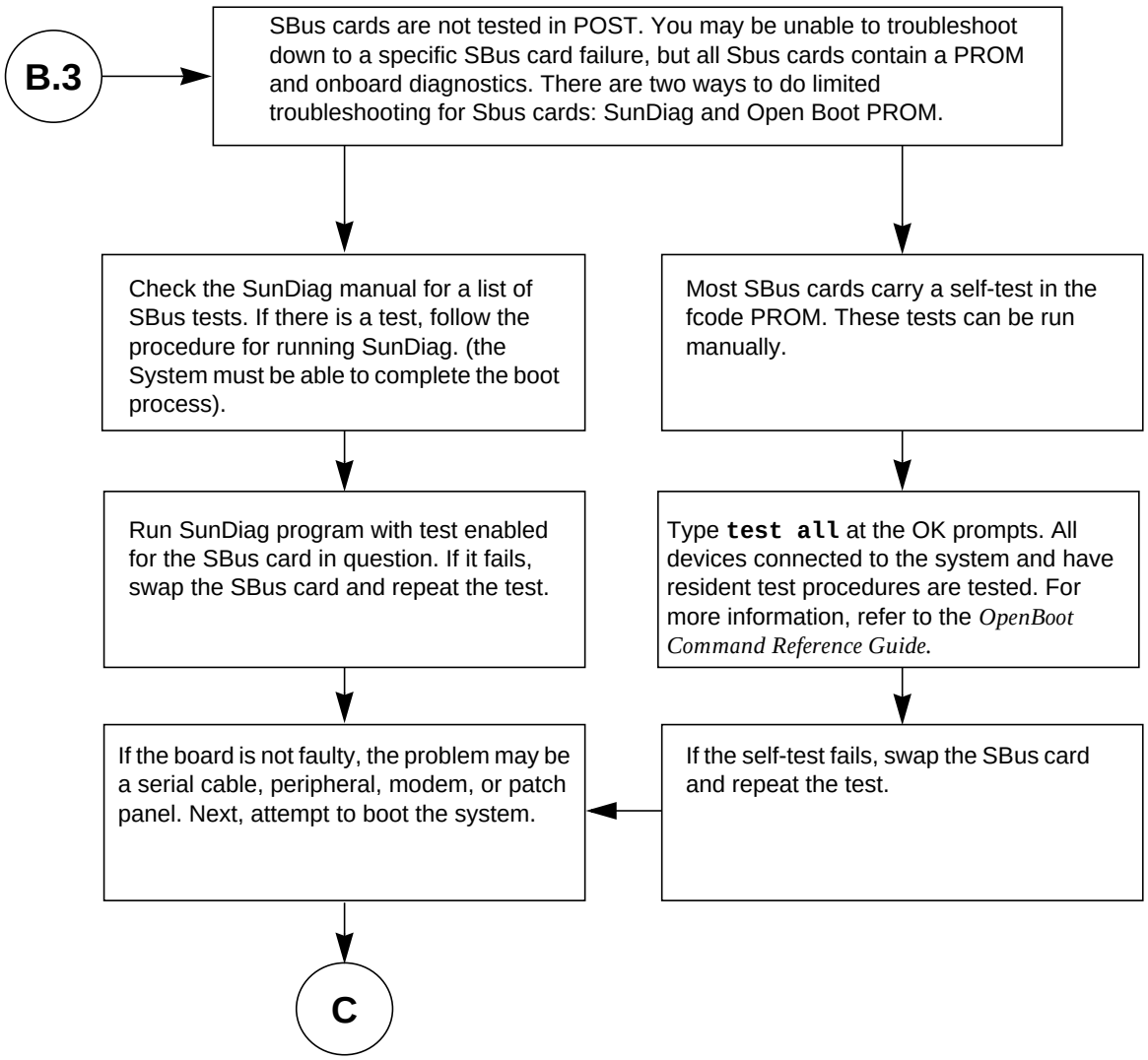


Figure 3-8 Branch B.3: SBus Card Fault

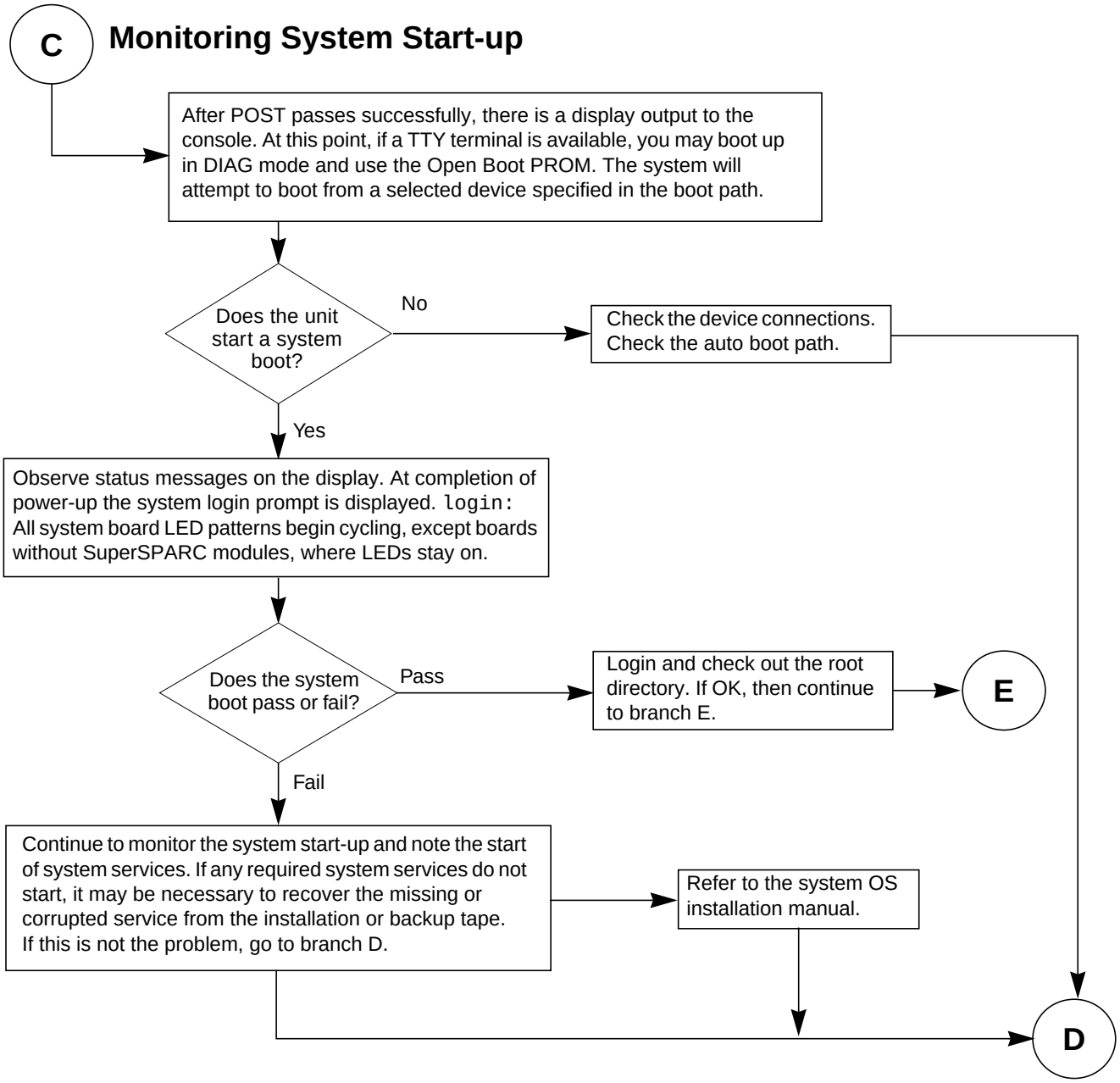


Figure 3-9 Branch C: Monitoring the System Boot-up

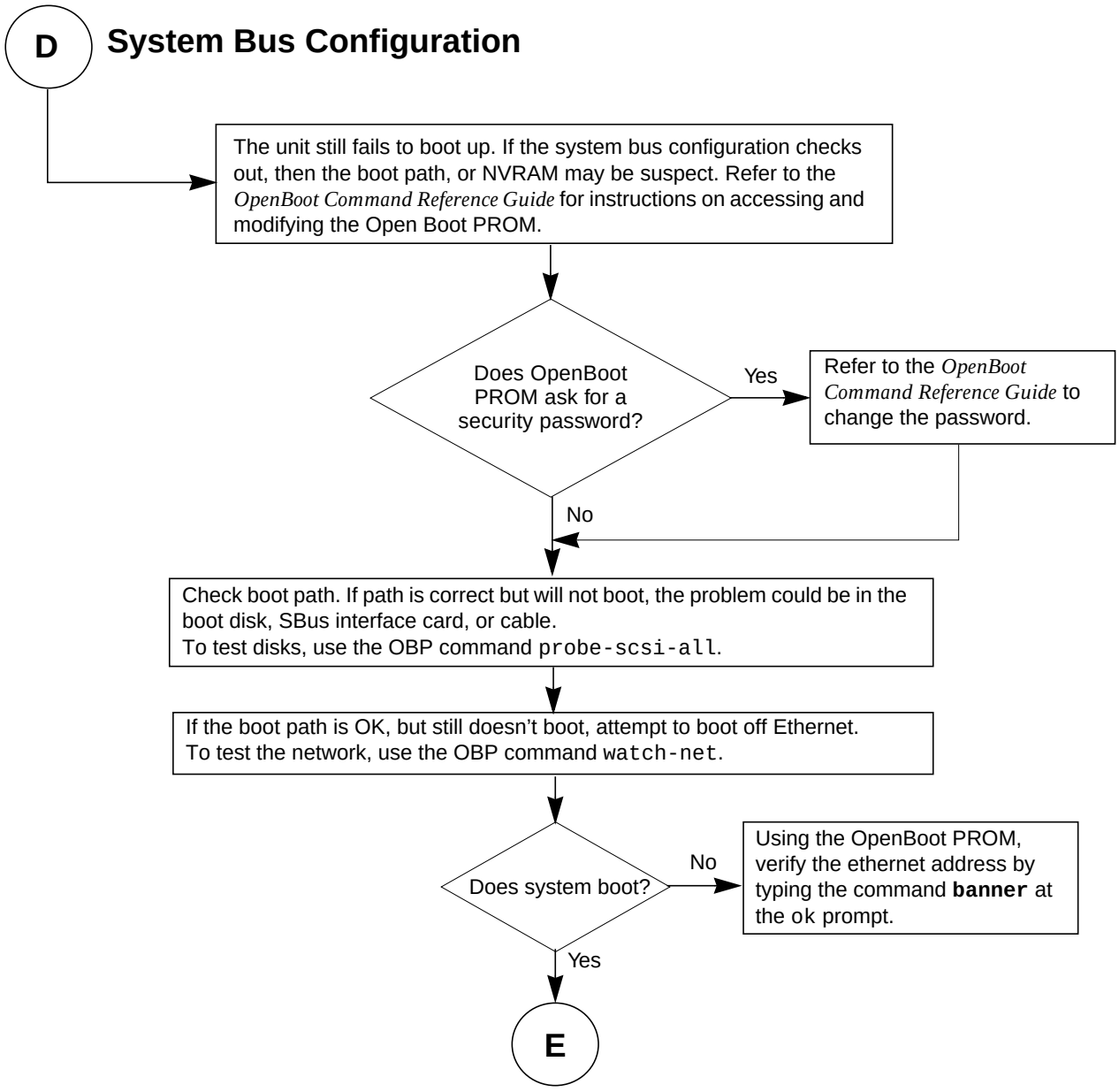


Figure 3-10 Branch D: Checking Boot Path and NVRAM

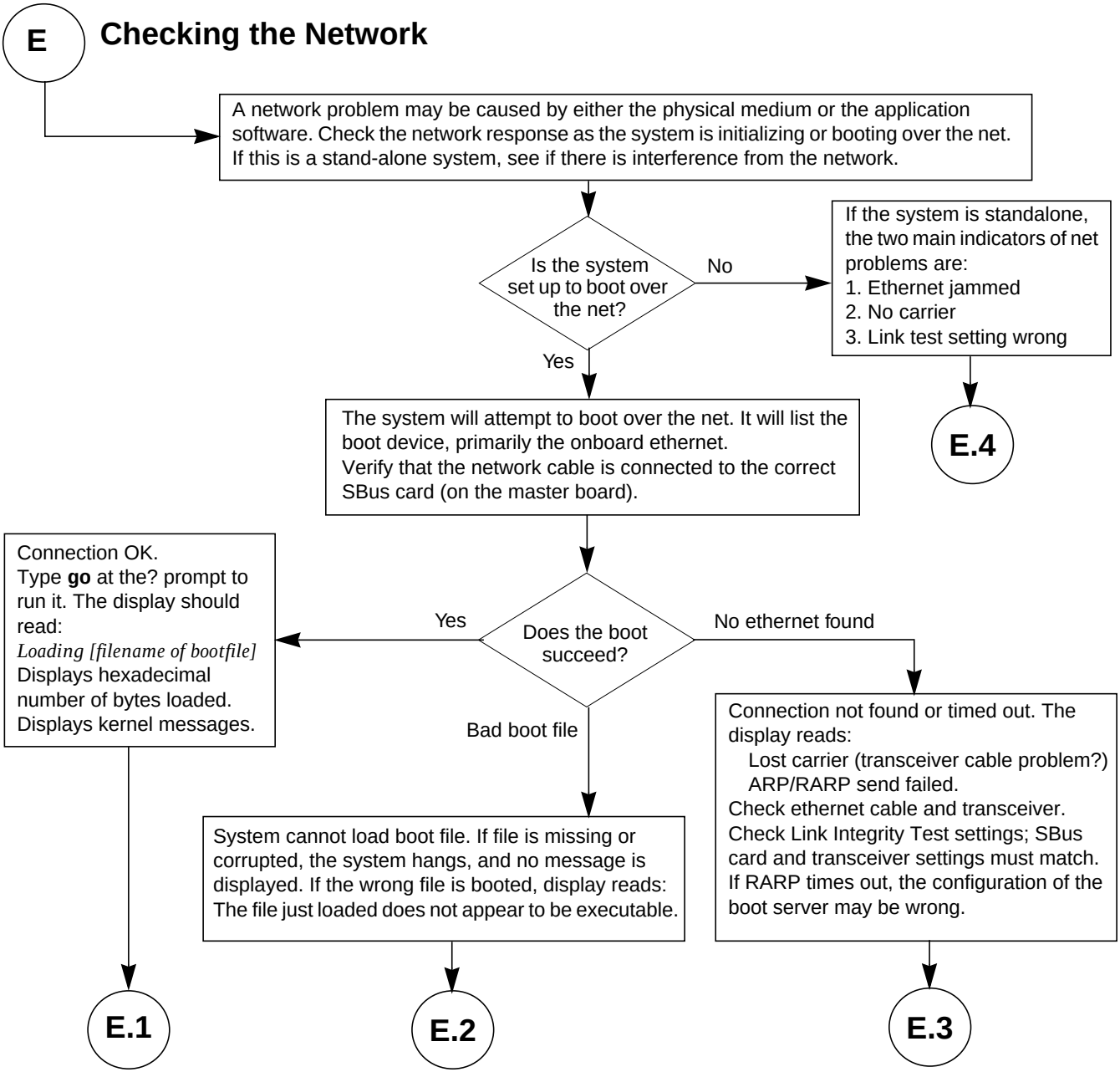


Figure 3-11 Branch E: Checking the Neta

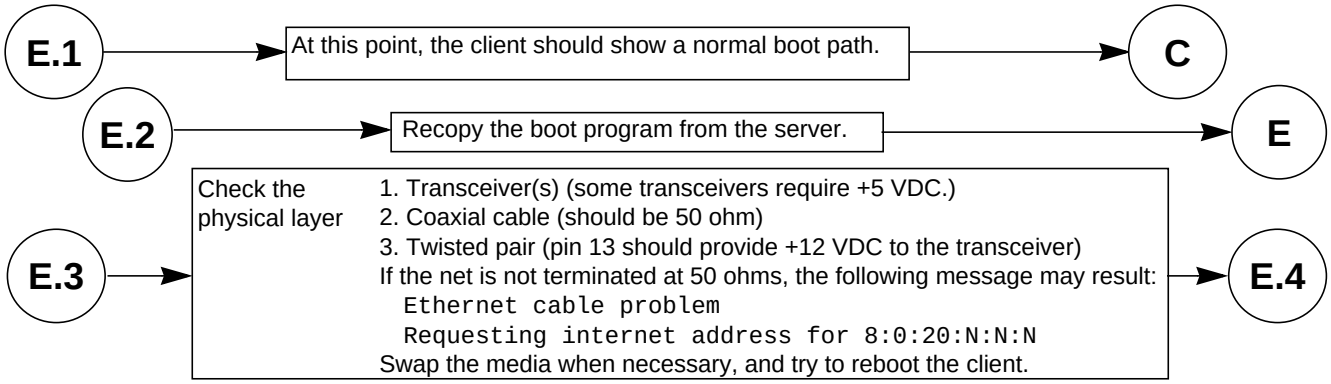


Figure 3-12 Branches E.1, E.2, and E.3: Client Boot Status

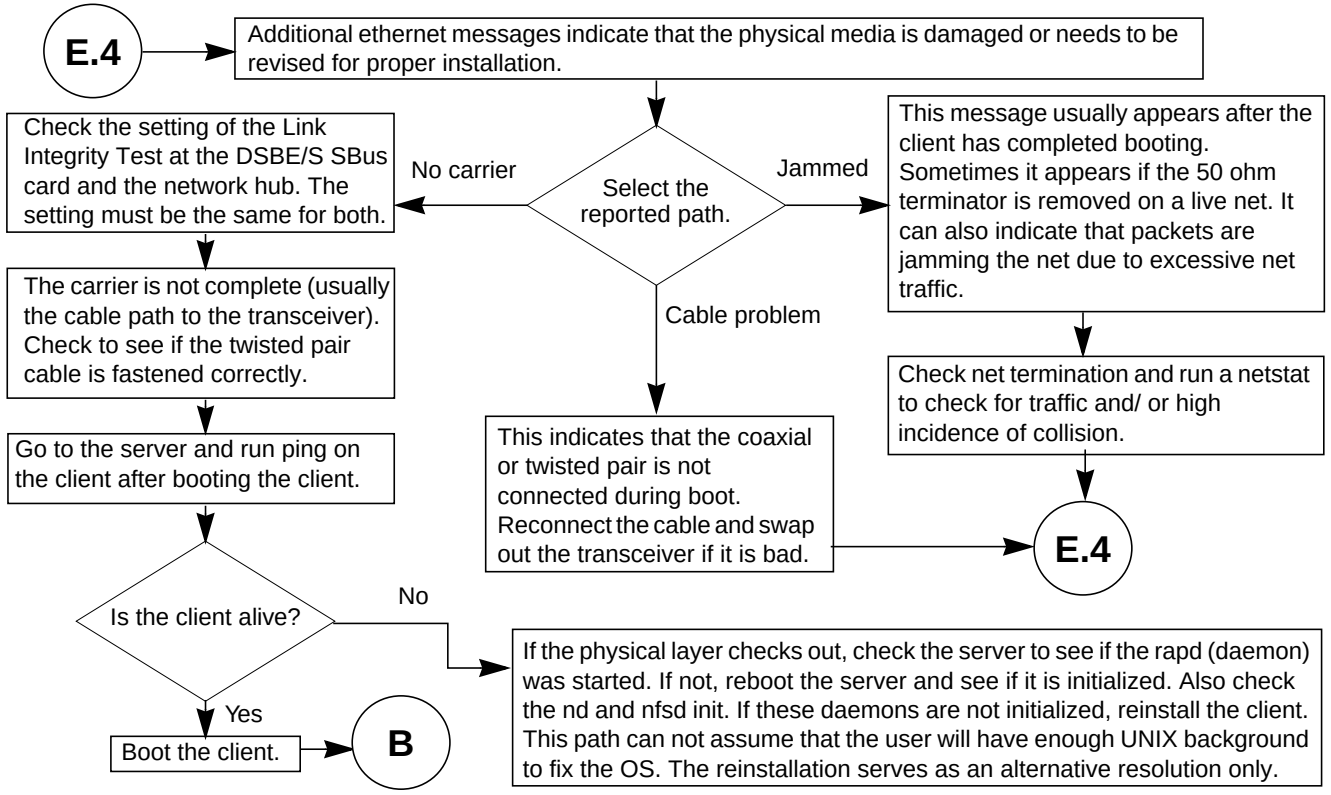


Figure 3-13 Branch E.4: Additional Ethernet Messages

Part 3 — Preparing for Service

Safety and Tools Requirements 5

This chapter covers the procedures and information you need to know before you begin servicing your SPARCserver 1000 system.

5.1 Safety Precautions

Caution – Use **the Sun ESD kit provided** when working on the SPARCserver 1000. This kit contains the Sun approved Sun ESD mat which has cushioning to protect underside components, prevent board flexing, and provide ESD protection. Instructions for use are printed on the mat.

To protect yourself and the equipment, observe the following precautions when working on or in the server.

Table 5-1 Safety Precautions

Item	Problem	Precaution
Springfingers	Personal injury	The springfingers have sharp edges. Use care when handling springfinger-equipped cabinet screens and system boards.
AC cord	ESD (Electrostatic discharge)	Ensure the AC cord connects the server to a grounded electrical outlet. This cord provides a ground path for the unit to bleed off electrostatic charge.
Wrist strap or Foot strap	ESD	Wear a conductive wrist strap or foot strap when handling printed circuit boards. Proper use of a conductive strap reduces the risk of damage to the boards by discharging static electricity to ground.
ESD mat	ESD	Use the Sun ESD kit provided when working on a printed circuit board[1]. The mat provides ESD protection when used with a wrist- or foot strap. The mat cushions the board to prevent breakage of components that contact the bench surface.
PC boards	ESD	Handle the PC board by the edges only. Store the board in an anti-static bag.
PC boards	Trace damage by board flexing	Hold the PC board by the edges near the middle. Do not support the board by the ends only.
Cover panels	System damage and overheating, regulatory compliance	Install all cover panels after performing service work on the system. The panels keep out foreign objects to prevent physical damage to internal parts and guide airflow to prevent overheating. Also, certain panels are required for regulatory compliance.
Airflow restrictor boards	System damage and overheating	Install airflow restrictor boards in all unused card cage slots. Unused, open slots severely reduce the cooling capability of the system and can lead to equipment damage from overheating.

1. A disposable EDS kit can lose effectiveness after a single use.

5.2 Tools Required

Have the following tools available before you begin:

- Sun ESD mat and grounding wrist strap
- #0 and #1 Phillips screwdriver
- Flat-blade screwdriver

Powering Off and On 6

Use the information in this chapter to power off and on the system.

6.1 Powering Off the System

Once the diagnostics are completed, you can remove the TTY terminal. However, do not disconnect the terminal while the system is running.

Before turning off the system power, halt the operating system.

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

To shut down the system and give users a shutdown warning:

1. **Back up the system files and data to tape, if necessary.**
2. **Notify users that the system is going down.**
3. **Halt the system using the appropriate commands.**
4. **Wait for the system-halted message and the boot monitor prompt.**

5. **Turn the key switch on the front panel to the Standby position (fully counterclockwise).**
   See Figure 6-1.

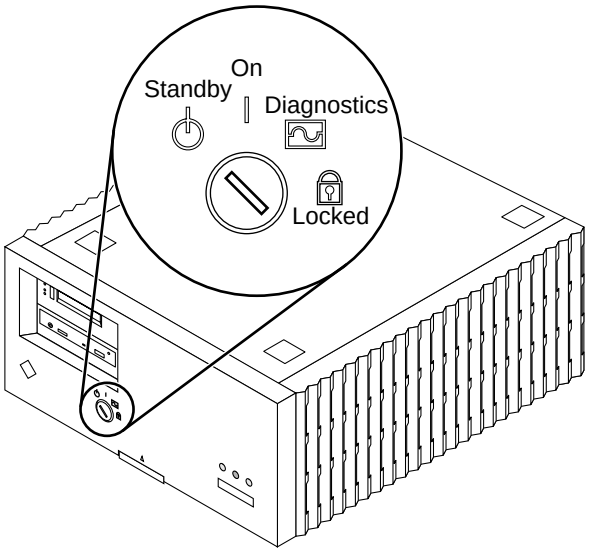


Figure 6-1 Key Switch in the Standby Position

6. **Turn the AC power switch on the system rear to off.**
   See Figure 6-2.

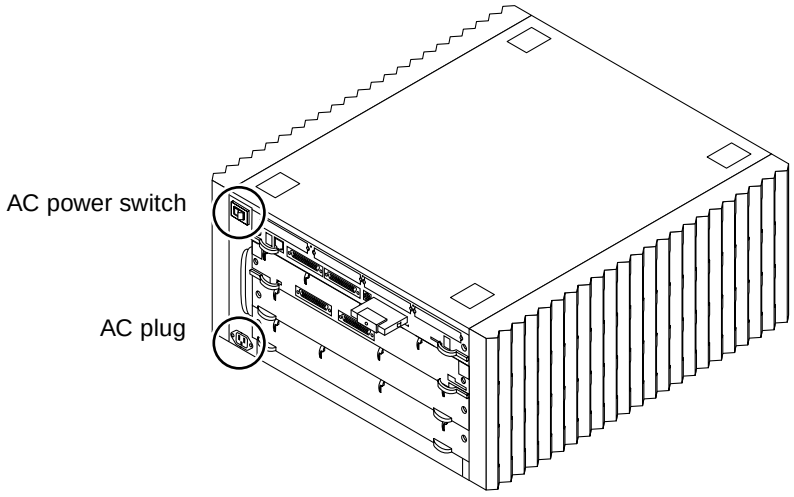


Figure 6-2 AC Power Switch and Plug

6.2 *Restarting the System*

Note – As the system starts up, watch for error messages from the POST diagnostic program. If a terminal is not connected, locate a TTY terminal before continuing the installation. See Chapter 3, Section 3.6, “Connecting a Terminal to the System Master” for connecting and setting the terminal.

1. **Begin with a safety inspection of the system.**
   a. **Ensure the key switch on the front panel is in the Standby position.** See Figure 6-1.
   b. **Ensure the AC power switch on the system rear is off.**
   c. **Verify the power cord is plugged into the server and a wall socket.**
2. **Turn on the TTY terminal.**
3. **Turn on the AC power switch on the rear panel.**
4. **Turn the key switch to the on position.**
   See Figure 6-3. You should see and hear several things happen:
   - Fans begin turning.

- The left front panel LED (green) turns on immediately to indicate the DC power supply is receiving current.
- The middle front panel LED (yellow) lights while POST runs for approximately 60 seconds. After 60 seconds, this LED turns off if the tests do not fail. If the LED remains lighted after 60 seconds, a test has failed.
- The right front panel LED (green) lights to show that booting is successful and the operating system is running. If this LED does not turn on and the middle LED is on, a severe hardware fault exists.

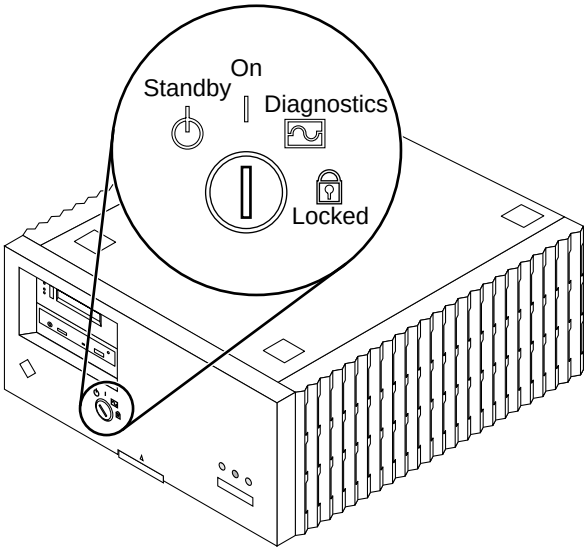


Figure 6-3 Key Switch in On Position

Warning – Never move the system when the power is on. Failure to heed this warning may result in catastrophic disk drive failure. Always power the system off before moving it.

5. **Watch the terminal screen for possible error messages from the POST diagnostic program.**
   POST tests subassemblies in the server and some interface paths between subassemblies.

   At the conclusion of testing, POST automatically attempts to reconfigure the system, omitting any parts of the system that have failed diagnostics.

   If there are no faults, or if POST completes a successful reconfiguration of the detected faults, the system boots.

If you wish to run diagnostics again, or if the system hangs, you need to press the reset switch behind the front panel. To access the reset switch:

1. **To reach and activate the reset switch:**

   a. **Remove the key from the key switch.**

   b. **Remove the front panel. Lift up on the latch at the bottom of the panel.** The top of the front panel rests in a grooved channel on the system top front edge. Once the bottom latch is opened, the front panel lifts off (Figure 6-4).

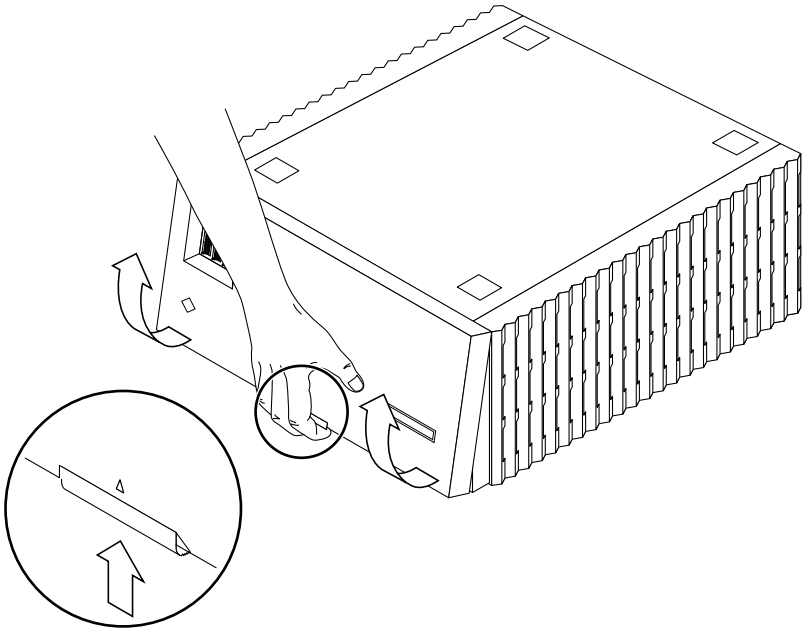


Figure 6-4 Removing the Front Panel

2. **Insert the back of a pencil or other narrow object into the small opening in the center of the metal face plate and press the reset button.**
   See Figure 6-5.

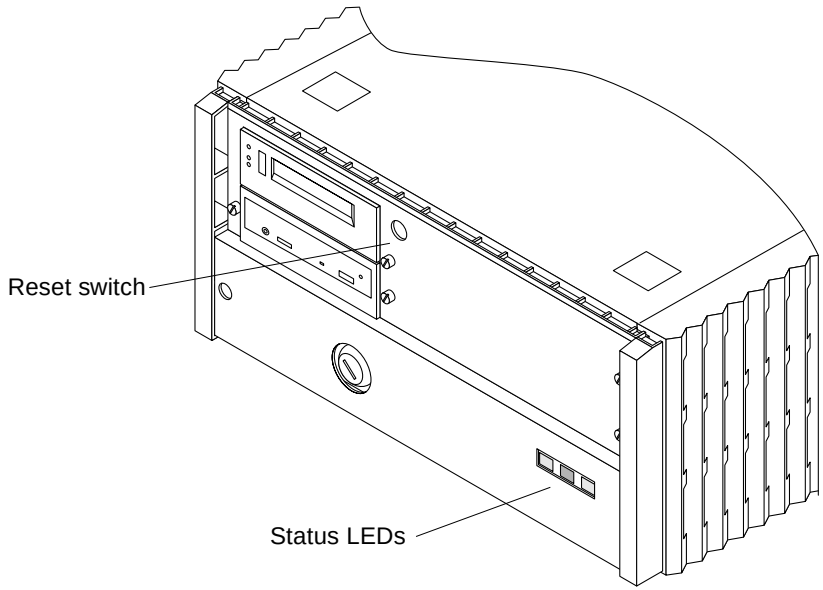


Figure 6-5 Reset Switch (Behind the Front Panel) and Front Panel Status LEDs

3. **After the system is reset, replace the front plastic panel.**
   Rest the top of the front panel in the grooved channel on the top panel. Push in on the lower portion of the front panel until it snaps back into place.

4. **Return the key to the key switch.**

Warning – Once the system is started, do not move or attempt to move the chassis with system power on. Failure to heed this caution may result in catastrophic disk drive failure. Always power the system off completely before attempting a move.

6.3 Boot Messages

Use boot software messages to verify all options are installed and recognized by the system. After POST completes self-test, a message like the following will appear on your screen. The message lists hardware components detected by the system.

```
<<<< SPARCserver 1000 POST V4.1 >>>>
    ... (various test messages) ...
SPARCserver 1000 Series No Keyboard
ROM Rev. -.-, --- MB Memory installed, Serial #---.
Ethernet address -:-:--:-:--:--, Host ID: ------.
```

Note – This screen display is an example only. The actual message displayed on the screen will depend on the software running on your system.

Boot the system using the appropriate procedure for your operating system.

After boot, check the status of the system by inspecting system status LEDs on the front panel. See Table 6-1 and Figure 6-5.

Table 6-1 Front Panel LED System Status

Location	Condition
Left LED	On — DC power supply is receiving AC current
Middle LED	On — (first 60 seconds of AC power) self tests are running Off — (after self tests end) no hardware failures detected On — (after self tests end) hardware failure was detected
Right LED	Off — (first 60 seconds of AC power) self tests are running On — (after self tests end) system is running Off — (after self tests end) system cannot run; repair is needed

Ideally, after the self-tests finish, both left and right LEDs should be on. The less than ideal condition is if all LEDs are on (system needs service, but is able to run). The worst conditions are if the left and middle LEDs are on (system cannot boot), or if none of the LEDs is on.

Part 4 — Subassembly Removal and Replacement

Internal Access 7

This chapter provides the information necessary to prepare the system for service after the system has been powered off.

To access the SPARCserver 1000 SCSI tray subassembly, the power supply, and the backplane remove the front panel and the EMI shield. To access the other side of the backplane, remove all system boards and air restrictor panels.

7.1 Front Panel

You must remove the front panel before you can remove the EMI shield. The front panel rests in a groove cut on the top front edge of the chassis.

To remove the front panel:

1. **Remove the key from the key switch.**
2. **Push up on the latch located on the bottom, center of the front panel.** Place your fingers under the arrow embossed on the front panel and push up to release the latch. See Figure 7-1.

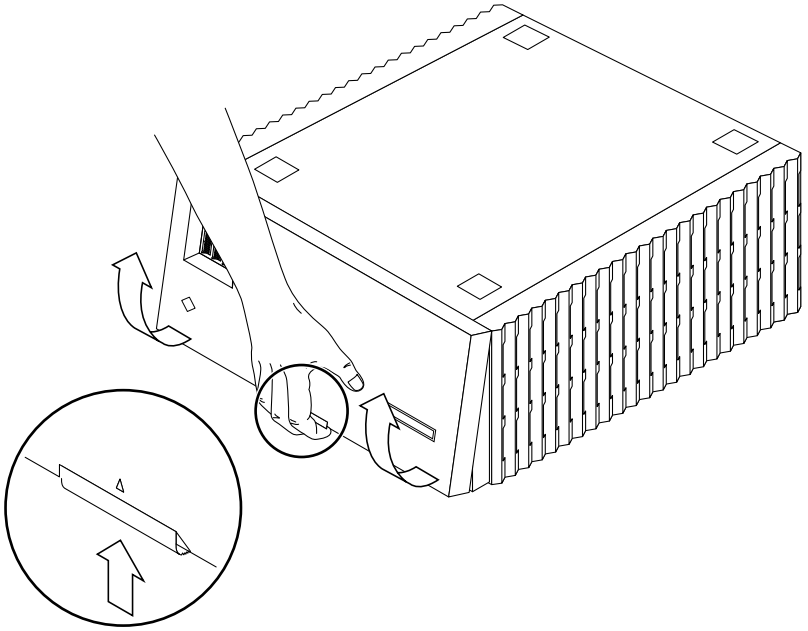


Figure 7-1 Removing the Front Panel

3. **When the bottom of the panel is released, gently pull the bottom of the front panel towards you and lift it off of the chassis. Set the panel aside.**

7.2 EMI Shield

To remove the EMI shield:

1. **Loosen six captive retaining screws securing the EMI shield to the chassis.**
2. **With your hands on the bottom of the EMI shield, pull the bottom towards you to disengage it from the chassis.**
   Set the EMI shield aside. See Figure 7-2.

Caution – Re-install the EMI shield before operating the system. Sun Microsystems Inc. is not responsible for regulatory compliance for a SPARCserver 1000 System which is operated with the EMI panel removed.

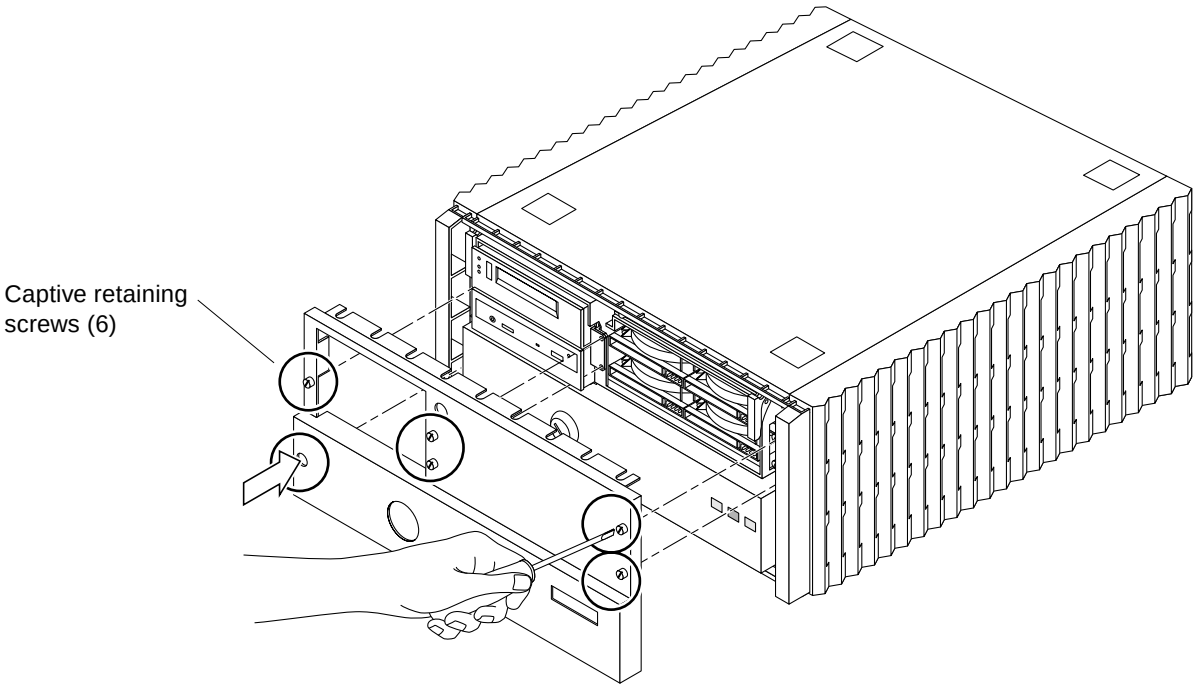


Figure 7-2 Removing the EMI Shield

7.3 Air Restrictor Boards

The SPARCserver 1000 can have up to four boards installed. Slots not occupied by functional boards must have air restrictor boards installed. These air restrictor boards must be removed to gain access to the backplane.

To remove the air restrictor board:

1. **Locate the air restrictor boards at the rear of the system chassis.**
   They are simple boards with pull tabs and no connectors or components.

2. **Remove the two screws securing the air restrictor board to the card cage. Set the screws aside for reinstallation.**
   See Figure 7-3.

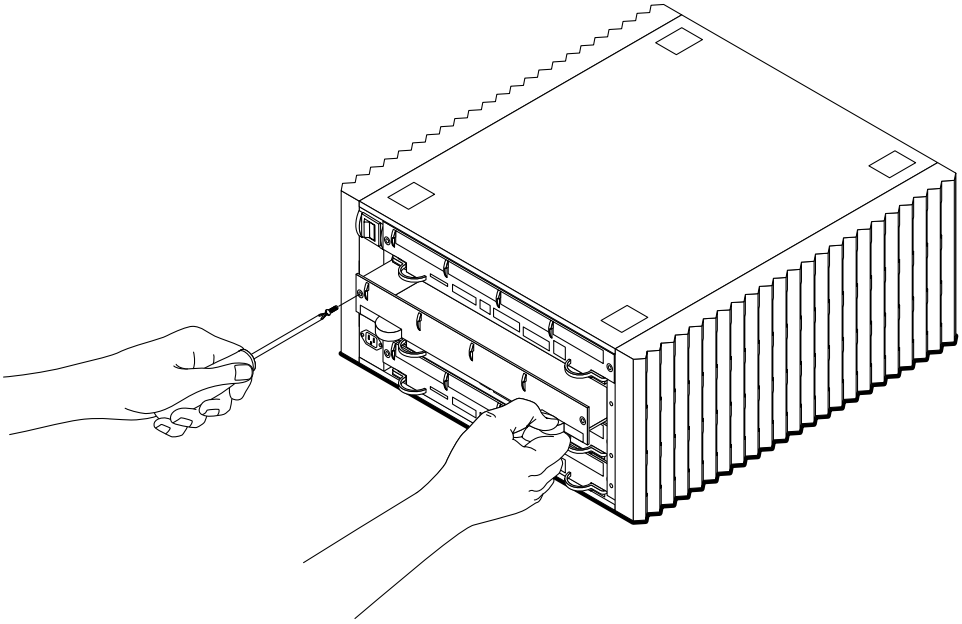


Figure 7-3 Removing Air Restrictor Board Retaining Screws

3. **Grasp the rounded pull tabs on the bottom of the board. Pull the tabs (and board) toward you until it clears the chassis.**

7.4 Side Panels

The side panels are self-attached slide and lock panels.

Note – You do not have to remove the side panels to access any of the system components or subassemblies.

To remove the side panels:

1. **Remove the front panel as described in the previous section.**
2. **Grasp one panel with both hands, and slide it towards the back of the system, then lift the panel off of the chassis.**
   In some cases it may be easier to push the front edge of the side panel toward the chassis rear. See Figure 7-4. Repeat for the other side panel.

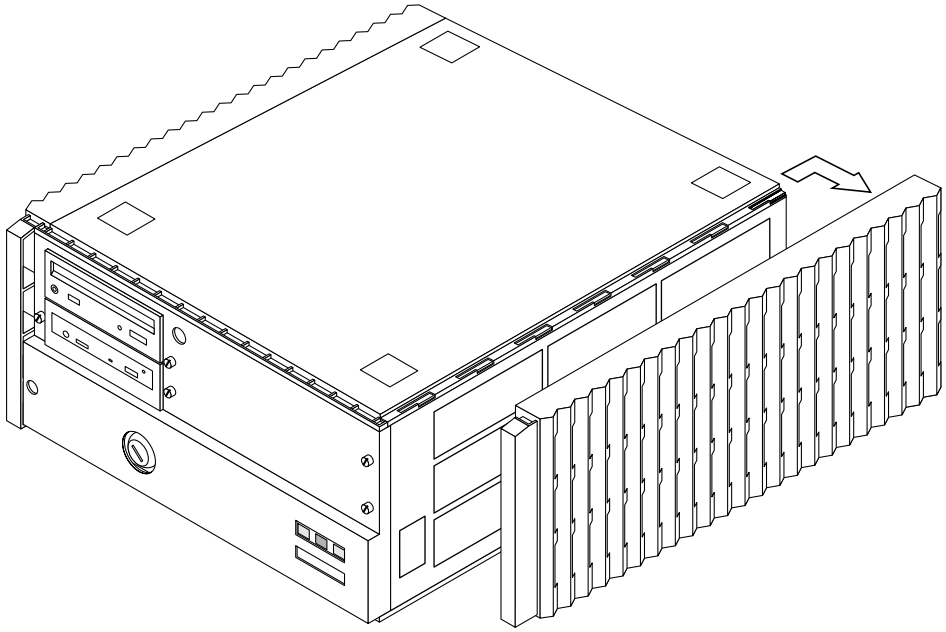


Figure 7-4 Removing the Side Panels

7.5 Top Panel

The top panel slides rearward to a release point, then lifts off.

Note – You need not remove the top panel to access any system component or subassembly.

To remove the top panel:

1. **Remove the front panel as described in Section 7.1.**

▼ Remove the Popouts

1. **Remove the four popouts from the top panel:**
   a. **On the panel, find the location where the two dots are adjacent to each other: one dot on the popout, one on the top panel. See Figure 7-5.**

b. Press down on the popout at the small dot.
This action rocks the popout on a hinge-point, unlatching it.

c. Slide the popout back, away from the dots and lift it free as shown in Figure 7-5. Set the popout aside.

2. Repeat step 1 to remove the remaining three popouts from the top panel.

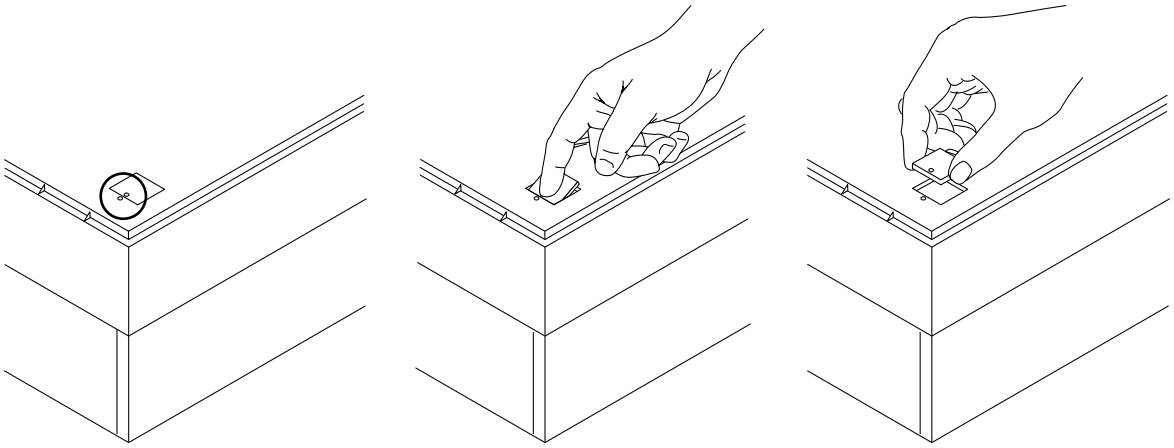


Figure 7-5 Removing the Popouts from the Top Panel

▼ Remove the Top Panel

3. Remove the panel. Use the steps below and refer to Figure 7-6:

a. Place your fingers under the panel rear lip and lift.
Lift with enough force to bow the panel rear up at the center. This action causes three small raised features on the panel underside to clear cutouts in the chassis sheet metal.

b. While lifting the panel rear, tap the front with your hand to slide the panel rearward.
Slide the panel a few inches only. This is enough to disengage it from the chassis.

Note – If necessary, slide your lifting hand side-to-side under the rear lip while tapping the front to free each of the three raised areas on the panel underside of sheet metal cutouts beneath.

---

c. Lift the top panel straight up and clear of the chassis. Set it aside.

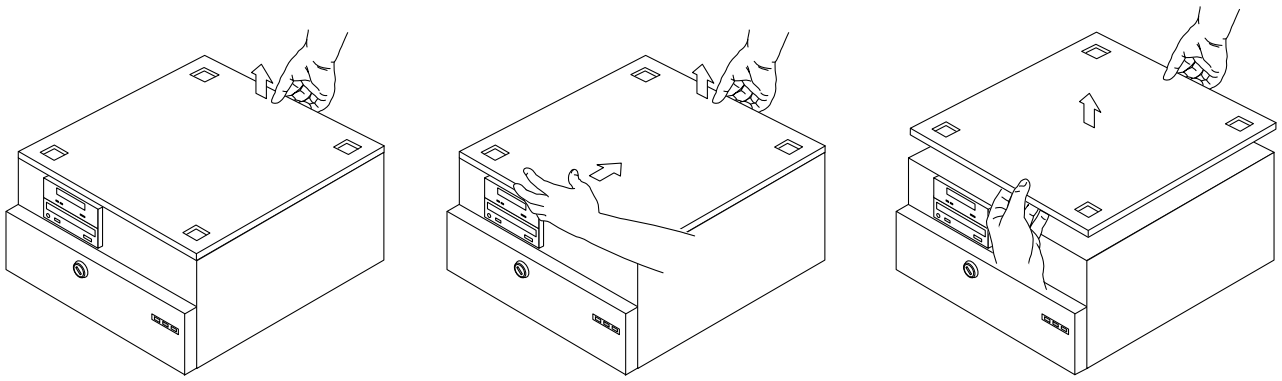


Figure 7-6 Removing the Top Panel

▼ Replace the Popouts

4. Replace the popouts in the top panel to avoid their separation and loss:

a. Orient the popout so the dots are nearest each other (see Figure 7-7).

b. Slide the popout in until it is centered in the hole.

c. Press down on the side opposite the dot to secure the popout in place.

d. Install the remaining three popouts in the same manner.

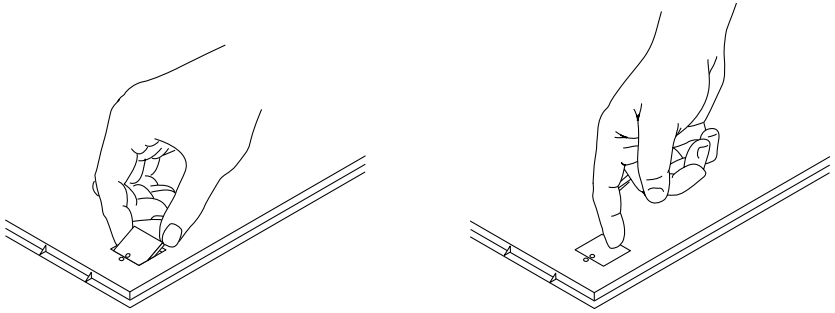


Figure 7-7 Replacing the Popouts in the Top Panel

7.6 Bottom Panel

Note – You need not remove the bottom panel to access any system component or subassembly.

To remove the bottom panel:

1. **Remove the Feet:**
   a. **Invert the chassis with the front facing you (see Figure 7-8).**
   b. **Unscrew all four feet and set them aside.**

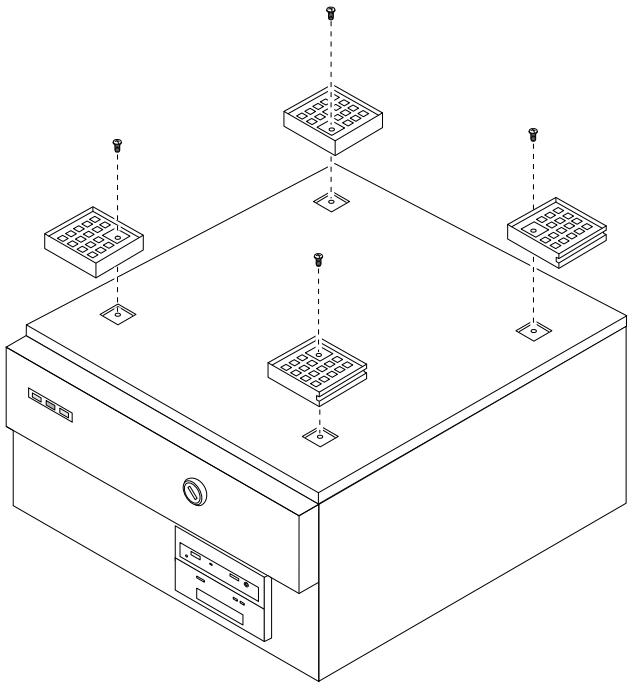


Figure 7-8 Removing the Feet

2. **Remove the Panel.**
   The bottom and top panels are identical part-fabrications and are removed in the same manner. With the chassis inverted and the front facing you, repeat Section 7.5, “Top Panel” step 3 and refer to Figure 7-6 to remove the panel.

Major Subassemblies 8

The SPARCserver 1000 is a compact server system with the assemblies below:

- Fan tray
- SCSI tray
- Power supply
- Backplane

Figure 8-1 shows the locations of each assembly in the system unit.

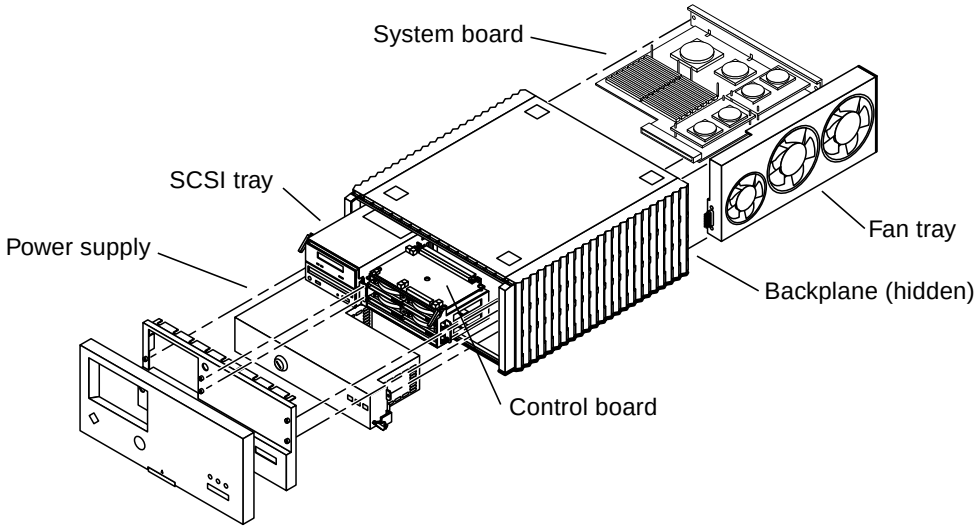


Figure 8-1 Subassembly Location

8.1 Fan Tray

The fan tray is located on the chassis right side — viewed from the front. See Figure 8-1.

8.1.1 Removal

1. **Locate the fan tray from the back of the system.**
   The fan tray is on the left side of the chassis, viewed from the rear, and has the power cord connector and the AC power switch.
2. **Unplug the power cable from the fan tray.**
3. **Remove the two retaining screws that secure the fan tray to the chassis. Set the screws aside for reinstallation. See Figure 8-2.**

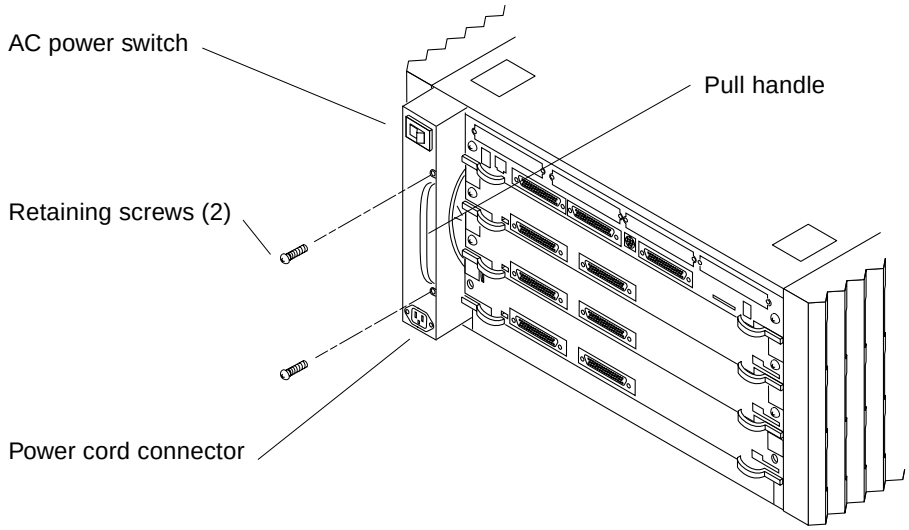


Figure 8-2 Fan Tray

4. **Grasp the pull handle. Slowly and firmly slide the tray from the chassis.**

8.1.2 Replacement

1. **Slide the fan tray into the slot on the left rear side of the chassis until you can hear and feel the connector seat in the power supply connector.**
2. **Replace the retaining screws to secure the fan tray in place.**
3. **Reconnect the power cord and follow the power on procedures in Chapter 6, "Powering Off and On."**

8.2 SCSI Tray Assembly

The SCSI tray assembly is located in the top front of the chassis behind the front cover and EMI shield. See Figure 8-1.

8.2.1 Removal

1. **Remove the front panel and EMI shield. See Chapter 7, "Internal Access."**

2. **Locate the SCSI tray assembly in the system front.**

3. **Loosen four captive screws securing the SCSI tray assembly to the chassis.**
   See Figure 8-2.

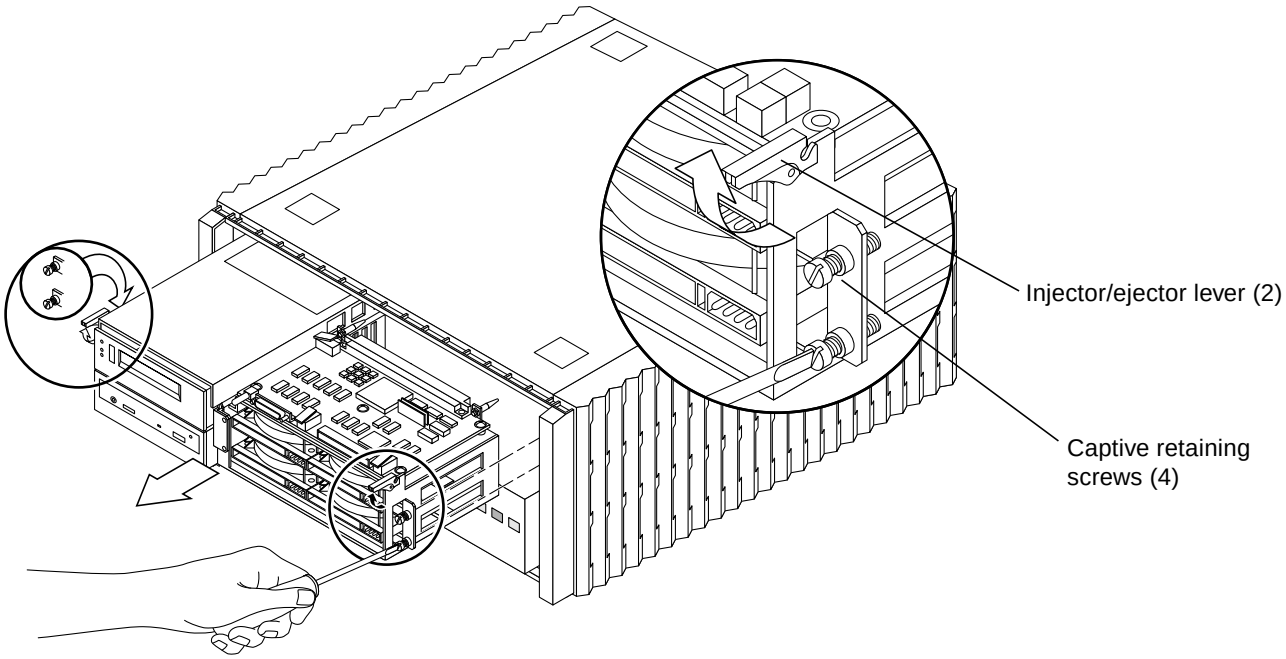


Figure 8-3 SCSI Tray Assembly

4. **Lift the injector/ejector levers until they are straight out. This action disengages the SCSI tray assembly from the backplane.**
   See Figure 8-2.

5. **Slide the SCSI tray out of the chassis.**

Warning – The SCSI tray assembly may be heavy. Grip it securely before sliding it all the way out of the chassis or it could fall and injure personnel or equipment.

8.2.2 Replacement

1. **Slide the SCSI tray into the chassis.**
2. **When the tray is halfway in, extend the injector/ejector levers toward you.**
3. **While holding the injector/ejector levers, slide the SCSI tray into the chassis until the injector/ejector levers engage the metal on the chassis.**
4. **Seat the tray. Push both levers down simultaneously to maintain insertion alignment until they are fully locked (down). Use care when doing so avoid connector damage.**

Caution – Do not force the injector / ejector levers in if the SCSI tray resists seating in the backplane connectors. Forcing the tray in can damage backplane or tray connector pins. Unseat the tray, and retry by gently closing the injector / ejector levers inward until fully seated.

5. **Tighten the four captive retaining screws.**

Note – Due to normal machine tolerances, it is best to thread all four screws in loosely (about 1-2 turns), then go around and tighten each screw.

6. **Replace the EMI shield and the front panel.**

Caution – Replace the EMI shield before operating the system. Sun Microsystems Inc. is not responsible for regulatory compliance for a SPARCserver 1000 System which is operated with the EMI panel removed.

8.3 Power Supply

The power supply is located in the lower front of the SPARCserver 1000 system behind the front cover and EMI shield. See Figure 8-1.

8.3.1 Removal

1. **Remove the front panel and EMI shield. See Chapter 7, “Internal Access.”**
2. **Locate the power supply in the SPARCserver 1000 system lower front.**

3. **Loosen two captive retaining screws securing the supply to the chassis.**
4. **Rotate the injector/ejector levers down toward you until straight out.**
5. **Firmly grasp the injector/ejector levers and pull until you feel the power supply disengage from the chassis.**
6. **Slide the power supply from the chassis. See Figure 8-2.**

Warning – The power supply is heavy. Grip it securely before sliding it all the way out of the chassis or it could fall and injure personnel or equipment.

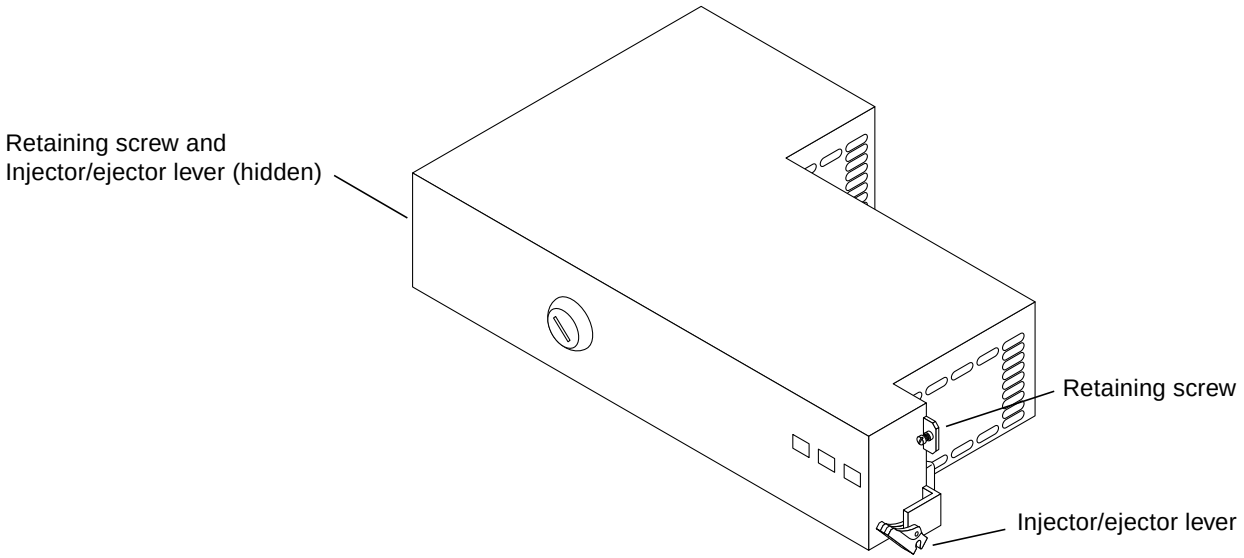


Figure 8-4 Power Supply

8.3.2 *Replacement*

1. **Slide the power supply into the chassis.**
2. **When the supply is halfway in, extend the injector/ejector levers out.**
3. **While holding the injector/ejector levers, slide the power supply into the chassis until the levers engage the metal on the chassis.**

4. **Seat the power supply. Push both levers up simultaneously to maintain insertion alignment until they are fully locked (up). Use care when doing so avoid connector damage.**

Caution – Do not force the injector/ejector levers in if the power supply resists seating in the connectors. Forcing the power supply in can damage connector pins. Unseat the power supply, and retry by gently closing the injector/ejector levers until the supply is fully seated.

5. **Tighten the captive retaining screws.**

6. **Replace the EMI shield and the front panel.**

Caution – Replace the EMI shield before operating the system. Sun Microsystems Inc. is not responsible for regulatory compliance for a SPARCserver 1000 System which is operated with the EMI panel removed.

8.4 Backplane

The backplane is located near the center of the SPARCserver 1000 behind the front cover, EMI shield, SCSI tray, and power supply. See Figure 8-1.

8.4.1 Removal

1. **Remove the front panel and EMI shield. See Chapter 7, “Internal Access.”**

2. **Remove the SCSI tray as described in this chapter.**

3. **Remove the power supply as described in this chapter.**

4. **Remove system board(s), air restrictor panels, and any other options that may be installed in the four card cage slots.**

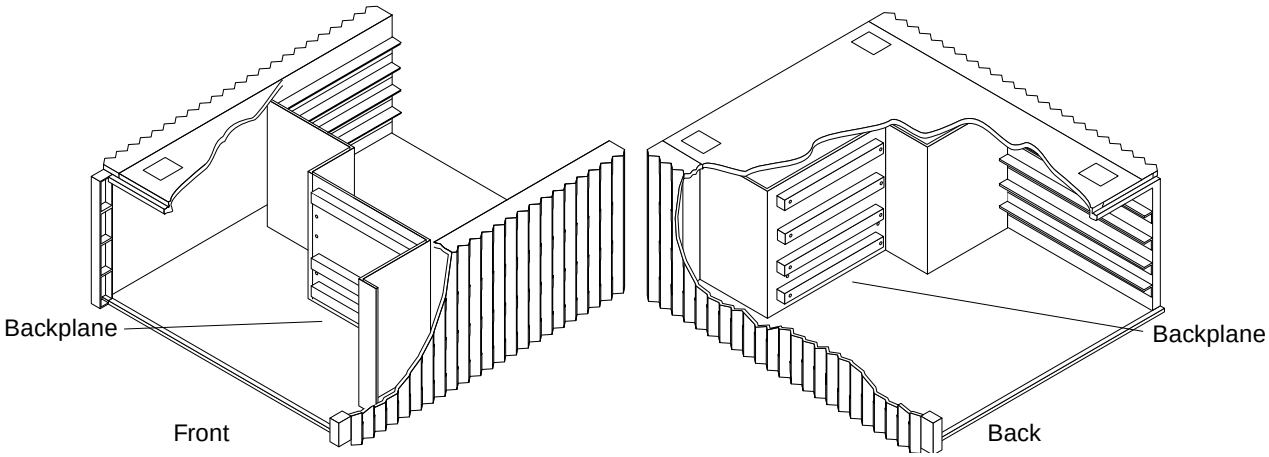


Figure 8-5 Backplane

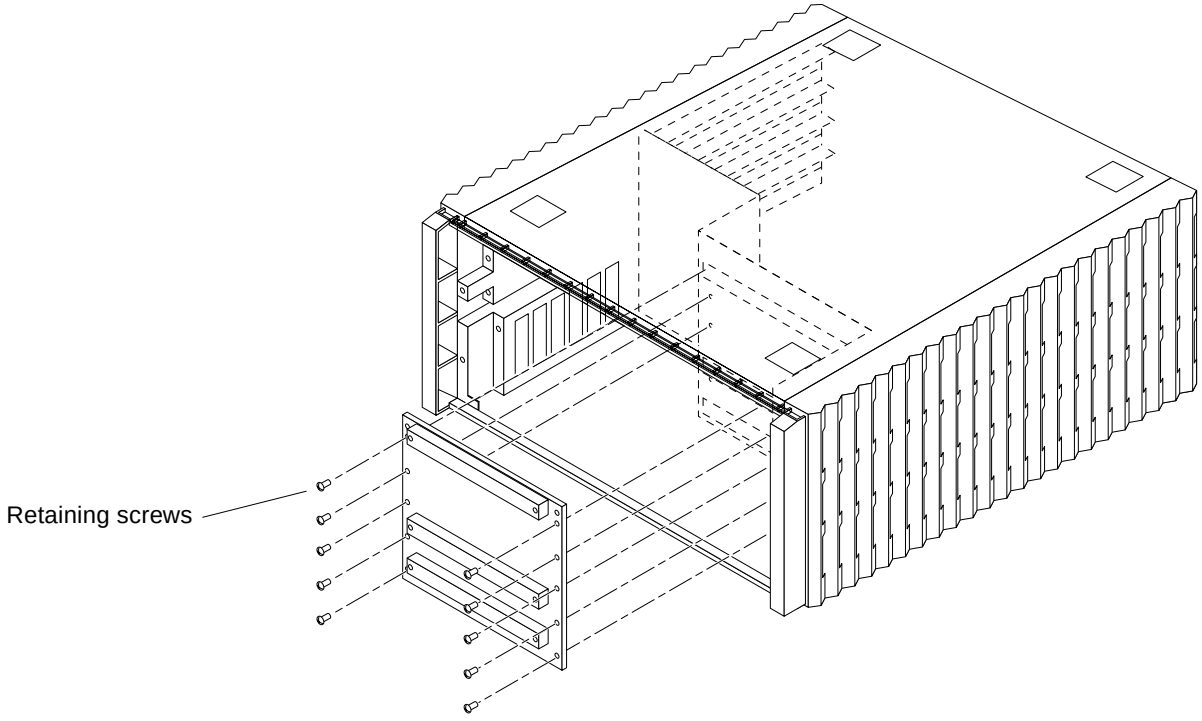


Figure 8-6 Removing the Backplane

5. **Locate the backplane near the middle of the chassis.**
   See Figure 8-2.
6. **From the system front, loosen ten screws securing the backplane in place.**
   Refer to Figure 8-6.
7. **Remove the backplane from the chassis.**

8.4.2 *Replacement*

1. **Slide the backplane into the chassis ensuring the side with three connectors face the front of the chassis.**
2. **Replace the ten screws that secure the backplane to the chassis.**
3. **Replace the power supply as directed in Section 8.3.2, “Replacement.”**
4. **Reinstall the SCSI tray. See Section 8.2.2, “Replacement.”**
5. **Replace any system boards, air restrictor boards, or other optional boards removed at the beginning of this procedure.**
6. **Replace the EMI shield and the front panel.**

Caution – Replace the EMI shield before operating the system. Sun Microsystems Inc. is not responsible for regulatory compliance for a SPARCserver 1000 System which is operated with the EMI panel removed.

Storage Devices 9

This chapter describes the procedures used to remove and replace the storage devices located in the SCSI tray assembly.

The SPARCserver 1000 SCSI tray assembly can contain the following devices:

- CD-ROM drive: SunCD Plus or SunCD 2Plus or SunCD Plus4
- tape drive
- disk drives

In addition, storage can be increased by installation of one, two or three optional disk cards in the card cage.

Note – Procedures that follow assume
- the chassis-front is accessed using procedures found in Section 7.1, “Front Panel,”
- the SCSI tray assembly is removed using instructions found in Chapter 8, “Major Subassemblies.”

9.1 CD-ROM Drive: SunCD Plus and SunCD 2Plus

9.1.1 Removal

The CD-ROM drive (SunCD) is located on the bottom left side of the SCSI tray assembly.

1. **Disconnect the power and SCSI-2 cables from the rear of the drive.**
2. **Remove two screws (SCSI tray rear - near the bottom) securing the bracket to the tray. Remove the 5 1/4-inch device bracket from the tray.**
   See Figure 9-1.

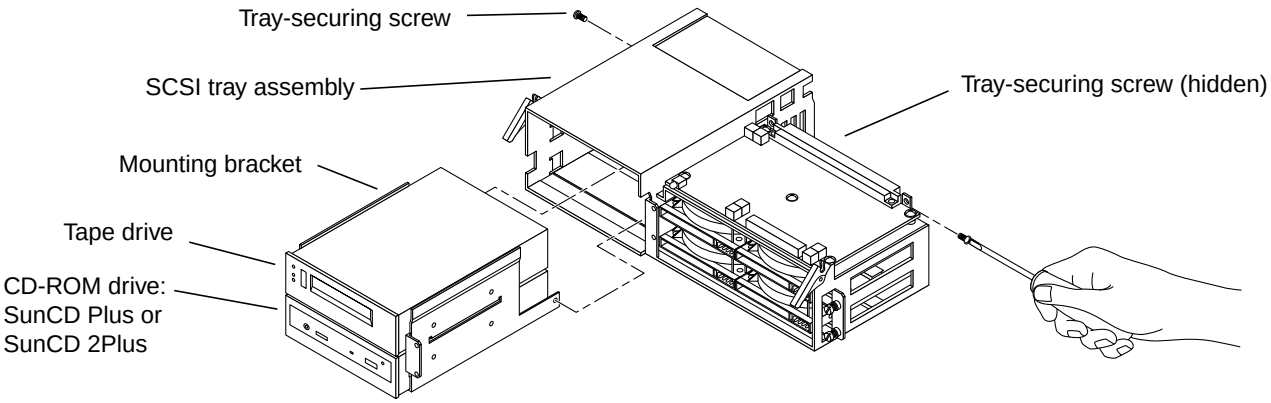


Figure 9-1 Removing the Mounting Bracket from the SCSI Tray

3. **Slide the bracket out of the tray from the front.**
4. **Remove four screws that secure the CD-ROM drive to the bracket.**
   See Figure 9-2.
5. **Remove the CD-ROM drive from the 5 1/4-inch device bracket.**

Note – Slide the drive out from the front if a tape drive is mounted above it.

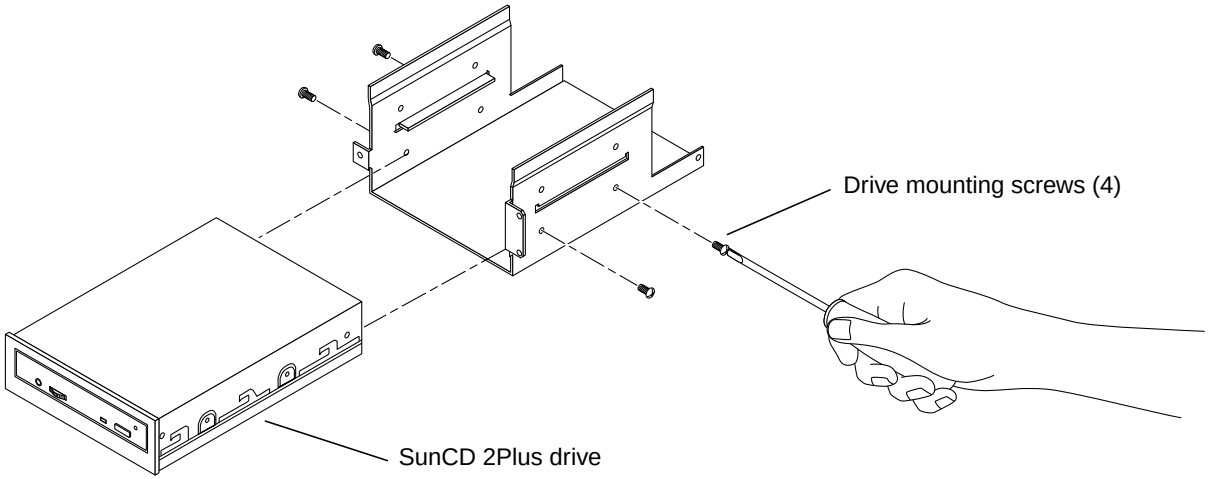


Figure 9-2 Removing the CD-ROM Drive from the Mounting Bracket

9.1.2 Replacement

Note – Verify the ID SELECT, PARITY and PREVENT/ALLOW jumpers are correct before replacing the drive. Set them if necessary. For the correct configuration instructions, refer to Appendix E, Section E.4, “Selecting Drive ID Numbers in the SCSI Tray.”

1. **Slide the CD-ROM drive into the bottom position of the 5 1/4-inch device bracket.**
2. **Set the SCSI ID jumpers.**
3. **Install four screws to secure the CD-ROM drive to the bracket.**
4. **Slide the 5 1/4-inch device bracket with CD-ROM drive installed into the SCSI tray assembly, from the front, and install two retaining screws.**
5. **Reconnect the power and CD-ROM drive at the drive rear.**

9.2 Tape Drive

9.2.1 Removal

The optional tape drive is located on the SCSI tray assembly top left side.

1. **Disconnect the power and SCSI-2 cables from the rear of the tape drive.**
2. **Remove two screws securing the bracket to the tray. Remove the 5 1/4-inch device bracket from the tray.**
   See Figure 9-1.
3. **Slide the bracket out of the tray from the front.**
4. **Remove the tape drive from the 5 1/4-inch device bracket.**
5. **Remove four screws (two on each side) securing the drive to the bracket.**
   See Figure 9-3.

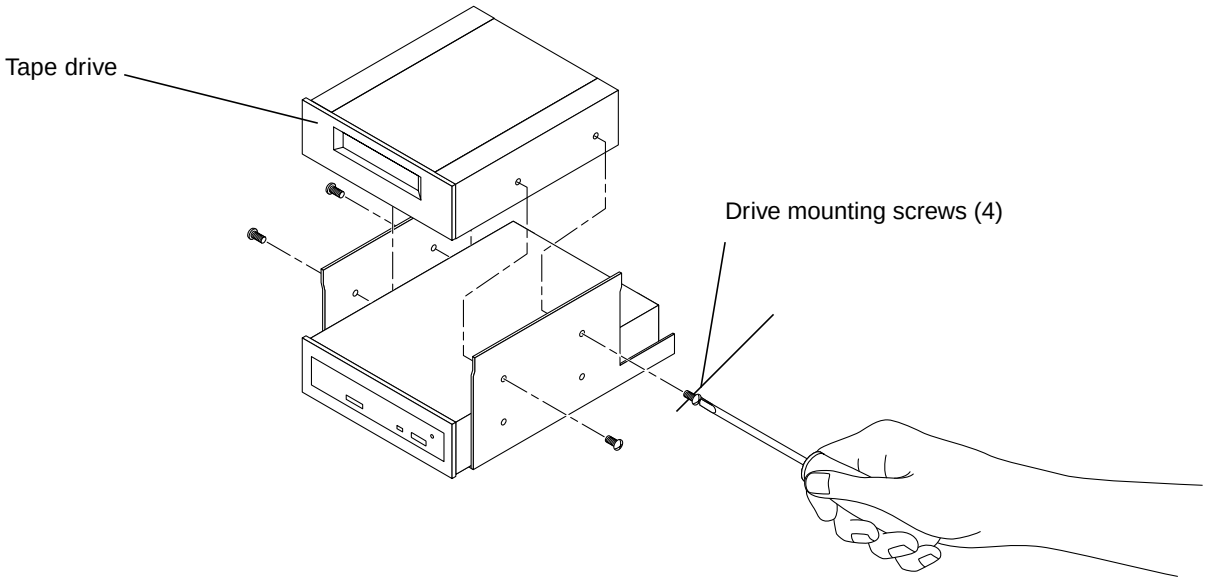


Figure 9-3 Removing the Tape Drive

6. **Slide the tape drive out of the 5 1/4-inch device bracket.**

9.2.2 Replacement

Note – Verify the device ID is correct before replacing the drive. Set it if necessary. For the correct address and configuring instructions, refer to Appendix E, Section E.4, “Selecting Drive ID Numbers in the SCSI Tray.”

1. **Slide the tape drive into the 5 1/4-inch device bracket.**
2. **Set the SCSI ID jumpers.**
3. **Install four screws to secure the drive to the bracket.**
4. **Slide the 5 1/4-inch device bracket (with tape drive installed) into the SCSI tray assembly, from the front, and install two retaining screws.**
   See Figure 9-1.
5. **Reconnect the power and SCSI-2 cables at the drive rear.**

9.3 Disk Drive

9.3.1 Removal

The disk drives reside on two small disk drive brackets mounted on the SCSI tray right side. Either bracket can be removed without disturbing the other.

1. **From the front of the SCSI tray assembly, disconnect the cables from the disk drive bracket you are planning to remove.**
   Label the cables for easy identification during replacement.
2. **Turn the SCSI tray around so the tray rear faces you.**
   The disk drive brackets are now on your left.
3. **Remove two screws securing the drive bracket to the SCSI tray assembly.**
   See Figure 9-4.
4. **After the screws are removed and set aside, pull the drive tray towards you until it is completely free of the SCSI tray assembly.**
5. **Invert the drive tray so the mounting plate faces up.**
   See Figure 9-5.

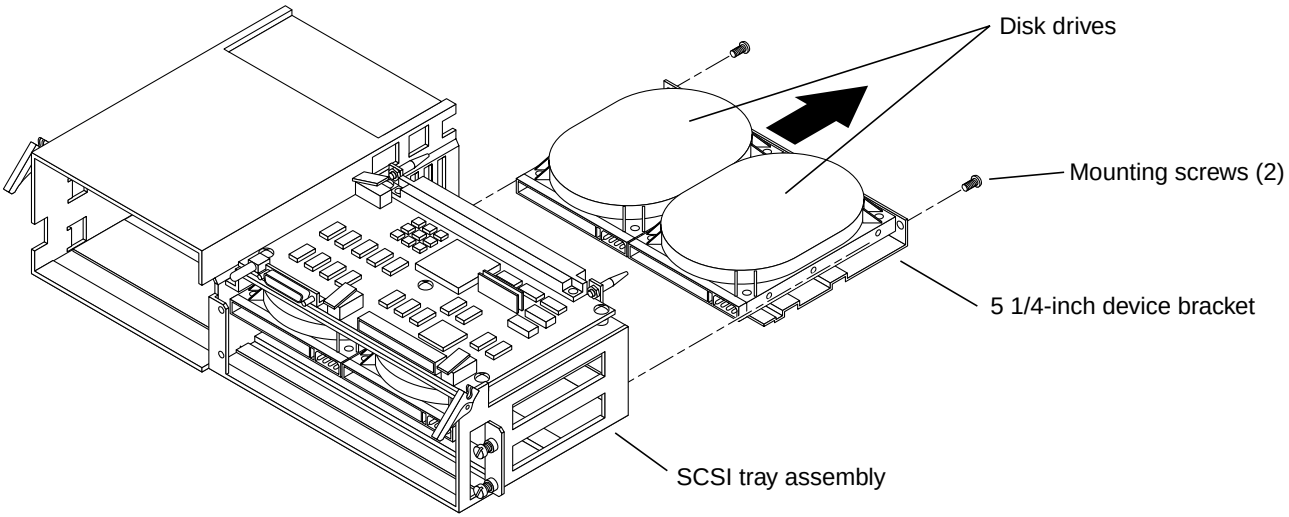


Figure 9-4 Removing the Disk Drive Tray

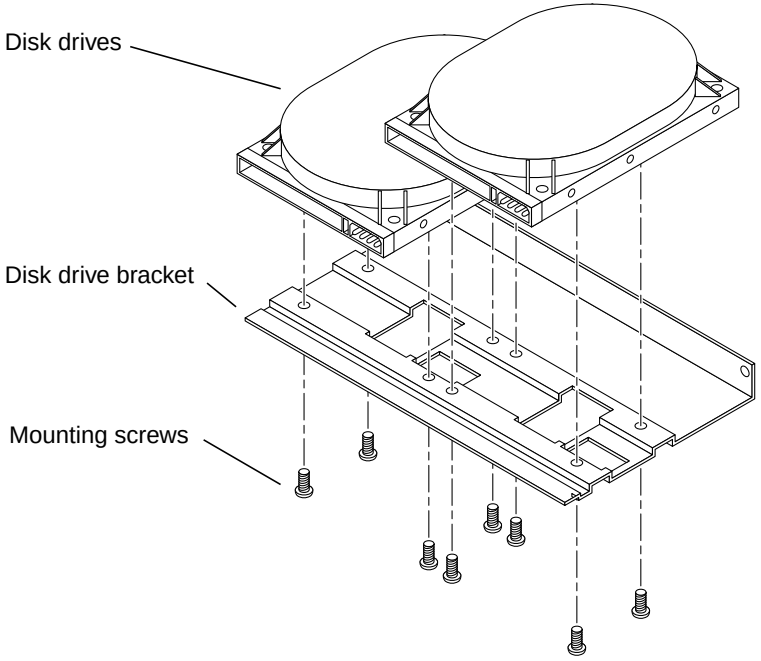


Figure 9-5 Removing the Disk Drive from the Mounting Plate

6. **Remove the four screws securing the disk drive to the disk drive bracket.** See Figure 9-5.
7. **Carefully turn the disk drive bracket over and set it aside to expose the desired disk drive for removal.**
8. **Remove the drive.**

9.3.2 Replacement

Note – Verify the device ID is correct before replacing the drive. Set it if necessary. For the correct address and configuring instructions, refer to Appendix E, Section E.4, “Selecting Drive ID Numbers in the SCSI Tray.”

1. **Place the disk drive to be installed on a flat work surface with the mounting holes facing up.**
2. **Place the disk drive bracket on top of the disk drive so the mounting holes align with those in the drive.**
   The disk drive connectors should be facing directly opposite the lip of the disk drive bracket (towards the front of the SCSI tray).
3. **Set the SCSI ID jumpers.**
4. **Reinstall the screws to secure the disk drive to the disk drive bracket.** See Figure 9-5.
5. **Carefully invert the disk drive bracket so it can be inserted into the tray.** The disks drives are now on top of the mounting plate.
6. **Slide the disk drive bracket into the SCSI tray assembly and reinstall the retaining screws to secure the disk drive bracket to the SCSI tray.** See Figure 9-4.

9.4 Control Board

The control board is mounted on top of the disk drives on the top right side of the SCSI tray assembly. See Figure 9-6.

9.4.1 Removal

1. **Disconnect the four cables attached to the control board.**
   Label the cables for accurate identification during replacement.
2. **Remove five Phillips screws securing the control board to the tray.**
   See Figure 9-6.
3. **Lift the control board off of the SCSI tray and place it on an antistatic mat.**

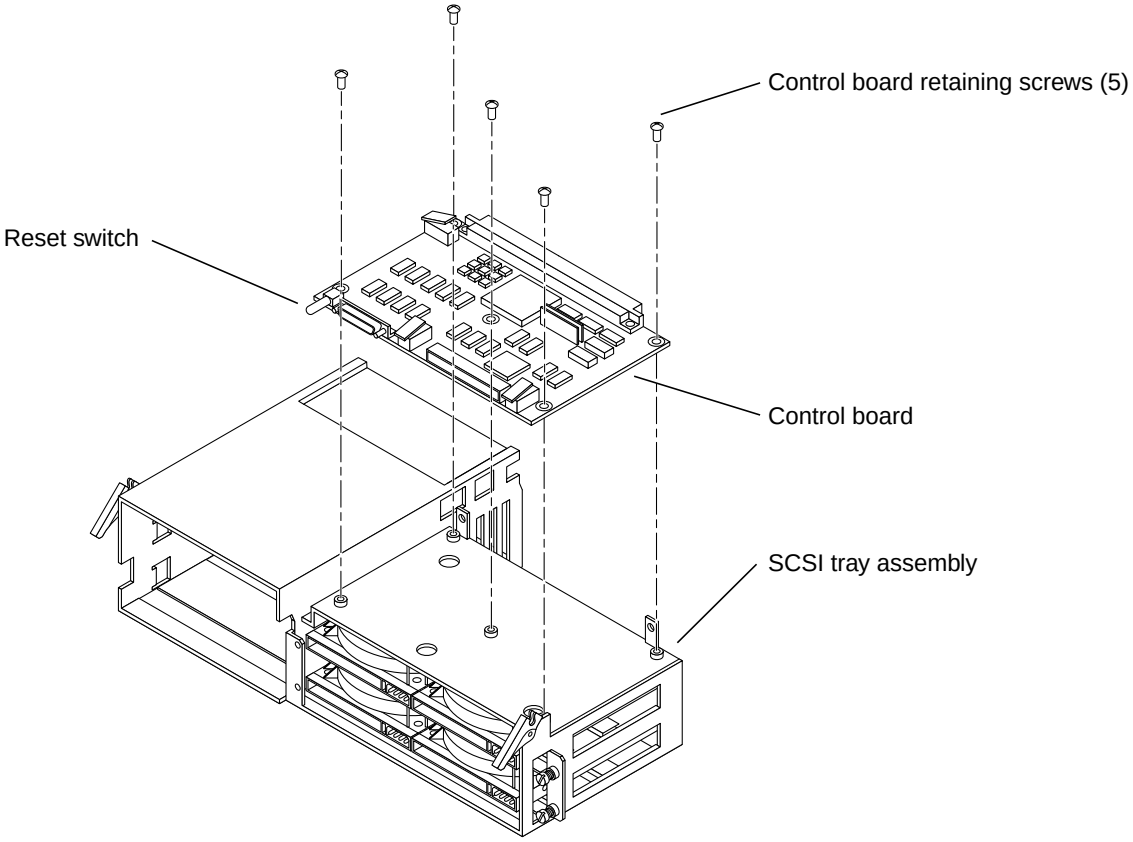


Figure 9-6 Removing the Control Board

9.4.2 Replacement

1. **Place the control board on top of the disk drive side of the SCSI tray.**

2. **Align the mounting holes in the board with those in the SCSI tray and replace the retaining screws.**

3. **Reconnect all cables disconnected during removal.**

4. **Power on the system. Refer to Chapter 6.**
   The yellow (middle) LED on the front panel light and remain on.

5. **At the** `ok` **prompt, enter the following command**:

```
ok:* update-system-idprom
```

Note – The `update-system-idprom` command causes the ID PROM on the control board to be loaded with required data from the NVRAM on the master system board.

---

6. **Press the reset switch (Figure 9-6) to restart the operating system.**
   The yellow LED should turn off after approximately 30 seconds.

9.5 Disk Card (Option)

The optional disk card is installed in card cage slot 1, 2 or 3.

9.5.1 Removal

Before removing a disk card, halt the system. Turn off the power using instructions found in Chapter 6, “Powering Off and On.”

1. **Remove two screws that secure the board to the card cage.**
   See Figure 9-7.

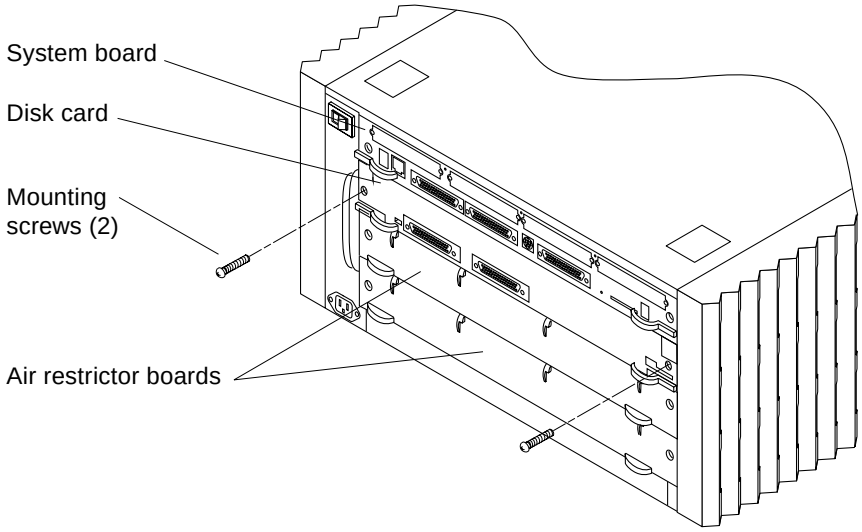


Figure 9-7 Removing Disk Card Mounting Screws

2. **Disconnect the SCSI-2 cable from the IN port on the disk card.**
   In a single System board configuration (system board in slot 0), the SCSI-2 cable connects to an FSBE or SWIS SBus card installed in the system board. In a system having two or three System boards, the SCSI-2 cable may connect to the on-board SCSI-2 port of the second or third System board.
3. **Disconnect the SCSI-2 terminator or (if daisy-chained) SCSI-2 data cable from the OUT port on the disk card.**
4. **Pull the curved ends of both extraction levers out simultaneously to unseat the board from the backplane connectors.**
5. **Carefully slide the board out of the card cage.**
   See Figure 9-8

Caution – The card is cut out on the right side, therefore, the right side of the card will clear the card guides before the left. The card is heavy. Grip the edges of the card firmly or the card may fall and damage components. See Figure 9-8.

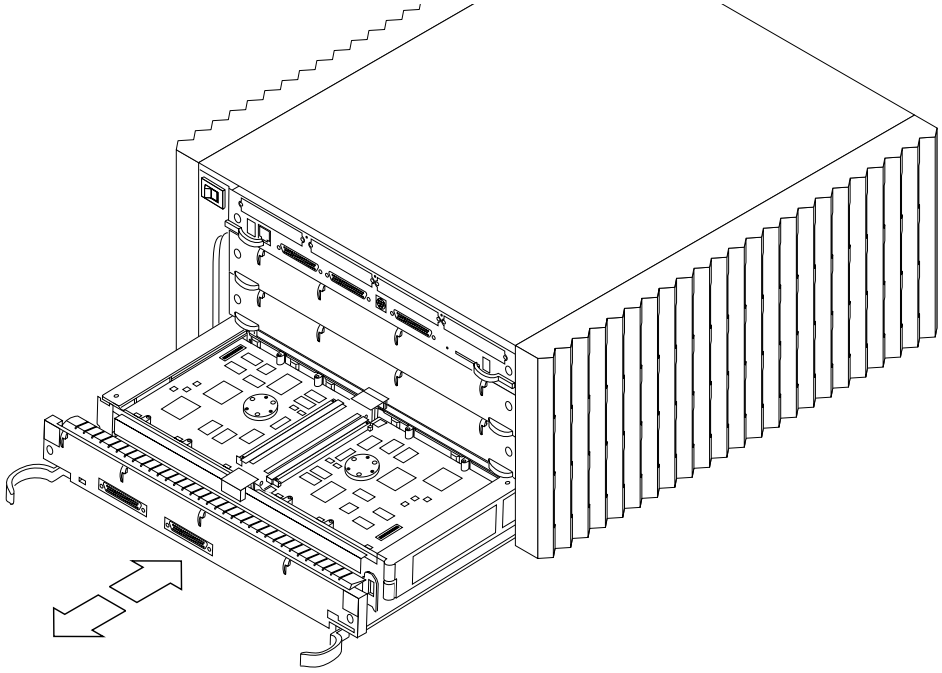


Figure 9-8 Removing or Installing the Disk Card

9.5.2 Replacement

1. **Carefully insert the board in the proper slot in the card cage, ensuring the board does not slip out of the left and right card guides.**
   The component side of the board must face up.

2. **Ensure the ejector/injector levers are in the outward position while sliding the board into the backplane.**
   See Figure 9-8. The board will not seat fully unless the levers are fully out.

Caution – DO NOT FORCE A BOARD into a slot, this can damage the board and system. The board should insert and seat smoothly. If it binds, remove it, and inspect the card cage for sign of obstruction. Also inspect the board and backplane for bent pins or other damage.

3. **Use the ejector/injector levers to seat the board.**
   Simultaneously swing both extractor/injector levers into the locked position. Ensure the card remains aligned to the card guides (does not become cocked). See Figure 9-9.

Caution – Do not press on the board rear panel to seat it—doing so will damage the connector pins.

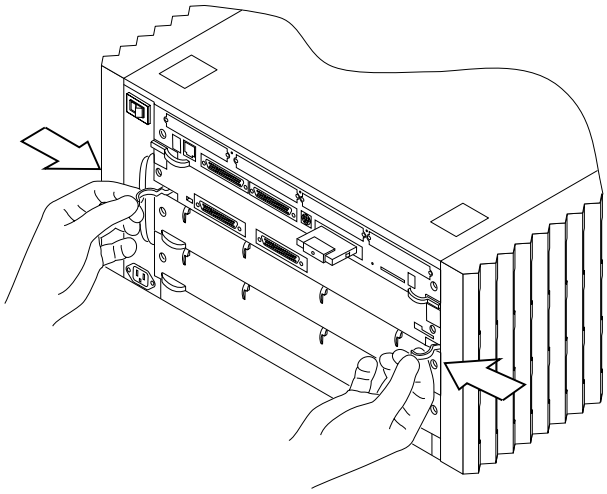
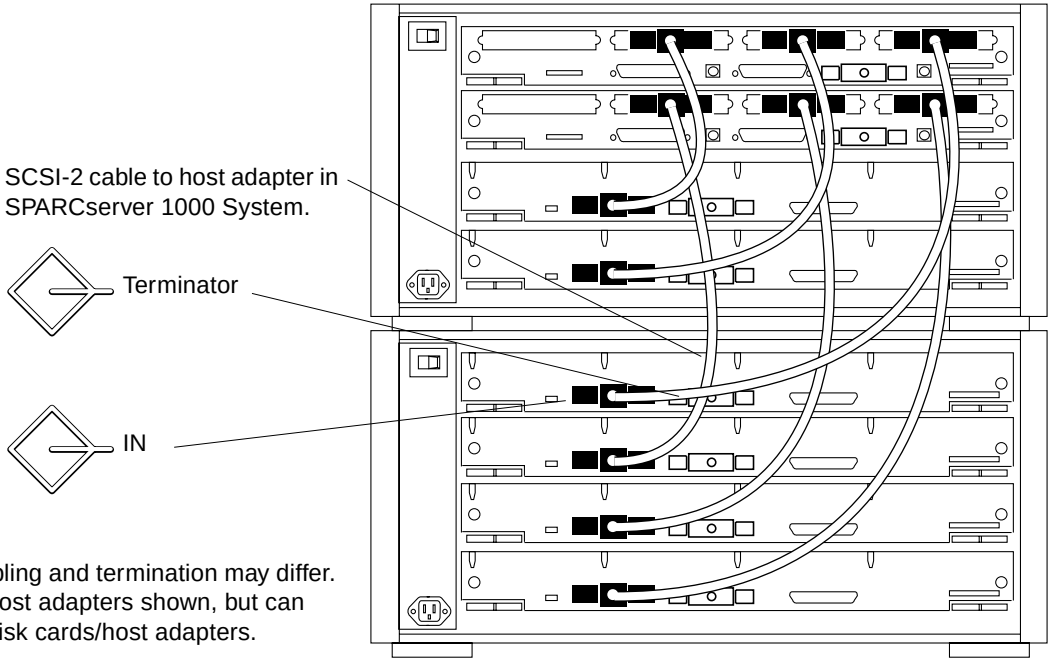


Figure 9-9 Closing the Ejector/Injector Levers

4. **Install two screws to secure the board to the card cage.**
   See Figure 9-7.

5. **Connect the SCSI-2 cable from the IN port on the disk card to the host adapter directly or indirectly as per below:**
   - single disk card per host adapter or the first disk card in a daisy-chain: directly to the port of the SCSI-2 host adapter in the SPARCserver 1000. See Figure 9-10.



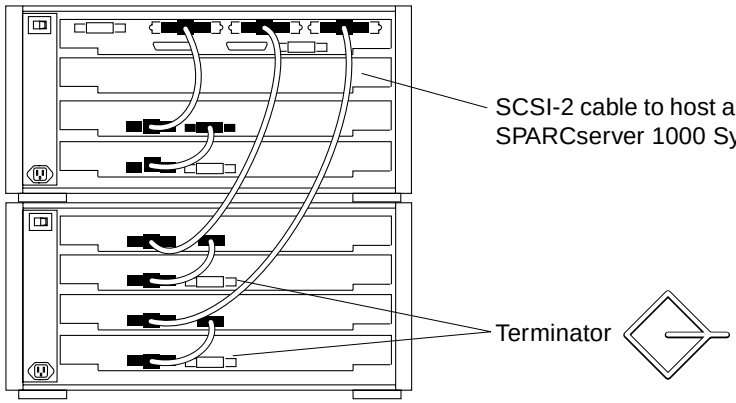
Notes:
Example cabling. Your cabling and termination may differ.
Narrow SCSI disk cards/host adapters shown, but can also apply to wide SCSI disk cards/host adapters.

Figure 9-10 Single Disk Card per SCSI-2 Host Adapter Cabling

- multiple disk cards per host adapter: to the OUT port of the next upstream disk card in the daisy-chain (see example cabling in Figure 9-10)

6. Install the appropriate item on the OUT port:

- single disk card per host adapter or the last wide SCSI-2 disk card in a daisy-chain: install a terminator; see Figure 9-10
- any upstream disk card in a daisy-chain: connect the SCSI-2 cable feeding the next downstream disk card in a daisy-chain (Figure 9-10)



Note: Example cabling. Your cabling and termination may differ

Figure 9-11 Multiple Disk Card per Wide SCSI-2 Host Adapter Cabling

9.6 Disk Card Disk Drive

With the disk card removed from the chassis, replace a disk drive as follows:

1. **Position the antistatic mat on the work surface. Place the card on the mat.**

Caution – Observe all safety precautions detailed in Chapter 5 with regard to ESD and antistatic mat use. Failure to do this may result to disk drive damage.

2. **Remove the old disk drive:**
   a. **Press the latch on the ejector drive retainer to release it.**
   b. **Carefully open the ejector drive retainer. The drive should slide out from the connector. See Figure 9-12.**
3. **Slide the old drive out and place it on the antistatic mat.**
4. **Unpack the new disk drive:**
   a. **Inspect the shipping container for evidence of damage.**
      i. **If the carrier‘s agent is not present when the container is opened, and the contents are found to be damaged, keep all contents and packing materials for the agent‘s inspection.**

ii. **If there is no evidence of damage, carefully remove the drive from the shipping container.**
Save the carton and packing material for possible later reuse.

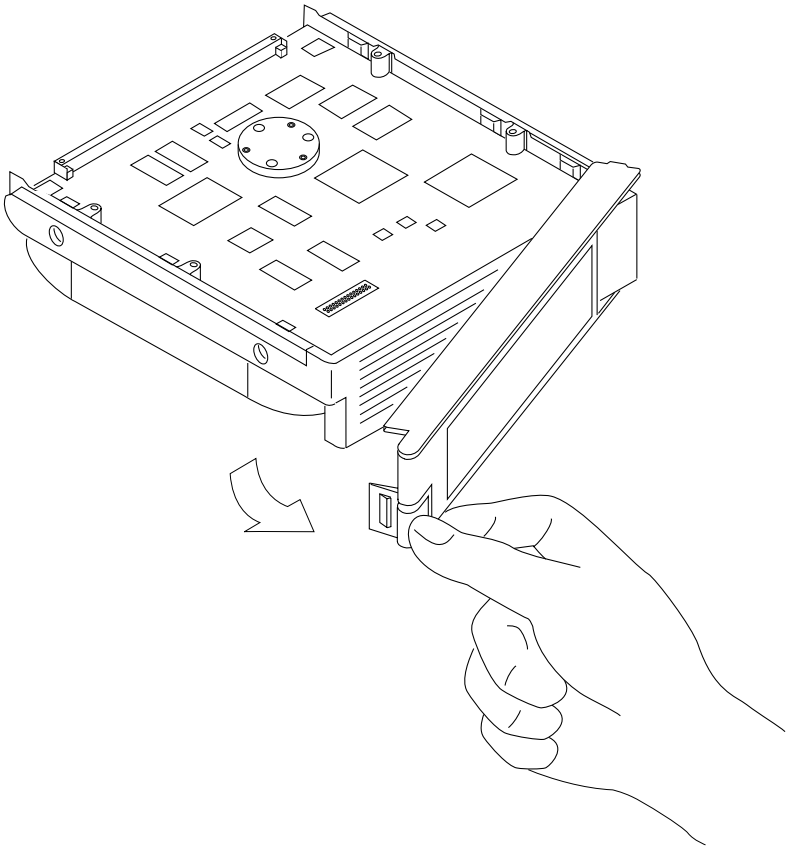


Figure 9-12 Opening the Ejector/Retainer to Remove a Disk Drive

5. **Place the drive on the antistatic mat.**

6. **Hold the ejector drive retainer in the open position (not locked) and gently slide the new drive in. Close the ejector drive retainer.**
As the ejector closes, you will hear the latch snap closed. See Figure 9-12.

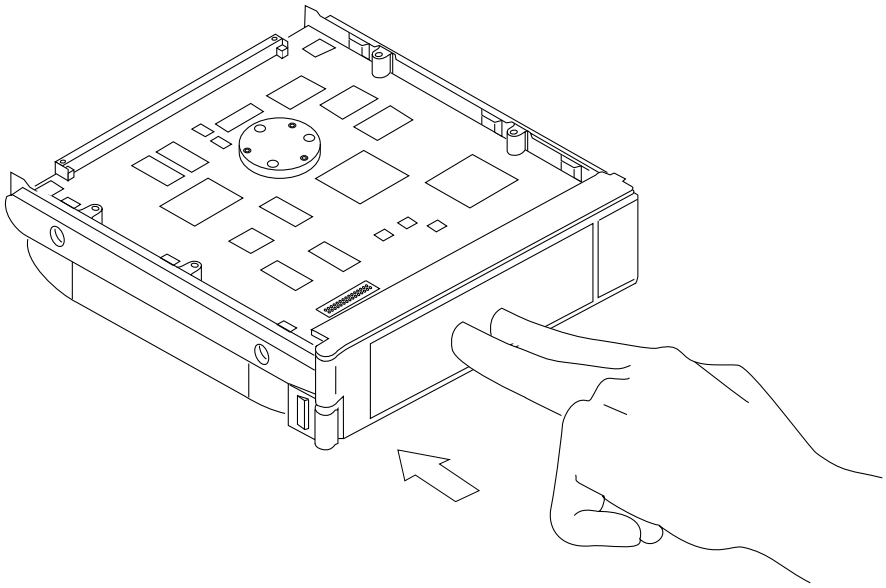


Figure 9-13 Closing the Ejector/Retainer to Install a Disk Drive

7. To replace the disk card, See Section 9.5.2, “Replacement.

Part 5 — System Board

System Board Overview 10

10.1 Damage Prevention

Caution – Use the ESD kit provided when working on SPARCserver 1000 boards. Instructions are printed on the ESD mat.

Note – A disposable ESD kit can lose effectiveness after a single use.

10.2 Handling System Boards and Subassemblies

Caution – The system chassis power must be turned OFF, and the AC power cord must remain plugged in to ensure a proper ground.

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

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

- Hold the system 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 system board or SBus cards 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.
- Transport the board in an antistatic bag.

10.3 System Board Description

Figure 10-1 shows the major components on the system board.

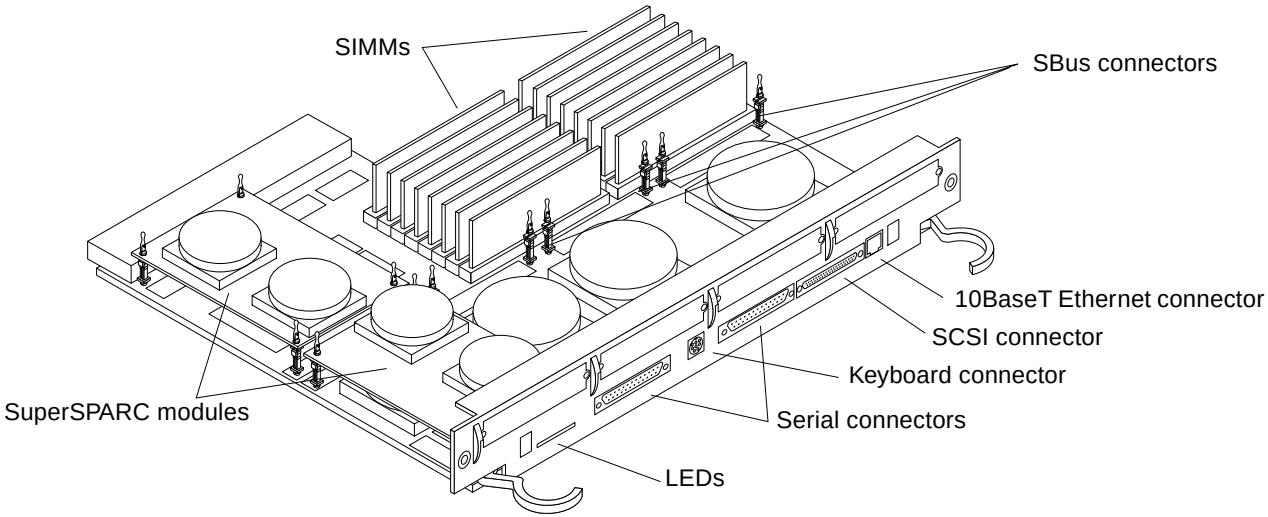


Figure 10-1 System Board Three-Quarter View

All system boards are basically the same. No jumper changes are necessary.

Minimum configuration for the board in slot 0, the system master, is a SuperSPARC module in location A. See the note below.

Note – A system board can be moved to any slot, especially during troubleshooting. However, by convention, the system master is in slot 0. The factory ships systems in this configuration. It is possible POST may assign a new system master in a different slot if the original system master fails. If this occurs, correct it and install a fully functional system board in slot 0.

If a serial-interface console is used, it must be plugged into RS232 connector A on the system master. If a color monitor is used, a color-graphics interface card must be installed in SBus slot 1 on the system master.

Also, by convention, install system boards in the lowest card cage slot numbers first. Fill all SuperSPARC module A slots before installing modules in the B slots. Install all group 0 SIMMs before installing any group 1 SIMMs.

For comprehensive slot assignment rules and configuration priorities, See Appendix E, “General Rules for System Configuration.”

10.4 System Board Block Diagram

Figure 10-2 is a block diagram of the system board. The SPARC modules, SIMMs, and optional SBus cards are removable and can be replaced or moved to another SPARCserver 1000 system board.

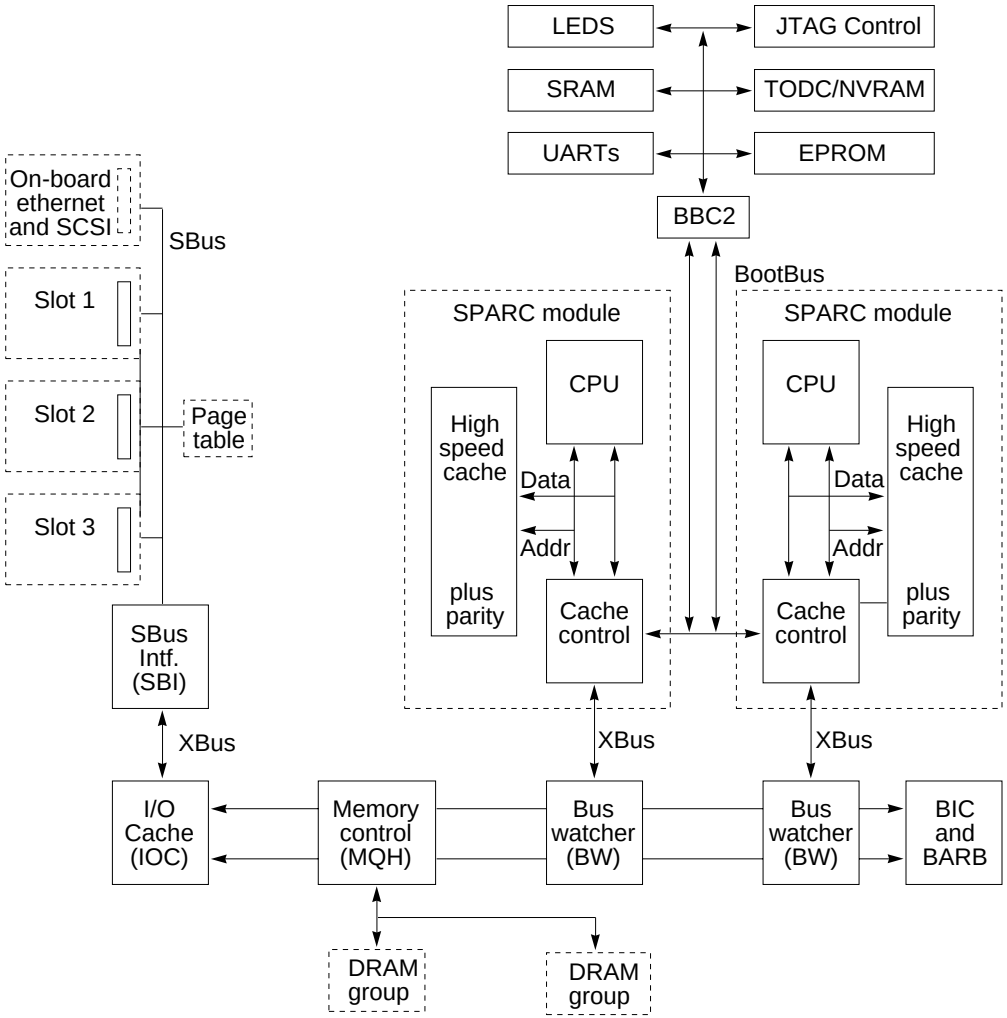


Figure 10-2 System Board Block Diagram

Components shown in solid outlines are not field replaceable; if diagnostics report that a non-removable component failed, replace the entire system board.

System Board and Component Replacement

10

This chapter provides information on removing or replacing:

- System boards
- SuperSPARC Modules
- SBus cards
- SIMMs and NVSIMMs
- OpenBoot PROMs

10.1 System Board

10.1.1 Removal

Before you remove a system board, you must first halt the system. Turn off the power using the instructions in Chapter 6, “Powering Off and On.”

1. **Unfasten any cable connectors from the board back panel; set them aside.** First disconnect any keyboard cable, SCSI cable, network cable, or any other cables connected to the back panel. Label all cables for accurate reconnection later.

2. **Remove the two screws that secure the system board to the card cage.** See Figure 10-1. Set the screws aside for later reinstallation.

3. **Pull the curved ends of both ejector/injector levers outward simultaneously to release the board from the backplane connectors.** See Figure 10-1.

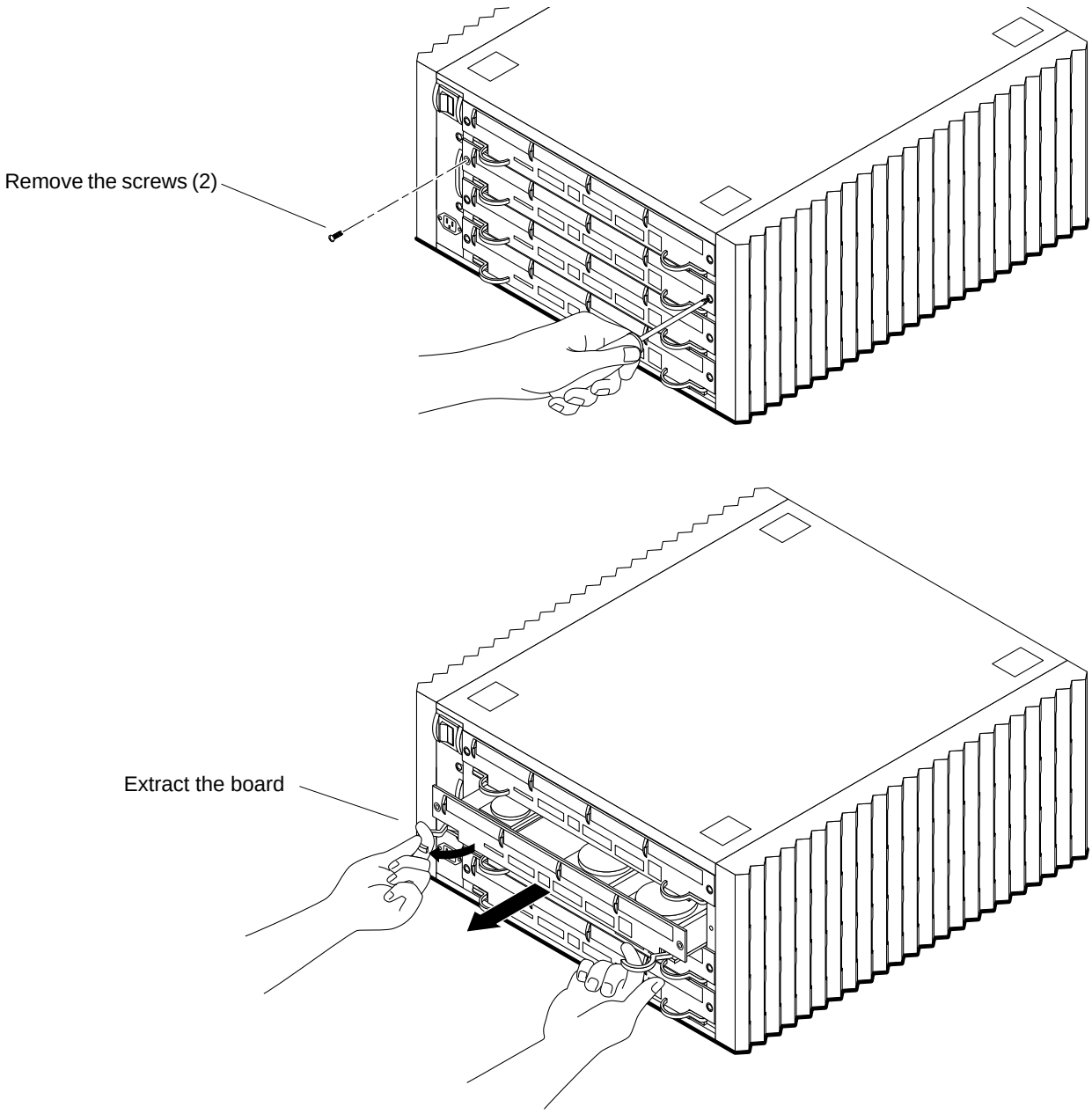


Figure 10-1 Removing the System Board

4. **Holding the board by both of the ejector/injector levers, gently slide the board out of the card cage.**

Caution – The board is cut out on the right side, therefore, the right side of the board will clear the card guides before the left. Ensure you grip the edges of the board firmly or the board may fall and damage components.

5. **Place the board on the ESD mat or in an antistatic bag.**

10.1.2 Replacement

Note – To select a card cage slot for the system board, See Appendix E, "General Rules for System Configuration."

1. **Open the protective packaging and take out the system board.**

Note – The board with the highest revision-level Boot PROMs must be installed in the system master position, slot 0. To determine which board to install in slot 0, see Appendix E, "General Rules for System Configuration."

2. **Carefully insert the board in the proper slot in the card cage, ensuring the board does not slip out of the left and right card guides.**
   The component side of the board must face up.

3. **Ensure the ejector/injector levers are in the outward position while sliding the board toward the backplane connectors.**
   See Figure 10-1. The board will not seat fully unless the levers are in this starting position.

Caution – DO NOT FORCE A BOARD into a slot, this can damage the board and system. The board should insert and seat smoothly. If it binds, remove it, and inspect the card cage for sign of obstruction. Also inspect the board and backplane for bent pins or other damage.

4. **Use the ejector/injector levers to seat the board.**
   Simultaneously swing both extractor / injector levers into the locked position making sure the card remains aligned to the card guides (does not become cocked). See Figure 10-2.

Caution – Do not press on the board rear panel to seat it—doing so will damage the connector pins.

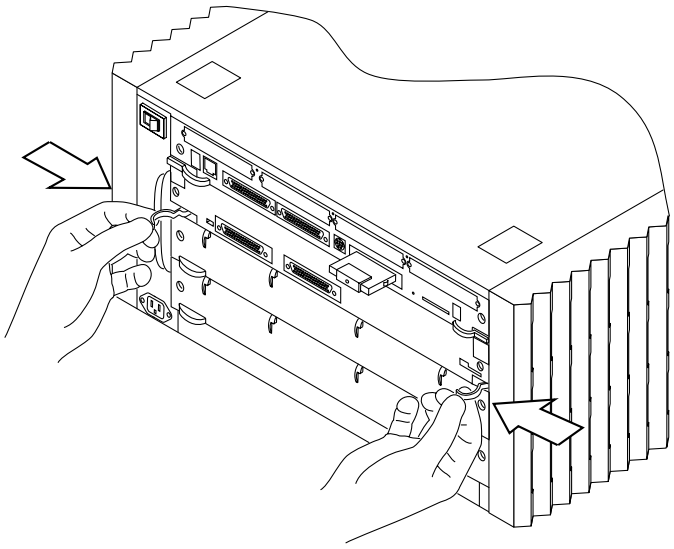


Figure 10-2 Closing the Ejector / Injector Levers

5. **Install two screws to secure the board to the card cage.**
   See Figure 10-1.

6. **Connect any applicable interface cables to the system board back panel.**

10.2 Using Standoffs

Plastic standoffs lock the SuperSPARC Modules and SBus cards to the system board. See Figure 10-3.

- 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.

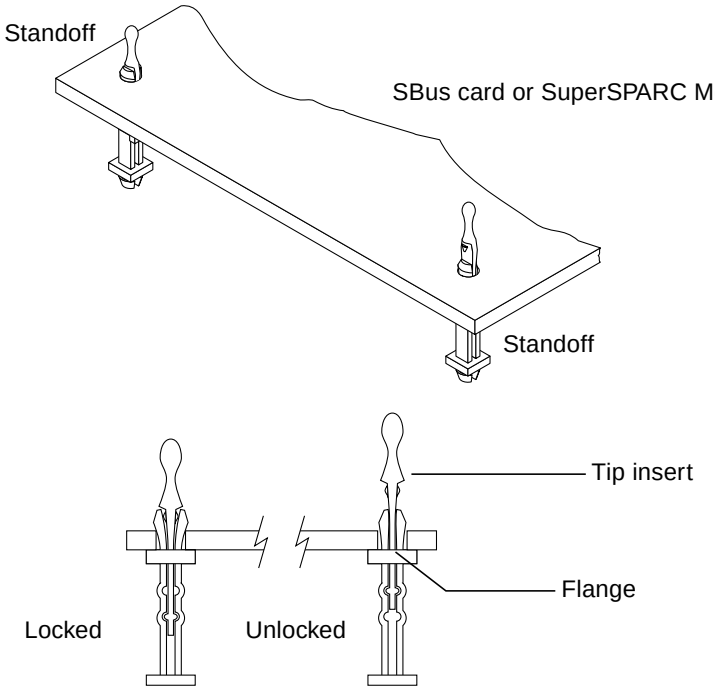


Figure 10-3 Locking and Unlocking Standoffs

10.3 SuperSPARC Modules

Each system board can have two SuperSPARC Modules, A and B. See Figure 10-4. To select the proper location for a SuperSPARC Module, See Appendix E, "General Rules for System Configuration."

Caution – Use the Sun ESD kit provided when performing these procedures.

Note – A disposable ESD kit can lose effectiveness after a single use.

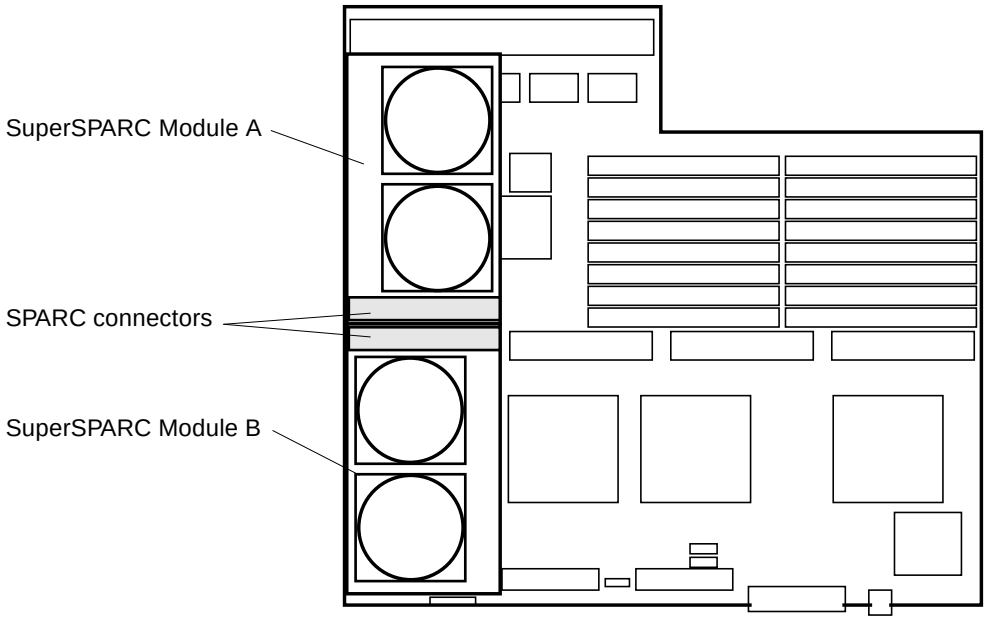


Figure 10-4 SuperSPARC Modules A and B

10.3.1 Removing a SuperSPARC Module

SuperSPARC Module A mounts on four standoffs on the system board. SuperSPARC Module B mounts like an SBus card, the connector end rests on standoffs but the back panel end slides onto the lip of a back panel filler plate.

Warning – The heat sinks on the SuperSPARC module may be hot. Use caution when removing or installing modules and avoid contact with the heat sinks. Hold SuperSPARC modules only by the edges.

▼ SuperSPARC Module A

1. **Unlock four standoffs securing the module to the system board.**
   Pull up the tip insert of each standoff to unlock. See Figure 10-3.
2. **Hold the module by the edges near the connector and carefully loosen the connector from the socket.**

Caution – The connector housing will break if the module is tilted too far.

3. **Place the module in an antistatic bag.**

▼ SuperSPARC Module B

SuperSPARC module B mounts like an SBus card: the connector end rests on standoffs, but the back panel slides onto the lip of a back panel filler plate.

1. **Unlock four standoffs securing the module to the system board.**
   Pull up the tip insert of each standoff to unlock. See Figure 10-3.
2. **Hold the module by the edges near the connector and gently loosen the module from the socket.**
3. **Lift the module from the socket at an angle while guiding the other side of the module out from the back panel filler.**
   See Figure 10-5. Each module hole rests on a small pin. Gently free the module from the back panel filler.

Note – It may be necessary to remove SuperSPARC Module A or the SBus card in slot 1 to get a firm grip on SuperSPARC Module B. A firm grip is necessary to remove the module from the connector without breaking the connector.

4. **Place the SuperSPARC Module in an antistatic bag.**

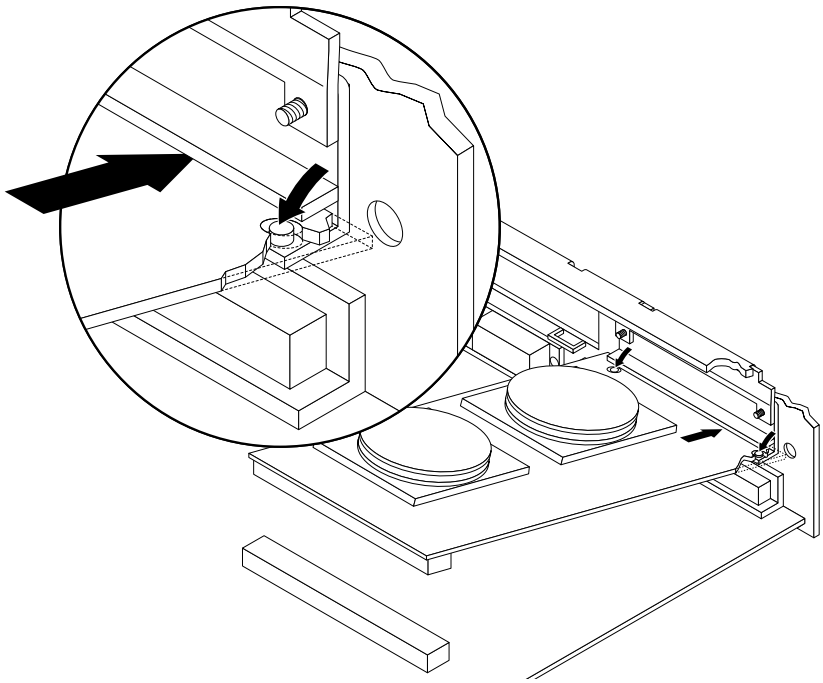


Figure 10-5 Installing SuperSPARC Module B

10.3.2 Replacing a SuperSPARC Module

1. **Unlock standoffs for the chosen location if they are not already unlocked.**
   Pull up the tip insert of a standoff to unlock it. See Figure 10-3.

2. **Take the module out of the protective packaging and inspect the connector for bent pins.**

3. **Place the module on the standoffs and align the module connector with the system board socket. For SuperSPARC Module B, slide the back panel end (the side opposite the connector) into place under the lip of the back panel filler panel, then align the connector with the socket.**
   Ensure holes in the board align with filler panel pins. See Figure 10-5.

Caution – Ensure the heat sink does not catch on the lip of the system board back panel during installation. If it does, the board will not seat properly in the backplane.

4. **Hold the module by the edges near the connector and firmly but gently press the module down until the connector is fully seated.**

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

5. **Starting from the side opposite the connector, press each corner of the module to ensure that it rests on the collar of the standoff.**

6. **Press down on the tip insert of each standoff to lock the module in place.**

10.4 SBus Cards

The system board has three SBus card locations. See Figure 10-6. To select the card location, see Appendix E, "General Rules for System Configuration."

Caution – Use the Sun ESD kit provided when performing these procedures.

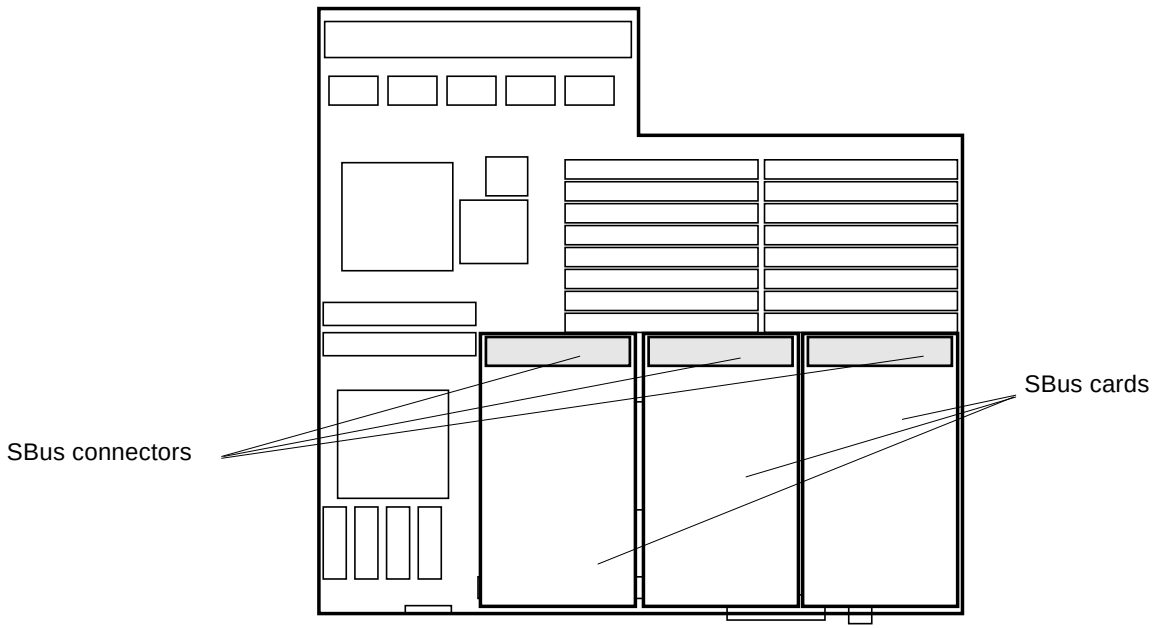


Figure 10-6 SBus Card Locations

10.4.1 Removal

1. **Remove two screws that secure the SBus card to the back panel.**
   Save the screws for installation of a replacement SBus card or a filler panel.

2. **Unlock the SBus card by pulling up the tips of the two standoffs.**
   Pull up the tip insert of a standoff to unlock it. See Figure 10-3.

3. **Hold the card by the edges near the connector and gently loosen the card from the socket.**
   You may need to remove SBus cards, SIMMs, or SuperSPARC Modules near the object SBus card to make enough room to grip the card during removal.

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

4. **Lift the SBus card from the socket at an angle while guiding the face plate out from the back panel opening.**
   See Figure 10-7.

5. **Place the SBus card in an antistatic bag.**

6. **If the SBus card is not immediately replaced, install a filler panel (part number 340-2305-xx) on the back panel opening of the system board. To secure the filler panel, use the screws that were removed in step 1.**

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.

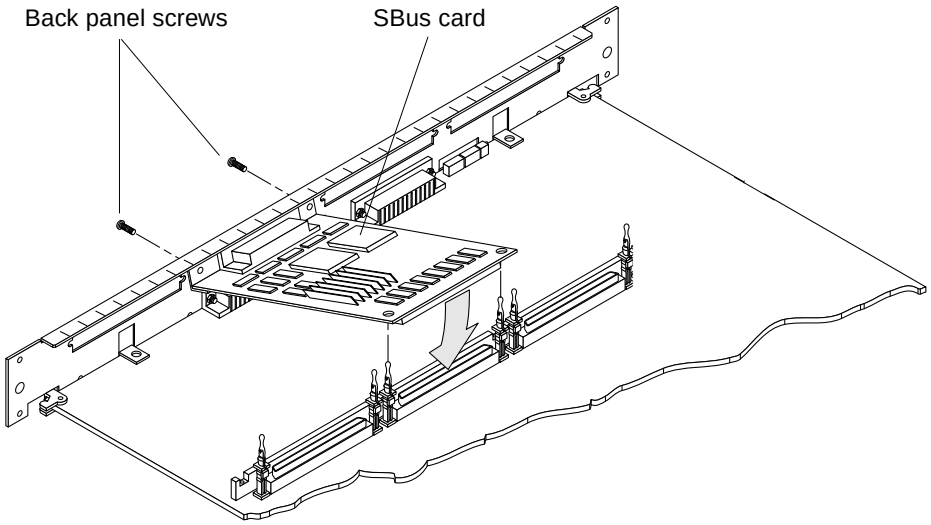


Figure 10-7 Removing or Installing an SBus Card

10.4.2 Preparing a New SBus Card

Note – If the new SBus card has an adapter bracket (See Figure 10-8), remove the bracket by performing the procedures in this section. If the SBus card lacks an adapter bracket, go to Section 10.4.3, “Installing an SBus Card.”

1. **Open the protective packaging and take out the SBus card.**
2. **Remove the adapter bracket from the SBus card rear panel.**
   See Figure 10-8. Using a #0 Phillips screwdriver, remove two screws securing the adapter to the card rear panel. The adapter bracket and screws are not needed for installation.
3. **Remove the black plastic card retainer shipped with the card.**
   See Figure 10-8. Spread the ends of the retainer apart to remove it from the card. The retainer is not needed for this installation.

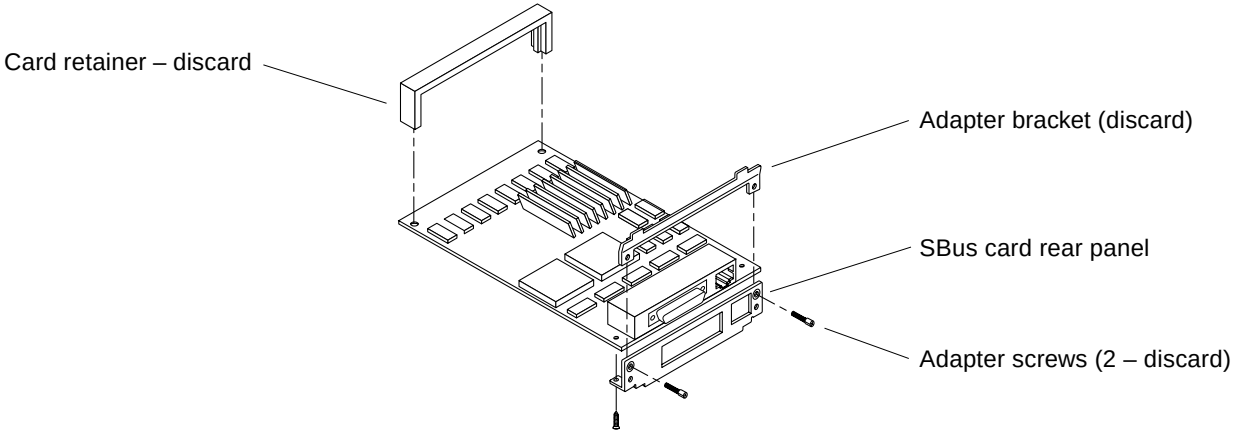


Figure 10-8 Removing the SBus Card Retainer and Adapter Bracket

Link Integrity Test

4. **For DSBE/S and FSBE/S cards: remove the two outer retaining screws (refer to Figure 10-9), but do NOT remove the middle screw or the springfinger.**
   Use a #0 Phillips screwdriver and a 3/16 nut driver or socket wrench.

5. **For DSBE/S and FSBE/S cards, configure jumper J0302 for link integrity test functionality. Refer to**
   DSBE/S — Figure 10-9:

   FSBE/S — Figure 10-10

   a. **Put the shunt over both pins to** *disable* **the Link Integrity Test, as shown in Figure 10-11 "Disabled.".**

   b. **Put the shunt in one pin to** *enable* **the Link Integrity Test, as shown in Figure 10-11 "Enabled.".**

Caution – If the customer chooses to disable the test, it must be disabled both at the hub and at the SBus card. In the event of "loss of carrier" or "not responding" problems, check the status of the link enable on both the SBus card and the hub.

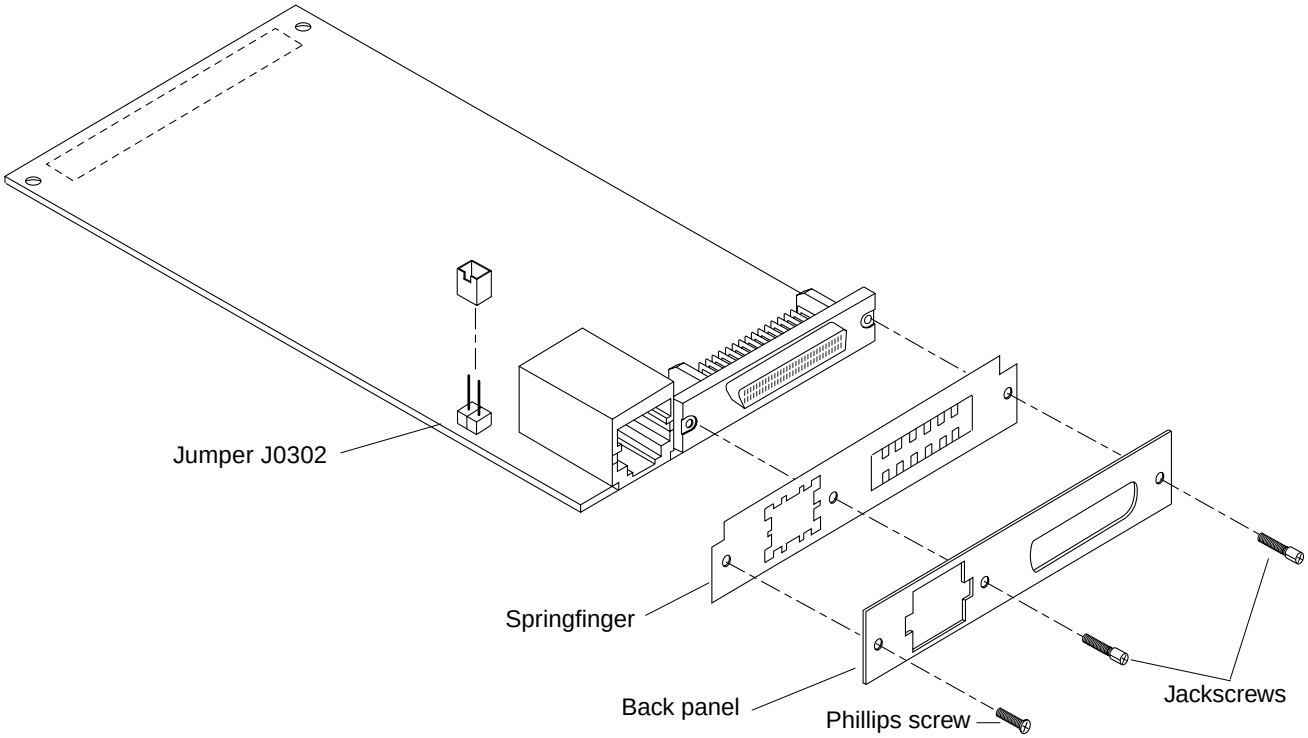


Figure 10-9 DSBE/S SBus Card

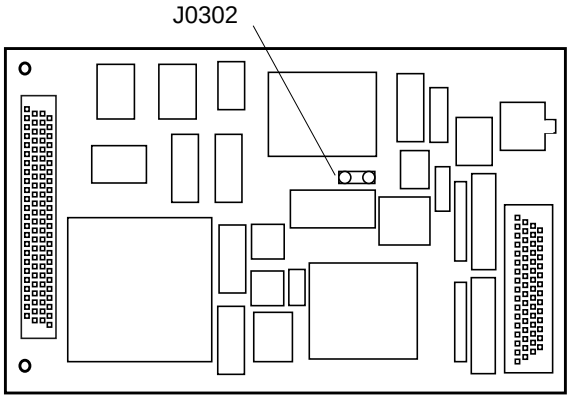


Figure 10-10 FSBE/S SBus Card

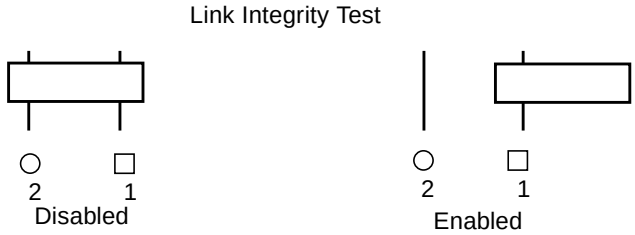


Figure 10-11 Disabling and Enabling the Link Integrity Test

10.4.3 Installing an SBus Card

1. **If a filler panel covers the back 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.
2. **Unlock the two standoffs for the slot.**
   Pull up the tip insert of a standoff to unlock it. See Figure 10-3.
3. **Remove the card from the protective packaging. Inspect the pins in the connector to make sure they are not bent.**
4. **Guide the SBus card face plate under the springfingers and against the rear face of the back panel.**
   See Figure 10-7. The I/O connectors of the SBus card should be visible through the opening in the back panel.
5. **Hold the card by the edges nearest the SBus connector and place the card over the two standoffs.**
6. **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 system board back panel.

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

7. **Press each corner of the card to ensure it rests on the collar of the standoff.**
8. **Press down on the tip insert of each standoff to lock the card in place.**

9. Replace and tighten back panel screws to secure the SBus card in place.

Note – For Ethernet type SBus cards, you may want to verify SBus card operation at this point. To per form the link integrity test, refer to Section 3.9, “Disabling and Enabling the Link Integrity Test.”

10.5 SIMMs and NVSIMMs

Three SIMM options exist; two are DRAM SIMMs. The third is a nonvolatile SIMM (NVSIMM). (See Figure 10-12.) All three SIMM types are removed and replaced in the same manner. Table 10-1 summarizes the SIMM variations.

Table 10-1 SIMM Variations

Capacity	Type	Part Number	Appearance
8 Mbyte	DRAM	501-1817-xx	Type A
8 Mbyte	DRAM	501-1817-xx	Type B
32 Mbyte	DRAM	501-2196-xx	Type A
32 Mbyte	DRAM	501-2196-xx	Type B
1 Mbyte	NVSIMM (featuring battery backup power)	501-2197-xx	Type C

Note – These SIMMs were designed for the SPARCserver 1000 system and are not interchangeable with other types of SIMMs.

Type A 8 Mbyte SIMMs are interchangeable with Type B 8 Mbyte SIMMs. The two 32 Mbyte SIMM types may also be interchanged. However, SIMMs of different capacities cannot be interchanged within a group. To select the proper SIMM socket locations, See Appendix C, “SIMMs and Jumpers.”

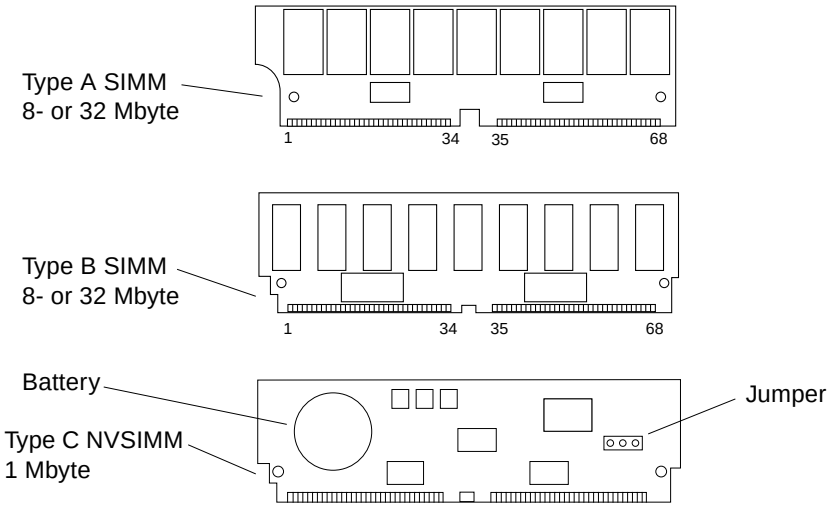


Figure 10-12 SIMMs and the NVSIMM (Battery Side)

Note – The two top SIMMs shown in Figure 10-12 differ in appearance only because they are made by different manufacturers, not because they have different memory capacities. Each SIMM can have a capacity of either 8 or 32 Mbytes (depending on whether 1 Mbit or 4 Mbit DRAMs are used.

10.5.1 Removal

1. **Locate the faulty SIMM by matching the location number displayed by POST with the J-numbers shown in Figure 10-13.**
2. **Orient the system board so the backplane connector faces you.**
3. **To unlock a SIMM, press the locking tabs toward the outside of the socket and tilt the SIMM forward.**
   See Figure 10-14.

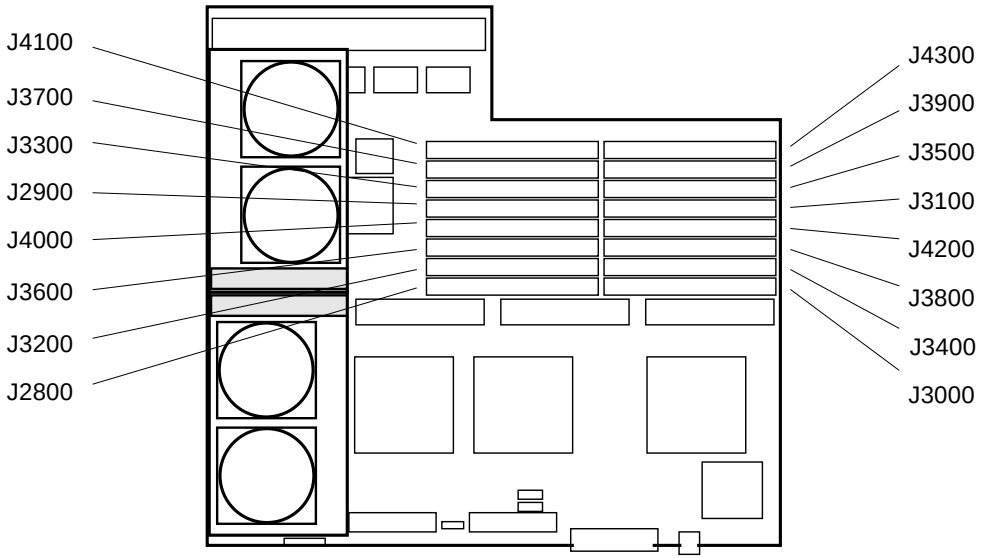


Figure 10-13 SIMM Socket Locations

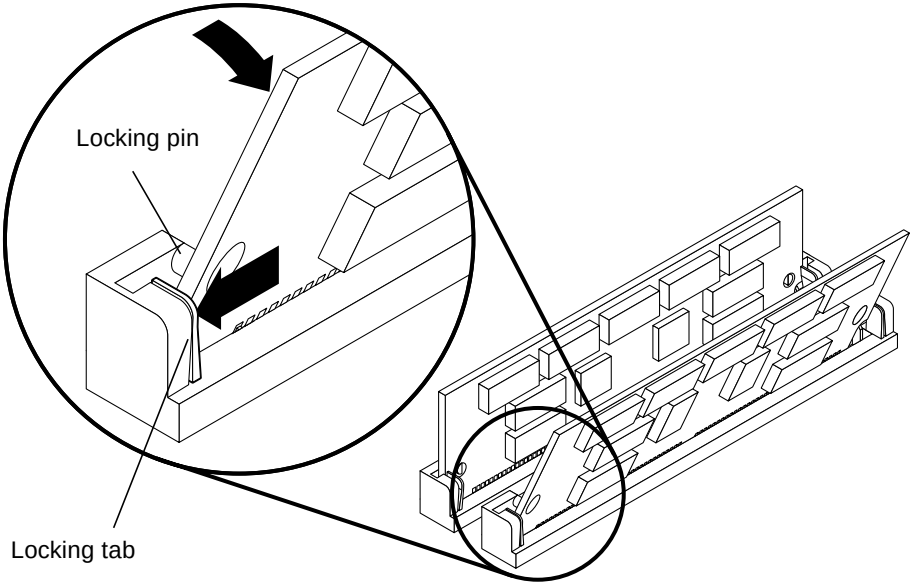


Figure 10-14 Unlocking a SIMM

4. **Unlock two more SIMMs to make space for the faulty SIMM to tilt forward far enough to be free of the locking pins.**
   See Figure 10-15.

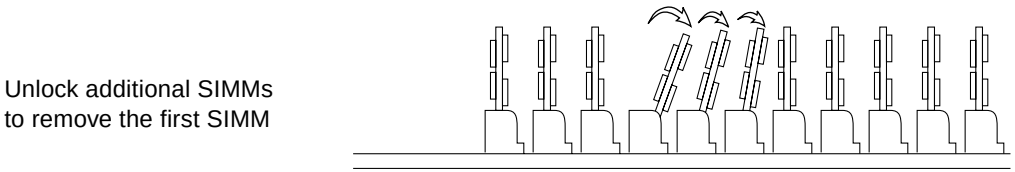


Figure 10-15 Creating Space to Remove a SIMM

5. **Remove the SIMM from the socket and place it in an antistatic bag.**

10.5.2 Replacement

Caution – Do not mix 8 Mbyte SIMMs with 32 Mbyte SIMMs (or 1 Mbyte NVSIMMs) in the same group. (However, SIMMs of different *manufacturers* are interchangeable in a group if the SIMMs have identical capacity and speed.)

1. **Orient the system board so the backplane connector faces you.**
2. **Remove the SIMM (or NVSIMM) from the antistatic package.**
3. **Hold the SIMM at the edges, with pin 1 to the left.**
   The side alignment notch (Type A) or double notch (Type B SIMM or Type C NVSIMM) are at the left side.
4. **Guide the SIMM into the slot at an angle so the SIMM connector pads touch the bottom of the socket.**
   The SIMM bottom alignment notch must align with the tab in the socket center. Ensure the locking pins align with the holes in the sides of the SIMM.
5. **Tilt the SIMM upright to lock it in place.**
   The locking tabs should automatically lock around the SIMM.

Note – The SIMM should require very little insertion force. If the SIMM doesn't seat properly, or if a replacement SIMM is made by a different manufacturer, the replacement SIMM may be backward; verify the SIMM alignment holes and notch *exactly* match the corresponding parts of the socket.

6. **Lock any SIMMs that were loosened during the installation procedure.**

10.5.3 NVSIMM

Before installing NVSIMMs you must first activate the battery to insure data retention. To do this, locate the jumper on the right side of the NVSIMM. See Figure 10-16. Move the jumper to the battery ON position.

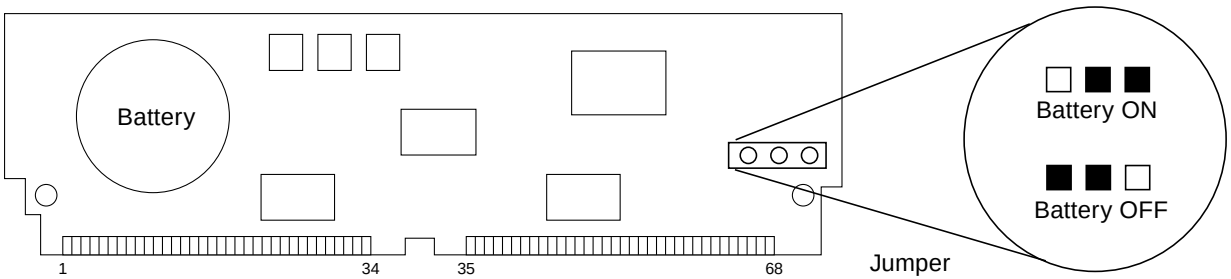


Figure 10-16 NVSIMM Jumper Locations

Once the jumper is in the ON position, proceed with the installation or removal as described in the preceding sections.

Caution – After you turn the battery ON do not move or remove the jumper. Moving the jumper will cause the lose of any data contained in the NVSIMM.

10.6 OpenBoot PROMs

Use this procedure for OpenBoot PROM upgrades. See Figure 10-17 for the PROM socket locations. Pin one is at the upper left corner for all the PROMs.

10.6.1 Removal

1. **To uncover the PROMs, remove the SuperSPARC Module (if any) in module location B.**
2. **Use an IC extractor tool to remove the PROMs.**
3. **Place the PROMs on antistatic foam plastic in an antistatic package for storage or possible reuse.**

10.6.2 Replacement

1. **Verify the correct PROM location.**
   Each PROM has a different socket location (Figure 10-17) and part number.
2. **Position the PROM carefully on the socket, and partially seat the PROM.**
3. **Ensure the PROM pins are not bent, then press firmly to seat the PROM in the socket.**

Caution – When inserting the PROM, do not flex the board or press it against a hard surface. Use a cushioned ESD mat to protect the board.

4. **Repeat steps 2 and 3 for the remaining OpenBoot PROMs.**
5. **Replace any SuperSPARC Module that was removed for this procedure.**

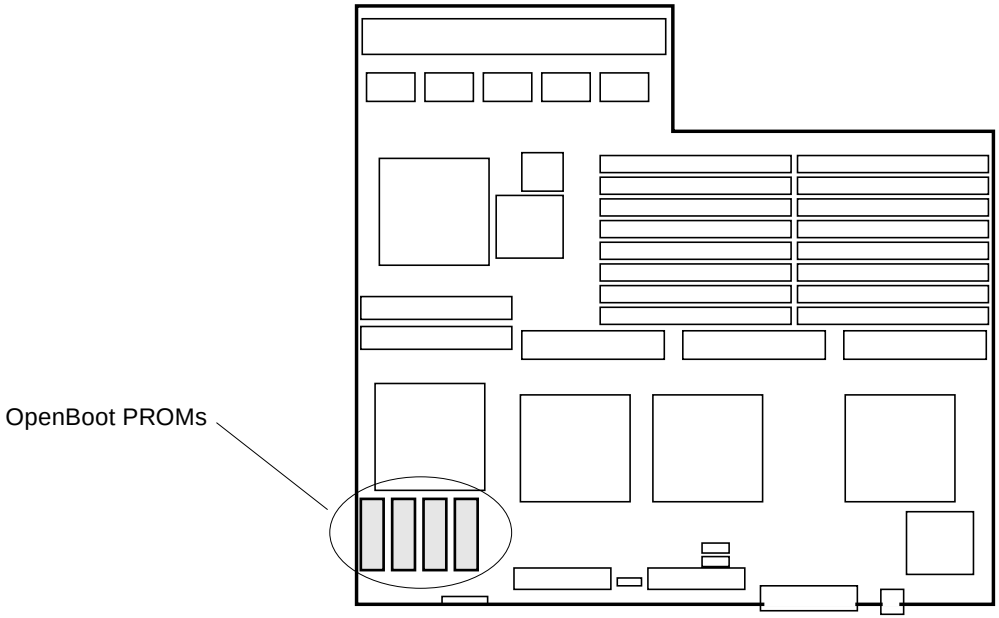


Figure 10-17 OpenBoot PROMs on the System Board

10.7 System Restart

To verify the SBus cards, SuperSPARC Modules, SIMMs, OpenBoot PROMs, or system boards are installed properly, run the power-on self-test program (POST), as follows:

1. **Turn on power to the monitor.**
   If the system does not have a monitor, connect an RS232 TTY terminal to serial port A on the system master. The system master is the system board occupying the lowest-numbered card cage slot (usually slot 0.)

2. **Configure the terminal software.**
   The most commonly-used setup is as follows:

- 9600 baud
- 1 stop bit
- 8 data bits
- Parity off
- Full duplex

Refer to the instruction manual shipped with the terminal for additional configuration instructions.

Note – The listed setup parameters may differ from the customer site settings. These parameters can be changed in the NVRAM.

---

3. **Turn the front panel key switch to On to boot the system and run normal system diagnostics.**
   Watch the diagnostics display for error messages regarding newly installed or replaced hardware.

   After diagnostics are completed, POST configures the system to utilize all available processors and options.

4. **Watch the boot display to confirm all processors and newly installed or replaced hardware are recognized.**

5. **After the system finishes booting, a login prompt is displayed.**
   Log in and resume operation.

Part 6 — Illustrated Parts Breakdown

Illustrated Parts Breakdown 12

The illustrations and tables on the following pages are intended to supplement the removal and replacement procedures described in previous chapters.

12.1 Replaceable Units

The following items for the SPARCserver 1000 can be replaced at the customer site by a qualified service provider.

Table 12-1 List of Replaceable Components *(1 of 3)*

General Category	Description	Part Number
Exterior components	Chassis assembly — includes backplane, power supply, fan tray and plastics	540-2273
	Front panel assembly	540-2394
	EMI panel	340-2689
	Side panels	330-1470
	Top / bottom cover	330-1469
	Plug cover	330-1589
	Foot	330-1590
Fan tray	Fan tray	370-1547
DC power supply	Power supply	300-1103
Backplane assembly	Backplane assembly	501-2021
	Chassis enclosure	340-2684

Table 12-1 List of Replaceable Components *(2 of 3)*

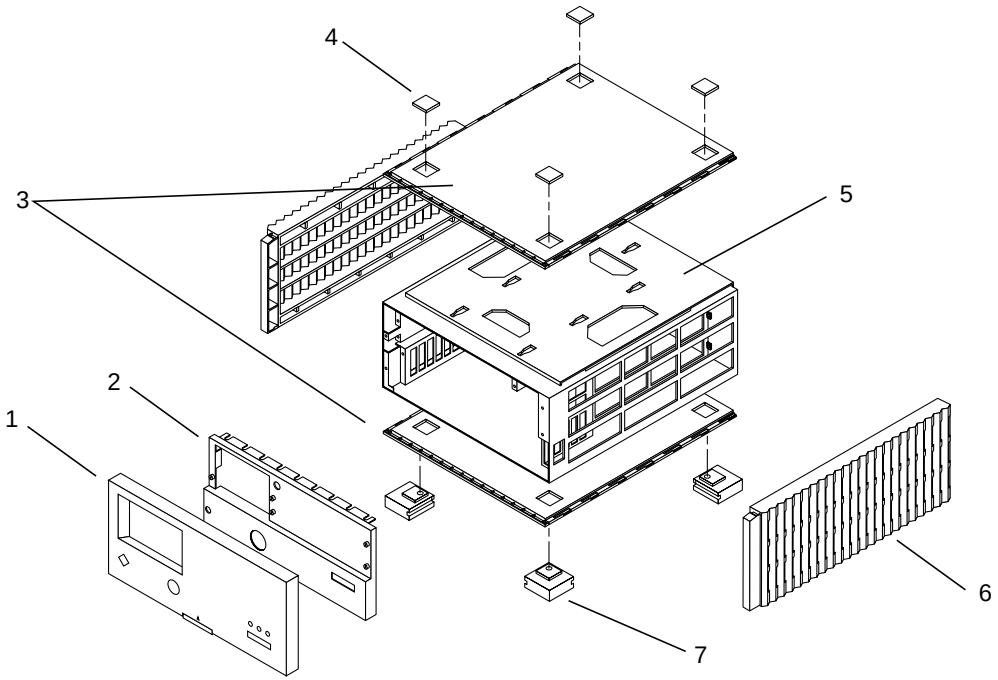
General Category	Description	Part Number
SCSI tray assembly	SCSI tray	540-2274
	Control board assembly	
	SPARCserver 1000	501-2412
	SPARCserver 1000E	501-2667
	SCSI-2 cable assembly	530-1911
	Tape/SunCD Plus/SunCD 2Plus DC harness assembly	530-1912
	Disk drive DC harness assembly	530-1913
	SCSI tray, metal enclosure	340-2685
	5 1/4 inch device bracket	340-2687
	Disk drive bracket	340-2688
	Blank filler panel	540-2429
	SunCD Plus back cover	340-2705
	SunCD 2Plus back cover	340-2705
	Tape drive	
	8 mm tape drive, 10 Gbyte	370-1808
	8 mm tape drive, 14 Gbyte	370-1857
	4 mm DAT tape drive	370-1571
	4 mm 4-8Gbyte DAT tape drive	370-2178?
	SunCD Plus drive	370-1584
	SunCD 2Plus drive	370-1681
	SunCD Plus4 drive	?
	Disk drive	
	1.05 Gbyte SCSI-2	370-1710
	535 Mbyte	370-1424
System board	System board, 0 processors, 0 SIMMs, SPARCserver 1000	501-2336
	System board, 0 processors, 0 SIMMs, SPARCserver 1000E	501-2668
	SuperSPARC module, 50MHz	501-2562

Table 12-1 List of Replaceable Components *(3 of 3)*

General Category	Description	Part Number
	SuperSPARC module, 60MHz	501-2519
	8Mx9 100ns SIMM	501-1817
	32Mx9 100ns SIMM	501-2196
	1Mx9 NVSIMM	501-2197
	Air restrictor board, SBus slot cutout	340-2305
	Air restrictor board, card cage board slot	540-2388
Disk card	4.2 Gbyte wide SCSI-2 PCB assy. to accommodate four 3 1/2-inch disk drives	501-2589
	Disk drive, 1.05 Gbyte wide SCSI-2 single connector with bracket	540-2568
	2.1 Gbyte board assembly to accommodate four 3 1/2-inch disk drives	501-2066
	Disk drive, 535 Mbyte single connector with bracket	540-2403

12.2 Exterior Components

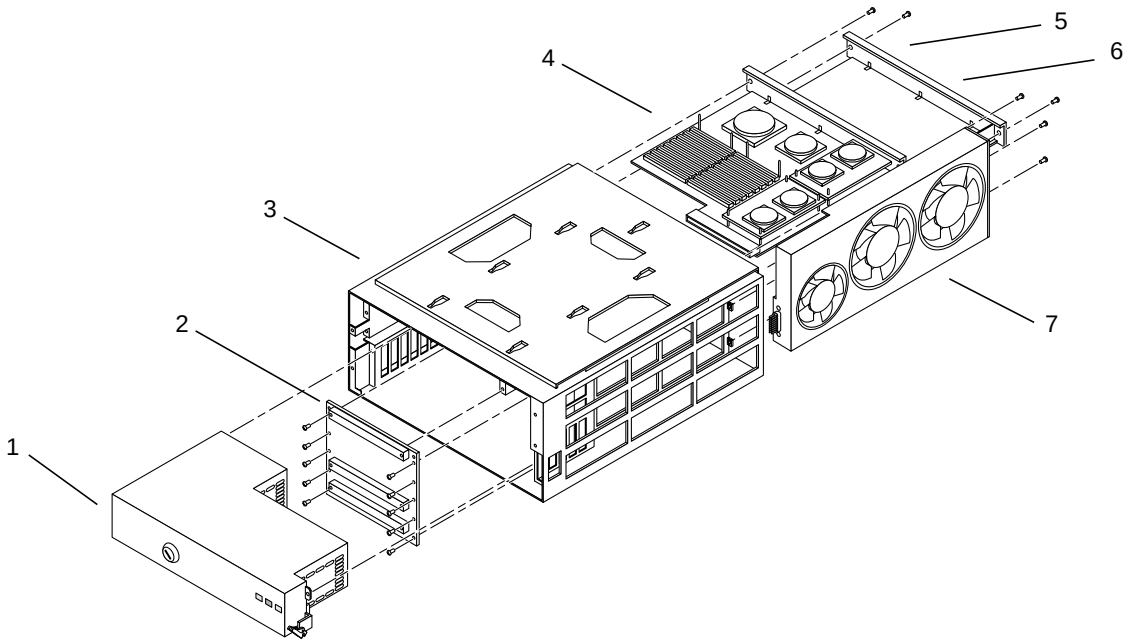
Table 12-2 Parts List for Exterior Components



Key	Description	Part Number
1	Front panel assembly	540-2394
2	EMI panel	340-2689
3	Top / bottom cover	330-1469
4	Plug cover	330-1589
5	Chassis enclosure	340-2684
6	Side panels	330-1470
7	Foot	330-1590

12.3 Chassis Assembly

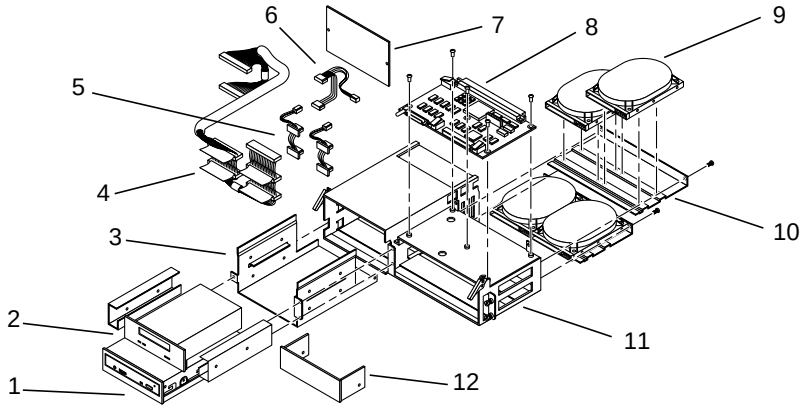
Table 12-3 Parts List for Base Chassis and Backplane



Key	Description	Part Number
1	Power supply	300-1103
2	Backplane assembly	501-2021
3	Chassis enclosure	340-2684
4	System board, SPARCserver 1000	501-2336
4	System board, SPARCserver 1000E	501-2668
5	Air restrictor board, card cage board slot	540-2388
6	Disk card, 4.2 Gbyte wide SCSI-2 (hidden)	501-2588
6	Disk card, 2.1 Gbyte SCSI-2 (hidden)	501-2066
7	Fan tray	370-1547

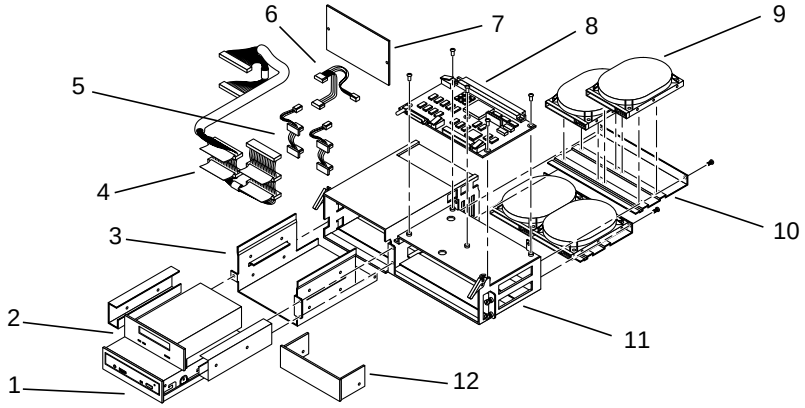
12.4 SCSI Tray Assembly

Table 12-4 Parts List for SCSI Tray Assembly



Key	Description	Part Number
1	SunCD Plus drive	370-1584
1	SunCD 2Plus drive	370-1681
	SunCD Plus 4 drive	?
	Tape drives	
	8 mm tape drive, 10 Gbyte	370-1808
	8 mm tape drive, 14 Gbyte	370-1857
	4 mm DAT tape drive	370-1571
	4 mm 4-8GByte DAT tape drive	370-2178
3	5 1/4 inch device bracket	340-2687
4	SCSI-2 cable assembly	530-1911
5	Disk drive DC cable assembly	530-1913
6	Tape/SunCD Plus/SunCD 2Plus DC cable assembly	530-1912
	SunCD Plus back cover	340-2705
7	SunCD 2Plus back cover	340-2705
8	Control board assembly, SPARCserver 1000	501-2412
8	Control board assembly, SPARCserver 1000E	501-2667
9	Disk drive 1.05 Gbyte SCSI-2	370-1710

Table 12-4 Parts List for SCSI Tray Assembly



Key	Description	Part Number
	535 Mbyte SCSI-2	370-1424
10	Disk drive bracket	340-2688
11	SCSI tray, metal enclosure	340-2685
12	Half-height filler panel	540-2429

Part 7 — Appendixes, Glossary, Index

Product Specifications

This chapter describes the physical, electrical, and environmental specifications of the SPARCserver 1000 system.

A.1 Physical Specifications

See Table A-1 and Table A-2 for SPARCserver 1000 system physical specifications.

Table A-1 Physical Specifications

	US	Metric	Comments
Height	8.3 in	21 cm	
Width	20 in	50 cm	
Depth	21 in	54 cm	
Weight	70 lb approximate	32 kg	Actual weight depends on the installed options
Power cord	6 ft	1.8 m	

.

Table A-2 Clearance and Service Access

	US	Metric	Comments
Front	12 in	31 cm	Access to storage media, key switch, and reset switch
Rear	16 in	41 cm	Access to system board, fan tray, and cables
Left	6 in	16 cm	To maintain airflow
Right	6 in	16 cm	To maintain airflow

A.2 Electrical Specifications

Table A-3 lists the specifications for the power supply.

Table A-3 Power Supply Characteristics

Parameter		Value
Input	**Voltage range**	100-240 VAC
	Current, maximum	9.5A
	Current frequency range	47-63 Hz
Output	+5 VDC, maximum	5 to 100A
	+1.2 VDC, maximum	0 to 40A
	+12 VDC, maximum	0 to 2.5A
	–12 VDC, maximum	0 to 0.6
	+12 VDC, maximum	1.5 to 8A For peripherals and fans
Power rating	Maximum power not to exceed	650W
Volt-Ampere rating		9.5A RMS at 100 VAC input at 650W load

A.3 Environmental Requirements

The acceptable environmental ranges for the SPARCserver 1000 system are:

- Temperature between 32 and 104 degrees Fahrenheit (0 and 40 degrees Celsius)
- Humidity between 5 percent and 80 percent (relative noncondensing)
- Altitude between 0 and 10,000 feet (0 and 3048 meters) above sea level
- Well-ventilated or air-conditioned work area to avoid overheating
- Relatively dust free — as in an office environment

Functional Description

B

B.1 System Overview

Figure B-1 is a functional block diagram of the SPARCserver 1000 system.

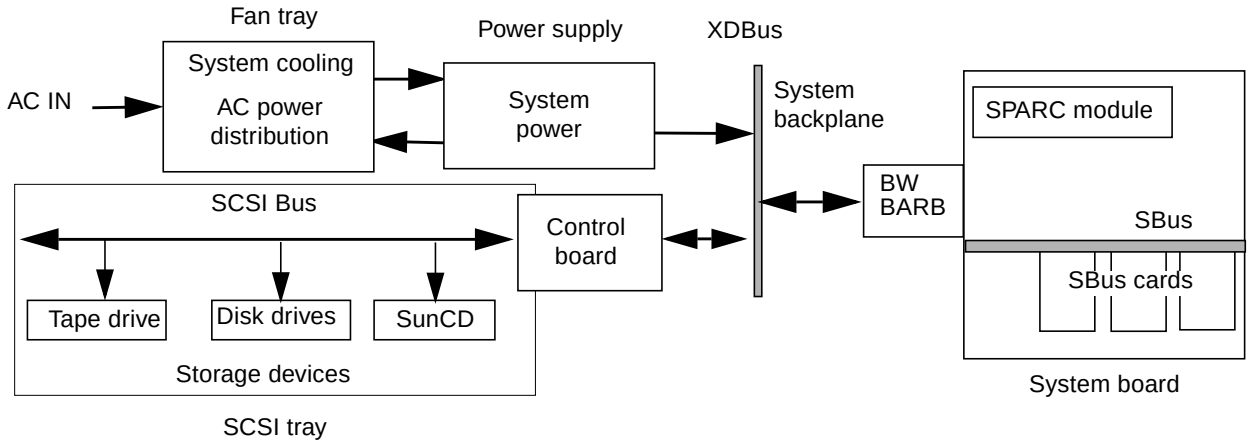


Figure B-1 SPARCserver 1000Simplified Block Diagram

B.1.1 System Board

Figure B-2 shows components on the system board. The system board has 0, 1, or 2 processor modules, SIMM memory divided into four groups of four SIMMs each, and up to three SBus cards. Any of these components can access the main system bus. The system board also contains a bus arbitrator (BARB)

for the XDbus and four bus interface chips (BICs). Also included are two bus watchers (BW), a memory queue handler (MQH), I/O cache (IOC), and an SBus interface (SBI) component.

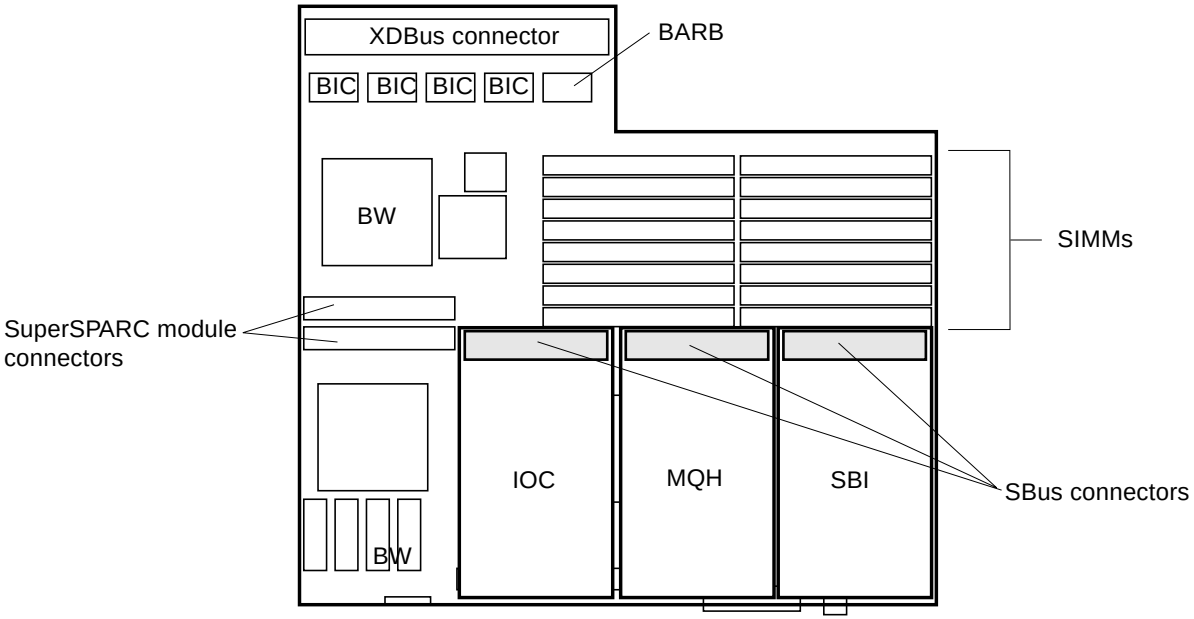


Figure B-2 System Board Components

B.2 System Architecture

Figure B-3 is a detailed block diagram of SPARCserver 1000 architecture. Each SPARCserver 1000 supports 1 to 8 SuperSPARC modules, 1 to 4 SBusses and 0 to 12 SBus cards, 0 to 3 on each system board. Memory capacity is 32 Mbytes to 2 Gbytes.

Functionally, the SPARCserver 1000 consists of six main sections: processor, memory, I/O, bus interface, bootbus interface, and clock generation. The main sections of the system are interconnected by the system bus (called the XDBus).

The XDBus is the main system bus located on the backplane and system board. BICs interconnect the backplane XDBus with the XDBus on the system board. XDBus is supported by four BICs, which are 18-bit, bit-sliced pipeline registers.

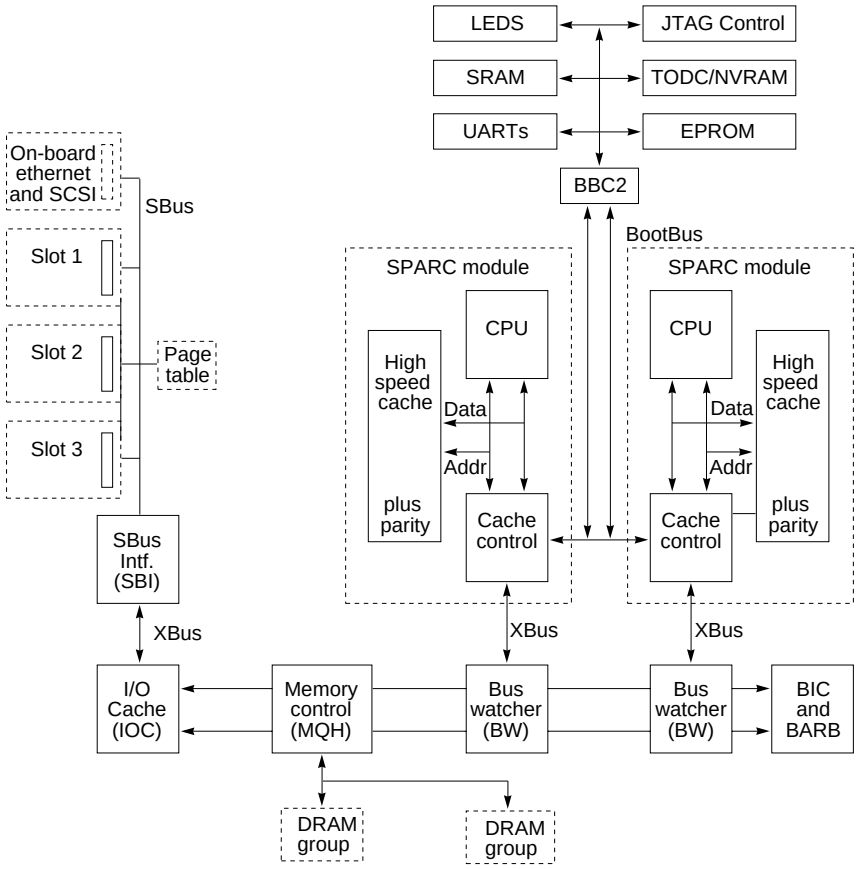


Figure B-3 Detailed Block Diagram

B.3 Arbitration System

The SPARCserver 1000 supports a large number of devices that demand ownership of system resources, including exclusive access to the system backplane address and data bus. To prevent conflicts over access to resources, SPARCserver 1000 has a two-tier arbitration system; one tier monitors the boards; the other tier, which is higher, monitors the overall system.

Each system board has a board arbiter (BARB). The function of the BARB is to determine which device (bus watcher (BW), memory queue handler (MQH), or I/O cache (IOC)) is next in line to access the XDBus.

Because the system boards are identical, an external arbitrator must determine which board can access the system bus at any instant. The external arbitrator is called the central arbiter (CARB), which is located on the control board.

B.4 SuperSPARC Module

Figure B-4 is a block diagram of the SuperSPARC module. Each board supports up to two SuperSPARC modules. Each module contains one processor integrated circuit (SMXX), cache memory, an MX cache memory controller (MXCC) and a (BW) interface. Main memory banks are on the system board.

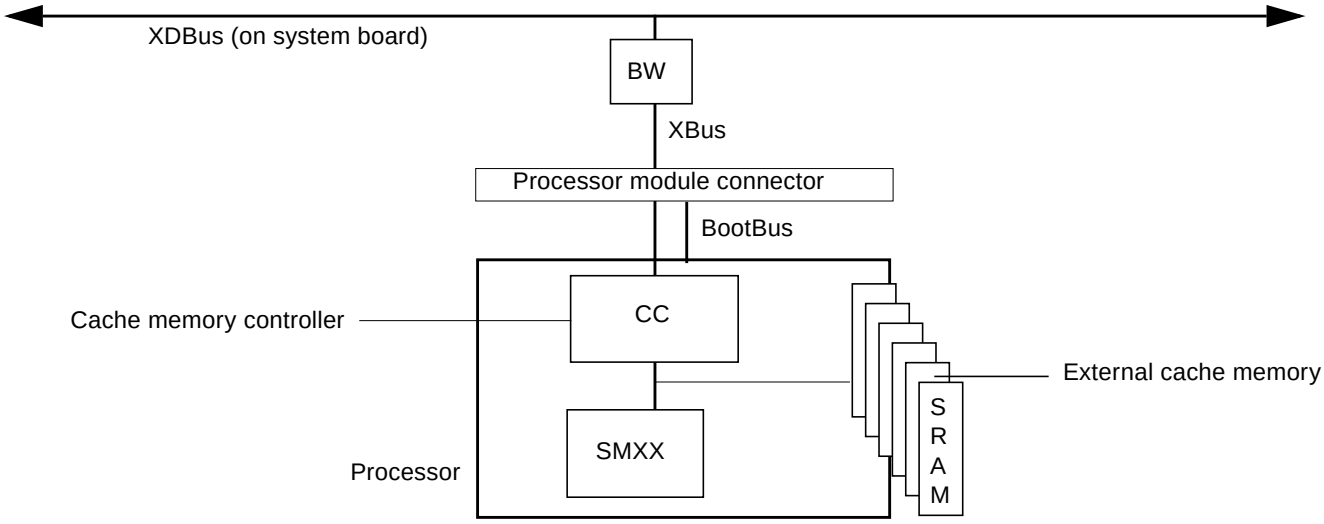


Figure B-4 Processor Module Block Diagram

B.5 I/O Unit

Figure B-5 shows the I/O section of the system board, which is called the I/O unit. The I/O unit includes an SBus Interface (SBI) chip, an IOCache (IOC), and an I/O memory management unit, known as the External Page Table (XPT). SBus addresses are translated into memory and I/O addresses by the I/O memory management unit, which is controlled by the SBus interface chip.

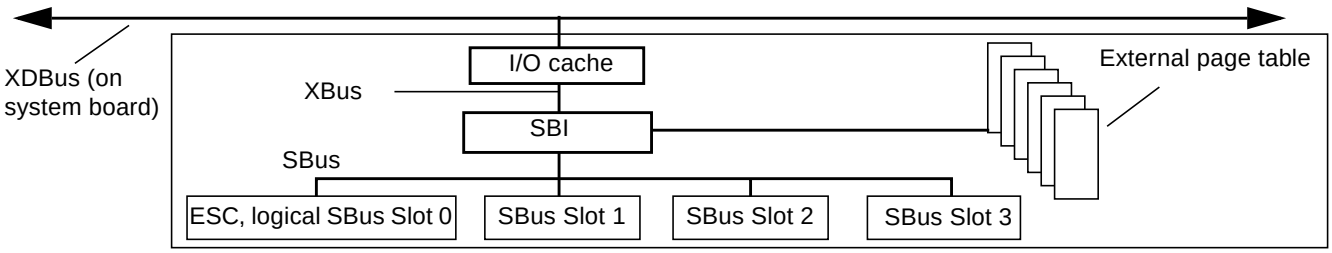


Figure B-5 I/O Unit Block Diagram

B.6 Main Memory Unit

Figure B-6 shows the system board main memory section (the main memory unit). Each system board contains one memory queue handler (MQH). Each MQH controls up to 16 SIMMs using four programmable decode registers located in the MQH. These registers can be programmed to handle DRAMs with densities from 1 Mbit to 256 Mbit. The memory described by one decode register is known as a group and the memory controlled by one MQH is called a bank. Because each decode register describes the memory in a group, it is possible for the decode registers for a single MQH to handle SIMMs of different densities if their timing characteristics are the same. See Appendix A for a more detailed description of SIMMs and SIMM groups.

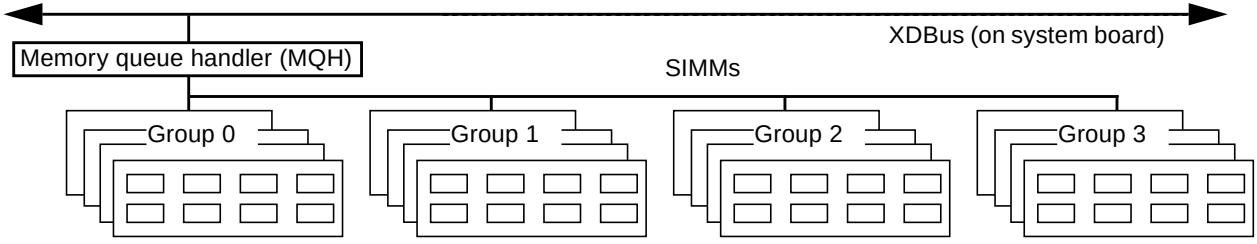


Figure B-6 Main Memory Unit Block Diagram

B.7 Control Board

Figure B-7 is a detailed control board block diagram. One control board serves the entire system regardless of the number of system boards. The control board generates all system-wide clocks. The central arbiters (CARBS) arbitrate disputes between the BARBS on the system boards that compete for use of the system bus. LEDs on the board edge display the power and signal status.

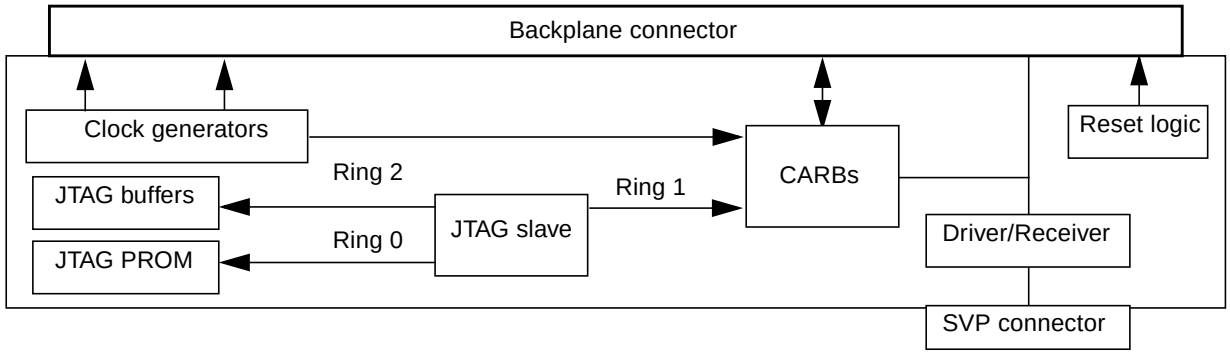


Figure B-7 Control Board Block Diagram

B.8 SBus Cards

SBus cards allow the use of a wide variety of I/O options like graphic displays, Ethernet, FDDI, printers, etc. Each system board supports 0-3 SBus cards.

B.9 Power Distribution

Figure B-8 shows power distribution. AC input power is routed to the power supply via a 30-ampere circuit breaker in the fan tray.

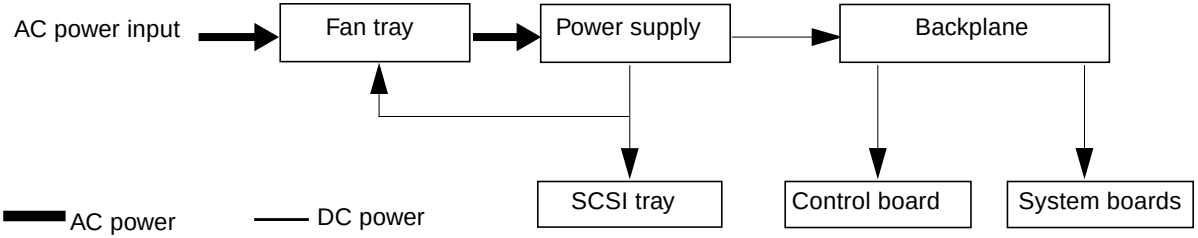


Figure B-8 Power Distribution Block Diagram

B.9.1 Power Supply

The 650-watt power supply provides +1.2, +5, +12, and -12-volt DC power to the control and system boards via the backplane and +5 and +12-volt DC power to the SCSI tray. The supply also produces +24-volt DC for the fan tray.

SIMMs and Jumpers B

Use this appendix to identify SIMM slot locations and to verify system board jumper settings.

B.1 SIMM Configuration

B.1.1 System Board Rules

- Each system board has slots for sixteen SIMMs divided into four groups of four SIMMs each. See Figure B-1.
- Each 64-bit data-word is distributed among four SIMMs, which make up a group.
- When SIMMs are loaded onto a board they are installed in sets of four, so the lowest numbered group is completely filled first.
- SIMMs can only be installed in groups of four, hence you can have zero, four, eight, twelve, or sixteen SIMMs installed on a given system board.
- SIMM socket numbers (J-numbers) are printed on the back of the system board. (J-numbers refer to the socket locations. U-numbers refer to the corresponding devices that fit in the sockets.)
- All SIMMs installed in a given group must be of the same capacity; 1 Mbyte (for NVSIMMs), 8 Mbyte, or 32 Mbyte. SIMMs from different manufacturers may be mixed within a group, provided the SIMMs are of the same capacity.

- When additional memory is added to a system, the new SIMMs are always be installed in the lowest available group, regardless of the board on which the SIMMs are installed.
- When adding memory to a system, begin with the system board in the lowest available card cage slot number (slot 0) and fill the lowest open group. Then fill the lowest available group on the system board in slot 1, etc.

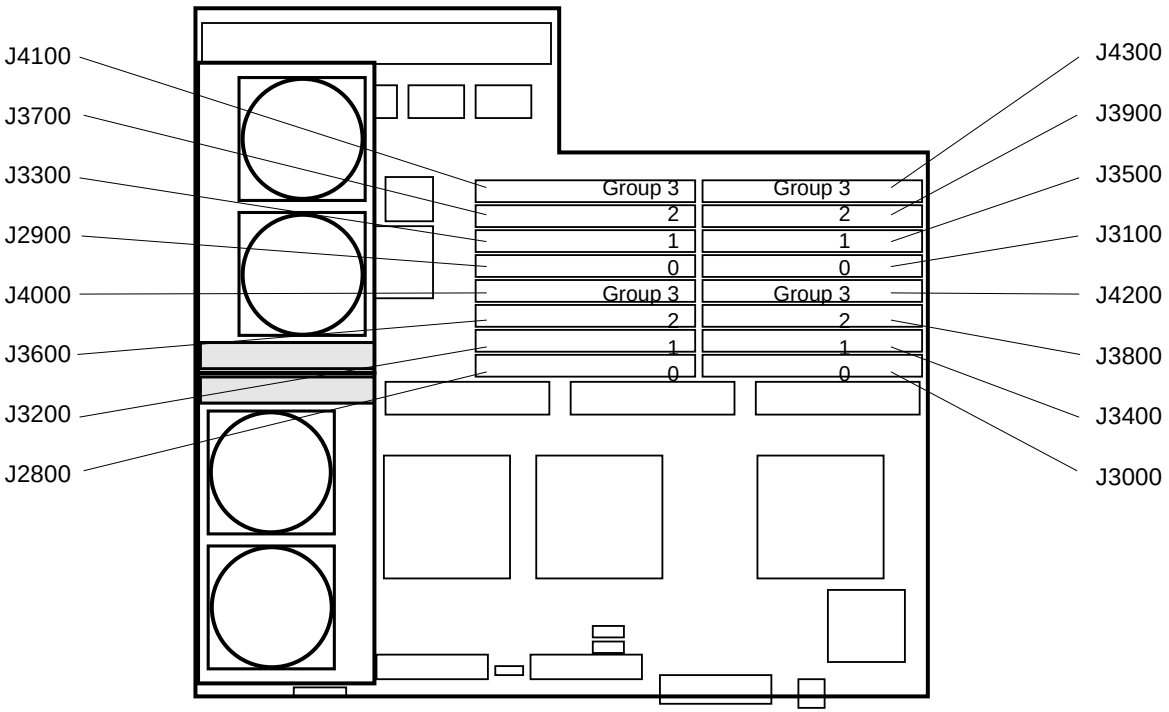


Figure B-1 SIMM Group Locations on the System Board

SIMMs on a board are divided into four groups, as summarized in Table B-1.

Table B-1 SIMM Group Organization

Group	Location
Group 0	J2800, J2900, J3000, J3100
Group 1	J3200, J3300, J3400, J3500
Group 2	J3600, J3700, J3800, J3900
Group 3	J4000, J4100, J4200, J4300

B.1.2 Locating a Failing SIMM

When a SIMM (or NVSIMM) fails during Power On Self-Test (POST), the SIMM slot number (J-number) and system board card cage slot number can be learned by using the `prtdiag` command. Refer to Section 3.2, "Using `prtdiag`" for instructions.

B.2 Jumper Configuration

Note – Jumpers are factory set and should not be changed except for use with factory diagnostic equipment and software.

Use Table B-2 and Figure B-2 to verify jumper settings are correct. Pin 1 of each location is identified by a square solder pad.

Table B-2 System Board Jumpers

Label	Jumper	Default Setting	Function
J1200	Pins 2, 3	In	Connects +12V to RS232 line driver. (Pin 1 = ground, pin 2 = line driver input, pin 3 = +12 V supply.) Used to power the RS232 ports.
J1201	Pins 2, 3	In	Connects –12V to RS232 line driver. (Pin 1 = ground, pin 2 = line driver input, pin 3 = –12 V supply.) Used to power the RS232 ports.
J1100	Pin 1 to ground	Out	Holds processor A in reset so the other processor can be tested.
J1101	Pin 1 to ground	Out	Holds processor B in reset so the other processor can be tested.

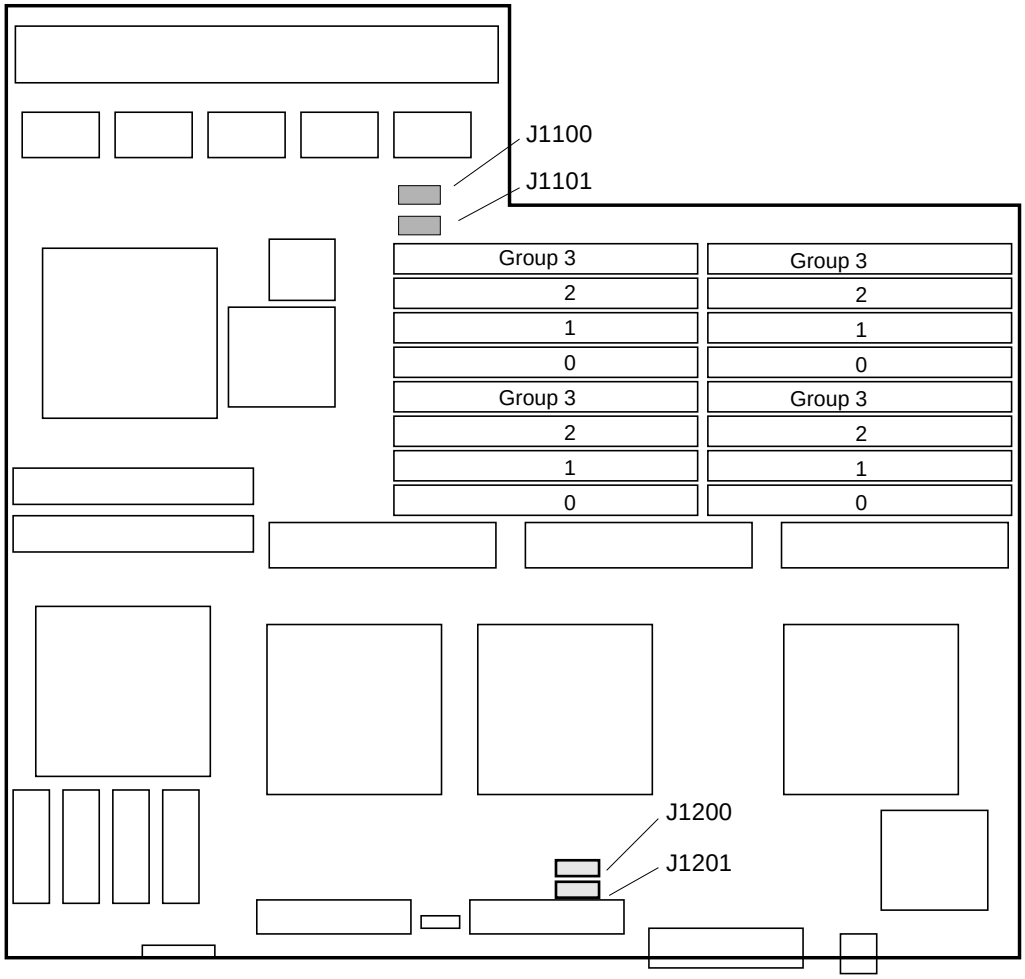


Figure B-2 Jumper Locations on the System Board

Connector Pinouts

C

This appendix lists pinouts of connectors on the system board:

- Keyboard and mouse connector
- Serial port connectors A and B
- SBus slots 1, 2, and 3
- Backplane connector
- SuperSPARC module slots A and B

C.1 Connector Locations

Figure C-1 shows the back panel and the top of the system board. The backplane has diagnostic LEDs, cable connectors, and SBus card openings. The top of the board has connectors for three SBus cards, two SuperSPARC modules, and 16 SIMMs.

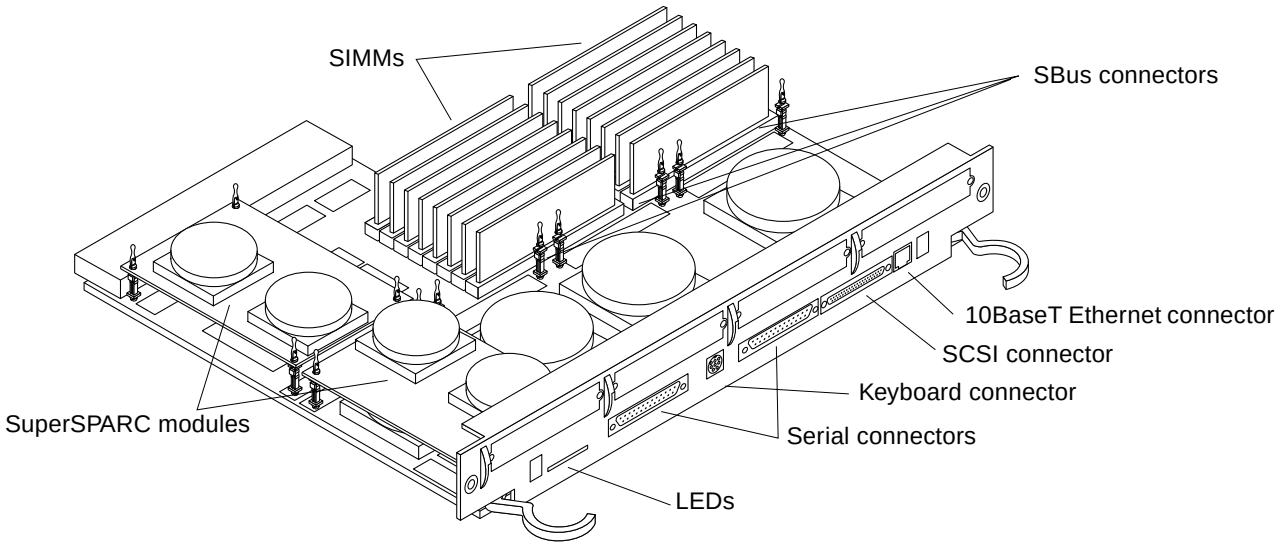


Figure C-1 System Board Three-Quarter View

C.2 Keyboard and Mouse Connector

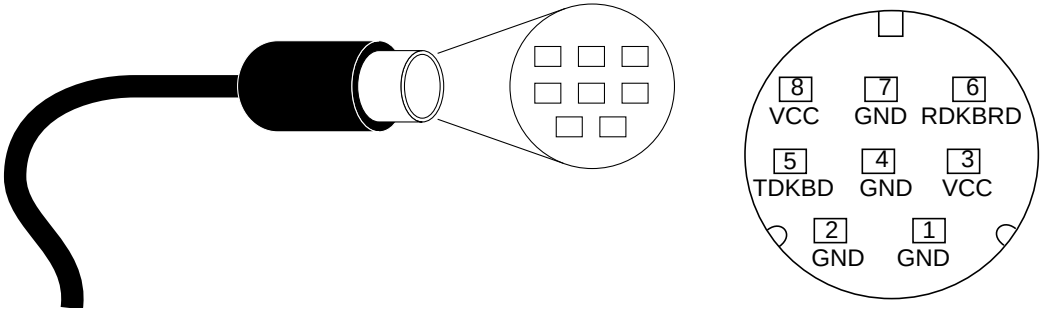


Figure C-2 Keyboard / Mouse Connector Pinout

C.3 Serial Port Connectors

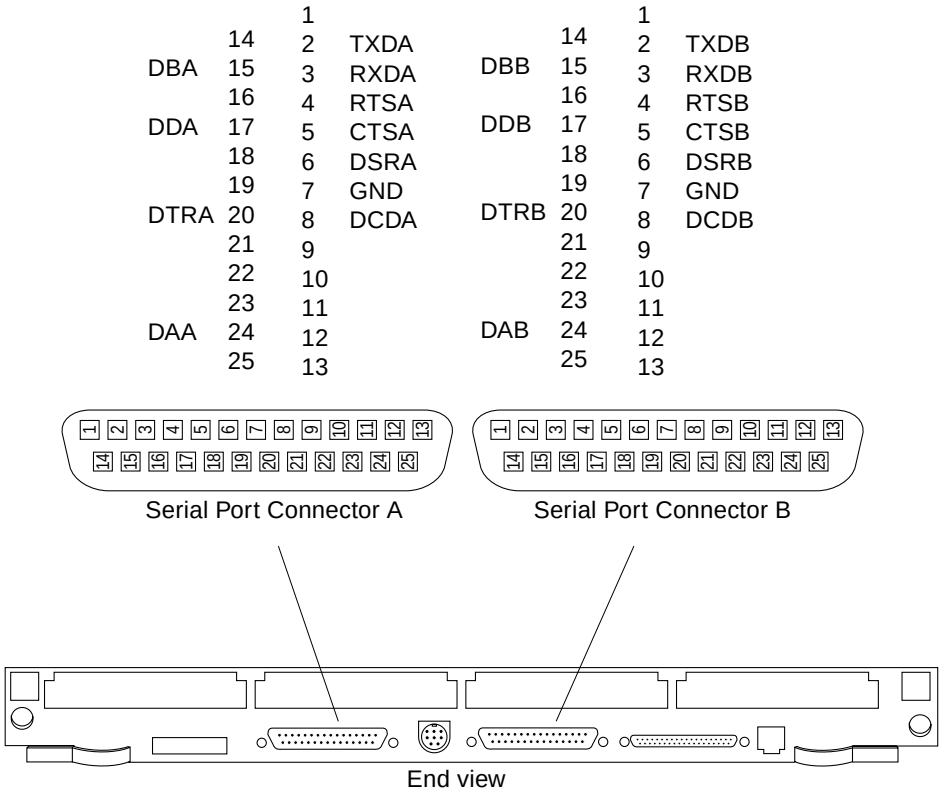


Figure C-3 Serial Port A and B Connector Pinouts

C.4 SBus Connectors

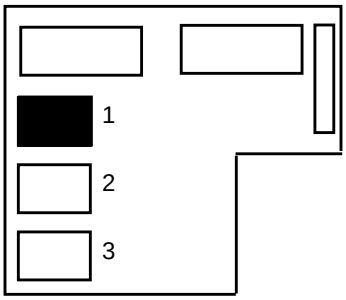


Table C-1 SBus Connector 1 (Connector J4901)

Section 1		Section 2		Section 3	
1	GND	33	SB_PA<6>	65	SB_D<18>
2	SB_BR_L<0>	34	SB_PA<8>	66	SB_D<20>
3	SB_Sel_L<0>	35	SB_PA<10>	67	SB_D<22>
4	SBIntR_L<0>	36	SB_Ack<0>	68	GND
5	SB_D<0>	37	SB_PA<12>	69	SB_D<24>
6	SB_D<2>	38	SB_PA<14>	70	SB_D<26>
7	SB_D<4>	39	SB_PA<16>	71	SB_D<28>
8	SBIntR_L<1>	40	SB_Ack<1>	72	VCC
9	SB_D<6>	41	SB_PA<18>	73	SB_D<30>
10	SB_D<8>	42	SB_PA<20>	74	SB_Siz<1>
11	SB_D<10>	43	SB_PA<22>	75	SB_Rd
12	SBIntR_L<2>	44	SB_Ack<2>	76	GND
13	SB_D<12>	45	SB_PA<24>	77	SB_PA<1>
14	SB_D<13>	46	SB_PA<26>	78	SB_PA<3>
15	SB_D<16>	47	SB_DPar	79	SB_PA<5>
16	SBIntR_L<3>	48	FS_VBB	80	VCC
17	SB_D<19>	49	SB_Clk<0>	81	SB_PA<7>
18	SB_D<21>	50	SB_SBG_L<0>	82	SB_PA<9>
19	SB_D<23>	51	SB_A_L	83	SB_PA<11>
20	SBIntR_L<4>	52	GND	84	GND
21	SB_D<25>	53	SB_D<1>	85	SB_PA<13>
22	SB_D<27>	54	SB_D<3>	86	SB_PA<15>
23	SB_D<29>	55	SB_D<5>	87	SB_PA<17>
24	SBIntR_L<5>	56	VCC	88	VCC
25	SB_D<31>	57	SB_D<7>	89	SB_PA<19>
26	SB_Siz<0>	58	SB_D<9>	90	SB_PA<21>
27	SB_Siz<2>	59	SB_D<11>	91	SB_PA<23>
28	SBIntR_L<6>	60	GND	92	GND
29	SB_PA<0>	61	SB_D<13>	93	SB_PA<25>
30	SB_PA<2>	62	SB_D<15>	94	SB_PA<27>
31	SB_PA<4>	63	SB_D<17>	95	SB_Rst_L<0>
32	SBLErr_L	64	VCC	96	FS_VDD

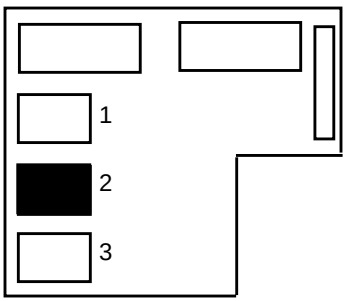
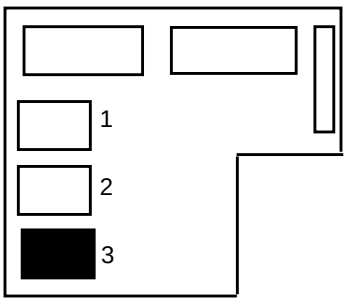


Table C-2 SBus Connector 2 (Connector J4902)

Section 1		Section 2		Section 3	
1	GND	33	SB_PA<6>	65	SB_D<18>
2	SB_BR_L<1>	34	SB_PA<8>	66	SB_D<20>
3	SB_Sel_L<1>	35	SB_PA<10>	67	SB_D<22>
4	SBIntR_L<7>	36	SB_Ack<0>	68	GND
5	SB_D<0>	37	SB_PA<12>	69	SB_D<24>
6	SB_D<2>	38	SB_PA<14>	70	SB_D<26>
7	SB_D<4>	39	SB_PA<16>	71	SB_D<28>
8	SBIntR_L<8>	40	SB_Ack<1>	72	VCC
9	SB_D<6>	41	SB_PA<18>	73	SB_D<30>
10	SB_D<8>	42	SB_PA<20>	74	SB_Siz<1>
11	SB_D<10>	43	SB_PA<22>	75	SB_Rd
12	SBIntR_L<9>	44	SB_Ack<2>	76	GND
13	SB_D<12>	45	SB_PA<24>	77	SB_PA<1>
14	SB_D<13>	46	SB_PA<26>	78	SB_PA<3>
15	SB_D<16>	47	SB_DPar	79	SB_PA<5>
16	SBIntR_L<10>	48	FS_VBB	80	VCC
17	SB_D<19>	49	SB_Clk<1>	81	SB_PA<7>
18	SB_D<21>	50	SB_SBG_L<0>	82	SB_PA<9>
19	SB_D<23>	51	SB_A_L	83	SB_PA<11>
20	SBIntR_L<11>	52	GND	84	GND
21	SB_D<25>	53	SB_D<1>	85	SB_PA<13>
22	SB_D<27>	54	SB_D<3>	86	SB_PA<15>
23	SB_D<29>	55	SB_D<5>	87	SB_PA<17>
24	SBIntR_L<12>	56	VCC	88	VCC
25	SB_D<31>	57	SB_D<7>	89	SB_PA<19>
26	SB_Siz<0>	58	SB_D<9>	90	SB_PA<21>
27	SB_Siz<2>	59	SB_D<11>	91	SB_PA<23>
28	SBIntR_L<13>	60	GND	92	GND
29	SB_PA<0>	61	SB_D<13>	93	SB_PA<25>
30	SB_PA<2>	62	SB_D<15>	94	SB_PA<27>
31	SB_PA<4>	63	SB_D<17>	95	SB_Rst_L<1>
32	SBLErr_L	64	VCC	96	FS_VDD

Table C-3 SBus Connector 3 (Connector J4903)

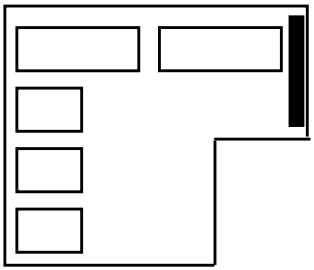


Section 1		Section 2		Section 3	
1	GND	33	SB_PA<6>	65	SB_D<18>
2	SB_BR_L<2>	34	SB_PA<8>	66	SB_D<20>
3	SB_Sel_L<2>	35	SB_PA<10>	67	SB_D<22>
4	SBIntR_L<4>	36	SB_Ack<0>	68	GND
5	SB_D<0>	37	SB_PA<12>	69	SB_D<24>
6	SB_D<2>	38	SB_PA<14>	70	SB_D<26>
7	SB_D<4>	39	SB_PA<16>	71	SB_D<28>
8	SBIntR_L<15>	40	SB_Ack<1>	72	VCC
9	SB_D<6>	41	SB_PA<18>	73	SB_D<30>
10	SB_D<8>	42	SB_PA<20>	74	SB_Siz<1>
11	SB_D<10>	43	SB_PA<22>	75	SB_Rd
12	SBIntR_L<16>	44	SB_Ack<2>	76	GND
13	SB_D<12>	45	SB_PA<24>	77	SB_PA<1>
14	SB_D<13>	46	SB_PA<26>	78	SB_PA<3>
15	SB_D<16>	47	SB_DPar	79	SB_PA<5>
16	SBIntR_L<17>	48	FS_VBB	80	VCC
17	SB_D<19>	49	SB_Clk<2>	81	SB_PA<7>
18	SB_D<21>	50	SB_SBG_L<2>	82	SB_PA<9>
19	SB_D<23>	51	SB_A_L	83	SB_PA<11>
20	SBIntR_L<18>	52	GND	84	GND
21	SB_D<25>	53	SB_D<1>	85	SB_PA<13>
22	SB_D<27>	54	SB_D<3>	86	SB_PA<15>
23	SB_D<29>	55	SB_D<5>	87	SB_PA<17>
24	SBIntR_L<19>	56	VCC	88	VCC
25	SB_D<31>	57	SB_D<7>	89	SB_PA<19>
26	SB_Siz<0>	58	SB_D<9>	90	SB_PA<21>
27	SB_Siz<2>	59	SB_D<11>	91	SB_PA<23>
28	SBIntR_L<20>	60	GND	92	GND
29	SB_PA<0>	61	SB_D<13>	93	SB_PA<25>
30	SB_PA<2>	62	SB_D<15>	94	SB_PA<27>
31	SB_PA<4>	63	SB_D<17>	95	SB_Rst_L<2>
32	SBLErr_L	64	VCC	96	FS_VDD

C.5 Backplane Connector

The system board has one backplane connector. Table C-4 shows the connector location and lists the function of each connector pin.

Table C-4 Backplane Connector (Connector J0200) *(1 of 2)*



Section 1		Section 2		Section 3		Section 4	
A1	VBB	B1	MSTRPR_L	C1	SYTAS	D1	SYTCK
A2	SYTDO	B2	SYTMS	C2	GND	D2	VCC
A3	SYTDI	B3	GND	C3	LEDGN_1	D3	SysOn
A4	LEDYEL_L	B4	LEDREC_L	C4	GND	D4	VCC
A5	VTT	B5	SY1D_L<0>	C5	SY1D_L<1>	D5	VCC
A6	SY1D_L<2>	B6	GND	C6	GND	D6	SY1D_L<3>
A7	VTT	B7	SY1D_L<4>	C7	SY1D_L<5>	D7	VCC
A8	SY1D_L<6>	B8	GND	C8	GND	D8	SY1D_L<7>
A9	SyClk	B9	GND	C9	SY1DP_L<0>	D9	VCC
A10	VTT	B10	SyEClk	C10	GND	D10	SY1D_L<8>
A11	SyClk_L	B11	GND	C11	SY1D_L<9>	D11	VCC
A12	VTT	B12	SyEClk_L	C12	GND	D12	SY1D_L<10>
A13	SY1D_L<11>	B13	GND	C13	SY1D_L<12>	D13	VCC
A14	SY1D_L<13>	B14	GND	C14	GND	D14	SY1D_L<14>
A15	VTT	B15	SY1D_L<15>	C15	SY1DP_L<1>	D15	VCC
A16	SY1D_L<16>	B16	GND	C16	GND	D16	SY1D_L<17>
A17	VTT	B17	SY1D_L<7>	C17	SY1D_L<17>	D17	VCC
A18	SY1D_L<20>	B18	GND	C18	GND	D18	SY1D_L<21>
A19	SY1D_L<22>	B19	GND	C19	SY1D_L<23>	D19	VCC
A20	VTT	B20	SY1DP_L<2>	C20	GND	D20	SY1D_L<24>
A21	SY1D_L<25>	B21	GND	C21	SY1D_L<26>	D21	VCC
A22	VTT	B22	SY1D_L<27>	C22	GND	D22	SY1D_L<28>
A23	SY1D_L<29>	B23	GND	C23	SY1D_L<23>	D23	VCC
A24	SY1D_L<31>	B24	GND	C24	GND	D24	SY1DP_L<3>
A25	VTT	B25	SY1D_L<32>	C25	SY1D_L<33>	D25	VCC
A26	SY1D_L<34>	B26	GND	C26	GND	D26	SY1D_L<35>
A27	VTT	B27	SY1D_L<36>	C27	SY1D_L<37>	D27	VCC
A28	SY1D_L<38>	B28	GND	C28	SY1D_L<39>	D28	SY1DP_L<4>
A29	SY1D_L<40>	B29	GND	C29	GND	D29	VCC
A30	VTT	B30	SY1D_L<41>	C30	SY1D_L<42>	D30	SY1D_L<43>
A31	SY1D_L<44>	B31	GND	C31	GND	D31	VCC
A32	VTT	B32	SY1D_L<45>	C32	SY1D_L<46>	D32	SY1D_L<47>

Table C-4 Backplane Connector (Connector J0200) *(2 of 2)*

Section 1		Section 2		Section 3		Section 4	
A33	SY1DP_L<5>	B33	GND	C33	SY1D_L<48>	D33	VCC
A34	SY1D_L<49>	B34	GND	C34	GND	D34	SY1D_L<50>
A35	VTT	B35	SY1D_L<51>	C35	SY1D_L<52>	D35	VCC
A36	SY1D_L<53>	B36	GND	C36	GND	D36	SY1D_L<54>
A37	VTT	B37	SY1D_L<55>	C37	SY1DP_L<6>	D37	VCC
A38	SY1D_L<56>	B38	GND	C38	GND	D38	SY1D_L<57>
A39	SY1D_L<59>	B39	GND	C39	SY1D_L<58>	D39	VCC
A40	VTT	B40	SY1D_L<61>	C40	GND	D40	SY1D_L<60>
A41	SY1D_L<63>	B41	GND	C41	SY1D_L<62>	D41	VCC
A42	VTT	B42	SY1DQ_L<0>	C42	GND	D42	SY1DP_L<7>
A43	STS1R0_L<2>	B43	GND	C43	SY1RQ_L<1>	D43	VCC
A44	VTT	B44	SY1RQS_L	C44	GND	D44	SY1RQO_L
A45	SY1GT_L	B45	GND	C45	SY1RQP_L	D45	VCC
A46	VTT	B46	SY1GTT_L<1>	C46	GND	D46	SY1GTT_L<0>
A47	SY1GT0_L	B47	GND	C47	SY1GTT_L<2>	D47	VCC
A48	VTT	B48	SY1GTP_L	C48	GND	D48	SY1GTS_L
A49	BDID<0>	B49	BDID<1>	C49	SYSECT	D49	VCC
A50	Fan_Fail	B50	GND	C50	AC_Fail	D50	DiagMode_L
A51	SyPwrRst_L	B51	TXDA	C51	GND	D51	VCC
A52	SYSRST_L	B52	GND	C52	SYRST_L	D52	TPIM
A53	TPOP	B53	TPOM	C53	TPIP	D53	VCC
A54	SCRST	B54	GND	C54	GND	D54	SCSD<0>
A55	SCSEL	B55	SCIO	C55	SCSD<1>	D55	VCC
A56	SCSD<2>	B56	GND	C56	SCSD<3>	D56	SCSD<4>
A57	SCSD<5>	B57	SCSD<6>	C57	GND	D57	VCC
A58	SCSD<7>	B58	SCDP	C58	SCMSG	D58	VCC
A59	VDD	B59	SCATN	C59	SCBSY	D59	SCACK
A60	VDD	B60	SCREQ	C60	SCCD	D60	TERMPWR

C.6 SuperSPARC Module Connectors

SuperSPARC module connectors A and B have identical pinouts.

Table C-5 SuperSPARC Module Connectors (Connectors J2000 and J2300) *(1 of 2)*

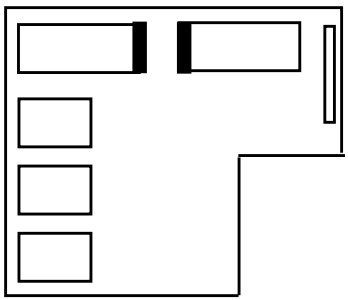
Name	Name		Blade	Name	
	1	BWBdTdo		51	BdTms
	2	BdTdo	Gnd	52	BdPwrRst_L
	3	BDTck		53	BootData<7>
	4	BootData<6>	Gnd	54	BootData<5>
	5	BootData<4>		55	BtStrb_L
	6	XData<0>	Gnd	56	XData<1>
	7	XData<2>		57	XData<3>
	8	XData<4>	Gnd	58	XData<5>
	9	XData<6>		59	XData<7>
	10	XData<8>		60	XData<9>
	11	XData<10>		61	XData<11>
	12	XData<12>	+5V	62	XData<13>
	13	XData<14>		63	XData<15>
	14	XData<16>	+5V	64	XData<17>
	15	XData<18>		65	XData<19>
	16	XData<20>	+5V	66	XData<21>
	17	XData<22>		67	XData<23>
	18	XData<24>	+5V	68	XData<25>
	19	XData<26>		69	XData<27>
	20	XData<28>		70	XData<29>
	21	XData<30>		71	XData<31>
	22	XGnt0_L	Gnd	72	XReq1_L<1>
	23	XPar<3>		73	XReq1_L<0>
	24	VkClk	Gnd	74	XPar<2>
	25	CcClk		75	XPar<1>
	26	XGtyp_L	Gnd	76	XPar<0>
	27	XCCAF_L		77	XReq0_L<1>
	28	Gnd	Gnd	78	XReq0_L<0>
	29	VREF\G		79	Spare
	30	XData<32>		80	XData<33>
	31	XData<34>		81	XData<35>
	32	XData<36>	+5V	82	XData<37>
	33	XData<38>		83	XData<39>

Table C-5 SuperSPARC Module Connectors (Connectors J2000 and J2300) *(2 of 2)*

Name	Name		Blade	Name	
	34	XData<40>	+5V	84	XData<41>
	35	XData<42>		85	XData<43>
	36	XData<44>	+5V	86	XData<45>
	37	XData<46>		87	XData<47>
	38	XData<48>	+5V	88	XData<49>
	39	XData<50>		89	XData<51>
	40	XData<52>		90	XData<53>
	41	XData<54>		91	XData<55>
	42	XData<56>	Gnd	92	XData<57>
	43	XData<58>		93	XData<59>
	44	XData<60>	Gnd	94	XData<61>
	45	XData<62>		95	XData<63>
	46	BootCmd<2>	Gnd	96	BootData<3>
	47	BootData<2>		97	BootData<1>
	48	BootData<0>	Gnd	98	CCErr_L
	49	BdRst_L		99	BootCmd<1>
	50	BootCmd<0>		100	XGnt_L

General Rules for System Configuration

E

This appendix lists recommended priorities and locations for:

- System boards
- SuperSPARC modules
- SBus modules
- SIMMs
- Drive IDs
- SCSI cables
- Ethernet cables
- Video cables*

E.1 Selecting Installation Locations

Each component described in this appendix has a specific recommended location. The following sections describe the location for each component.

E.2 System Master Board

The system board slot numbers are marked on the card cage. Install system boards from the lowest card cage slot number (0) to the highest (9). Install filler panels in all empty slots.

The system board must be installed in card cage slot 0. If the system has an TTY console, connect it to port A of the system master. A TTY console is not normally required if the system is in auto-boot mode (see the OpenBoot Command Reference for instructions on enabling and disabling auto-boot).

E.2.1 Identifying the System Master

To determine which board is the system master, observe the LEDs on the system board rear panels during boot.

- On the system master the lower eight LEDs (yellow) cycle on and off in a repeated pattern.
- On other system boards the lower eight LEDs are lit in a solid pattern until boot completes.
- After boot ends, all LEDs (on boards with SuperSPARC® modules) will cycle.

The system master in slot 0 must meet a set of minimum hardware requirements, as described next.

E.2.2 Minimum Requirements for the System Master

The system master must have

- one or two SuperSPARC modules

  Two green LEDs, marked PA and PB, denote the presence of functional SuperSPARC modules in slots A and B when lit.

- DSBE/S or DWIS/S interface card in SBus slot 0

  The DSBE/S or DWIS/S card connects to the main network and to the root disk drive.

- FSBE/S interface card in SBus slot 3.

  The FSBE/S card connects to the SCSI tray in the top of the cabinet.

E.2.3 Selecting the System Master Board

Note – The system master board must have the highest-revision Open Boot PROM (OBP). Also, if your system has OBP patches stored in NVRAM, these must be erased before assigning a board having different revision OPB as system master. This is required because OBP patches are PROM-version specific. Use the `set-default nvramrc` command at the OPB `ok` prompt to erase patches **before** powering down the system for board reassignment.

Determine which board is the candidate to become the system master. Before installing a given board:

1. **Determine the dash-revision level of Boot PROMs installed on the board. The level is expressed by the last two digits in the part number, as in: 525-xxxx-yy where "yy" conveys the dash-revision level.**
2. **Likewise, examine other system boards installed (or to be installed) in the card cage to determine the dash-revision level of PROMs on these boards.**
3. **Identify the board to be system master:**
   If a board has a higher dash-revision level Boot PROM than the others, it must be the system master.
   If two or three have higher levels, than one from that pool of boards must be the system master.
4. **Install the candidate-board into slot 0 as system master.**

The Open Boot PROM resides below an SBus card location as shown in Figure E-1. Remove the SBus card as required to expose the OBP for examination to determine the OBP revision level.

Part Number	U Position
525-1325-xx	U1000
525-1326-xx	U1001
525-1327-xx	U1003
525-1328-xx	U1004

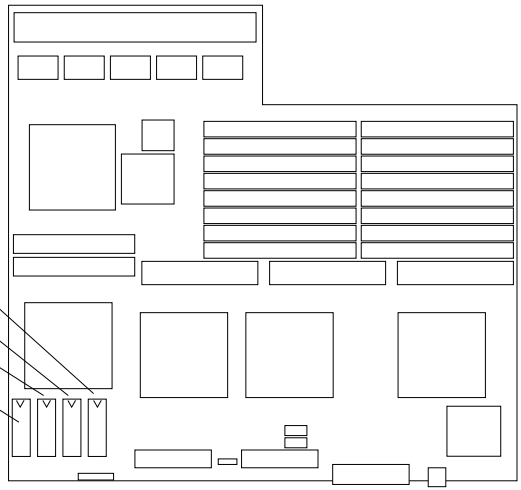


Figure E-1 System Board Open Boot PROM Location

The OpenBoot PROM on the system master is usually the OBP master. This PROM controls the boot process. If the system master is replaced at the customer site by a new system board, the OpenBoot PROM on the replacement board will lack the specific system information required for the OBP master. In a single board system, OBP will program the PROM on the board by default. However, in a multiple-board configuration, OBP will prompt you to select a system board to be programmed as the OBP master.

E.2.3.1 Additional System Master Details

If a serial-interface TTY console is used, it must be connect to serial port A on the system master.

Note – The system master board must connect to a terminal, or you will not see the OBP message. If the terminal is connected to the *wrong* board, the message will not appear. At this point the system may seem to be locked up, but OBP is only pausing, waiting for you to respond.

If a color monitor is used, a color-graphics interface card must be installed in SBus slot 1. Only one color-graphics interface is allowed in the system.

E.3 System Slave Boards

The remaining system boards are “slave boards,” because the master board exercises control during portions of boot and other system operations.

For uniformity of configuration and ease of service, install and equip slave system boards according to the guidelines below. (These guidelines are not required by system architecture, but are strongly recommended, to maintain consistency between systems and to simplify service procedures.)

1. Install slave boards in the lowest card cage slot numbers, following the system master.
2. Installing SuperSPARC modules strictly according to the guidelines presented in Section E.3.1.
3. Install SIMM devices strictly according to the guidelines presented in Section E.3.3.

E.3.1 SuperSPARC Modules

When installing or replacing a SuperSPARC module, use the following guidelines to verify that you have selected a valid location.

Warning – The heatsinks on the SuperSPARC module may be hot. Use caution when removing or installing SuperSPARC modules and avoid contact with the heatsinks. Hold SuperSPARC modules only by the edges.

Each system board has two SuperSPARC module connectors, designated A and B (location A is closest to the backplane connector). See Figure E-2. Modules mount above the system board on standoffs. Modules should first be installed

in the A connectors on consecutive system boards starting with the system board in slot 0. After all of the A connectors are filled, begin filling the B connectors, starting with the system board in slot 0 and working down.

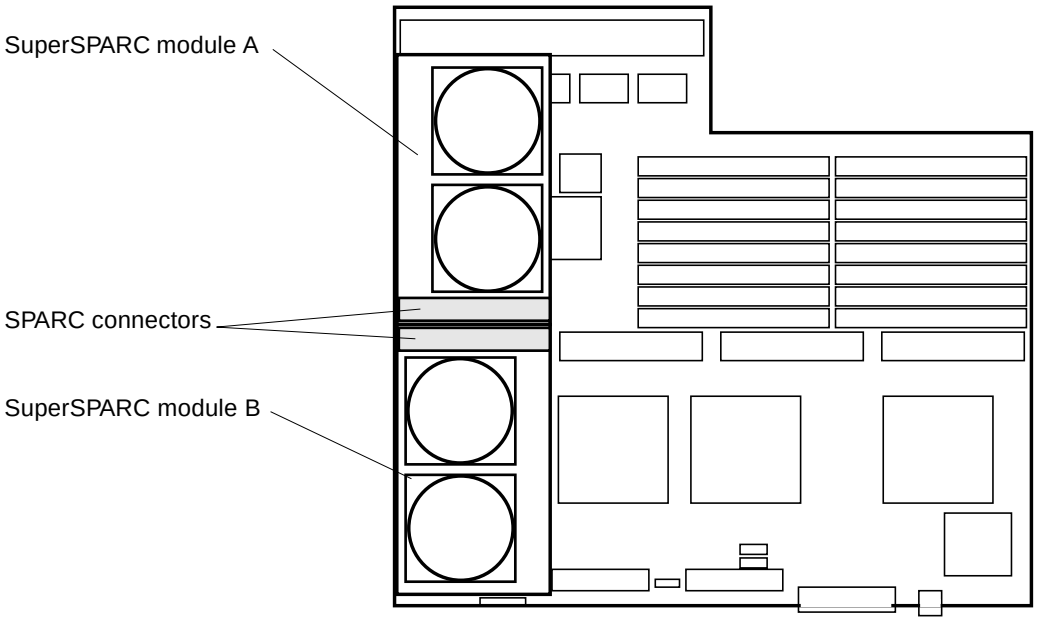


Figure E-2 SuperSPARC module Locations

The example in Table E-1 shows how to distribute four SuperSPARC modules on three system boards.

Table E-1 Example of Connector and Slot Priorities

	System Board Slot 0	System Board Slot 1	System Board lot 2
Connector A	Full	Full	Full
Connector B	Full	–	–

E.3.2 SBus Cards

Each system board has three SBus slots. Each SBus card mounts on standoffs above the system board. See Figure E-3.

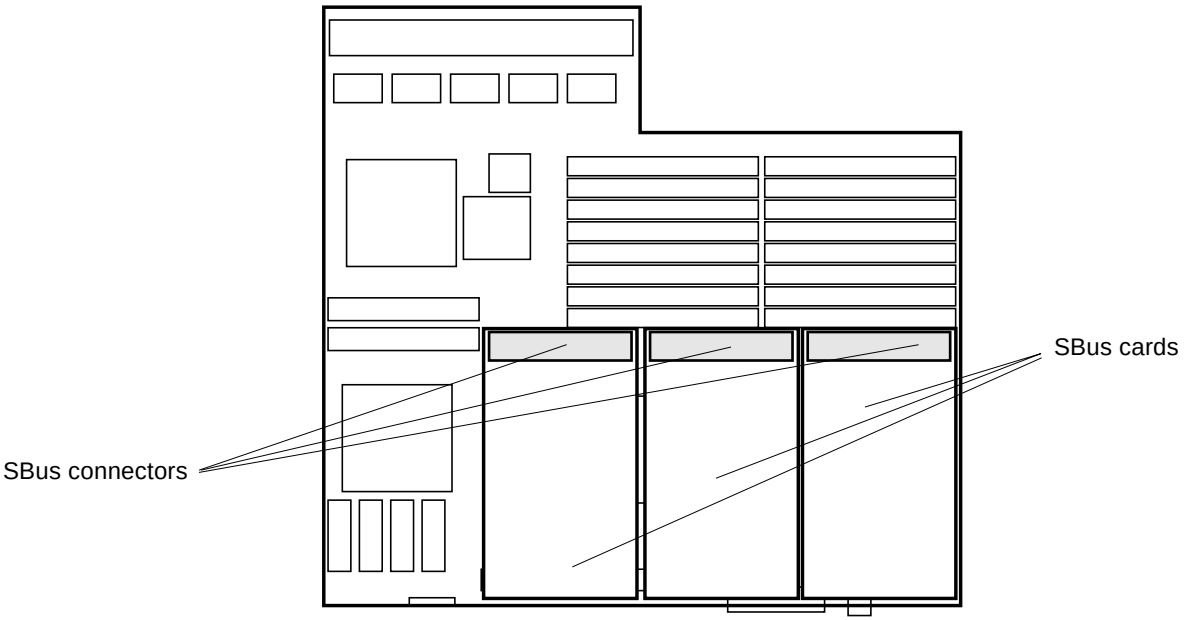


Figure E-3 SBus Card Locations

The system board in slot 0 must have the minimum required configuration. The on-board SCSI port on the system board in slot 0 must be terminated. All SBus slots are available. Each type of SBus card should be distributed evenly among available system boards.

If video is required, install the CGSIX SBus card in slot 1 (first available) on the system board installed in slot 0.

The example in Table E-2 shows how to distribute five FSBE/S cards and two SPIFFs on three system boards.

Table E-2 Example of SBus Card Distribution

System Board Location	SBus Cards Installed
Slot 0	2 FSBE/S and 1 SPIFF
Slot 1	2 FSBE/S and 1 SPIFF
Slot 2	1 FSBE/S

E.3.3 SIMMs

The SPARCserver 1000 system has three SIMM options. Two types of DRAM, high-density and low-density, are available as well as nonvolatile NVSIMM.

The 8 Mbyte (low-density) SIMMs use 1Mbit by 4bit DRAMs. Two vendors are used, so a slight variation exists in physical appearance between the two products. See Figure E-4.

The 32 Mbyte (high-density) SIMMs use 4 Mbit by 4 bit DRAMs. Each vendor uses the same printed circuit card for both the 8- and 32 Mbyte SIMMs, so no major difference in appearance exist between a given vendor's high- and low-density SIMMs.

The 1 Mbyte NVSIMM uses 128 Kbit by 8 bit SRAM. See Figure E-4.

SIMM – Vendor 1

Capacity	Type	P/N
8 Mbyte	DRAM	501-1817
32 Mbyte	DRAM	501-2196

SIMM – Vendor 2

Capacity	Type	P/N
8 Mbyte	DRAM	501-1817
32 Mbyte	DRAM	501-2196

NVSIMM

Capacity	Type	P/N
1Mbyte	NVSIMM	501-2197

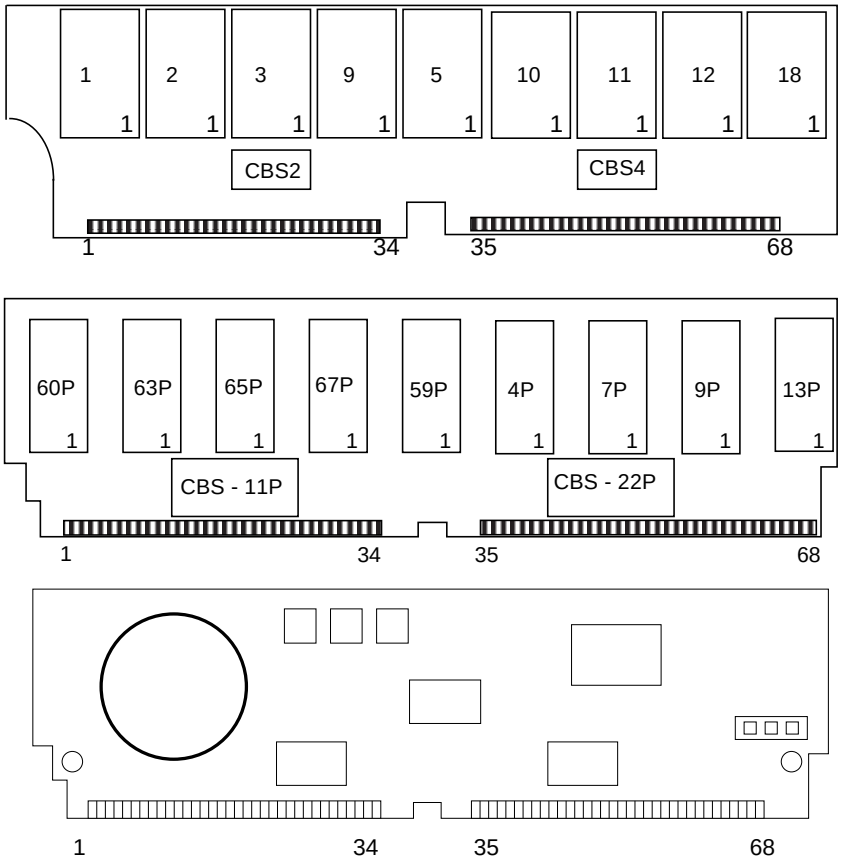


Figure E-4 SIMMs and NVSIMM

The system board has 16 SIMM sockets physically divided into two rows of eight. The SIMMs are also logically divided into four groups of four, known as group 0, 1, 2, and 3. Figure E-5 shows SIMM locations and identifies groups.

A system board can be installed with zero memory or from one to four groups filled. For example, 0 SIMMs, 4 SIMMs, 8 SIMMs, 12 SIMMs or 16 SIMMs.

When installing memory, first install all group 0 SIMMs on all system boards, from the lowest board slot number to the highest. Then, install group 1 SIMMs in the same order, followed by groups 2 and 3 for the remaining SIMMs.

The 8 Mbyte SIMMs of either vendor can be mixed in a group. Similarly, both vendor's 32 Mbyte SIMMs can be mixed in a group. However, a SIMM group can contain only one type of SIMM (all 8 Mbyte; all 32 Mbyte; or all NVSIMM). Additionally, 8- and 32 Mbyte SIMMs can be used on the same board, provided they do not reside within the same group.

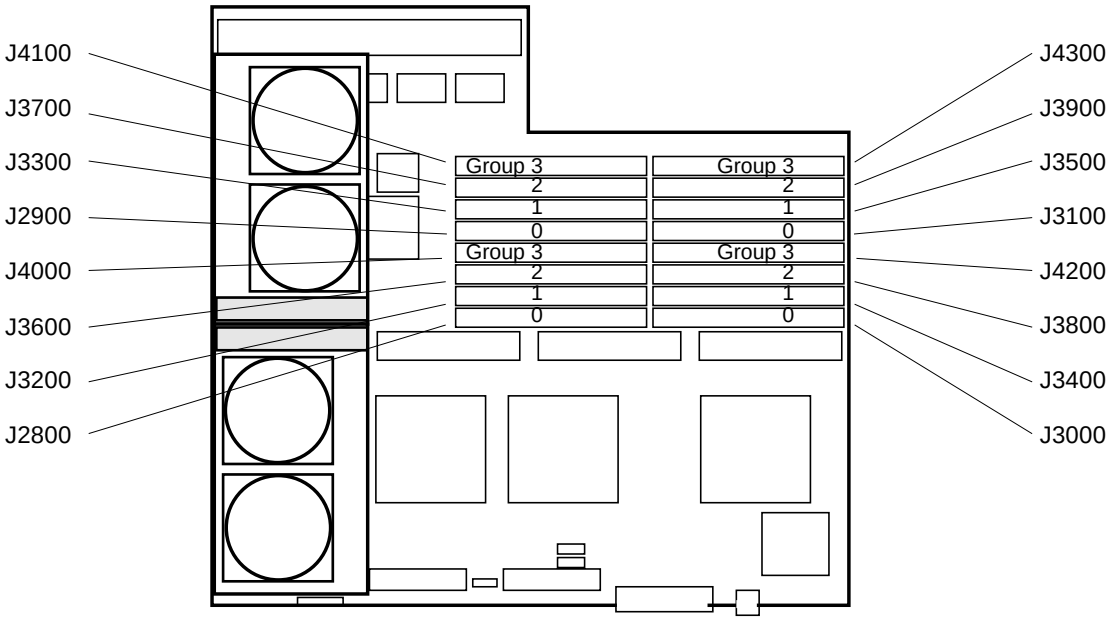


Figure E-5 System Board SIMM Locations

E.3.3.1 NVSIMMs

Before installing NVSIMMs, first activate the battery to insure data retention.

To activate the battery:

1. **Locate the jumper on the right side of the NVSIMM.**
   See Figure E-6.

2. **Move the jumper to the battery on position.**

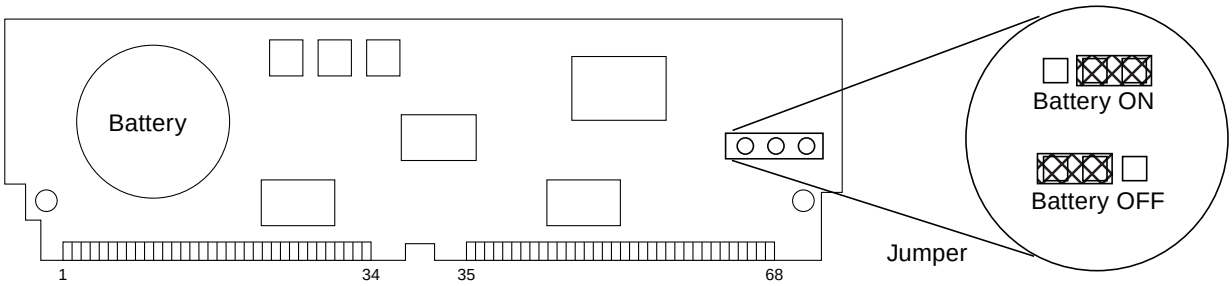


Figure E-6 NVSIMM Jumper Locations

Caution – Once you turn the battery on do not remove or reposition the jumper. To do so will cause data stored in the NVSIMM memory to be lost.

E.4 Selecting Drive ID Numbers in the SCSI Tray

The SCSI tray is mounted in the front of the server and accommodates six devices and the device controller. The controller connects to the system board via the backplane. The CD-ROM drive device, mounted in the lower left location in the SCSI tray, has device ID 6. The tape drive, if installed, mounts just above the CD-ROM drive and has device ID 5. Your system can have two or four disk drives mounted on the SCSI tray right side, behind a metal faceplate. Device IDs for these devices are 0, 1, 2, and 3. See Figure E-7. The example found in the table in Figure E-7 shows how to address six drives in the SCSI tray.

Before installing a new storage device, set the device address to agree with the addresses shown in Figure E-7. On most devices, the address is set using switches on the device rear. Figure E-7 through Figure E-12 show switch settings for all devices that can be installed in the SCSI tray.

Example of ID Numbering in the SCSI Tray

Device	ID
SunCD	6
tape drive	5
Disk drive	0
Disk drive	1
Disk drive	2
Disk drive	3

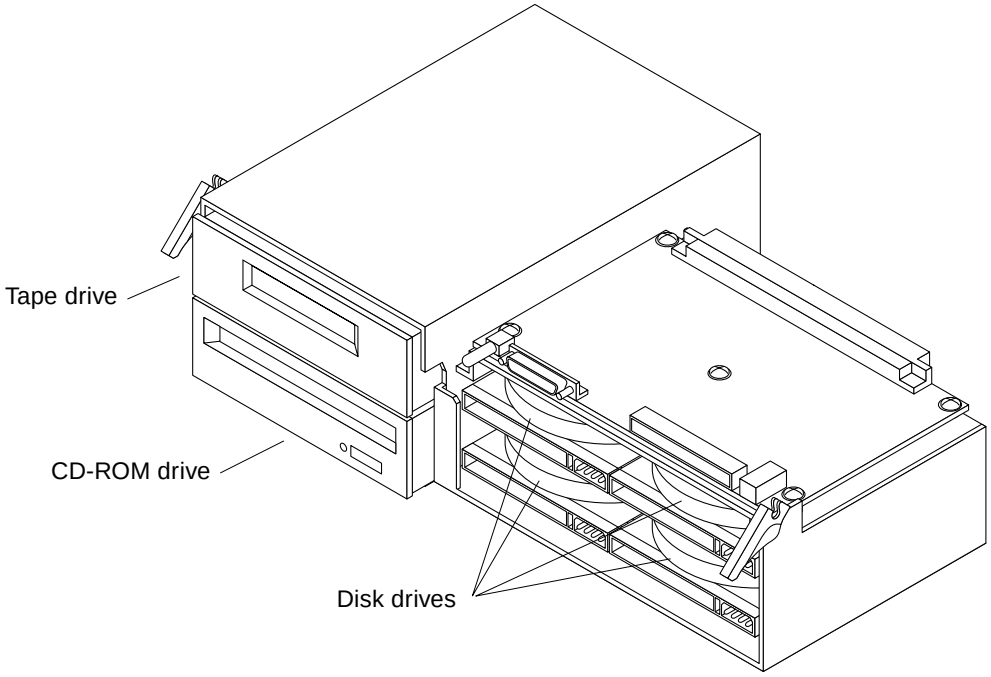


Figure E-7 SCSI Tray Assembly

Note – The CD-ROM drive is factory configured to ID 6 - the correct address. Do not change this address as no other address is allowed. See Figure E-7.

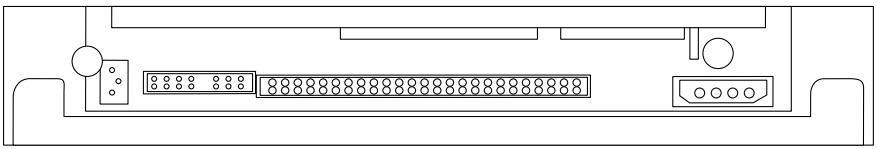
Note – Besides the address jumpers, ensure the other jumpers are correct. Follow steps 1 and 2 below.

1. **On the drive rear panel, locate the** PARITY **and** ID SELECT **and/or** TERM POWER **pins. See Figure E-7.**

2. **Verify the jumpers are correct for SunCD Plus or SunCD 2Plus as appropriate:**

   a. **SunCD Plus:**
   Jumpers must be installed on the PARITY and PREVENT/ALLOW pins. Refer to Figure E-7. Ensure jumpers are installed on pins 2 and 1 to select address 6.

   b. **SunCD 2Plus and SunCD Plus4:**
   Ensure jumpers are installed on pins 2 and 1 to select address 6, and on TERM POWER. No other jumpers may be installed. Refer to Figure E-7.



SunCD Plus

SunCD Plus4

Figure E-8 CD-ROM Drive Device Addressing

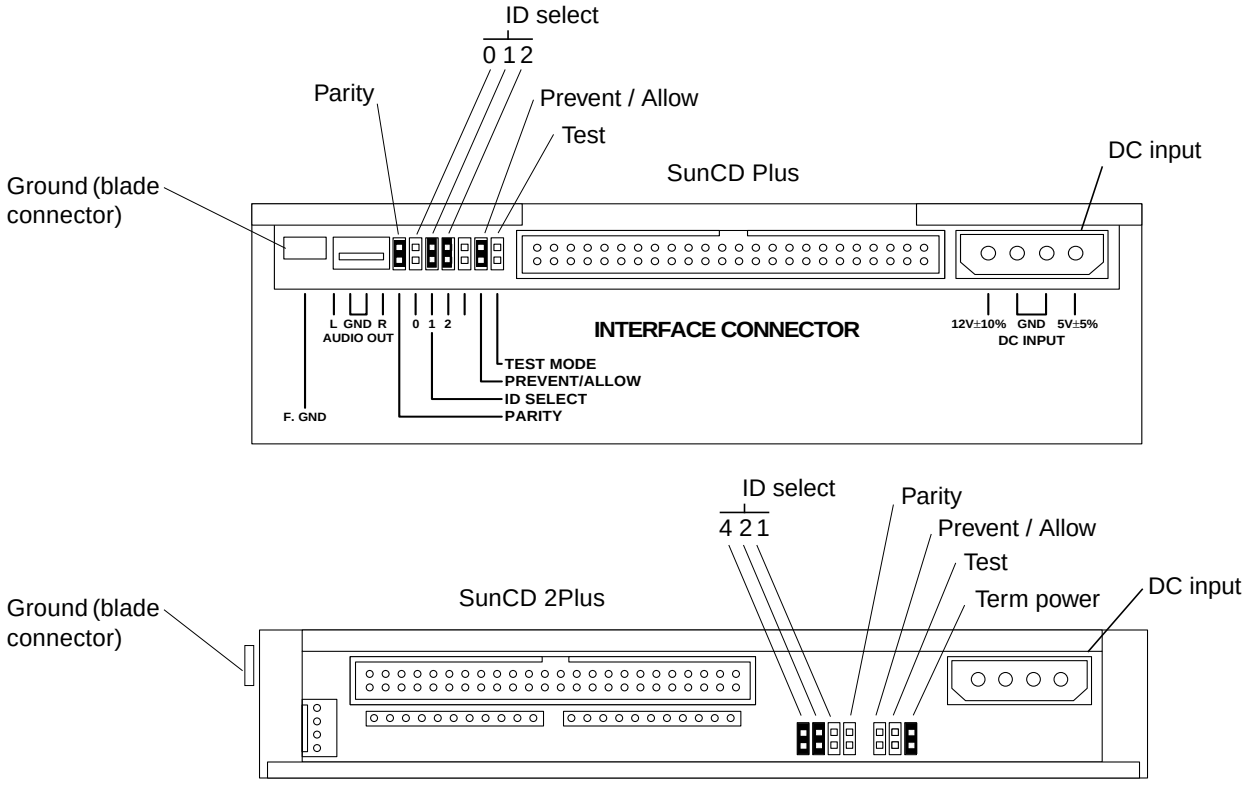


Figure E-9 CD-ROM Drive Device Addressing

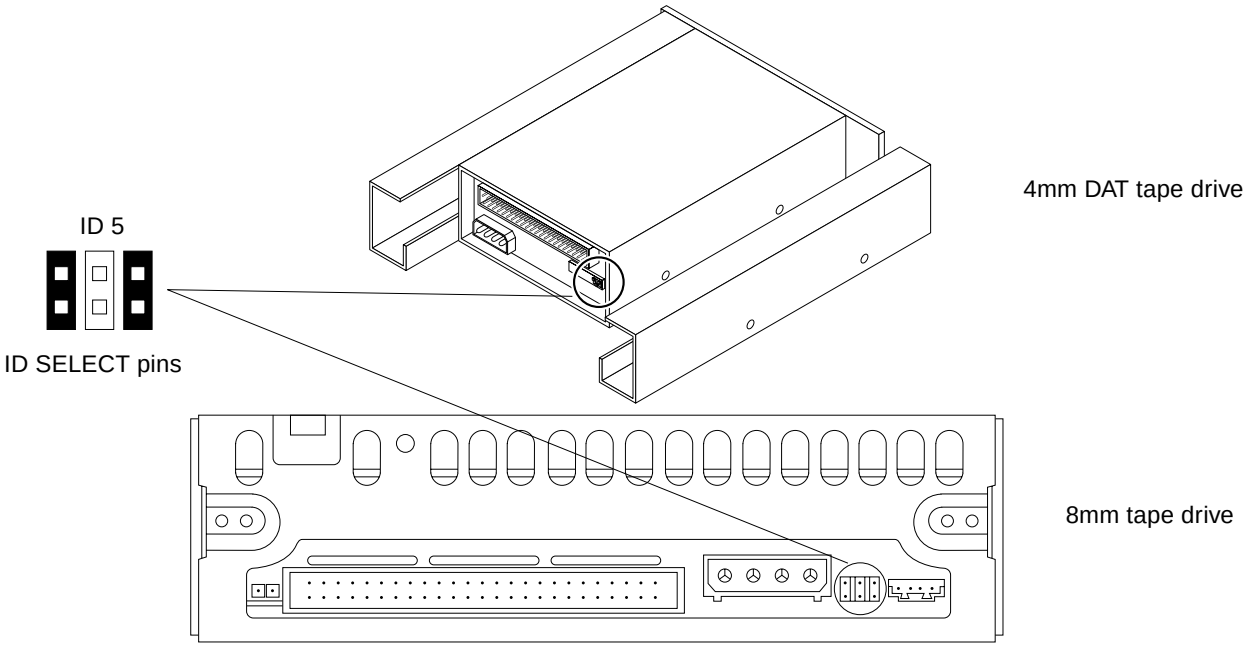


Figure E-10 8 mm and 4 mm Tape Drive Device Addressing

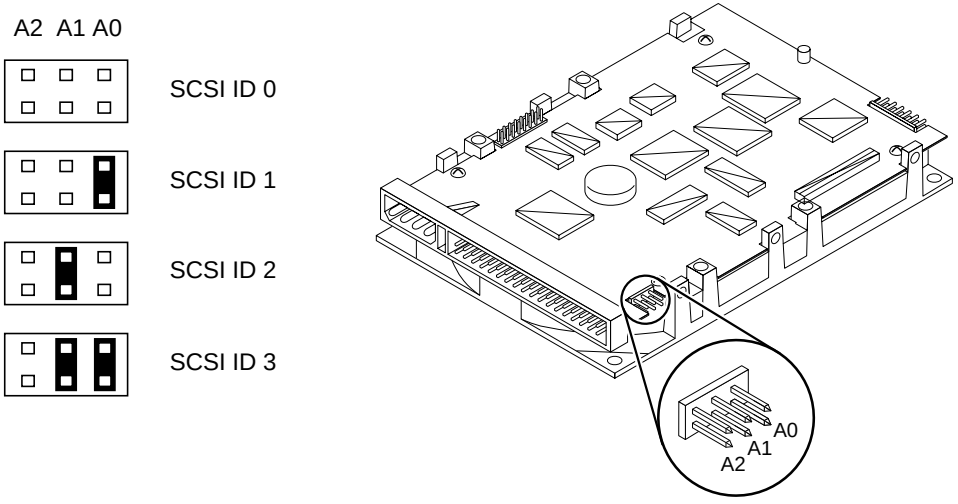


Figure E-11 Seagate Disk Drive Device Addressing

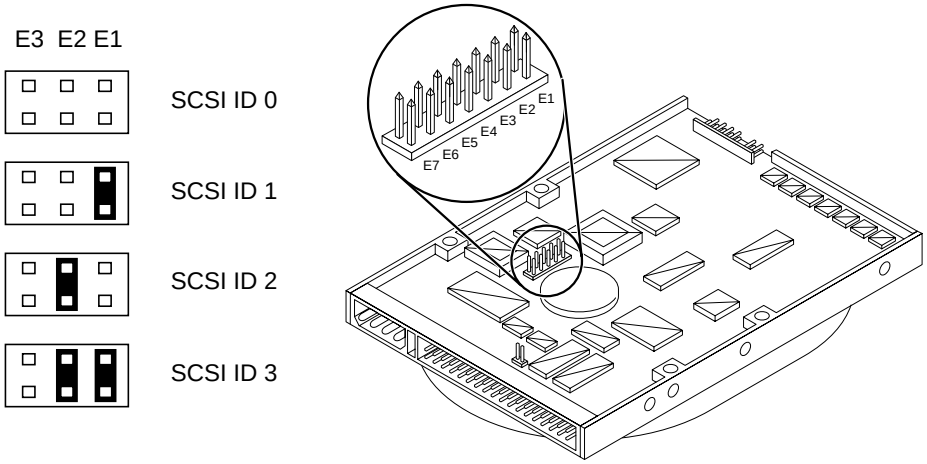


Figure E-12 Conner Disk Drive Device Addressing

E.5 Connecting Cables

E.5.1 SCSI Cables

SCSI cables for internal devices are factory connected. If installing additional devices, refer to the installation instructions provided with the storage device.

E.5.2 Ethernet Cables

The main network cable must be connected to the on-board Ethernet connector on system board 0. Refer to instructions provided with your Ethernet transceivers for additional connection information. The SPARCserver 1000 system supports twisted-pair Ethernet installations.

E.5.3 Video Cables

Only one CGSIX interface is allowed per system. It must be installed in SBus slot 1 of system board 0. The keyboard must be plugged into the keyboard connector of system board 0 and the video cable into the GCSIX card. The diagnostic program requires a monitor or terminal. If the system lacks a monitor, plug an RS232 TTY terminal into port A of the system board in slot 0.

Glossary

Air Restrictor Board

A blank board with a special air deflector fin to simulate the airflow pattern of an actual board. If air restrictor boards are not installed in blank slots, a condition called a “thermal short” is created. Thermal shorts severely reduce the cooling capability of the system, which can lead to equipment damage.

ASIC (Applications Specific Integrated Circuit)

Many circuits that formerly were composed of many ICs and other components are now implemented by single ASICs. Among these are: BARB, CARB, BBC, BIC, BW, MQH, IOC, and SBI. See individual ASIC names for details.

Backplane

The backplane is located near the center of the chassis. The control board and power supply connect on one side of the backplane and the system boards or other boards connect on the other side of the backplane.

BARB (Board Arbiter)

BARBs are part of the bus arbitration system. One BARB ASIC is located on each system board. See *Arbitration System.*

BBC (BootBus Controller)

The BBC is an ASIC on the control board. The BBC works with a BBC2 on each system board to control parts of the boot process. Among other functions, the BBC2 provides SuperSPARC modules access to diagnostic code contained in POST EPROMs on the system board. Other functions permit SuperSPARC modules to access system status registers and the time-of-day (TOD) clock.

BBC2 (BootBus Controller 2)

See *BBC*.

BIC (Bus Interface Chip)

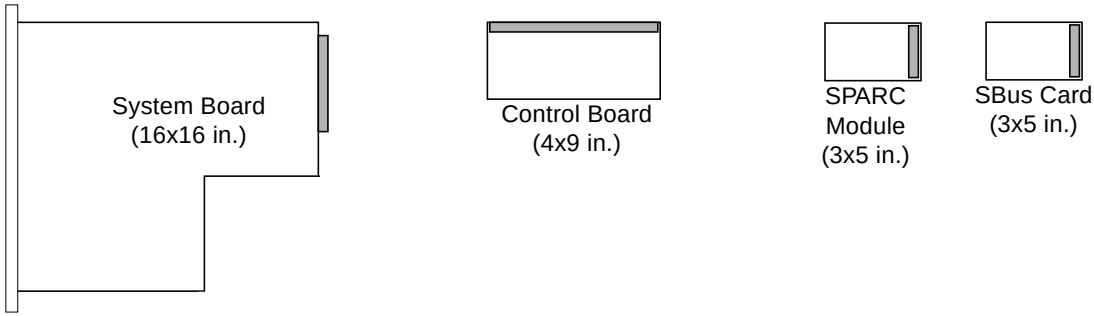
Four BICs on each system board connect the board to the backplane XDBus™.

Board

The term **board** refers to printed circuit boards larger than a certain size (for example, larger than 3x5-inch SBus **cards** and SPARC **modules**).

There are two types of boards in the SPARCserver 1000 system: system boards (maximum of four) and control board (one only). See also *Card* and *Module*.

Relative sizes of the system board, SPARC module, and SBus card are:



Note – The SPARCserver 1000 system board is not interchangeable with VME boards.

See also specific board types: *Control Board* and *System Board*. See also *SuperSPARC Module* and *SBus Card*.

Board ID

Slot identification codes are hardwired into the backplane. These codes functionally configure the board for the slot address it occupies. System boards can be installed in any slot without need for jumper (or other) configuration.

BootBus

The BootBus is located on the system board. This bus connects the OpenBoot EPROM set on system board to the SPARC module(s). See also Bus.

Bus

There are six basic types of busses in the SPARCserver 1000 system:

4. XDBus—the card cage backplane bus.
5. XBus—used for high bandwidth on system boards: between BW chips and SuperSPARC modules, and between IOC and SBI chips.
6. SBus—services SBus cards on system boards.
7. Processor bus—found only on the SuperSPARC module.
8. BootBus—this system board bus connects the OpenBoot EPROM to the SuperSPARC module.
9. JTAG—for factory use only.

Bus Arbitration System

When there are at least two SuperSPARC modules in the system, a system of bus arbitration is required to govern which processor has control of the system resources at any moment. The SPARCserver 1000 arbitration system consists of one Central Arbiter (CARB) on the control board and one Board Arbiter (BARB) on every system board.

BW (Bus Watcher)

The system board has two BWs (one for each processor). BWs convert XDBus signals to XBus signals and pass them to the cache controller (MXCC) on the processor module. Together, the BWs and MXCC control the flow of information between the XDBus and the processors (and their respective cache SRAMs).

Cache

The system design places a number of memory caches adjacent to various busses for more efficient data transfer.

CARB (Central Arbiter)

A system of central arbiters (one CARB on the control board) and a board arbiter (one BARB on every system board) determine which processor on which system board controls the system bus at any given time.

Card

In this manual, the term card refers to a 3x5-inch SBus card. See also *Board*, *Module*, and *SBus Card*. An exception is the 2.1 Gbyte disk card.

Card Cage

By convention, boards are installed in a card cage (not a board cage). The SPARCserver 1000 system card cage is accessed from the rear of the enclosure that contains up to four system or other boards. The card cage provides card guides to guide the board into the backplane.

Card Slot

Each system board has three card slots for SBus interface cards.

CC (Cache Controller)

See *MXCC*.

Clock Generation

System clocks are generated on the control board and are distributed to system boards by way of the card cage backplane.

Control Board

The control board is part of the XDBus arbitration system. A central arbiter ASIC (CARB) on the control board works in cooperation with board arbiter ASICS (BARBs) on system boards to determine which processor controls the bus structure at any instant. The control board mounts on top of the SCSI tray.

Disk card

An optional SCSI-2 disk expansion board featuring four 3 1/2-inch disk drives. The card cage can accommodate up to three, residing in slots 1-3.

Filler panel

See *Air Restrictor Board*.

ID

Identity code, number, or address. ID is required for each SCSI-2 device installed in the SCSI tray.

IOC (I/O Cache)

The IOC controls movement of data to and from the SBus card slots.

J-number

A J-number is the location on a schematic drawing or printed circuit board of a device socket. In this manual a J-number corresponds to a U-number, which is the SIMM or integrated circuit that occupies the device socket.

Jumper

A jumper is a small metal sleeve that slides over two adjacent pins in a 2- or 3-pin header jumper receptacle to provide an electrical connection.

Key Switch

The key switch on the system front panel has four positions: Standby, On, Diagnostics, and Locked (reset switch is disabled, L1-A is disabled).

LED Indicators

System Front Panel

For an explanation of this display, refer to Table 3-1, “Terms Used in the System Status Display.”

System Board

The system board has ten LEDs on the board rear panel. Two green LEDs (left positions) denote the presence of zero, one or two SuperSPARC modules. The remaining eight yellow LEDs (right positions) display board activity and status.

Module

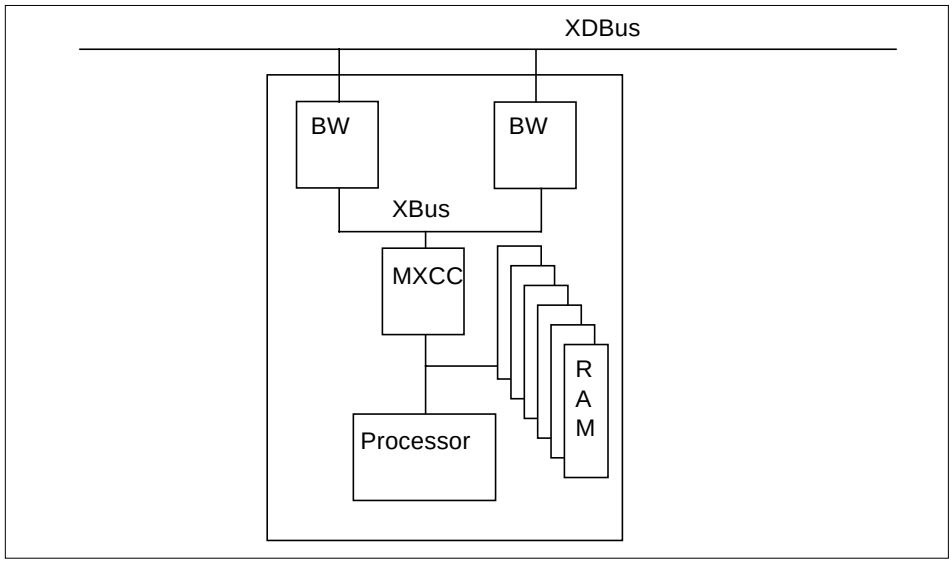
See *SuperSPARC Module.*

MQH (Memory Queue Handler)

The MQH on the system board provides the interface between the system board SIMMs and the backplane XDBus. There is one MQH on a system board.

MXCC (Module XBus Cache Controller)

The MXCC ASIC is located on the processor module and controls flow of data between the XBus and the module cache RAM and processor chip.



NVSIMM

The nonvolatile SIMM (NVSIMM) design incorporates a battery on the device to prevent data loss in the event of power failure. Battery current is shared among a group of NVSIMMs. This feature prevents memory failure should one battery fail.

Power-on Reset

Reset signals produced by reset circuitry on the control board. At power-on, reset is asserted for 200msec and is distributed to each system board to initialize all ASICs. The reset PAL maintains system reset until Vtt is ready.

Processor

See *SuperSPARC Module*.

Processor Bus

Found only on the SuperSPARC module. To compare bus types, see *Bus*.

Replaceable Unit

Replaceable units are server subassemblies which can be replaced at the customer site by trained, qualified service personnel.

Reset Switch

This switch is behind the front panel. When pressed, it resets the system.

Root Disk

The root disk is the disk drive where the operating system resides. This drive is in the SCSI tray that is located behind the front panel.

SBI (SBus Interface)

The SBI implements the interface between the SBus and the XBus. There is one SBI on each system board.

SBus

Located on the system board, this bus connects up to three optional SBus cards to the SBus Interface controller (SBI), which connects (in turn) interfaces with other busses on the system board.

SBus card

Any of a large number of available cards providing optional features to the system. Three SBus connectors are present on every system board.

SBus clock

The SBus operates at 20 MHz for SPARCserver 1000, and 25 MHz for SPARCserver 1000.

SCSI Tray

This tray can hold up to six SCSI-2 devices and the control card. The chassis accommodates one SCSI device tray.

SIMM (Single In-line Memory Module)

Sixteen SIMM sockets reside on the system board. A SIMM consists of control circuitry and numerous DRAMs. SIMMs are 8- or 32 Mbyte. See also *NVSIMM*.

Status Registers

Three status registers reside on the system board. These registers monitor LEDs, reset status, fan-, temperature- and DC/AC power conditions. Board and processor ID are also monitored in these read-only registers.

SuperSPARC Module

This 3x5-inch card contains one SuperSPARC processor, cache memory, and a cache controller. Note that main memory (SIMM groups) reside elsewhere on the system board. A system board can have two SuperSPARC modules. A SPARCserver 1000 system can have up to four such boards equaling eight modules.

System Board

A system board can contain two SuperSPARC modules and associated SIMMs. The board also has accommodates three optional SBus cards.

TODC (Time of Day Clock)

TODC contains the system date and time (year-month-day-hour-minutes). Every system board has a TODC, so at boot time the control board selects the TODC on one system board to be the master datekeeper for the entire system.

U-number

See *J-number*.

XBus

The XBus is a high-speed bus located on the SuperSPARC module. It connects the Bus Watchers (BWs), MXCC, IOC and SBI. See also *Bus*.

XDBus

This is the main card cage backplane bus.

Index

A

AC power
    routing, 1-6
    switch, 1-6
air restrictor board, Glossary-1
    removal, 7-3
assembly drawing *See* illustrated parts breakdown

B

backplane, Glossary-1
    assembly, 1-4
    connector, D-7
    features, 1-4
bad boot file, 4-11
battery, NVSIMM jumper, 11-20
block diagram of system board, 10-4
board, Glossary-2
    control, 1-7
    system, 1-8
boot
    bootbus, Glossary-2
    program path, 4-12
    PROM
        installing, 11-21
        remove, 11-20
bottom panel, removal, 7-8
breakdown, illustrated parts, 12-1
bus, Glossary-2

C

cables
    connecting, E-16
    POST does not test, 3-6
card cage, Glossary-4
card retainer, SBus, 11-12
CD-ROM drive, *See* SunCD Plus, SunCD 2Plus
chassis, 1-4
configuration rules, E-1
configuring
    jumpers, C-1
    SIMMs, C-1
connecting
    Ethernet cables, E-16
    SCSI cables, E-16
    video cables, E-16
connector
    backplane, D-7
    keyboard and mouse, D-2
    locations, D-1
    pinout, D-1
        keyboard / mouse, D-2
        serial ports, D-3

SBus, D-4
serial ports, D-3
SuperSPARC modules, D-9
control board, 1-7, Glossary-4
description, B-5
removal, 9-7
current, input/output, A-2

D

damage prevention, 10-1
DC power
connector, 1-6
supply, 1-5
disable Link Integrity Test, 11-13
disk card, 9-1, 9-9, 12-3, 12-5, Glossary-4
disk drive
disk card, 9-9
removal, 9-5
SCSI tray, 1-7
document organization, xxi
drawing, assembly *See* illustrated parts breakdown
DSBE/S card
preparing, 11-13
DWIS/S card
preparing, 11-13

E

EMI shield, removal, 7-2
enable Link Integrity Test, 11-13
ethernet
controller, 1-9
problem, 4-12
jammed, 4-11
no carrier, 4-11
external features, 1-1

F

fan tray, 1-6
connection to power supply, 1-5
features
external, 1-1
internal, 1-2
filler panel, Glossary-4
SBus card, 11-15
flow diagrams
network, 4-11 to 4-12
front panel, removal, 7-1

H

halting the system, 6-1
handling precautions, 10-1

I

illustrated parts breakdown, 12-1
installing
OpenBoot PROM, 11-20
preparing for, 10-1
SBus card, 11-12 to 11-16
SIMMs, 11-19 to 11-20
internal features, 1-2
interpreting LEDs
system board, 3-17
system status, 1-5, 2-4, 6-8
watchdog reset, 3-17

J

jumpers, Glossary-4
configuration, C-3
NVSIMM, battery, 11-20
system board, C-3

K

key switch, Glossary-5
location, 6-3
keyboard
and mouse connector, D-2
pinout, D-2

L

LEDs, Glossary-5

See also troubleshooting
system board, interpret, 3-17
system status, 1-5, 2-4, 6-8
watchdog reset, 3-17
locating a failing SIMM, C-3
loss of carrier message, 11-13

M

messages
bootup, 6-8
module, Glossary-5
SuperSPARC, Glossary-7
monitor, *See* tty terminal
mouse connector, D-2

N

net responding message, 11-13
NVSIMM, Glossary-6
installation, 11-19 to 11-20
removal, 11-16 to 11-19
troubleshooting, 4-10

O

OpenBoot PROM
install, 11-20
precautions, 3-6
system status display, 3-13
operating system, boot path, 4-12
options
disk drives, 1-10
external, 1-9
internal, 1-10
SBus cards, 1-10
overview, system, 1-1

P

part
breakdown, illustrated, 12-1
number
replaceable units, 12-1 to 12-6
system board, 12-2
pinout
backplane, D-7
keyboard / mouse, D-2
SBus, D-4
serial ports, D-3
SuperSPARC module, D-9
popouts, top panel
remove, 7-5
replace, 7-7
POST, C-3
cables not tested, 3-6
interpreting LEDs, 3-17
precautions, 3-6
reconfiguration of system, 6-5
power
distribution, B-6
off the system, 6-1
on the system, 6-1
rating, A-2
supply
assembly, 1-5
description, B-6
switch, AC, 1-6
power-on self test *See* POST
preparing a new SBus card, 11-12

R

releasing the board, 7-4, 11-2
removing
air restrictor board, 7-3
boot PROM, 11-20
control board, 9-7
disk drive, 9-5
EMI shield, 7-2
front panel, 7-1
SBus card, 11-10 to 11-11
filler panel, 11-15
side panels, 7-4
SunCD Plus, SunCD 2Plus, 9-2
SuperSPARC module, 11-6 to 11-8
system boards, 11-1
tape drive, 9-4
top panel, 7-5, 7-8
popouts, 7-5

tty terminal, 6-1
replaceable units, 12-1 to 12-6, Glossary-6
system board, 12-2
replacing
boot PROM, 11-21
control board, 9-8
disk drive, 9-7
SBus card, 11-15
SIMM, 11-19 to 11-20
SunCD Plus, SunCD 2Plus, 9-3
SuperSPARC module, 11-9
tape drive, 9-5
top panel popouts, 7-7
reset
switch, Glossary-7
watchdog, 3-17

S

safety precautions, 5-1
SBus, Glossary-7
SBus card
connector, D-4
description, B-6
fault, 4-8
filler panel, 11-15
installation, 11-12 to 11-16
pinout, D-4
preparation, 11-12
removal, 11-10 to 11-11
retainer, 11-12
slots, 1-9
system board capacity, E-7
SCSI
disk card, 9-9
drive ID numbers, E-11
tray
assembly, 1-7
contents, 1-7
drive ID numbers, E-11
selecting
SCSI ID numbers, E-11
SIMM locations, E-8
SuperSPARC module location, E-5
serial port
connectors / pinouts, D-3
service, preparation, 10-1
setup, terminal, 3-9
shield, EMI, 7-2
side panels, removal, 7-4
SIMM
configuration rules, C-1
failure, C-3
installation, 11-19 to 11-20, E-9
locations, E-8
memory, troubleshooting, 4-7
options, E-8
removal, 11-16 to 11-19
socket numbers, C-1
unlocking, 11-19
u-number displayed, 11-17
slave system boards, E-5
slot assignments, E-1
software, operating system, 4-12
specifications
electrical, A-2
environmental, A-2
physical, A-1
power supply, A-2
standoff
lock and unlock, 11-6
usage, 11-5
status LEDs, 1-5, 2-4, 3-17, 6-8
storage devices, 9-1 to 9-13
SunCD Plus, SunCD 2Plus
removal, 9-2
replacing, 9-3
SuperSPARC module, Glossary-7
block diagram, 10-4
connectors, D-9, E-5
description, B-4
location, 10-2, E-5
removing, 11-6 to 11-8
replacing, 11-9
troubleshooting, 4-5
switch
AC power, 1-6
key, Glossary-5

reset, Glossary-7
system
control board, mounting, 1-7
external features, 1-1
features, 1-1
internal characteristics, 1-2
overview, 1-1
power, on/off, 6-1
system board
block diagram, 10-4
description of, 10-2, Glossary-8
field-replaceable unit, 12-2, 12-5
illustration, 10-2, D-2
jumper, C-3
master, E-1
rules, C-1
SIMM memory rules, C-1
system complement, 1-8

T

tape drive, removal, 9-4
terminal settings, 3-9
testing SBus card, 4-8
top panel, removal, 7-5
troubleshooting
boot
path, 4-10
status, 4-12
ethernet messages, 4-12
LEDs do not light, 4-3
network, 4-11
NVRAM/TOD, 4-10
overview, 2-1
physical system, 4-3
POST, 4-6
SBus card, 4-8
SIMM memory, 4-7
SuperSPARC module, 4-5
system boot-up, 4-9
tty terminal
need for, 1-9
removal, 6-1
set-up characteristics, 11-22

U

unlocking SIMMs, 11-19
u-number, SIMM memory, 4-7, 11-17
using standoffs, 11-5

W

watchdog reset, 3-17

X

XBus, Glossary-8
XDBus, 1-4, Glossary-8

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